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MARINE ANNELIDS (POLYCHÆTA)

OF

SOUTH AFRICA.

PART I.

BY

WILLIAM CARMICHAEL McINTOSH,

M.D., LL.D., F.R.S., &c.,

Professor of Natural History in the University of St. Andrews, Director
of the Museum and the Gatty Marine Laboratory in the University.

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INTRODUCTION.



PREVIOUS to 1861, little was known of South African Annelids. During the three centuries which had elapsed since the skilful Portuguese navigator, Bartholômew Diaz, made Europeans acquainted with the Cape of Good Hope, or, even during the somewhat shorter period since his countryman, Vasco de Gama, rounded the Cape, this group of marine invertebrates remained in obscurity. It is true that Pallas made known, by the aid of intelligent ship-captains and others, a few of its Annelids, such as *Pectinaria capensis* and *Lepidonotus Wahlbergi* (which he included under *Lepidonotus squamatus*—his *Aphrodita squamata*, and a form closely allied to *Lepidonotus clava*, Montagu). In 1854, an account of some Annelids, from the east coast at Mozambique, was published by W. C. H. Peters, but the descriptions are not sufficiently minute for accurate diagnosis. It was not, however, till the publication of Schmarda's work, in 1861, that the richness of the region in this group was disclosed. The Austrian naturalist described no less than about 50 Marine Annelids (Polychæta) from the Cape, and everyone of which he made a new species. About 18 families of Annelids were represented in this treatise, which marked an era in the literature of the subject. Unfortunately, the inferiority of his instruments, or the lack of artistic accuracy in delineating structure, makes it no easy task to diagnose some of the species, though the majority are recognizable—either by description or figures. Kinberg further added to the information concerning the Annelids of the region, including Port Natal, in his account of those collected during the voyage of the Swedish frigate "Eugenia." A few others were described by Grube from the Austrian "Novara" Expedition. The voyage of the German Exploring Ship "Gazelle," enabled Grube to extend his list of African Annelids—mostly from the region of the Congo and West Africa, but also from Table Bay at the Cape. Amongst these were several European forms, such as *Sigaliou Edwardsi* (Madeira), *Glycera couvoluta*, Kefertein, and *Pista cristata*, O. F. Müller. The "Challenger," again, considerably extended the information on the subject by obtaining 23 species, nine of which were dredged south of the Cape, in 98 to 150 fathoms, and the rest were collected between tide-marks at Sea Point, Cape Town, and at Simon's Bay.

Since the voyage of the "Challenger," Marenzeller has contributed a notice of the Annelids of Angra Pequena-Bucht, that is, a bay on the western coast of Africa, considerably to the north of the Cape (Great Namaqua Land). Ehlers, some

years later, still further enriched the subject by an account of Annelids from the East African region — chiefly south of Zanzibar. Lastly, an important collection has recently been made at Zanzibar, by a young and able observer, Mr. Cyril Crossland, and a report on certain groups has been published.* When the examination of these is completed, much information on the Annelids in general as well as of the Geographical distribution of the group will be available.

Dr. Gilchrist's collection was made between tide-marks, and probably indicates the most conspicuous forms of the region. In glancing at the series, it is found that the Polynoïdæ, Phyllodocidæ, Syllidæ, Nereidæ, and Sepulidæ have but few representatives, and the Hesionidæ are absent, yet all of them usually are found in numbers under stones, between tide-marks, in a prolonged search. Their number will probably receive considerable additions in future. The forms frequenting sand, or sandy mud, are for the most part absent, either because digging was not resorted to, or because the region was purely rocky. The Annelids generally found in the media mentioned are the Nephthydidæ, Glyceridæ, Opheliidæ, Scalibregmidæ, Telethusæ, Spionidæ (including *Magelona*), and Ammocharidæ, whilst in deep water the Ampharetidæ are frequent. Doubtless, the groups mentioned will be represented when the trawl and dredge are used. The trawl-net is especially productive—not only in regard to the debris of old bivalve and univalve shells in which Annelids lurk, or have their tubes coiled within them, but from the frequency with which soft Annelids, both errant and tubicolar (now devoid of a tube) cling to the meshes. By the flashes of phosphorescence, even small forms like the Syllidæ and *Polycirrus* may be secured at night, whilst the bright colours of others, such as the Nemeteans and Hesionidæ readily distinguish them by day. Many Annelids are minute, and require careful inspection of the apparatus for their detection. Special inquiry should also be directed to the forms which bore in calcareous rocks, in or under crusts of *Melobesia*, in shells, or softer media, which become pelagic, like Palolo, at the reproductive period, or which are useful as bait; indeed, there are few which are not available for the latter purpose. The purely pelagic types such as *Alciopa*, *Halodora*, *Phalacrophorus*, *Pelagobia*, *Haliplanes*, and *Lopadorhynchus*, and the temporarily pelagic, such as *Autolytus*, may also occur in tow-nets along with *Tomopteris*, and the larval and post-larval stages of the sedentary types.

Much may likewise be accomplished by splitting the rocks between tide-marks with hammer and chisel, or using a lever to overturn large stones and separate shelving rocks—in the

*Proceed. Zool. Soc., 1903, Part I., p. 169, Pls. xvi & xvii., and Part II., Aug., 1903.

fissures of which many Annelids lurk. Moreover, some frequent the tubes of other Annelids, like the British *Polyoë scolopendrina* in the tubes of *Terebella uebulosa*, or the South African *Polyoë attenuata*, occur in the ambulacral areas of certain starfishes, or on *Echini*, between mantle and shell of limpet-like mollusks, or in Balani, in the interior of the basket-like Hexactinellid sponges, in the tissues of these and of horny sponges, in the branchial chamber of Ascidians, and a few are parasitic in the bodies of other Annelids.

Particular care is necessary in the preservation of Annelids, which should, as a rule, be killed with corrosive sublimate, carefully washed, and then preserved in spirit, which should be changed after a few hours, and again within 24 hours. If the Annelids are large, the change should be repeated in a few days. Those intended for section may be treated with Flemming's, or with Bles's fluid. In any case, it is unsatisfactory to place many in a single bottle, or jar, of spirit.

When living, a special note should be made of their coloration, the presence of crustacean ectoparasites on their surface, or gills, the colour of their circulatory fluid (red or green), the presence of eggs, in sacs, or otherwise, the issue of sperms, and their habits and movements, both in nature and in confinement.

One of the most interesting features in Dr. Gilchrist's collection is the occurrence of so many European annelids at the Cape, and of others which can scarcely be distinguished from well-known European representatives. Moreover, some of these stretch far eastwards to the Indian and Pacific seas on the one hand, and on the other are found to the westward and the American shores, for instance, from Canada to Cape Horn. These Invertebrates seem to be independent of the laws which govern the distribution of such forms as the food-fishes, for instance, the common Gadoids, which prefer the colder waters of the north, yet there is a remarkable coincidence in the complete identity—even to their crustacean parasites—of annelids frequenting the widely distant littoral belts of Britain and South Africa. Nor is this community confined to one group of Invertebrates, for, amongst others, Mr. Stebbing* has noticed similar features in regard to the Crustacea. These and other facts lead to the belief that in the sandy bays of South Africa the hardy plaice of the North Sea might live and flourish in a noteworthy manner; nor would there be more difficulty in its transport than in the case of Australia. The Turbot, Conger, Whiting and Sole might also be useful additions. In any case, and as might be expected, it would appear that the laws which govern the distribution of land animals do not hold for all of the marine. The contrast, for instance, between the mammals and

* South African Crustacea, Part II., p. 1., 1902.

birds of South Africa and those of Britain is sufficiently pronounced, and even the fish-fauna of the two is divergent, yet in the group of the Annelids not a few are common to both regions, and as knowledge extends such may even be found more general than is supposed.

In the following report, a few collected by the "Challenger" are indicated in their proper places—occasionally with additional information. The references under the various species have been selected as those which, in all probability, may be most useful.

EUPHROSYNE CAPENSIS, Kinberg, 1858.

1858. *Euphrosyne capensis*, Kinberg, Öfversigt K. Vet.-Akad. Förhändl, d. 14 Januari, 1857. Stockh, 1858.
 ,, *Euphrosyne capensis*, Id., Fregatten Eugenies Resa. Taf. 12. fig. 14.
 1861. *Euphrosyne polybrauchia*, Schmarda, Neue wirb. Thiere, I. 1j., p. 136, Taf. 32, figs. 264-287.
 1885. *Euphrosyne capensis*, McIntosh, Ann. "Challenger," p. 1., Pl. II. fig. 5., Pl. 1A. figs. 1-3.

This widely distributed species, which ranges from the Cape to St. Paul, is characterised, when contrasted with the British, by the proportionally longer, more finely spinose and more flattened body. The dorsal surface is convex, the ventral flattened. The head bears a caruncle, consisting of an elevated keel and a flat band, which reaches to the eighth segment. In front of it is a short and somewhat conical tentacle with an eye on each side of its base. A pair of more minute and in some almost confluent eyes occur on the ventral surface of the cephalic ridge. In front of the puckered opening of the mouth are two kidney-shaped pads, separated by a deep median fissure, and which may be homologous with the palpi of other families. These pads are probably of some importance as pivots during the action of the buccal apparatus. The arborescent branchiæ are purplish with the elliptical or sub-oval tips pale reddish, and each complete row generally consists of eleven trunks. The dorsal bristles are of two kinds—smooth and crenated in the fissure, whilst all the bifid ventral bristles are smooth. The size of the largest example agreed with those found by the "Challenger" under stones between tide marks at Sea Point, Cape Town, and the British *Euphrosyne foliosa* has the same habitat in the Channel Islands. The pigment in both probably subserves other functions than either ornament or protection.

A typical segment of the body consists of a convex dorsal and a flattened ventral arch. The former is bare in the middle line, but has laterally a superior division carrying a dense series of bristles and a posterior row of branchiæ—with a cirrus at the dorsal margin and another midway between the bristles and the branchiæ. The latter is the longer and has a slight median constriction. Neither tapers much. The inferior division has a tuft of bristles, and inferiorly and posteriorly a cirrus, which is generally more slender distally than either of the foregoing. All are shorter and thicker than in the British *Euphrosyne foliosa*. The dorsal row of bristles is comparatively short in contrast with the northern *E. borealis*, and are even less boldly marked than in *Euphrosyne foliosa*. The curve of the tip of the bristle is less pronounced than in the latter, and the disproportion between the processes more distinct. The notches on the limbs of the fork are due to transverse grooves. At the dorsal edge as well as in the centre of the row are many bristles with a smooth fork, the longer process being much attenuated—so that they project beyond the serrated kind. The ventral bristles are considerably larger than the dorsal, and are terminated by a slightly curved blunt tip, with a rounded spike at the base. The central canals from the processes coalesce after a short course downward, and a slight dilatation occurs opposite the enlargement at the upper end of the shaft.

In *Euphrosyne* and *Chloëia* the bristles are characterised by their extreme brittleness, their tubular condition, calcareous nature and the entrance of air into the interior.

The branchiæ, which are eleven in number in the typical segments, form a densely ramose series on the dorsal region of the segment. Each is dichotomously branched, and the tips end in elliptical or sub-oval bodies resembling those of *Euphrosyne foliosa*. So far as observed the branchiæ are devoid of a cavity, and the blood-vessels can be traced from the body-cavity up to, but not into, the tips of the organs. A complex series of muscular fibres appear at the base, and the cuticle and hypoderm are dense, except distally—where the former becomes very thin.

In the structure of the body-wall the species offers no peculiarities. The nerve-cords superiorly have a firm investment which is continuous from side to side. In the hollow between them superiorly is a fascicle of muscular fibres and below them is a central granular structure. Moreover, the cords are united by a striated isthmus inferiorly.

The anterior part of the buccal apparatus or proboscis is cylindrical, ensheathed in cuticle, and protrusible. The centre is occupied by a large muscular and vascular, but chiefly glandular mass, the inner lining of which is thrown into bold

longitudinal rugæ. The vast collection of glands would indicate important secreting functions. Behind is a remarkable lingual organ, which in longitudinal section resembles the tongue in mammals. It is attached at the base posteriorly to a dense glistening muscular mass, separated by a layer of horizontal fibres from the complex series of radiating muscles which diverge upward to the periphery of the organ. In vertical longitudinal sections in the middle line, these interwoven fibres posteriorly are separated, by septa passing downward from the thick chitinous coat, into spaces which enlarge anteriorly. The muscles at the tip of the tongue arch backward over the posterior part of the preceding glandular region (which forms a high vascular cushion), and pass downward to the front of the dense basal glistening mass formerly alluded to, the curve of the arch becoming less and less till the fibres are nearly vertical behind the cushion, or at the commencement of the smooth and dense cuticular region of the tongue. The chitinous coat of the organ is so largely developed at this part that it is as thick as the hypodermic layer. In this region also are three strong plates of transverse muscular fibres extending from summit to base. If the section deviates to the lateral regions, the decussation of the fibres is very complex. In transverse sections, again, near the tip, the thickness of the hypoderm on the rugæ of the pre-lingual mass as well as in the lingual papillæ is considerable. In the centre of the tongue is an inextricable mass of crossed and interwoven fibres, the base assuming a somewhat stratified appearance, since the blood-vessels lie at intervals in regular horizontal rows. The tip of the tongue is highly vascular, indeed, the organ throughout is richly supplied with blood-vessels. The dorsum of the free tip is covered by a series of elevated papillæ—truncated at the tip, and with one angle pointed. They are processes of the hypoderm sheathed in cuticle. Nothing can exceed the complexity of the muscular structure of this organ, which is eminently calculated to subserve important functions. Probably the animal erects its lingual process and applies it with a rasping action to the surface of a sponge, the successive pieces being crushed against the firm rugose wall behind, by the hard posterior surface of the tongue, and again subjected to the play of the deeply folded or lamellar region behind it. Before the food reaches the intestinal surface, it has been partially disintegrated and fitted for absorption, especially soft tissues like those of sponges. Minute shells of annelids, such as *Spirorbis*, are of course less affected, though many are broken into fragments, and all are in a condition to give up their contents.

Behind the tongue the alimentary canal presents on its ventral aspect a large and a small fold, the former in longitudi-

nal section often having a broad summit applied to the vault of the canal and a narrow base, so that it resembles a pedicled mass. This region has numerous transverse folds, so deep in some cases as to merit the name of lamellæ (like those in the ruminant's psalterium or "manyplies"). The canal then curves upward (from the posterior pit) and forms a kind of pylorus, with thick walls and deep furrows, and terminates in the intestine, into which the part freely projects. The thick rugose intestine, which agrees in structure with that in the ordinary Annelids, terminates in a dorsal anus, with two cirri at the sides inferiorly.

Some of the examples were laden with ova which in the preparations were of a pale orange hue and measured $\cdot 1524$ mm. in diameter. They floated freely in the perivisceral cavity. No evidence existed as to their mode of escape. Other examples seemed to have spawned. Schmarda thought there were special oviducts which opened near the anus, but no trace of these was observed.

Like the British species at Herm, the South African form would seem to browse on the patches of *Halichondria* and other sponges which abound under stones between tide-marks; and there is no wonder therefore that there should be so many interesting homologies between its buccal apparatus and that of such Nudibranchs as *Doris tuberculata* and *Doris Fohnstoni*, which follow precisely similar habits. In some examples, moreover, many fragments of crustaceans, numerous portions of cells and avicularia of Polyzoa showed that occasionally the dietary was varied.

The examples were procured between high and low water-mark at St. James', False Bay.

LEPIDONOTUS WAHLBERGI, Kinberg, 1858.

1861. *Polynoë trochiscophora*, Schmarda, Neue wirb. Thiere I. II. p. 151, Taf. xxxvi., fig. 310.
 1885. *Lepidonotus wahlbergi*, M'Intosh, "Challenger" p. 66, Pl. xi., fig. 1., Pl. xviii. fig. 8., Pl. xa., figs. 15, 16.
 1898. *Lepidonotus wahlbergi*, De St. Joseph, Ann. Sc., Vol. 8c. sec. v. p. 225, Pl. xiii., figs. 2-8.
 1898. *Lepidonotus wahlbergi*, M'Intosh, Ann., Nat. Hist. Sc. 7. Vol. II. p. 101, Pl. ii. figs. 11 and 12.

A further consideration of this form, afforded by Dr. Gilchrist's specimens, inclines me to the belief that Schmarda's species is identical, and it is possible that there is a closer relationship

between Stimpson's *Lepidonotus scutlecta** than is hinted at in the Challenger volume,† so that this author's title may yet claim priority. Kinberg's examples came from the Cape as well as Port Natal, Schmarda's from Table Bay, while Stimpson procured his from Simon's Bay, and the present examples were got between tide marks at St. James', in False Bay.

The examples from the "Challenger" were larger than those of the present series, a male measuring 36 mm.

The head agrees generally with the type in *Lepidonotus*. The median tentacle is somewhat longer than the palpi, dilated at the tip, and with a filiform termination. The lateral tentacles, though small, correspond in structure. In the males, the ventral papillæ of the body are longer than in the females, in which they are tulip-shaped.

Schmarda's figures, presumably from life, though details are somewhat doubtful on this head, show the middle of the dorsum as quite bare from the head to the tail, yet he does not indicate the structure of the head thus exposed, the yellowish hue of the dorsum passing forward to the base of the tentacles, a condition at variance with nature. On the whole, the structure of the foot, the scales and the bristles, as shown by this author, do not offer any objection to the union of the species with Kinberg's. Schmarda observes that the proboscis is brown and yellow, and that the intestine (which he figures) has sixteen pairs of cæca.

The scales are generally covered with sand-grains, mud, thread-like algæ, Infusoria like *Salpingaca*, with, here and there, an example of *Loxosoma*.

The species seems to be widely distributed round South African shores, and takes the place, for example, of such a form as *Lepidonotus clava*, Montagu, in Britain. As Kinberg observes, the South African form is probably included in the *Aphrodita squamata* of Pallas, who conjoined with it the European species as figured by Baster.

Baron de St. Joseph, who has done such excellent work amongst the Annelids of the French coast, was of opinion that this species was only a variety of *Lepidonotus clava*, Montagu, but as shown in the Annals of Natural History in 1898,‡ a considerable margin for variation will be necessary before this can be established. De St. Joseph's main reasons for the union of the species are (1) that the figure of the scale in the "Challenger" volume exactly agrees with *Lepidonotus clava*, and (2) that in the same work it has been shown that the palpi are papillose, a feature, also, characteristic of *Lepidonotus clava*.

* Prodr. Exped. Ocean. Pacif. Septen., &c. Proceed. Acad. Nat., &c. Philad., July, 1855.

† p. 67. ‡ Ser. 7, vol. II., p. 108, Pl. ii., figs. 11 and 12.

But in the latter species, only the first four scales have the large tubercles which are visible under a lens, whereas, in *Lepidonotus Wahlbergi*, every scale has them. Yet this is not an impassible barrier to their union—if in *Lepidonotus Wahlbergi* prominent and acute spines had not been present on several of the anterior scales. The tips of these spines are slightly bent, and are minutely nodular, so that the surface in some views presents a slightly areolar or scaled appearance. On the other hand, the truncated capstan-like tubercle, characteristic of the first scale of *Lepidonotus clava*, has the head minutely and somewhat regularly nodular, the tip of each process having a spine. When viewed from above, the rim of the head is thus minutely hispid. The arrangement and structure of the other papillæ, on the respective scales, also differ. Further, the dorsal bristles of *Lepidonotus Wahlbergi* have a stouter tip, with a definite curve, and is much less elongated and tapered than in *Lepidonotus clava*. The ventral bristles, again, have a more elongated tip, with a longer row of spinous ridges. From point to point, therefore, the European and the African forms differ, even the scales in the latter being distinctly smaller.

Yet it cannot be doubted that a close approach, in many respects, occurs between the two forms—separated by so many thousand miles, and in view of the conditions found in other South African Annelids, it may be that the differences pointed out in the foregoing paragraph, will suffice only to constitute a local variety. Chitinous structures of the nature of spines on scales, of bristles and the parts of the dental apparatus, are prone to vary, and intermediate forms of *Lepidonotus clara* may yet be obtained, which would warrant the union of this form with *Lepidonotus Wahlbergi*.

EUPHIONE ELISABETHÆ, McIntosh, 1885.

1885. *Euphione Elisabethæ*, McIntosh, Ann. "Challenger," p. 62, Pl. ix., fig. 3, Pl. xvii., fig. 7, Pl. xviii., fig. 10, and Pl. viii. A., figs. 3–6.

This striking form was procured by the dredge south of the Cape of Good Hope, in 150 fathoms, on a bottom of green sand. It is about 35 mm. in length, and its breadth at the widest part (including the bristles) is 23 mm. The chief features are the correspondence of the head with that in *Lepidonotus*, only the eyes are almost connate on each side. The smooth tentacula and dorsal cirri have an enlargement at the tip, and a constriction beneath it. Scales—13 pairs, as in *Iphione*, flexible, leathery, the first being rounded, the rest somewhat rhomboidal, the anterior edge, however, being incurved, the posterior

convex. Their surface is studded on the inner region with rotate papillæ, some small and adpressed, others large, and elevated on a pedicle. Externally are softer elongated spinose papillæ, which, in shape, resemble a prickly pear; margin of the scale ciliated; dorsal bristles, pale, silky, with a very attenuate tip—hispid with opposite spines; ventral bristles, dull yellow, with simple, slightly hooked tips.

So far as known, this form has hitherto occurred only in the region mentioned, and is one of the most characteristic Annelids of the Cape.

EUNOA CAPENSIS, McIntosh, 1885.

1885. *Eunoa capensis*, McIntosh, Ann. "Challenger," p. 72, Pl. xv., f. 5; Pl. xi A., figs. 1—3.

A fragmentary form, procured between tide-marks at Sea Point, Cape Town, along with *Sabellaria*, *Terebella*, and *Sabella*. Unfortunately, the specimen had no scales, but it will be recognized by the following features:—The head is characterised by the large size of the base of the median tentacle; the lateral tentacles are short, with a filiform tip passing abruptly from the nearly cylindrical organ. Palpi of moderate length, and papillose. A pair of small eyes occur at the outer and posterior border of the head, whilst a pair lie behind the anterior border, and lateral in position. The tentacular cirri have a slight enlargement below the filiform tip, and the cylindrical column is papillose. The dorsal bristles end in a somewhat blunt rounded process, as in *Eunoa hispanica*,* and an allied bristle is seen in Kinberg's *Autinoë pulchella*,† from the mouth of the La Plata. The ventral bristles have comparatively short tips, with a simple terminal hook.

POLYNOË CAPENSIS, McIntosh, 1885.

1885. *Polynoë Capensis*, McIntosh, Ann. "Challenger," p. 114, Pl. iv. fig. 4, Pl. xv. fig. 1, Pl. xix. fig. 4, Pl. ixa. figs. 4, 5.

Procured by the "Challenger" in the dredge south of the Cape in 98 fathoms.

Head elongated from before backwards. Two rather small eyes at the posterior border and two larger in front of the lateral prominences. The tentacular and dorsal cirri have a tendency to assume a fusiform condition, and all are smooth. The ven-

* Trans. Zool. Soc. Lond. ix., p. 396.

† Freg. Eugen. Resa., p. 20, Tab. vi., f. 29, Gs.

tral cirri are long and large. Body moderately elongated. Scales 15, ovoid, blackish grey, and smooth, with the exception of a triangular group of blunt tubercles near the anterior notch. Foot somewhat short with feebly developed pale dorsal bristles having many thecate infusoria parasitic on them. They have a short, peculiarly curved tip with fine rows of spikes. The ventral bristles have a well-marked hook at the tip and a secondary process beneath, besides a spinous edge. The bristles on the whole approach those of *Halosydna*, whilst the head somewhat resembles that of *Lepidouotus*.

HEMILEPIDIA TUBERCULATA, Schmarda, 1861.

1861. *Hemilepidia tuberculata*, Schmarda, Neue wirb. Thiere, I., II., p. 149, Taf. xxxvii., fig. 317, and woodcut.

1885? *Polynoë attenuata*, McIntosh, Ann. "Challenger" p. 120, Pl. xv., fig. 2., Pl. xx., fig. 9. Pl. xia. figs. 8 and 9.

This species was first described by Schmarda as having been procured in Table Bay in shallow water under stones. The present example was obtained between tide marks at St James', in False Bay, 5th October, 1902.

It measures about 45 mm. in length, while its widest part anteriorly, inclusive of the bristles, is 7 mm. A considerable amount of coloration still remains along the centre of the dorsum, from the head to the tail, and it is somewhat symmetrically arranged throughout, especially in the posterior region which is devoid of scales. The sides of the body anteriorly covered by the scales, are pale as likewise are the feet, the bases of the tapering dorsal cirri, however, being set in a ring of dark pigment with a crescent attached in front, whilst the organ itself is coloured about half its length. The bare posterior region again is prettily marked with light and dark touches, making a surface almost like chain-work. Along the centre is a row of papillæ elongated from before backward and dark coloured, a bar of pigment tapering from each side and passing between the two nearest lateral papillæ, since they are alternately arranged with the median. Their tips are pale, whilst a triangle of dark pigment passes inward from each, the apex entering the pale region in front and rear of the central papilla, and thus behind the middle of each segment. Externally a dark patch intervenes between each papilla and surrounds the base of the dorsal cirrus, a little pigment also appearing on the basal part of the column of the organ. Pigment of an iridescent dark brownish hue tints the ventral surface for nearly two thirds of its posterior moiety, each segment having two long lozenges on each side, the posterior pair, which have their broad bases internally, being

specially distinct. The neural region is distinguished by its darker hue in front where no lateral pigment is, and by its pallor in the middle of the darker posterior region. A touch of pigment marks the base of each ventral cirrus at the anterior part of the coloured region, then various bars of dark pigment occur on the under surface of each foot, the whole having a characteristic arrangement.

The head is slightly leaden in hue, with a deep notch filled by the brown base (ceratophore) of the median tentacle in front. Two eyes of moderate size lie posteriorly near the nuchal border, whilst two less distinct occur towards the anterior angle, though they were so hidden by parasitic *Loxosomæ* that doubt remains as to their precise position. The median tentacle is comparatively short, little tapered, and ends in a slender filament. The lateral are typical in length and also have slender terminal processes. The palpi are marked by longitudinal cirri closely arranged, especially ventrally. The tentacular cirri have the same shape as the median tentacle.

The body is elongate, slightly narrowed in front, remains for some distance of nearly equal diameter and then gently diminishes throughout more than the posterior half towards the tail, which has two short cirri. Ventrally a median lozenge of pigment passes to the mouth. The anterior third of the body has numerous *Loxosomæ* between the feet and at the tentacular cirri. The bristles project on each side as pale yellow fasciculi.

The first pair of scales are paler than the succeeding, but have a similar pattern, viz., an ovoid pale patch at the scar, with a dark band traversing it. The broad crescent of pigment along the inner border, however, is less marked both in superficial extent and tone than in the succeeding scales. They adhere with considerable tenacity. In outline, the front pair are more or less circular with a projection opposite the pale region. The others are somewhat ovoid, the pale region being at one end, and the bar by-and-by becomes a spot. Though apparently smooth to the naked eye, minute and somewhat clavate papillæ are scattered over the surface, here and there appearing beyond the margin, as near the white spot (where they are specially numerous), and other parts.

The pale outer region has numerous small clavate papillæ, some of which extend beyond the border, and a few short papillæ also project at intervals from the inner border.

The typical foot resembles that in *Polynoë scolopendrina*, Savigny, yet Schmarda gives "piuna unica," as one of the specific characters, though he probably means apparently single. It really has two divisions. The foot forms a short cone with a bevelled tip (Plate I. fig. 1). The dorsal cirrus is comparatively short and slightly tapered, with a slender filiform tip. The surface has numerous short clavate papillæ which are

longest towards the tip of the organ. The dorsal division forms a separate elevation with the spine-papilla (pierced by the spine) at its outer and lower border. It carries a group of transparent slightly curved spinous bristles (Plate II., fig. 2, one of the shorter), which Schmarða figures as bifid terminally, and, which at first sight have this appearance, but the condition is only apparent, as more careful examination shows that the tips have been fractured, and, that in many, the split parts give a pseudo-bifid aspect. The shorter forms at the inner border of the fan, which have been shielded by the longer, have simple tips tapering to a point. The latter is often coated with a finely granular investment. These bristles are more slender and elongate posteriorly. They are evidently brittle, and, if the species, like *Polynoe scolopendrina*, inhabited a tube, and was commensal, the fracture of the tips would be explained.

The mass of the foot is formed by the ventral division, and the great yellow spine is more powerful than the superior, whilst its papilla is posterior. In front, another and longer conical papilla projects outward. The first or upper bristle is much stronger than the others, of a deep yellow colour, and hastate (Plate II., fig. 3, from the 40th foot), yet there are indications that it is only a modified form of the series which follows, for traces of rows of spines are present—especially in the anterior and posterior parts of the body, and even the tip occasionally shows a minute spike, or secondary process. At the 10th foot, for instance (Plate II., fig. 4), it is only a somewhat larger bristle, with a long spinous simple tip. At the 30th and 40th feet, on the other hand, it is truly hastate or javelin-shaped, and nearly symmetrical, yet a trace of the spinous rows occurs on the left. These are barely visible at the 50th foot, but, again re-appear in the bristles of the caudal region. All the bristles below the larger conform to the same type, having straight translucent and slightly yellowish shafts, the terminal region being enlarged at its commencement, diminishing distally till it reaches the bifid tip, where a slight dilatation again occurs (Plate II., fig. 5). Rows of spikes appear on the upper edge of the tip. These bristles have longer tips in the 10th foot, and they diminish in length and increase in strength for some distance backward, and remain short in the caudal region.

The ventral cirrus is short and subulate, the tip reaching only a little beyond the bases of the nearest bristles. Its surface, with the exception of the filiform tip, has clavate papillæ.

In all probability, the habit of this species is akin to that of such forms as *Polynoe scolopendrina*, being a commensal with another Annelid, mollusc or echinoderm. It is doubtful, if

Schmarda's *Hemilepidia erythrotaenia** is not a variety of the same species.

The example is a female with ova far advanced.

The relationship of this species to the *Polynoë attenuata* of the "Challenger" expedition,† is so close, that it may be necessary to unite them. The "Challenger" form was obtained between tide-marks at Sea Point, near Cape Town, along with *Sabellaria*, *Terebella*, and *Sabella*, and from its great length and general appearance, it resembles a commensalistic form, probably living in the tube of a *Terebella*. The two forms agree in general outline of the body, and in the number of the scales, those in the specimen from the "Challenger," however, being more distinctly papillose, especially at the margin, yet, it is only a question of degree. In the specimen from the "Challenger," no large bristles, such as are figured in this paper, were present, and the fact was commented on at the time. Such may be a variation, or an exceptional condition, for the other bristles closely correspond.

STHENELAIS BOA, Johnston, 1833.

1833. *Sigalion boa*, Johnston. Loud. Mag. Nat. Hist. vi., 332, f. 42.
 1839. *Sigalion boa*, Id. Ann., Nat. Hist. ij., 439, Pl. xxiii. figs. 6-15.
 1843. *Sigalion Idunæ*, H. Rathke. Nova Act, Acad. Caesar. Nat. Cur. xx., p. 150, Tab. ix., f. 1—8.
 1851. *Sigalion Idunæ*, Grube. Fam. Ann. p. 38.
 1851. *Sigalion boa*, Williams. Rept. Brit. Assoc. 1851, p. 201.
 1851. *Sigalion Idunæ*, Sars. Nyt. Mag. Natur. xi. 3, p. 264.
 1861. *Sigalion Idunæ*, Id. Vid. Selsk. Förh., 1861 (sep. copy), p. 1.
 1865. *Sigalion Idunæ*, Malmgren. Nord. Hafs.-Ann. p. 86.
 1865. *Sthenelais Idunæ* and *S. boa*, De Quatrefages. Ann. i., p. 276.
 1865. *Sigalion boa*, Johnston. Cat. Brit. Mus., p. 124, pl. 13, f. 6.
 1873. *Sthenelais Idunæ*, Sars. Bid. Christ. Faun., p. 14.
 1874. *Sthenelais boa*, McIntosh. Invert. and Fishes St. And., p. 118.
 1875. *Sthenelais Idunæ*, Ehlers. Ann. "Porcupine," 1869, ibid., p. 18.
 1876. *Sthenelais boa*, McIntosh. Trans. Zool. Soc. ix., p. 390.
 1876. *Sigalion Idunæ*, Tauber. Ann. Danic. 83.
 1880. *Sthenelais Idunæ*, Langerhans. Zeit. f. w. Zool. xxxiii., p. 276, Taf. xiv., f. 6.
 1883. *Sigalion Idunæ*, Levinsen. Nord. Annul., p. 199.

* Op. cit. p. 150, Taf. xxxvii., fig. 318.

† Op. cit. p. 120, Pl. xv., fig. 2; Pl. xx., fig. 9; Pl. xia., figs. 8 and 9.

1884. *Sigalion Idunæ*, V. Carus. Faun. Medit., p. 205.
 1888. *Sthenelais Idunæ*, De St. Joseph. Ann. d. sc. nat. (7),
 v., p. 187, Pl. viii., f. 55.
 1890. *Sigalion Idunæ*, Malaquin. Ann. Boulon., p. 23.
 1900. *Sthenelais boa*, McIntosh. Brit. Ann. II. (Ray Soc.),
 p. 409, Pls. xxvi., f. 7 and 8; xxvii. f. 21 and 22;
 xxix., f. 1; xxxi., f. 5; xxxiii., f. 16; xli., f. 19—23.

Procured between tide marks at St. James' and False Bay, 19th July, 1901, and 25th June, 1902, the former being the larger. A few about 60-90 mm. in length have a breadth, over the bristles at the widest part, of 5-7 mm.

The head is somewhat shield-shaped, broad in front and narrower behind, with two eyes in front, one on each side of the ceratophore of the median tentacle. Another pair lie in front on the anterior border, and thus are not readily seen from the dorsum. The median tentacle is comparatively short and subulate in outline. A ctenidium occurs at each side of its base. At the posterior border of the head is on each side a truncated papilla. The structure of the first feet, which occupy the usual position in front, and that of the palpi is typical, a large ctenoidal flap enshathing the inner base of the latter—which are long tapering organs.

The body is a little diminished in front, remains for some distance of nearly equal breadth, and then diminishes gradually towards the tail which bears two slender cirri of moderate length. The dorsum is mottled with the touches of pigment on the numerous scales, which have, in those best marked anteriorly, a madder-brown crescent behind the scar, joined by a process which runs into another crescent just within the upper and posterior border of the scale. In passing backward, however, various additional pigment-touches appear, so that the pattern becomes more complex, some presenting three spurs from the anterior to the posterior crescent, besides a broader spur beneath.

In structure they appear to agree in the closest manner with *Sthenelais boa*, Johnston, in regard to outline, papillæ and cilia.

The typical foot likewise corresponds with the European form in every minute detail.

It is noteworthy to find a variety of the well-known British species frequenting the shores of South Africa, and which does not in any essential feature differ from it. The wide range of the species, however, makes this less remarkable, for it not only frequents the shores of Norway but stretches far southward along the western shores of Europe and into the African section of the Atlantic at Madeira.* A closely allied, if not identical form occurs at Bermuda.†

* Langerhans, Zeit. f.w. Zool., Bd. xxxiii., p. 276, fig. 6.

† Trans. Conn. Acad. x., p. 666, 1900.

EULALIA VIRIDIS, O. F. Müller, var. CAPENSIS, Schmarda.

1800. *Die grüne Nereide*, O. F. Müller. Naturges. ein wurm arten, p. 162, Tab. 11, fig. 1.
 1820. *Nereis viridis*, Savigny, Syst. Ann. p. 45.
 1834. *Phyllodoce clavigera*, And. and Ed. Annel. p. 226, Pl. va. figs. 9-13.
 1840. *Phyllodoce viridis*, Johnston, Ann. Nat. Hist. iv., p. 228, Pl. vi., figs. 11-15.
 1843. *Eulalia viridis*, CErsted, Ann. Dan. Consp. p. 27, figs. 22, 30, 35, 86, and 88.
 1849. *Phyllodoce viridis*, Leuckart, Arch. f. Naturges, 1849, p. 202.
 1851. " " Grube, Fam. Ann. pp. 56 and 129.
 1865. " " Johnston, Cat. B.M. p. 178, Pl. xvi., figs. 11-15.
 1861. *Eulalia capensis*, Schmarda, Neue, wirb. Thiere, I. ij., p. 86, Pl. xxix., fig. 231.
 1867. *Eulalia viridis*, Malmgren, Nord. Hafs- Ann. p. 98, Tab. xv., fig. 39.
 1874. " " M'Intosh, Invert. and Fishes, St. And., p. 120.
 1885. " *capensis*, Id. Ann. "Challenger" p. 168, Pl. xxvii., fig. 7, Pl. xxxii., fig. 10, Pl. xiva., figs. 16 and 17.
 1888. " *viridis*, De St. Joseph, Ann. sc. nat. (7) v. p. 283, Pl. xii., fig. 154.

Obtained between tide marks at St. James', in False Bay, 5th August, 1902.

A specimen of average length—55 mm.—and of the usual proportions.

The chief features are the size and general signs of luxuriant growth, as shown in the larger dorsal and ventral lamellæ, and the larger bristles. Yet in all essential characters of proboscis, feet and bristles, though the proportions slightly vary, as indicated minutely in the account of the "Challenger" Annelids, the distinctions are so slight as to warrant its being placed as a variety of the European form.

This species abounds not only in European waters, but extends to Madeira (Langerhans*) and to Angra Pequena—Bucht (Marenzeller†).

* Zeitsch. f. w. Zool. Bd. xxxiii. p. 309. † Zoologisch. Jahrb. Bd. III. p. 5 (sep. abdr.).

ETEONE SPETSBERGENSIS, Malmgren, 1867.

1867. *Eteone spetsbergensis*, Malmgren, Nord. Hafs.- Ann. p. 102., Tab. xv. fig. 38.

Found between tide-marks at St. James, False Bay, 2nd September, 1902.

This form extends from Europe to the shores of America, and again to those of South Africa.

The specimen is larger than the finest example from St. Andrews, or Lochmaddy, representing the eastern and western shores of Britain. This free growth affected the size of the lamellæ and the foot generally—without altering the characters of the parts or the bristles. It is chiefly a dweller in sand.

AUTOLYTUS PROLIFER, O. F. Müller, 1788.

1788. *Nereis prolifera*, O. F. Müller. Zool. Danic II, p. 15, Tab. 52, f. 5—7.

1862. *Polybostrichus Mülleri*, Keferstein. Zeit. f. w. Zool. xii., p. 113, Tab. xi., f. 1—6. (male)

1855. *Saccouereis helgolandica*, Max Müller. Arch. f. Anat. u. Physiol., 1855, p. 18, Tab. II. (female)

It occurred amongst the debris of other forms from St. James', False Bay, 8th July, 1902.

The example was minute, about 4 mm. in length, yet it had all the specific characteristics of head, eyes, and cirri. The compound bristles, also, were essentially the same as those from Britain and other European localities.

The range of this form is, therefore, very wide—stretching from the shores of Norway, where the distinguished author of the "Zoologia Danica" found it budding, to those of Madeira and South Africa on the one hand, and from the Channel to the American coast on the other.

PIONOSYLLIS MALMGRENI, McIntosh, 1869.

1869. *Pionosyllis Malmgreni*, McIntosh. Trans. R. S. E. xxv., p. 414, Pl. xvi., f. 10.

A small Syllidean, measuring about half an inch, or a little more, in length, with rather long cirri, which are distinctly articulated.

Procured between tide-marks, St. James, in False Bay, 8th July, 1902.

The head is typical in regard to palpi, and the position of the eyes, the posterior pair of which are nearer each other than the anterior, and thus lie obliquely forward and outward from the posterior pair. The median tentacle is somewhat shorter than the longest cirri in the example. The body is proportionately stout, tapering posteriorly towards the tail, which ends in two long cirri. The sides are flanked by the curved cirri, which cling firmly to their bases, thus differing from the ordinary forms, in which these organs are readily detached. They are long, gently tapered, and distinctly articulated from base to apex, the number of segments ranging from below 20, to 29 or 30. The setigerous region is somewhat elongate, with a bifid tip, a small papilla at the end superiorly, and a group of stout bristles, which are pale, slightly curved, dilated, bevelled at the tip of the shaft, and furnished with a moderately elongated terminal piece, which has a minutely bifid tip, after the manner of *Pionosyllis*, and a spinous edge beneath. None of the swimming bristles were present.

The ventral cirrus extends fully as far as the tip of the setigerous region.

So far as observed, this form agrees with the British species, though, perhaps, the bristles are less numerous.

It is interesting that a form first found at Lochmaddy, North Uist, should stretch to the shores of South Africa. Langerhans, however, procured no less than four species of the genus at Madeira.

Schmarda found at least nine representatives of the Syllidæ at the Cape, but it is not possible to identify any of them with this form. His *Syllis closterbranchia* has jointed bristles with an elongated bifid terminal piece, but the dorsal cirri are thick and short. No other form described by him approaches it, though several of his species had compound bristles with bidentate tips.

A single Syllidean (*Syllis capensis*) was obtained by the "Challenger," at Station 141, south of the Cape of Good Hope, in 98 fathoms, on a bottom of green sand. Though devoid of the long capillary bristles Malmgren associated with the genus, and having moniliform cirri, it would seem to approach *Pionosyllis* very closely, indeed, in the proofs it was so termed. In the structure of the compound bristles, it approaches the present form, as it also does in the general structure of the head, and in the absence of long simple bristles, but it diverges, in so far, as its dorsal cirri have only eight or nine segments, whereas, *Pionosyllis malmgreni* has as many as 20 or 30. How far age affects the number of these organs is, however, an open question; certainly the forms are nearly allied.

SYLLIS CORNUTA, H. Rathke, 1843.

1843. *Syllis cornuta*, H. Rathke (Beitr. z. Fauna Norw.), Nova Act. Acad. C.L.C. Nat. cur. xx. I. p. 164, Tab. vii. fig. 12.
 1867. *Syllis cornuta*, Malmgren, Ann. Polych. p. 43, Tab. vii. fig. 45.
 1869. *Syllis cornuta*, McIntosh, Trans. R.S.E., xxv. p. 415, Pl. xvi. fig. 14.
 1869. *Syllis cornuta*, McIntosh, Trans. R.S.E., xxv. p. 415, Pl. xvi. fig. 15.
 1885. *Syllis cornuta*, J. V. Carus, Faun. Medit., 1. p. 228.

Found in the debris of specimens of *Dasybrauchus* from St. James'. False Bay, between tide-marks, 2nd September, 1902.

The head agrees with the typical Syllidean, and the body is rather narrow and elongated, though the softened specimen is not in a satisfactory condition.

A comparison with the European form indicates that in the small specimen (about 10 or 11 mm. in length) from South Africa, the dorsal cirri varied in a similar manner in length, being characteristically moniliform and with 18 to 28 segments in the longer forms. The setigerous region is similar, but, apparently from difference in size, bears fewer bristles than the European, though their structure corresponds. The ventral lobe has the same proportions.

No form described by Schmarda can be identified with this species. His *Syllis gracilis* approaches it in regard to the dorsal cirri, but the tips of the bristles are long and tapering. His *Gnathosyllis diplo-donta* would seem to be near it in external characters, but its dental apparatus is peculiar.

Sylliscornuta ranges from Finmark to Norway and Spitsbergen, to the British shores, as well as occurs in the Mediterranean and at Madeira.

NEREIS (MASTIGONEREIS) VARIEGATA, Grube, 1858.

1858. *Nereis variegata*, Grube, Annulat. Ørsted., Vid. Meddel. Nat. Fören. p. 164.
 1861. *Mastigonereis podocirra*, Schmarda, Neue wirb. Thiere, I., ii. p. 108, Taf. xxxi. fig. 247, and woodcuts.
 1867. *Nereis (Nereilepas) Stimpsonis*, Grube, Ann. Novara. Exped. p. 18, Taf. 1, fig. 8.
 1901. *Nereis variegata*, Ehlers, Polych. Mag. u. Chilen, p. 112, Taf. xiv. figs. 1-21.

Obtained between tide marks at various dates, at St. James', False Bay.

The examples ranged from $1\frac{1}{2}$ to 5 inches and in life the latter probably reached 7 or 8 inches.

The dull bluish iridescent head is shield-shaped, with the broad end posterior. Two eyes occur on each side posteriorly, the anterior being wider apart. A small cuticular lens is in the middle of each. The tentacles are stout and subulate. The palpi are massive organs with bulbous terminal processes. The dull brownish tentacular cirri are of moderate length, and the dorsal of the second pair is longest as in ordinary Nereids.

The body is slightly tapered in front, then dilates to its widest region and again diminishes gradually to the tail which ends in two cirri of moderate length below the anus. The dorsum in the preparations has a dull bluish iridescence, which Schmarda states (presumably in life) is greenish blue, and the ventral surface is yellowish brown. The sides are flanked by the feet with their amber-coloured bristles.

The proboscis (Plate I, figs. 6 and 7) in the majority of the examples is extruded, having distally a pair of powerful maxillæ which, in the old examples, have their teeth abraded, but in the younger forms show four or five distinct teeth in each. Dorsally (Plate I, fig. 6) a group of paragnathi lies a little behind each maxilla, and they are arranged in short lines, the longest being posterior. In the median line between these is a single larger tooth. On the ventral aspect of the maxillæ on each side is a group of paragnathi similar in size to the dorsal, but arranged in four oblique posterior rows, and an irregular anterior series (Plate I, fig. 7). A little posterior to these in the middle line is another group consisting of three curved rows and one or two points in front. A double belt of larger paragnathi occurs ventrally at the base of the proboscis (in extension), ending at each side in a single row, while dorsally the arrangement is continued by a transversely elongated and bluntly conical tooth on each side, and a single isolated tooth in the centre. The organ is symmetrically cut by lines into various areas so that it has a "quilted" aspect.

The first foot is typical of the Nereids, having a somewhat blunt and subulate dorsal cirrus, an ovate superior lobe, a truncated setigerous region with two black spines beneath, a smaller ovate ventral lobe extending beyond the former, and a lanceolate ventral cirrus. The setigerous region is supported by a single black spine which in lateral view separates the dark amber-coloured bristles into two groups. The upper consists of about three with long but stout tapering tips having spinous edges and two with the shorter falcate tip. The inferior group conforms to the latter type.

In its progress backward a tendency to a lamellar expansion of the base of the dorsal cirrus appears. Thus at the 20th foot

it forms a distinct ridge at the base of the cirrus dorsally, whilst the homologue of the dorsal lamella of the first foot has coalesced with the ventral base of the cirrus and is continuous with the dorsal ridge just mentioned (Plate I. fig. 8). Moreover, a new process, which first appears at the third foot in front of the spinigerous lobe, has at the 20th foot placed itself between the dorsal and ventral divisions of the foot, that is, has the dorsal tuft above it and the ventral beneath it. Two black spines are present, one to each division. The upper tuft consists of bristles with more slender shafts and longer spinous tips than any in the tuft beneath. At the 30th foot the upper division, viz., the flattened lamella with the dorsal cirrus at its tip, is now larger in proportion to the rest of the foot beneath, a condition still more evident at the 40th foot (Plate I. fig. 9), in which the vertical diameter of the lamella is equal to the rest of the foot beneath it. At the 60th foot the large somewhat rectangular lamella exceeds in vertical diameter the rest of the foot, and in some the dorsal cirrus springs from the upper angle and not from the middle of the upper edge, but this appears to be due to irregularly from injury or abnormality. The vascularity of the large flattened lamella is now very distinct, and it has a greenish hue. The various lobes of the feet are more distinctly separated from each other, as is also the ventral cirrus from the lobe adjoining. At the 70th foot the lamella stands nearly erect, the inner or dorsal edge being convex, the outer slightly concave (Plate I. fig. 10). There is little change till the tip of the tail is reached—when the flattened process diminishes.

The upper bristles (Plate II. fig. 12) have moderately elongated tips which are finely and closely serrated, the spikes coming off with a curve (the concavity being distal) at the base, but towards the tip they are straight and somewhat more prominent—if less regular.

The falcate bristles are generally devoid of terminal pieces and it is only by examining small examples of the developing bristle in the foot that a perfect one is obtained. This (Plate II. fig. 11) presents a short brownish tip slightly hooked, and as yet devoid of serrations, but these soon appear as in the figure. The bevelled tip of the shaft is also brownish, and from it the longitudinally and transversely striated central region passes backward. With the exception of the tip, the shaft is pale. In the older examples the entire bristle is deep brownish.

The largest example is a female with well developed ova flowing freely in the cœlomic space.

The food in the alimentary canal consisted—in one—of a peculiar alga with minute stalked globular processes.

Schmarda's woodcuts are recognizable, though he shows a papilla to the inner side of the ventral cirrus which is not visible

in these examples. He states that the maxillæ have only two teeth (fig. K.), but the specimen was probably adult, when considerable changes occur. He terms the dorsal cirri and their lamelliform base—gills. His examples were procured in Table Bay.

This species is very similar to the *Nereis heteropoda* of Chamisso and Eysenhardt,* procured on the shores of Unalashka.

It also approaches *Nereis (Lipephile) macropos*, Claparède,† which again is closely allied to *N. Marionii* Aud and Éd., and the same may be said of De St. Joseph's *Neanthes Perrieri*‡ allowance being made for variations. The *Nereis vexillosa* of Grube§ is another form the relationships of which require re-investigation: there is much in the description and figures which agree with *N. Marionii*. It is also clear that the *Nereis (Nereilepas) Stimpsonii* (an var. *variegata* Grube-Kroyer?) is the same form, procured at the Cape during the Austrian "Novara" Expedition.

Kinberg|| found another species of the genus, which he procured at San Francisco, California; whilst Michaelsen's¶ descriptions and figures of the proboscis of *Nereis (Mastigonereis) longicirra*, Schmarda, from Ceylon, show a very close approach to the present species, indeed the main difference is in the basal belt of paragnathi in the extruded proboscis, which is distinctly double in the South African species. Ehlers, therefore, has good grounds for uniting them. This author,** indeed, has placed Schmarda's *Mastigonereis podocirra*, *M. longicirra*, Kinberg's *Paranereis elegans*, Grube's *Nereis Stimpsonis*, and four of Hansen's species under the *Nereis variegata* of Grube.

The distribution of this species, indicates what may yet be accomplished by a careful revision of specimens from various quarters of the globe.

Accompanying the foregoing was a young example (8th July, 1902), the feet of which approach those of such forms as *Nereis Dumerilii*, with glandular masses on the dorsum.

LYSIDICE CAPENSIS, Grube, 1867.

Not uncommon between tide-marks at St. James, in False Bay.

1867. *Lysidice capensis*, Grube. Ann. "Novara" Exped., p. 12, Taf. I., fig. 4.

* De anim. quib. e Classe Vermium, &c. Fascic. II. p. 349, Tab. xxiv., f. 2. 1819.

† Ann. Chét. Nap. Suppl. p. 80, Pl. viii. fig. 1.

‡ Ann. Sc. Nat. (8) v. p. 288, Pl. xv. figs. 69-77.

§ Middendorf's Reise, Annulaten, p. 4, Taf. II. figs. 1, 5, and 6.

|| Ann. Nova. Öfers. af K. Vet. Akad. 1865, No. 2, p. 173.

¶ Jahrb. Hamburg, Wiss. Anat. ix., p. 9, figs. 8-10.

** Polychæt. d. Magellanisch, u. Chilenisch Strande, Berlin, 1901, p. 112, Taf. xiv. figs. 1-21.

A form reaching the length of 150 mm., or more, and having a breadth of 6—7 mm. at its widest part over the bristles.

The head is deeply bilobed, and carries three rather short stumpy tentacles, with a pale patch at the tip, the rest being of the brownish hue of the head. The median is the longer, and in the preparations its tip just touches the central fissure in front. External to the base of the outer tentacle, is an eye on each side, with a well-marked corneal thickening. The nuchal collar covers the back part of the head, concealing a median band, passing to the first segment, and a lateral junction at each outer tentacle, the margin of the central curving outward to the lateral.

The body is very little tapered in front, and the diminution towards the tail is also gentle. The latter terminates in two short subulate styles beneath the vent. It is pale brownish anteriorly, minutely dotted with pale specks, but in the preparations these disappear from more than the posterior half. Some of the anterior segments ventrally show the same specks on the brownish ground-colour, but the rest of the surface is of a uniform pale brown, variegated only by the reddish brown pad beneath the ventral cirrus.

The proboscis has maxillæ with rather short blunt blades in front, the posterior process narrowing to a notch, dilating, and again narrowing to form a lozenge-shaped appendage posteriorly. The maxillæ have three strong, blunt teeth in front. The notches on the azygos plate are indistinct, and there are few (about two) on the left anterior plate—beyond which is a small accessory plate. The right anterior curved plate has a bare edge internally, and four teeth externally, and at its outer edge is an accessory process.

The mandibles are boldly wedge-shaped, the anterior ventral plates being large and with curved lines. Internally, they are symmetrically striated, and are curved externally in front, a dense black longitudinal plate indicating the curvature. They taper posteriorly.

The apparatus is tinted blackish, and, on the whole, corresponds to the somewhat crude outline of the parts, in *Lysidice atra*, given by Schmarda. The posterior appendages are less elongated, and more definitely bevelled, than in *Lysidice Ninetta* of European waters, but it may yet be a question, how far such variations hold as specific distinctions, especially, as the size of the African examples is so much greater.

The tenth and 20th feet differ from the 30th and those following, by the absence of the long black ventral hook, otherwise, their structure is similar.

The 30th foot (Plate III, fig. 13) presents the single powerful black spine, which pierces the surface between the dorsal and

ventral bristles. Dorsally is the somewhat short subulate dorsal cirrus, the tip of which falls short of the setigerous region, which forms a thick truncated lobe, separated by a brief interval from the short and blunt ventral cirrus. The whole foot is richly vascular. The setigerous region bears above the spine a tuft of bristles with tapering tips, which have but faint indication of wings. A few brush-shaped forms are also present. Beneath the spine is a dense group of compound bristles with straight shafts, which are bent backwards and dilated at the tip, as well as bevelled for the terminal piece—which is somewhat short, bifid at the tip, and with wings.

The intestine contained sandy mud with fragments of sponge-spicules, echinoderms, and small calcareous fragments.

The specimen named by Grube *Lysidice capensis** seems to have been very small, only 21 mm. in length, but its general characters as well as the structure of the foot correspond.

Except in the coloration, Schmarda's *Lysidice atra* from the Cape agrees with this form. When the feet of the latter are contrasted with those of *Lysidice Ninetta* the African has black spines whilst the other has yellow spines, and the tips of the compound bristles appear to be slightly shorter in the African.

Some of the examples had free ova of a greyish colour in the perivisceral chamber, so that the breeding season would be at the time of capture.

As Langerhans found *Lysidice Ninetta* as far south as Madeira and the Canaries, it may yet be possible to reduce the number of species of this genus, and it may be that the form from the Cape will be placed as a variety of the European. The literature of this genus is much in need of critical revision.

It is curious that no example of the genus was procured during the voyage of H.M. Ship "Challenger."

EUNICE APHRODITOIS, Pallas, 1788.

1788. *Nereis aphroditois*, Pallas, Nova Acta Acad. Sc. Imper. Petropol. II. 4, p. 229, Tab. v. fig. 1.
 1820. *Leodice gigantea*, Savigny, Syst. Ann. p. 49.
 1861. *Eunice macrobranchia*, Schmarda, Neue wirb. Th. I. ij., p. 130, Pl. xxxii. fig. 258.
 1864. *Eriphyle capensis*, Kinberg, Ofvers. af K. Vet. Akad. Förh. p. 385 (fide Marenzeller).
 1865. *Eunice gigantea*, De Quatrefages, Ann. p. 311.
 1878. „ *aphroditois*, Grube, Ann. Semper, p. 147.
 1885. „ *aphroditois*, McIntosh, Ann. "Challenger" p. 282, Pl. xxxviii. figs. 16, 17, Pl. xxv. figs. 8-10.
 1889. *Eriphyle capensis*, Marenzeller, Zool. Jahrb. Bd. III. p. 7, Taf. I. fig. 3.

* Annel. Novara Exped. p. 12, Taf. I. fig. 4. 1867.

Obtained between tide marks, St. James', in False Bay.

A large Eunice, apparently common at the Cape, stretching to 180 mm. in spirit, and in life probably considerably beyond that measurement.

In dealing with spirit-specimens it is difficult to make out resemblances in colour, but in the examples from the Cape the tints of most are recognizable. The cupreous or brownish red and somewhat dappled hue, and the white bands anteriorly readily distinguish it.

The head, tentacles, bristles, branchiæ, and teeth all conform to the type. The simple bristles, which are modified winged bristles, are marked under a moderately high power by minute and slightly oblique lines (probably extending from the wings), and thus the surface is file-like, a condition figured by Schmarda in his *Eunice macrobranchia*, which is here considered to be the same species. The wing is very narrow, but the lines from the serrations on the edge pass inwards as described. These bristles have long tapering tips. The compound bristles with bifid tips were few in the examples procured by the "Challenger," and consequently an average example from the anterior region of the body is given in Plate II. fig. 14. The brush-shaped bristles have rather wide teeth with slender filaments distally, and a long filament at one end (Plate II. fig. 15). The posterior hooks correspond with those figured in the "Challenger."

The dental apparatus also coincides with the type, the great dental plates each having 5 teeth; the azygos 6; the left anterior lateral 4 teeth; and the right 7 teeth. Each of the two accessory pieces attached to the latter has a horny dental edge. The posterior appendages and the mandibles are typical.

The branchiæ commence in these examples on the sixth foot as a minute simple filament, and the organs become pectinate on the 11th foot. The pinnæ reach the number of 16 or 17, but they probably vary, and may increase with age. They are continued almost to the tip of the tail, which has two cirri beneath the vent.

The food in the alimentary tract consisted of portions of a Polyzoön with long vibracula, spicules of sponges, numerous diatoms, fragments of algæ and spores. In others, fragments of a larger sea-weed occurred, besides smaller branched forms encrusted with large diatoms and mingled with mud rich in Foraminifera, bristles of annelids, crustacean hairs, sponge-spicules and radiolarians.

Though Schmarda's description and figures of his *Eunice macrobranchia* leave much to be desired, yet, it is evident he refers to this species, and Ehlers is inclined to the same view. Thus he describes, under the specific characters, the semi-cylindrical body as cupreous, or reddish brown, and, further,

notes that it is 200 mm. long. His figures and description of the dental apparatus, however, are erroneous, and he has, apparently, joined the mandibles to the posterior appendages of the maxillæ. He observes that the first 12 segments are devoid of branchiæ, but he may have overlooked the simple branchial processes commencing on the 6th foot. He recognized the striated condition of the simple tapering bristles, and, though inaccurate, his figure of the compound form is recognizable. He gives the last segment of the body four cirri, but only two are present in those sent by Dr. Gilchrist.

The relationship of this form to the well-known *Eunice aphroditois*, Pallas, is interesting. In many respects they agree, and though the condition of the branchiæ on the anterior feet calls for notice, yet, it is easy for a simple branchial filament to become branched as age advances, or the environment alters. The wide distribution of *Eunice aphroditois* gives room for great variation, stretching, as it does, over the Indian and Pacific oceans to South Africa. Thus, specimens measuring fully two feet in spirit, from Viti Island, Samoa, show certain variations from others procured off Port Jackson, Australia, and between tide-marks at Samboangan. In the large examples, even the bristles are affected, for many of the compound forms have lost their tips, and, besides, are considerably abraded.

As Ehlers* has also pointed out, it is doubtful if Schmaroda's *Eunice nigricans*, and his *Eunice schemacephala*, are other than varieties of the same form (*Eunice aphroditois*). Kinberg's† figures of *Eunice capensis* would also appear to refer to this species, as likewise Marenzeller's account of the same form from Angra Pequena-Bucht.‡

MARPHYSA SANGUINEA, Montagu, 1815.

1815. *Nereis sanguinea*, Montagu. Trans. Lin. Soc. xi., p. 20, Pl. iii., fig. 1.

1868. *Marphysa sanguinea*, Ehlers. Borstenw. ii., p. 360, Taf. xvi., fig. 8--11.

Procured between high and low water marks at St. James, in False Bay.

The head agrees with that of *Marphysa sanguinea*, from the Channel Islands.

The body in all is incomplete, the longest—with a short regenerated posterior region, measures 85 mm., but the perfect form is probably more than double the length. It is rounded

* Borstenw. ii., p. 366.

† Op. cit., Tab. xv. fig. 16.

‡ Zool. Jahrb. Bd. iii., p. 7 (sep. abdr.).

in front, flattened throughout the rest of its exterior, and proportionally broad. In life, it must have been finely coloured, for in spirit the anterior region is dappled with reddish brown, and iridescent.

The branchiæ commence on the 19th foot, or in others on 20th and 21st feet, as a simple filament, thus corresponding in origin with those of *Marphysa sanguinea* from the Channel Islands and southern Europe, and, as noted subsequently, their condition on corresponding feet is similar. No example was complete, but, as far as could be observed, their distribution posteriorly was similar.

At the 10th foot, the dorsal cirrus is proportionally shorter and stouter than in *Marphysa sanguinea*, and there are five black spines in the setigerous region, instead of three. The simple dorsal bristles are similar in both, and no appreciable distinction between the ventral bristles, except in size, in the respective forms is noticeable. The ventral cirrus is slightly more prominent in the British form. The foot remains the same till the appearance of the branchiæ—often posterior to the 20th foot. At the 30th foot, whilst *Marphysa sanguinea* has two long slender divisions of nearly equal length to the branchia, and the dorsal cirrus is slender, the African form has the gill much shorter—the longest not being more than twice the length of the dorsal cirrus, the shorter about the same length. Four divisions of the branchia occur in the 50th foot of the British form, and they are nearly of equal length—two arising distally, and two beneath (externally); the African has also four divisions—two terminal, and two external. The proportions of the other part of the foot are the same. In each, four divisions of the branchia occur in the 70th foot.

So far as can be observed, both from the external appearance and the minute structure of feet and bristles, as well as of the dental apparatus, the British and the South African forms are the same. The species stretches to the American shores of the Atlantic, having been found on the coast of Rhode Island and New Jersey by Leidy,* by Webster† further south on the Virginian shores, and he states that it is common, especially near high water-mark. He points out that De Quatrefages made a new species (*Marphysa Leidii*) of Leidy's examples, having, by mistake, changed the 16 of the American authors' description into 60. Marenzeller,‡ again, finds the same species at Angra Pequena, on the south-eastern coast of Africa.

* Jour. Acad. Nat. Sc. Philad. ii., Vol. iii., p. 147.

† Trans. Albany Inst. ix., p. 36 (sep. copy).

‡ Zool. Jahrb. iii., p. 11 (sep. abdr.).

ARABELLA (ARACODA) IRICOLOR, Montagu, 1802, var
CERULŒA, Schmarda.

1802. *Nereis iricolor*, Montagu, Linn. Trans. vii. p. 82.
 1861. *Aracoda caerulea*, Schmarda, Neue wirb. Thiere, I. ij.
 p. 115, Taf. xxxii. fig. 253.
 1865. *Lunbriconereis tricolor*, Johnston, Cat. B.M. p. 141.
 1885. *Notocirrus capensis*, McIntosh, "Challenger" p. 236, Pl.
 xxxvii. figs. 3, 4; Pl. xviii. fig. 15.
 1888. *Maclovia gigantea*, De St. Joseph, Ann. sc. nat. &c.,
 ser. p. 230, Pl. ix. figs. 92-95.
 1901. *Aracoda caerulea*, Ehlers, Polych. Magellan. u. Chilen.,
 p. 143, Taf. xix. figs. 1-6.

Between tide marks at St. James', False Bay, apparently in considerable numbers.

In general aspect this form closely resembles the *Arabella iricolor* of Montagu.

The head forms a blunt cone which varies in outline according to the specimen, in some having a tendency to an ovoid outline, whilst in others it is more elongate. In lateral view it is distinctly conical. At the base dorsally are four black eyes arranged in a transverse line. The central pair are usually most distinct, and young examples show the eyes best. The under surface of the snout is often marked by a central hollow. The first (peristomial) and the succeeding segments resemble those of *A. iricolor*, and the same may be said for the rest of the body, including the feet.

The dental apparatus (Plate iv. fig. 16,) presents the same arrangement, three toothed plates being in front of the great dental plate, but the size of the individual teeth in these plates is considerably larger in the British forms. This is very noticeable in the first—a single fang, and in the second. There is thus a tendency to diminution. The great dental plates have a more distinct, pointed process externally and anteriorly, and they are somewhat shorter than in the British type.

The maxillæ are also rather shorter, and their bases are truncated transversely. About 6 teeth are visible at the edge of the broad basal region. These teeth are more numerous in those from the Channel Islands, 7 or 8 at least being present. The posterior appendages articulate with the maxillæ by a broad triangular process which obliquely slopes to the long appendage on each side, whereas in the British this is longer and narrower. Moreover, three appendages instead of two occur posteriorly, the additional process being somewhat broader, shorter and median.

The mandibles (Plate iv., fig. 17) also show certain differences, being broader, stouter and shorter in the African, narrower and

more elongate in the British, but essentially they are the same. Unfortunately the injured condition of the teeth in examples procured by the "Challenger" led to ambiguity as to the relations of the species.

In the shape of the feet there is little to discriminate between the forms, both having the setigerous lobe with its group of pale spines anteriorly, whilst the slightly curved conical lobe passes backward beneath it. Nor are the differences of the bristles noteworthy. In both some of the bristles are longer, have a marked curve at the commencement of the tapering tip and well-marked wings, but do not show marked serrations, whereas others have shorter tips with broader wings and bold serrations, three of which at least have ridges running in from the edge. In the British form this expanded region with the serrations appears to be more differentiated, the wings being narrower beyond it, so that the tip is more slender, but such distinctions are variable.

The body terminates posteriorly as in the European forms, and regeneration of the tail occurs. In some, a slight tube of mucus with sand-grains surrounds the body. On the whole the forms approach each other very closely, and if even the variations of the European examples are considered, e.g., as shown by Ehlers and by the British specimens, then there is little ground for specific distinction. Thus Ehlers, for instance, figures* the same arrangement of the posterior appendages of the maxillæ as seen in the African forms.

Further, the genus *Aracoda* of Schmarda† is clearly founded on this species, which he procured not only at the Cape but on the coast of Chili, and therefore lapses, since Grube's title has priority.

There is little in Schmarda's description of the genus, except that there are no eyes or dorsal cirri, bristles simple, 8 or 10 maxillæ, of which the inferior alone are calcareous. He noticed the serrated edges of the bristles with wide tips. His specific characters are:—Body cylindrical, bluish; Cephalic lobe longer than the first two segments; ten superior maxillæ. Feet conical; bristles winged, bent towards the tip. He gives a length of 240 mm. and 500 segments. His figures of the dental apparatus (woodcuts, p. 115) are fairly good, and so with that of the serrated bristle.

Schmarda's coloured figure shows the anterior end trilobed and tinted brown, but such a condition could only have been produced by the partial extrusion of the proboscis—a feature occasionally seen in the present examples. This author followed no strict law in grouping his Annelids, for his second

* Borstenwürmer, II. Plate xvii. fig. 10.

† Neue Wirb. Thiere, I. ii. p. 115, Taf. xxxii. fig. 253.

species of *Aracoda*** (*A. heterochæta*) is apparently a *Lumbriconereis* with a different dental apparatus.

It is probable that this species occurs at the Canaries (Langerhans§), so that the step to South Africa is broken. The *Arabella opalina*, of Verrill,|| is a very closely allied, if not identical species, and this has also been found at Porto Rico, by Treadwell.†† The *Arabella maculosa*, n.s., of Verrill,‡‡ from Flatts Inlet, Bermudas, presents no feature other than what might occur in a variety of this almost cosmopolitan form.

Further, the *Aracoda caerulea*, Schmarda, as described by Ehlers, would not seem to differ in any essential particular from the British representatives, for the presence of a third narrow appendage to the maxillæ is of comparatively little moment. This third appendage occurs in the same species from Japan (Kada Bay). The view here suggested is the more likely, from the fact of the very wide distribution of the species. A form which stretches from Britain to Japan on the one hand, and from South Africa to Juan Fernandez on the other, should not be too rigidly judged, according to artificial standards of distinction.

LUMBRICONEREIS TETRAURUS, Schmarda, 1861.

1861. *Notocirrus tetraurus*, Schmarda, Neue wirb. Th., I. ij., p. 117.

1885. *Lumbriconereis Pettigrewi*, McIntosh, Annel. "Challenger," p. 239, Pl. xxxvi., figs. 7, 8, 9, Pl. xviii., figs. 11—14.

1901. *Lumbriconereis tetraura*, Ehlers. Polych. Magell. u. Chilen., p. 137, Taf. xvii., figs. 1—10.

Found between tide-marks at St. James, False Bay.

The head of this species forms a blunt cone with one or two longitudinal grooves dorsally, and a close series ventrally. Posteriorly is a median band, with a depression on each side, where it joins the first segment.

An elongated species of the usual shape, and the tail is terminated by four short caudal cirri, the inferior being the longer. The colour is brownish, with fine bluish iridescence—especially anteriorly.

** Grube† adopted Schmarda's genus *Aracoda* for those which had the bases of the maxillæ toothed, and Ehlers* followed. Considerable confusion, however, exists as to the toothed condition of the maxillæ, for the teeth are often hidden— from the nature of the edge of the maxillæ.

Ann. Semper., p. 175.

Op. cit., p. 111.

§ Langerhans, Nova Acta. Bd. xlii., No. 3, p. 112, Taf. ii., fig. 18.

|| Report Invert. Vineyard Sound, 1874, p. 594, figs. 69 and 70.

†† Bullet. U.S. Fish Com. for 1900, p. 199.

‡‡ Trans. Conn. Acad. Arts and Sc. x., 1900, p. 651.

The dental apparatus comes near that of Schmarda's species, the long pointed ends of the posterior appendages being diagnostic (Plate III., fig. 18), and resembling those of Kinberg's *Lumbriconereis Facksouii*.* The maxillæ are strongly curved, and articulate posteriorly with a dilated region, which is again constricted, and ends in two slender tapering points (one on each side). In lateral view, the maxillæ show a considerable curve. The great dental plates have four distinct teeth on each side, and the movement of these plates is such that the dental edge can be placed either horizontally or nearly vertically with the teeth pointing dorsally. A considerable portion of the edge of each posteriorly is smooth. In front of these is a small plate, which also appears on the ventral surface with one or two teeth, then a larger plate similarly placed in front, with a single tooth at its posterior (dorsal) edge; whilst externally, is a flat horny plate, and after an interval, a thin curved horny process, which passes backward to a point opposite the middle of the maxillæ.

The whole apparatus is of a blackish-brown colour.

The mandibles are elongate, wedge-shaped as in *Lumbriconereis Pettigrewi*, only shorter.

The feet are normal in outline, a conical lobe, or process, slanting backward from the setigerous process. This is probably what Schmarda calls "*branchia (cirrus dorsalis) basi angustior*," a statement which has given rise to misapprehensions.

The bristles (Plate II., fig. 18*a*) anteriorly are winged with the usual curve at the base of the tip, and with finely serrated edges. Towards the 50th foot, winged hooks take the place of the inferior groups of winged bristles, and, by-and-by, winged hooks alone occupy the feet to the tip of the tail (Plate II., figs. 19 and 20). The wings of these hooks are somewhat broad, and the tip ends in a main fang, and several smaller points superiorly. In most of the larger forms these are abraded, being best seen in young specimens. The edges of the wings are serrated. The spines are yellowish.

The constricted condition of the posterior lamella of the foot (Schmarda's branchia) may have been connected with preservation, as this was not a feature observed in the present specimens.

Schmarda obtained it both at the Cape and on the coast of Chili, and Ehlers has recently described it both from Magellan and Chili. The distribution of this species is, therefore, very wide. The *Lumbriconereis Pettigrewi* of the "Challenger" would seem to be the same form.

* Freg. Eugen. Resa, &c., Taf. xviii., fig. 34.

LUMBRICONEREIS ——— ?

Another form dredged by the "Challenger," at Station 141 (off the Cape of Good Hope), differs from any in the present collection. It is distinguished by the presence of a single long-winged hook ("Challenger" Annel., Pl. xvii., fig. 15) in the anterior feet. An increase in the length of the tips of the second group of superior bristles anteriorly, and yellowish spines are other features. In the dental apparatus, the maxillæ had translucent hard tips, and the basal ridges did not correspond. The left great dental plate had four, and the right five teeth. The outer lateral plate in front is larger than in *Lumbriconereis tetraurus*, and bears two teeth. The inner has a short tooth.

As the only example was injured, it is well to draw attention to this species.

LUMBRICONEREIS CAVIFRONS, Grube, 1867.

1867. *Lumbriconereis cavifrons*, Grube. Ann. "Novara" Exped., p. 13, Taf. 1, fig. 5 ?

1868. *Lumbriconereis gracilis*, Ehlers. Borstenw. ii., p. 393, Taf. xvii., figs. 6—10.

Procured at St. James, False Bay, between tide-marks.

A small species about $1\frac{3}{4}$ ins. long.

The head forms a smoothly rounded blunt lobe in front, and is slightly constricted at the posterior border. A minute median band connects it dorsally with the first segment. In lateral view, the snout is nearly of equal depth throughout, so that the tip is characteristically blunt, but such is probably due to the degree of contraction, for in another example, with a deep median sulcus on the ventral surface of the snout, the latter was less blunt in profile. The dorsal groove mentioned by Grube in *Lumbriconereis cavifrons*, was not present in these.

The body is very little narrowed anteriorly, remains for some distance of nearly uniform diameter, and then tapers gently towards the tail—which, in the examples, had four short cirri (like papillæ), the two upper being the longer. The segments are very distinctly marked. The general colour of the body is pale brown, with only a little iridescence on the curves of the segments, and thus is in marked contrast with *Lumbriconereis tetraurus*. The cuticle is also somewhat delicate.

The dental apparatus (Plate iii. fig 21) presents a pair of strongly curved sharp maxillæ which pass backward to converge at a narrow pedicle connecting them with the posterior appendages. After a constricted region the latter again dilates, but the specimen is incomplete, though apparently they terminate in

the narrow plates. The great dental plates are pale translucent brown, and each has five prominent teeth of great strength. The plate in front has two teeth, and the anterior plate one tooth. Two prominent papillæ occur on the anterior edge of the lower lip, but no mandibles were present in either specimen.

The granular condition of the borders of the anterior horny plates, so well seen in British examples, is likewise present, though less distinct both in these and in the opaque areas exterior to the great dental plates.

The feet are not so prominent as in the preceding species, the posterior lobe being less conspicuous. The anterior feet have winged bristles dorsally and jointed hooks inferiorly. The former have the tip curved on the shaft—with broad wings and a short tapering tip. The hooks (Plate iv. fig. 22) have the long shaft slightly curved backward at its distal end and bevelled for the basal process of the terminal piece—which tapers to a crown with a main fang and several minute teeth above it, and with guards or wings which come from the end of the shaft.

The first foot has a winged bristle or two, a long simple hook and two jointed hooks. At the fifth and sixth foot only one jointed hook occurs, but they evidently vary as in the 7th and 8th two winged bristles with tapering tips occur, then three jointed hooks, and ventrally a single smaller winged bristle. The latter disappears in the 12th, 13th and subsequent feet, the 14th having only a single simple hook. The tapering tip of the bristle becomes shorter and the wings broader at the base.

The bristles by-and-by disappear, and the hooks remain simple (Plate IV. fig. 23) the shaft having a prominent curve at its stoutest or distal region, then narrowing to a crown which has a main fang and a series of small teeth above it. Moreover two small teeth occur on the distal edge of the great fang.

The description of *Lumbriconereis cavifrons* by Grube is somewhat imperfect, but it would seem to refer to the same form, though none of the present examples showed a dorsal groove on the head, which it may be remarked, also occurs in certain specimens of *Lumbriconereis gracilis*, Ehlers. The latter seems to be a closely allied if not identical form—first found by Ehlers at Fiume in the Gulf of Quarnero in the Adriatic, but which is now known to occur at Madeira and on British shores, so that its distribution is very wide and may yet embrace South Africa. Grube's examples came from Chalk Bay.

YOUNG EXAMPLES.

Certain young forms procured on various dates, show the following differences from the foregoing (*Lumbriconereis gracilis*). They occurred in the tissue of a sponge inside a fragmentary *Trochus*.

The head has a similar shape, but it has two distinct eyespecks near the anterior border.

The body (Plate iv. fig. 24) has from 15 bristled segments in the smallest to 28 in the largest, and the tail terminates in four flat papillæ. The proportions of the first two body-segments are the same. In that with 28 bristled segments, the first twelve have bristles with tapering winged tips, these as well as all behind having also long simple (unjointed) winged hooks, which appear to agree in structure with *Lumbriconereis gracilis* beside which these were found.

So far as could be observed in transparent preparations the dental apparatus corresponded in general structure with that of *Lumbriconereis gracilis*, though the posterior appendages of the maxillæ were less developed. The great dental plates had 5 teeth, and the anterior plates respectively two teeth and one tooth. No mandibles were present. A horny structure in the gut posteriorly was either a portion of the dental apparatus which had been shed, or a structure which had been swallowed as food, the former being the more likely. These may be the young stages of the previous species, if it were possible that the jointed hooks anteriorly were only developed in the later stages.

Obtained between tide-marks at St. James, in False Bay.

TROPHONIA CAPENSIS, McIntosh, 1885.

1885. *Trophonia capensis*, McIntosh. Annel. "Challenger," p. 363, Pl. xlv., figs. 7, 8, Pl. xxxiii, figs. 1—3.

The examples procured by Dr. Gilchrist are considerably longer than that obtained by the "Challenger" between tide-marks at Sea Point, Cape Town, in December, 1873, for they measured up to 90 mm., whereas, the "Challenger" example was only 60 mm.

The outline anteriorly is somewhat fusiform, and then the body gradually tapers to the tail which, however, is by no means slender. It terminates in the vent—with a slightly crenate margin. The segments were more numerous (about 90) than in that described. The skin had numerous sand-grains and siliceous and calcareous particles attached to it, the dorsal surface being coated with larger semi-translucent (pale) fragments—especially on the anterior region. The whole forms a tough investment of hardened mucus, fragments of sponge-spicules and light sand-grains, which can be peeled from the body—carrying many of the bristles with it. Thus exposed, the surface is definitely ringed and smooth—with papillæ arranged at regular intervals in each segment. Anteriorly, within the rows of bristles, are two rows of papillæ; between

the bristles and the hooks laterally are two rows; whilst, ventrally, there are four nearly equi-distant rows anteriorly; at the end of the anterior third are six rows, and these continue to the posterior region. These papillæ are readily recognized by their darker colour, the general surface of the body being pale brown. When the investment is removed, the body becomes flaccid—demonstrating that its comparative rigidity is due to this coat. The uniform arrangement of the small grains on the ventral surface and sides and their general effect, together with the addition of the larger translucent grains to the dorsal surface (to which, indeed, they were confined), showed discrimination and care on the part of the Annelid.

The snout bears two grooved tentacles, and a dense tuft of branchiæ superiorly on each side. The latter are more numerous and more slender than in the common European species (*Trophonia plumosa*), and they arise from the ventral aspect of a tongue-shaped triangular process, which projects upward and forward on each side from the upper lip. Each is marked, in extrusion, on the dorsal surface by a line of dark pigment just within a pale margin. The processes appear to fuse along the middle line, though a deep groove exists on the ventral surface. Ventrally, the branchiæ are closely arranged, and in somewhat regular rows. Each has an afferent and an efferent vessel. In the central line in front of the mouth is a longer papillæ, which may be bifid, each division being slender.

One example had the body-cavity filled with dark green ova, as in the case of the "Challenger" example, which was obtained in December. Another appeared to have masses of sperms in the same cavity.

The genus is probably identical with *Stylaroides*, Delle Chiaje.

FLABELLIGERA LUCTATOR, Stimpson, 1856.

1856. *Tecturella luctator*, Stimpson. Proc. Nat. Sc. Philad. vii., p. 391.

1861. *Phernsa tetragona*, Schmarda. Neue wirb. Thiere, i., ii., p. 20, Taf. xx., fig. 168.

1889. *Flabelligera luctator*, Marenzeller. Zool. Jahrb. iii., p. 15 (sep. abdr.).

Found between tide marks at St. James's, in False Bay.

A form somewhat fusiform in outline and ranging from 30 to over 50 mm. in length, and with a breadth at its widest part of 5-6 mm. It is of a firmer consistence than the ordinary *Flabelligera affinis*, and thus its habitat probably differs.

The tentacles are of considerable length and frilled in a characteristic manner. As a transparent object a series of club-

shaped granular papillæ occur in rows at the sides of the organ. The branchiæ form a dense group of thread-like structures on each side dorsally. Schmarda shows them of a bluish tint.

The foregoing organs are enclosed by a fringe of golden bristles, which with a dense series of elongated papillæ between them form a web continuous at the sides, but with a gap dorsally and ventrally. These bristles are comparatively short in contrast with *Trophonia*, but their structure is similar, and their curve is adapted to the contour of the wide fringe or palisade which they form around the central organs.

The long papillæ have slender stems with a fusiform dilatation near the tip—which ends in a bulbous enlargement.

The body is fusiform in outline, though by no means finely tapered, indeed the ends are blunt. The skin is dark brown and does not appear to have the abundant gelatinous tissue so characteristic of *Flabelligera affinis*. On each side of the dorsum is a series of bristle-tufts, the bristles having a similar structure to those in front, and at each tuft is a dense group of the long papillæ. The colour is dull greenish.

Ventrally, again, each segment has two long and strongly curved hooks (Plate iv. fig. 25) with slightly curved shafts which have a dilatation below the sharp hook at the tip, and another less marked at the commencement of the transverse lines at the end of the shaft. The number of the lateral bristle-tufts ranges from 41 to 54, Schmarda giving 37 body segments. His specimens, however, were smaller. The surface of the body has a considerable quantity of adherent sand-grains, which are found both dorsally and ventrally, but they do not form a continuous coat, much of the body being bare. The rows of ventral hooks have a narrower space between them than the dorsal bristles, the ventral surface of the tetrahedral body being thus much less than the convex dorsal region.

In regard to the sand-particles and their attachment it could not be said that each was fixed to the tip of a papilla. The grains seemed to adhere to mucus in which were sponge-spicules, diatoms, and here and there groups of papillæ, but the latter appeared to have no special connection with the particles though they may have with the mucus. The sand-grains contained many calcareous fragments amongst the siliceous.

The same sand with its coarser and finer particles occurred in the alimentary canal.

The general aspect of this form would seem to indicate that it leans to *Flabelligera*, though no example had the membrane between the hooks and bristles, and in this view it is satisfactory to have the support of so able an investigator as Dr. E. Marenzel-

ler, who found the species on the eastern coast of Africa, at Angra Pequena.* There are slight differences in the figure of the hook, to which the Austrian author gives transverse striæ in the distal region. Such, however, may be due to age or local variation.

FLABELLIGERA MARENZELLERI, n.s. (an var. *affinis*.)

Collected between tide-marks at St. James, False Bay, South Africa.

Procured along with *Flabelligera luctator*, Stimpson, from which it is readily distinguished by its smooth body, the presence of a membrane between the hooks, and the flattening of the bristles to the sides of the body, apparently by a similar gelatinous membrane. On the whole, however, it has a less gelatinous aspect than such as *Flabelligera affinis*.

The frontal bristles, in general aspect, resemble those of *Flabelligera affinis*, though minute examination shows that the former are darker yellow, and that the segments are shorter. No appreciable distinction could be drawn between the elongated filaments, with their characteristic terminal enlargements. The tentacles and branchiæ are similar.

The fusiform body is more consistent than that of *Flabelligera affinis*, and retains its straight outline, the convex dorsum being covered by a glistening cuticle. The dorsal area is large, since the lateral rows of bristles and hooks are carried far downwards, thus encroaching on the ventral area.

The dorsal bristles are shorter, stouter, and duskier in hue than those of *Flabelligera affinis*, and the transverse bars seem to be rather closer. In the British form, these bristles taper to a more slender elongated tip—followed by the long papillæ. The latter appeared to agree.

The long golden hooks are arranged, for the most part, singly, along the sides of the ventral surface, and have, about the commencement of the distal third, a curve backward. Distally, the shaft joins the flattened sickle-shaped tip (Plate III., fig. 26), which dilates at its commencement, and ends in a sharp strongly curved brownish claw. The internal striations nearly correspond with those in the British species, indeed, it is hard to draw a distinction between the two. The South African has, apparently, a more brittle nature, since a separation often occurred at the transverse segments, is darker (as a trans-

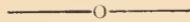
* Op. cit.

parent object), and the terminal claw is usually more erect, a condition seen in certain varieties of the European form, such as those from the Clyde.

The body-wall of the South African form has thicker muscular layers, and the papillæ seem to be more elongated terminally than in the British, but preparation may be responsible for this.

The question, therefore, as to specific distinction is a delicate one, and separation rests on the shortness and strength of the bristles, with their slightly narrower transverse lines, the curves and colour of the hooks, and the more consistent body. Future investigation may show that the Mediterranean *Siphonostoma diplochaitos* of Otto, has relations both to the northern forms and to those from the south.

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EXPLANATION OF PLATES.

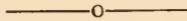
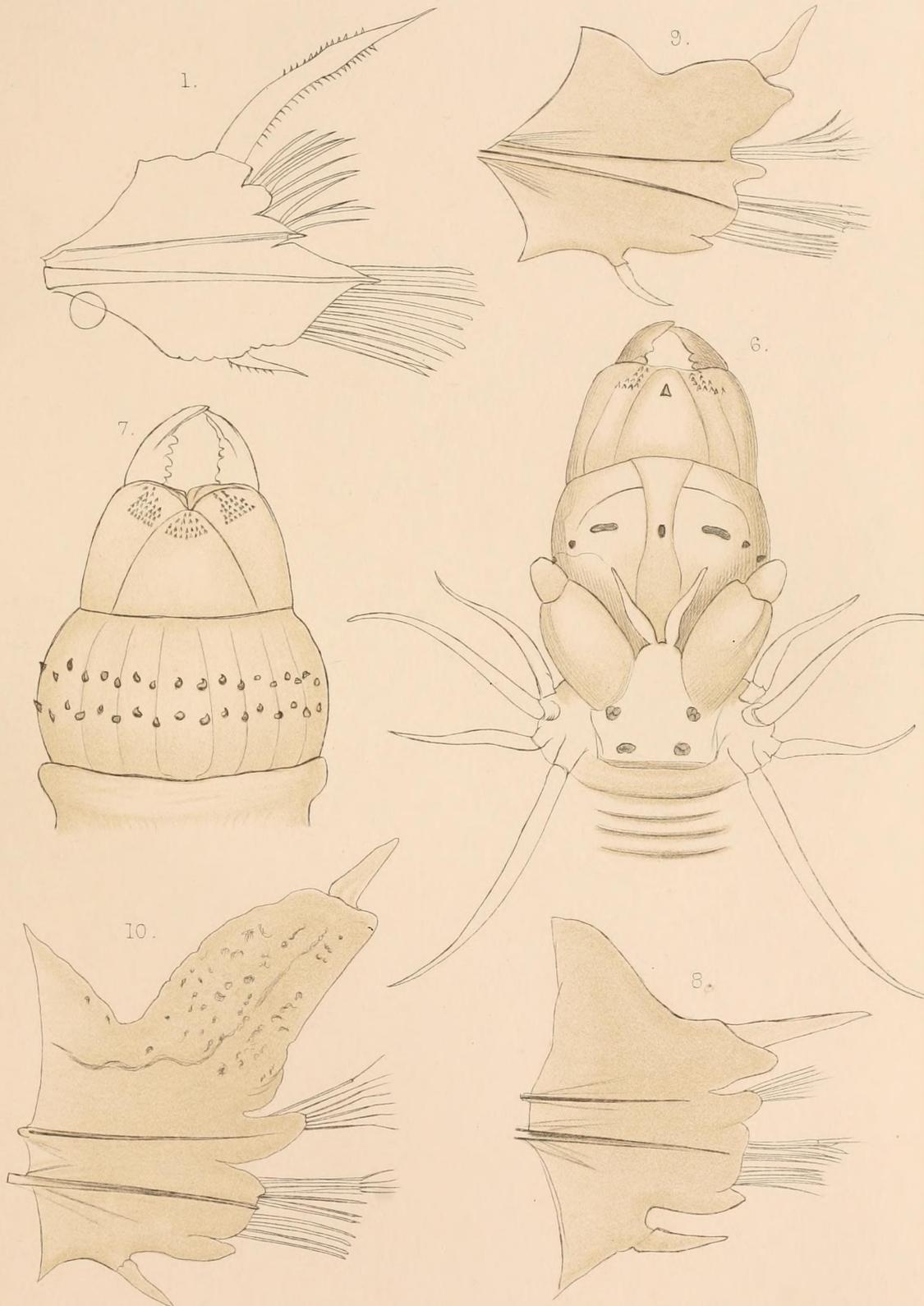


PLATE I.

FIG.

1. Anterior foot of *Hemitepida tuberculata*, Schmarda. 13 diam.
6. Dorsal view of the head and extruded proboscis of *Nereis (Mastigonereis) variegata*, Grube. Enlarged under a lens.
7. Ventral aspect of the proboscis of the same form. Enlarged under a lens.
8. Twentieth foot of the same. 13 diam.
9. Fortieth foot of the foregoing. 12 diam.
10. Seventieth foot of the same. 17 diam.



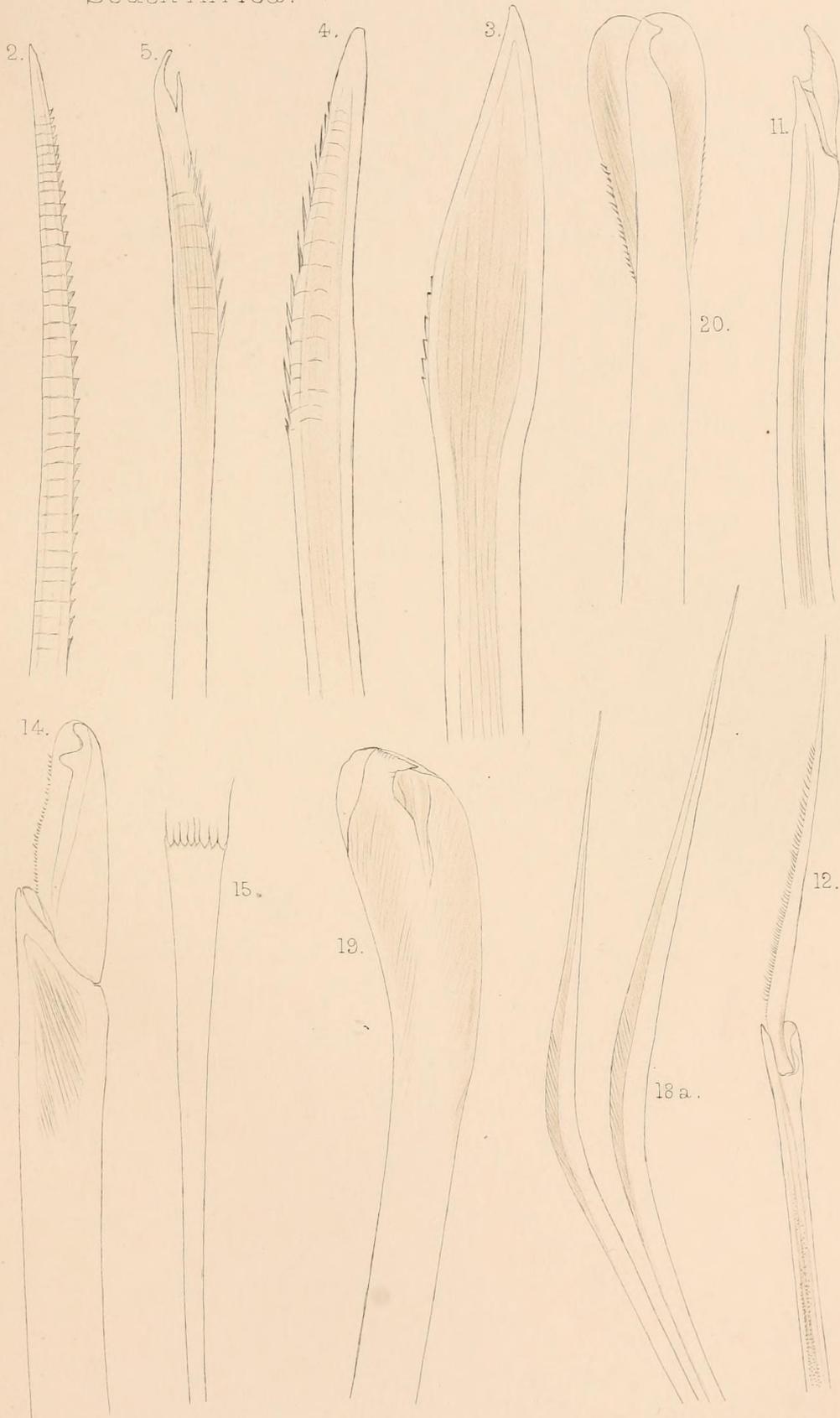
W.C.M. del.

Mintern Bros. lith.

PLATE II.

FIG.

2. Dorsal bristle of *Hemilepidia tuberculata*, Schmarda. $\times 240$ diam.
3. Large upper bristle of the ventral series of the fortieth foot. Similarly magnified.
4. Bristle from the upper series of the ventral of the tenth foot. Similarly magnified.
5. Bifid bristle from the ventral series of the same form. Similarly magnified.
11. Falcate bristle from the anterior region of *Nereis (Mastigoucreis) variegata* Grube. $\times 240$ diam.
12. Jointed dorsal bristle (with tapering tip) from the same region. Similarly magnified.
14. Falcate bristle from the ventral series of an anterior foot of *Enuice aphroditois*, Pallas. Magnified as before.
15. Brush-shaped bristle from the dorsal series of the same form. As before.
- 18a. Two winged bristles of *Lumbricoereis tetraurus*, Schmarda. 100 diam.
19. Winged hook of the same form in lateral view. $\times 240$ diam.
20. Head of another winged bristle viewed from the face (front). Similarly magnified.



W.C.M. del.

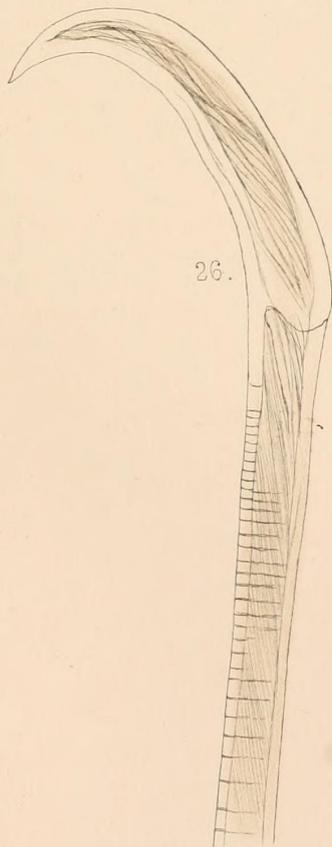
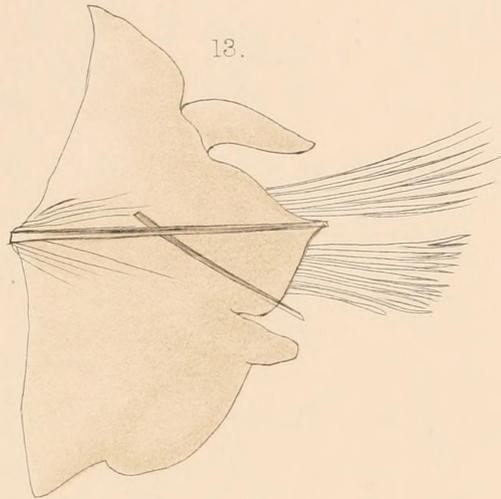
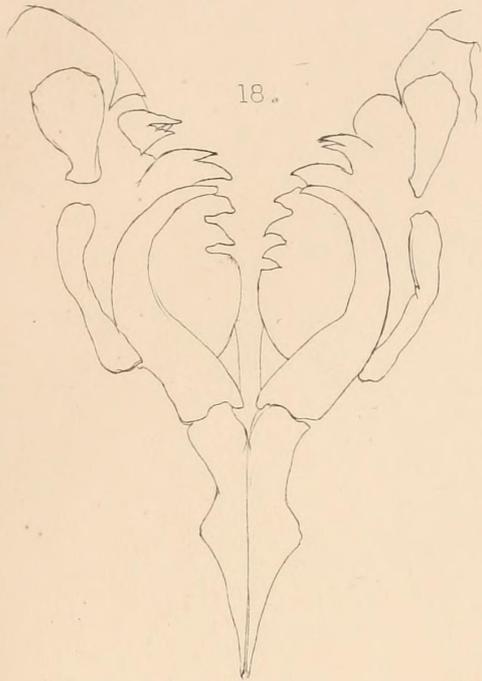
HEMILEPIDIA, EUNICIDÆ.

Mintern Bros. lith.

PLATE III.

FIG.

13. Anterior foot of *Lysidice capensis*, Grube. 24 diam.
18. Dental apparatus of *Lumbriconereis letraurus*, Schmarda. The second tooth is somewhat imaginary as its bifid condition is not seen in this position. 15 diam.
21. Dental apparatus of *Lumbriconereis cavifrons*, Grube. The dotted line continued from the broken posterior appendages is imaginary. 15 diam.
22. Lateral view of winged tapering bristle of the same form. Zeiss oc. 2. obj. D.+3 in. draw-tube.
20. Hook of *Flabelligera Marenzelleri* (an. var. *affinis*, Sars). 140 diam.



W.C.M. del.

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PLATE IV.

FIG.

16. Dental apparatus of *Arabella iricolor*, Montagu. 21 diam.
17. Mandibles of the foregoing. 15 diam.
22. Jointed anterior hook of *Lumbriconcreis cavifrons*, Grube. Zeiss oc. 2. obj. D.+3 in. draw-tube.
23. Winged simple hook of the same species. Similarly magnified.
24. Young examples of the same form with eyes, and the dental apparatus *in situ*. 50 diam.
25. Hook of *Flabelligera Merczelleri* (an var. *affinis* sars), 100 diam.



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EUNICIDÆ & CHLORÆMIDÆ.

