IV.—*Notes from the Gatty Marine Laboratory, St. Andrews.* No. XXVI. By Prof. M'Intosh, M.D., LL.D., F.R.S., &c.

[Plate IV.]

1. On the Pacific, Atlantic, and Japanese "Palolo."
2. On the British *Goniadidæ*, *Glyceridæ*, and *Ariciidæ*.
3. On the same Groups found in the 'Porcupine' Expeditions of 1869 and 1870.
4. On the same Forms dredged by Dr. Whiteaves, of Canada, in 1872 and 1873.
5. On the same Groups procured by Canon Norman in Norway and Finmark.
6. On some Japanese *Glyceridæ*.
7. On the Form described as *Hemipodus* (?) *magellanicus* in the 'Challenger' Annelida.

1. *On the Pacific, Atlantic, and Japanese "Palolo"* *.

In connexion with the interesting observations on the "Palolo" of Samoa (*Eunice viridis*, Gray) by Mr. McM. Woodworth in the 'American Naturalist' for December, 1903, a somewhat imperfect digest of which appeared in 'Nature' of March 31st, 1904 †, it is well to remember that previous observers had filled in much of the gap. Thus, even in the case of the first examples as described by Dr. Gray ‡, the discoverer, Mr. Stair, stated that the worm came from the coral-reefs. Subsequent observers knew that they dwelt in fissures and crevices of the rocks at and near low water, and that the swarming of the headless portions was connected with reproduction. The first head was described and figured by Dr. J. D. Macdonald §, one of those able naval surgeons, like Huxley and Moss, who have—when on duty on board ship—largely contributed to our knowledge of marine animals. Eunicids are very abundant in cracks and fissures of rocks everywhere, and especially in coral-reefs; but it has yet to be proved that they bore in the latter. Moreover, epitokous annelids have been familiar to zoologists for a long time, and the step to link on the "Palolo" of Samoa therewith was brief, for it was evidently the posterior region distended

* Communicated to the Cambridge Meeting of the British Association, Aug. 1904.

† Since this date a long discussion as to priority in finding that "Palolo" was *Eunice viridis* has taken place between Benedict Friedländer and Krämer (*cf.* Zool. Anzeiger, July 12, 1904).

‡ Ann. Nat. Hist. xix. p. 409 (1847).

§ Trans. Linn. Soc. Lond. xxi. p. 237, pl. xli. (1858). It is possible this author found a head of *Lysidice* amongst the others.

by the reproductive elements. The main point in Mr. Woodworth's observations was the demonstration of the atokous and epitokous regions of the body *in situ*, and as obtained by splitting the edges of the honeycombed coral-rocks. The author attaches much importance to what he calls the thermotropic or heliotropic reaction of the pigment-specks borne on the best-developed central segments of the epitokous region—in connexion with swarming. Further observations are necessary on this head, since similar features are observed in other forms without such pigment-specks.

In the Atlantic "Palolo" (*Eunice fucata*, Ehlers) from the Dry Tortugas and Porto Rico, a careful account of which was given in 1892 by A. G. Mayer *, a very similar condition prevails, the posterior epitokous or sexual region being thrown off by the annelids which live in canals and crevices of the dead and disintegrating coral-rock or corroded "coquina," sometimes along with the commensalistic *Polynoë granulata*, Ehlers. These sexual posterior regions are broader than in the Pacific "Palolo," and present no pigment-spots, but swim freely away in the same manner—constituting the swarming, which occurs within three days of the moon's last quarter, June 29th to July 28th.

In Britain a condition closely approaching that seen in the foregoing "Palolo" occurs in various forms, *e. g.* in *Nereis Dumerilii*, Aud. & Ed., swarms of which are seen in various bays. Thus they were in vast numbers in Castlebay, Barra, in May, and were captured by Dr. Thomas Scott, of the staff of the Fishery Board for Scotland. "Millions" of *Nereis longissima* were also found by Mr. Hearder swimming at the surface in Plymouth Sound in 1865. Like other Nereids this is likewise a favourite bait. An allied condition, that is free-swimming sexual forms, occurs in the Syllideans, the Cirratulids (*Dodecaceria*), and many other annelids.

Amongst others Verrill † mentions *Nectonereis megalops* as a form which "swims actively at the surface both in the evening and in the brightest sunshine in the middle of the day, from July 3rd to August 11th. In this species the palpi appear to be much diminished in the *Heteronereis* condition (unless it has some connexion with *Ceratonereis*). The males and females of *Nereis irritabilis*, Webster, when mature, also take to swimming on the surface in the beginning of August. The immature examples live near low-water mark in sand and mud on the Virginian coast.

* Brooklyn Inst. of Arts & Sc., Sc. Bullet. vol. i. no. 3, pp. 93–103, 1 plate, Dec. 1902.

† "Invert. An. Vin. Sound," U.S. Comm. F. & F. 1873, p. 592.

But one of the most interesting Nereids in this connexion is the Japanese "Palolo" (*Ceratocephale osawai*), as recently described and figured in a noteworthy paper by Mr. Akira Izuka *, Assistant Professor of Zoology in the Imperial University, Tokyo. The species is much used by the Japanese fishermen as bait, and occurs abundantly in the littoral region, as well as extends into estuaries, tributaries, canals, and ditches—burrowing in mud to the depth of a foot or more, like *Nereis diversicolor* of our own shores. The species thus approaches the fresh- and brackish-water Nereids from the Pacific coast and Hawaii, as recently described by Mr. H. Parlin Johnson †, and extends the list of such forms, which includes Sabellids and others.

The Japanese "Palolo," which has a dark brownish colour, leaves its burrows in the mud with the flood-tide and creeps about in search of food. It reaches the length of 200–250 mm and is 4 mm. in breadth, and may have as many as 300 segments. In this condition it resembles the ordinary type. Early in September, however, the change to the epitokous form takes place, and the sexes differ in colour, the male being more dusky (brownish) than the female, which is for the most part bright red. The body in both sexes considerably increases in breadth. Then the posterior region, comprising about two thirds of the total number of segments, begins to be differentiated—being narrower than the anterior region and of a different colour, dull brownish with a pale streak in the middle. Specimens in this condition are found by digging in the mud about a week before swarming—just as Mr. Woodworth procured his in the coral-blocks. The narrowed posterior region, however, is not utilized for the spreading of the eggs or spermatozoa, but degenerates and is cast off, apparently in many cases even before swarming, though a few are found swimming with the shrivelled posterior end attached. Shortly after the change just alluded to, the annelids leave their burrows and become pelagic—swarming near the surface of the water to a depth of several feet, and discharging ova and sperms from the aperture at the end of the anterior region (where the separation of the shrivelled posterior region took place). They are captured at night in great numbers by boats provided with a light, which attracts the annelids, and various nets, and they are much esteemed as bait. The swarming annelids appear to be carried by the tide seawards, though many perish previously by rupture of the body-wall or otherwise.

* Journ. Coll. Sc. Imp. Univ. Tokyo, Japan, vol. xvii. ii. p. 1, pl. i.
† Mark Anniversary Volume, art. x. p. 205, pls. xvi. & xvii. (1903).

The swarming takes place during the months of October and November, usually at four different periods, each lasting a few days; the periods falling on nights close to the appearance of the new and the full moon and just after flood-tide.

The Japanese "Palolo" therefore differs from both the Pacific and the Atlantic forms not only in regard to the family, but in the nature of the reproductive process, since in both of the latter a specially modified posterior region—bearing the sexual elements—is separated and swims freely, whereas in the Japanese species the specially modified posterior region degenerates and is shed—the enlarged anterior region swimming actively, discharging its sexual products and then perishing.

Mr. Akira Izuka's paper is illustrated by woodcuts and a coloured plate, the finish of which is in keeping with the excellent illustrations in the 'Economic Fishes of Japan,' by Otaki, Fujita, and Higurashi.

It is probable that the number of forms exhibiting similar features to the "Palolo" will be increased as observations extend.

All the foregoing belong to the temporarily pelagic group, which may be divided into two sections: (1) those which, as larvæ of reptant or fixed forms, rise to the surface and by-and-by return to the bottom; and (2) those which may come from the shore or the bottom (*e.g.* epigamous forms) and do not return thereto. Under the latter "Palolo" and the allied forms fall.

2. *On the British* Goniadidæ, Glyceridæ, *and* Ariciidæ.

The British Goniadidæ in Dr. Johnston's 'Catalogue' of the British Museum included but a single species, though a second was known shortly after its publication. The view of Ehlers that *Goniada* and *Glycinde* (*Eone*) should form one genus has certain recommendations, but it should be remembered that the structure of the dorsal division of the foot, both in soft parts and in bristles, shows a decided divergence, and the same may be said of the teeth. Moreover, Ehlers does not mention that between the body-wall of each of the common forms (*Goniada maculata* and *Glycinde Nordmanni*) there is this difference, viz., that in the latter the dorsal longitudinal muscles have a well-marked fold inferiorly, whilst in the former such is absent. Ehlers, in 1868, grouped them under his *Glycera polygnatha* and separated them by the condition of the teeth.

In considering the species of Glyceridæ mentioned in the

Catalogue of the British Museum, it would seem that Dr. Johnston's example of *Glycera mitis* resembled (in 1872) *G. dubia* in the collection, that is *Glycera siphonostoma*, Delle Chiaje (*G. tessellata*, Grube), and had apparently lost its teeth. Two species are thus accounted for. An example of the same species (also labelled *G. Rouxii*) from South Devon bears out the foregoing diagnosis; yet another specimen labelled *G. Rouxii* seems to be *Glycera lapidum*. *Glycera nigripes* appears to be a variety of *Glycera siphonostoma* procured in Scotland by Lieut. Thomas, R.N. Few examples of *Glycera lapidum* occur in Dr. Johnston's series, and one or two are in bottles with other species, such as *Glycera alba*. One example, however, labelled by Dr. Johnston "*Glycera capitata*," comes from Holy Island. Another is "*Nereis sorex*," of Montagu, from South Devon (Mus. Leach). The additions made to the Catalogue by Dr. Baird consist of the epitokous form of *Glycera capitata* ("*Glycera setosa*") and *Glycera alba*, O. F. M. It is, however, clear that the former is the epitokous condition of *Glycera lapidum*, a form closely approaching *Glycera capitata* and for a long time confounded with it.

The first form, *Goniada maculata*, Œrst., is abundant in the stomachs of haddock in St. Andrews Bay, and ranges from Shetland to the south in fairly deep water. It occurs also in sand at low water. The elongated and tapered snout of eight segments, its pinkish or scarlet colour, greenish eggs, and active habits are conspicuous. The broad region of the proboscis in extrusion is densely papillose and armed on each side by a row of about ten dark brown V-shaped denticles. Distally are the circle of papillæ and the denticles of the region. The first foot has two somewhat elongated lower lobes (the inferior being the cirrus), with bristles between and above, and superiorly a flattened process representing the upper division. The tenth foot is characteristically trifid, the setigerous region having a single spine and a tuft of bristles superiorly and inferiorly. At the 50th foot the dorsal lobe (cirrus) is elongated and tapered, with the dorsal bristles and their spine. The inferior division has a rounded setigerous region with its spine and two long papillæ projecting externally. A ventral cirrus occurs inferiorly. The foot remains of similar structure till near the tip of the tail (with its two cirri), the lobes and the bristles increasing in length. The bristles of the ventral lobe considerably exceed the others, their very long terminal pieces projecting far outward.

In glancing at examples of *Goniada* from various parts of the world two types of foot are apparent. The first conforms

to the description already given, and which is observed in those from the Outer Haaf and Skerries, Shetland, St. Andrews, Norway, and Canada. The foot is therefore, both anteriorly and posteriorly, the least complex. A tendency, however, to the enlargement of the lobe beneath the dorsal cirrus occurs in females with large ova from Canada.

The second type is represented by examples from Cape Finisterre and Cape Sagres, in which the anterior feet have five processes, viz. a dorsal and a ventral cirrus (the former being near the base of the foot), a long and large posterior lobe, and two smaller anterior. The dorsal lobe is long and narrow and has a slight constriction at its base. In this type the posterior feet have broadly lanceolate dorsal lamellæ, and three long digit-like papillæ inferiorly, above the elongate ventral cirrus.

From the foregoing *Glycinde* is readily distinguished by its tapering snout of ten segments, its eyes, the two divisions of the body, the structure of the proboscis, and the structure of the feet. The sole British representative, so far as known, is *Glycinde Nordmanni*, Malmgren, which Dr. Gwyn Jeffreys first procured in various Zetlandic waters. It ranges to several parts of Ireland, to the Atlantic, and elsewhere—generally in somewhat deep water. The proboscis is distinguished from that of the foregoing form by the absence of the lateral V-shaped denticles. The arrangement of the denticles at the termination of the first region of the proboscis seems to differ from Malmgren's figure, which shows a decreasing series of four teeth in lateral view, whereas in some this is not evident. The smaller denticles appear to be from 22 to 24 in number. The first feet are simple and short, bifid and afterwards trifid as they increase in length.

The 10th foot has three lanceolate lobes. The same number characterizes the 30th foot, but they are more massive and considerably flattened. Between the 30th and 50th feet the appendages attain greater complexity, the latter having a dorsal division of two lobes (or a cirrus and a lobe), a spine, and a few bristles, though the latter are often included in the tissues. This is evidently due to the growth of a dorsal lobe on the upper process of the trifid foot. The lower division consists of an upper long, bluntly conical, setigerous region, with fan-like groups of bristles which are arranged in three divisions, and a ventral cirrus beneath.

A great increase in the lamella of the inferior setigerous lobe occurs at the 70th foot, so that in outline the parts are broadly lanceolate; the bristles are also longer and more slender. Further changes appear in the 100th foot, for the

lower lobe now far exceeds the superior in bulk, the broadly lanceolate outline being due to the approximation of the two flaps. The ventral cirrus is proportionally smaller. In the superior division again the setigerous lobe forms a short and broad cone with the lanceolate cirrus superiorly. With slight modifications this structure continues to the posterior end.

Advanced ova occur in specimens from Ireland and Shetland in July.

Grube and Ehlers have each given classifications of the Glyceridæ, the former basing his main groups on the presence or absence of branchiæ, the latter using the armature of the proboscis and the nature of the feet to form his chief divisions. Ehlers's first group, the "Glycera tetragnatha," however, includes both of Grube's; the second, the "Glycera polygnatha," comprising *Goniada* and *Glycinde*, being treated separately by Grube. Arwidsson * retains, after Malmgren, the Glyceridæ and Goniadidæ as separate families, and his paper, illustrated by outline-figures, forms an important contribution to the subject.

The teeth in the Glyceridæ are arranged in pairs, their disposition, however, being such that they divide the circumference of the extruded proboscis into four nearly equal parts; the larger space, however, often occurring between the two pairs, not between the individuals composing a pair. The pairs of teeth are recognized by the direction of the spurs, which are symmetrically arranged on each side—spur pointing to spur—whether it is simple as in *Glycerella* or bifid as in the common *Glycera lapidum*. The single process, however, appears always to be longer than the bifid, and in either case the spur forms a large angle with the tooth which is obliquely inclined to the process.

The first and most abundant British form is *Glycera lapidum*, De Quatrefages, which stretches along both coasts from north to south, is a common European form, and ranges to the South Atlantic. In its epitokous form (like "*Glycera setosa*") it is found swimming at the surface of the sea from Shetland to the Channel Islands, though it is not common in this condition. This species has the body-segment three-ringed, the papillæ of the proboscis are filiform and crenate, and the foot has a single spine in front. At the 35th foot, however, the dorsal lobe, instead of being folded

* "Studien über d. Fam. Glyceridæ &c.," Bergens Museum Aarbog, 1898.

backwards, projects straight outward, and dorsal bristles are present, though the second spine only appears about the 45th foot. The typical foot presents three pointed lobes and a small dorsal cirrus above it, the third or inferior being the conical ventral cirrus, the hind lip being broad and rounded. The ventral bristles are in two fan-like groups, the extreme dorsal and ventral bristles being stronger than the central in the posterior region of the body. This important feature seems to have escaped the patient and persevering labours of Arwidsson, though it is also slightly indicated in *G. capitata*, Œrst. In the epitokous condition the body is longer, the feet longer and more prominent, and the spines and bristles longer and more attenuate. Moreover, simple bristles occur amongst the compound in the ventral series. In contrasting this form with the northern *Glycera capitata* in its epitokous condition the greater length and slenderness of the bristles is apparent, as well as the less pronounced increase in the thickness of the upper and lower groups of the strong compound bristles.

It was *Glycera lapidum* which was dredged in the 'Challenger'* off Fayal in the Azores, not *G. capitata*, and it was the latter species (as the original labelling of the slides as well as the remarks of Ehlers now indicate) which was procured at Kerguelen, but such differed from the ordinary type in the great length of the tips of the compound bristles and in the stoutness of the shafts of the upper and lower series of the same bristles, a feature approaching the condition in *G. lapidum*. The differences in transverse section between the ordinary form (*G. lapidum*) and the Kerguelen type, especially in regard to the nerve-cords, were described in the 'Challenger' volume.

De Quatrefages first applied the term *Glycera lapidum* to the species described by Dr. G. Johnston as *Glycera alba*, O. F. M.†, and with it he associated Keferstein's *Glycera capitata*, Œrst. In his description of the species, however, there is little that is definite, for he does not mention whether the segments are two- or three-ringed, though he states that the body is attenuate at both extremities, is devoid of branchiæ, that the head has 8–9 rings and is very elongate, the feet are short, biramose, have 2 or 3 groups of bristles, and that the superior cirrus is very small, whilst the ventral is large and conical. A perusal of Dr. Johnston's description and an examination of specimens in the British Museum show

* Annelids of the 'Challenger,' p. 344.

† Ann. & Mag. Nat. Hist. ser. 1, vol. xv. p. 147, pl. ix. figs. 1–10.

that he refers to the common British species (*G. lapidum*) hitherto termed *Glycera capitata,* a species in which the segments are three-ringed. The *G. capitata* of Keferstein is described by the author as two-ringed, so that Œhlers and Arwidsson must have satisfied themselves that this is a misapprehension before grouping it with the British form, which is three-ringed.

It is seldom that two forms so closely approach each other as *Glycera capitata,* Œrst., and *Glycera lapidum,* De Quatrefages, for the differences in the comparative length of the foot in spirit-preparations are not noteworthy, and the other characters require minute investigation. *G. capitata,* however, is a purely northern form, characteristic of the waters of Greenland, and not passing farther south than the North Atlantic according to Arwidsson, whilst *G. lapidum* ranges far southwards. The latter is distinguished from *G. capitata* by having an eleven-ringed cephalic region, pointed foot-lobes, first three feet small and devoid of a dorsal cirrus, ventral cirrus pointed, and dorsal cirrus larger. The papillæ of the proboscis are long and subulate, situated on eighteen longitudinal muscular areas, between which are short ovoid papillæ. The spur of the teeth forms a wide V, whereas in *Glycera capitata,* Œrst., there is but one limb and a truncated surface (Arwidsson, chiefly). How far future observations may indicate a closer relationship between the two forms is an open question. The differences in structure and distribution are, meanwhile, noteworthy.

Another abundant species is *Glycera siphonostoma,* Delle Chiaje (*G. tessellata,* Grube), which has an extensive range from the north of Scotland to the Cape. In this large form the segments are two-ringed and the massive proboscis has lanceolate papillæ each streaked like a leaf. The foot is comparatively short, with an ovoid dorsal cirrus on the body at the base, two long, anterior, broadly lanceolate lobes, about equal in length, and two short, blunt, posterior lobes besides the ventral cirrus, which is of considerable length, though it does not extend so far outward as the anterior lobes. The spur of the teeth in the proboscis resembles that of *Glycera capitata,* Œrst., in having a single process and a flat edge at its base. The body is upwards of a foot in length and nearly half an inch in diameter.

Glycera Ehlersi, Arwidsson?

A species from 80 fathoms in St. Magnus Bay, 1867; 9 miles off Balta, in 80 fathoms, in 1868; and in 53 fathoms on 3rd and 4th August, 1880, in the 'Knight Errant.'

This differs from any other British form in the structure of the foot and in the greatly elongated snout.

The cephalic cone is much elongated and shows about twenty-two rings with the tentacles at the tip. The papillæ of the proboscis are elongate and conical, whilst here and there are a few with broader tips, so as to be somewhat lanceolate. The teeth present only a single spur of considerable length with a shoulder or flange at the base.

The segments of the body, where most distinct, appear to be three-ringed.

The typical foot has a comparatively large rounded dorsal cirrus with a broad base, two elongated conical lobes anteriorly, and a single median lobe of considerable size—with a rounded edge posteriorly. The ventral cirrus is conical and extends beyond the tip of the latter.

This characteristic form has been in the meantime associated with a species described by Ehlers as *Glycera lapidum* *, but which differs from that which has a better title to the name, and therefore Arwidsson has termed it *Glycera Ehlersi* †. It is true it differs from the species described by Ehlers in having apparently three rings to each segment, but in small specimens it is often difficult to apply this character. The structure of the foot of the two forms is the same, though Ehlers has given no figure. Both have a single spur to the teeth—with a flange at its base—and the papillæ of the proboscis are similar. Ehlers considered that the *Glycera capitata* of Keferstein ‡ was his form, but I agree with Arwidsson in referring Keferstein's form to *Glycera lapidum*.

Amongst those with branchiæ is the almost cosmopolitan *Glycera alba*, H. Rathke, which ranges from Britain to Japan and is equally at home in the west of Shetland as on the shores of Devon and Cornwall. The body is of considerable length (6–8 inches) and the segments are two-ringed. The proboscis is short and clavate and the papillæ small and clavate. The teeth have a long external and a shorter internal spur, both arising from a broad base. The foot is somewhat short anteriorly, longer posteriorly. Branchiæ are present on all the feet except the first and the last (about twelve at each end) and arise from the dorsal edge of the foot towards the tip. The dorsal cirrus is short, with a constriction at the base. The foot soon shows two spines, two

* Borstenw. ii. p. 652.

† *Op. cit.* p. 19.

‡ Zeit. f. w. Zool. Bd. xii. p. 105, Taf. ix. figs. 17–27 (1862).

flattened lanceolate lobes anteriorly, and behind a shorter conical lobe, whilst a blunt lobe occurs inferiorly. The ventral cirrus is bluntly lanceolate and reaches only to the tip of the truncate lobe just mentioned. The branchia becomes very distinct at the 20th foot, and it diminishes towards the tip of the tail to a small process at the base of the dorsal lobe.

Though it is doubtful whether an accurate diagnosis can be made concerning the *Glycera unicornis* of Savigny *, yet the descriptions of subsequent authors, more especially those of Malmgren (his *G. Goësi* †) and Ehlers ‡ (who, however, gives it bifid branchiæ in certain instances), would appear to separate this form. Such branchiæ have not been seen in Britain, and it may yet be necessary to distinguish it from the *Glycera Goësi*, Malmgren. In Britain it has hitherto been chiefly found in deep water in Shetland, in the Minch, and off the south-west of Ireland. The head is typical, the body about 5 or 6 inches in length, and the segments two-ringed. The proboscis has conical papillæ interspersed with globular ones. The inner spur of each tooth takes the form of that of *G. capitata*, viz. a ridge which comes near the surface in position and a long bar below. In all the fang has a denticle about the point of origin of the inner spur, and the base of the tooth is set obliquely in the proboscis, so that the distance between the extreme points is considerable. The branchiæ commence on the 32nd foot and continue nearly to the posterior end (examples incomplete). The typical foot has considerable depth, with the comparatively large dorsal cirrus at the base. The branchia is on the anterior surface of the foot and is directed forward and slightly upward. Two long lobes occur at the tip of the foot anteriorly and two shorter flattened conical lobes posteriorly, besides a short ventral cirrus with an oblique and rather blunt tip. The *Glycera decipiens* of Marenzeller §, from the Bay of Miya in Japan, appears to resemble this species very closely both in regard to the position of the branchiæ and the structure of the foot; Arwidsson is of the same opinion.

No representative of the family Ariciidæ is entered in Dr. Johnston's 'Catalogue of the Annelids in the British Museum,' though under this head he gives several examples of the Spionidæ. The work, however, was only published after his death, and omissions probably occurred, for in an

* Syst. des Ann. p. 37.
† Ann. Polych. p. 71, tab. xv. fig. 81.
‡ Borstenw. ii. p. 666, Taf. xxiv. fig. 35.
§ Südjap. Annel. p. 140, Taf. vi. fig. 3.

illustrated MS. of his which came into my hands in 1872—after the death of Dr. Baird—a figure of "*Aricia Mülleri*" from H. Rathke's 'Beiträge zur Fauna Norwegens' (1843) is given, as if he had been studying the species.

Several examples of the family have long been known in Britain, the first (*Aricia Cuvieri*, Aud. & Ed.) being perhaps the most common. Its head is a pointed cone without trace of rings or eyes. A transverse line separates it from the peristomial segment ventrally, whilst dorsally a crescent is cut from the latter at the base. The body is from 8 to 10 inches in length, with narrow segments. The peristomial segment is narrow dorsally, but broad ventrally, and the proboscis forms a frilled rosette in extrusion. Posteriorly the body tapers to a blunt point, with the anus at the tip dorsally and with two very long and slender cirri. The first region of the body comprises 21 feet, but these vary considerably amongst themselves, commencing with rudimentary feet anteriorly and ending in modified feet towards the 21st. From the 6th foot backward the posterior of the three rows of ventral bristles is darker and is composed of spines increasing in strength, so that they form a conspicuous series of brown dots. The foot becomes more free and the posterior row of papillæ more conspicuous, extending ventrally beyond the bristles of the 17th foot. From the 19th to the 24th foot these papillæ go to the mid-ventral line. The rows of ventral bristles attain their maximum about the 15th or 16th foot. The dorsal cirrus increases in size in its progress backward and has an enlargement at the base. The branchiæ commence at the 5th foot and are of a rich red colour in life. In the succeeding region of the body (at and after the 22nd foot) the dorsal division has in front a long tuft of serrated or articulo-serrate bristles and behind is a large dorsal cirrus with blood-vessels. Below, after an interval, is a smaller cirrus, also with a blood-vessel. The ventral division consists of a setigerous process with a long papilla (ventral cirrus?) and a few very slender bristles of the same type as the dorsal. The peculiarly serrated bristles disappear posteriorly, long simple tapering bristles taking their places in both divisions of the foot. The majority of the specimens consist only of the anterior region, the posterior having been left in the sand or other ground frequented by them as the edge of the dredge severed them.

Aricia norvegica, Sars, again, was found in Shetland by Dr. Gwyn Jeffreys, and extends to Norway and Greenland (*Sars and Norman*). The head in this species is typical and the anterior region has fifteen bristled segments. The

branchiæ commence on the fifth. The dorsal cirrus is flattened, with a filiform process at its outer edge. The anterior rows of ventral bristles are pale, the last three or four with dark brown hastate spines. The rows of papillæ behind the foot are more acutely pointed than in the previous species and are from 8 to 12 in number. At the 23rd foot the dorsal division has 4 or 5 spines and a long tuft of slender bristles with finely tapered serrated tips. The cirrus is narrow and has a tapered extremity. A single spine occurs in the ventral division and a small group of slender bristles, the tips of which are serrated. The blunt setigerous region has a conical lobe to its outer side, whilst at the base externally is a conical ventral cirrus nearly equal in size.

Another of the series is the widely distributed *Scoloplos Mülleri,* De St. Joseph, which ranges from the tidal region to 50 or more fathoms, according to the locality. It extends to Northern Europe and the Siberian coast. The acutely pointed head rests on the truncated cone of the peristomial segment. The body is flattened and widened anteriorly, then rounded ventrally and flattened dorsally in its progress to the tail, which has four papillæ at the vent and a pair of long slender cirri. The anterior region has eighteen segments, bearing shorter, stouter, serrated bristles. The shorter curved bristles with blunt tips serrated on the convex side are modifications of the longer series, apparently due to special influences of habitat, and varying much among themselves. They can scarcely be regarded as a separate and distinctive series. The 15th foot has a conical dorsal cirrus or lobe, with a tuft of rather long bristles in front of it, the shafts of which are smooth. The tapering tips are peculiarly spiked, and end in smooth hair-like points. The ventral division has two short conical papillæ, one of which is below the bristle-tuft and probably represents the ventral cirrus; the other is below the dense, deep row of bristles which are shorter than the dorsal, but of the same type. The branchiæ commence as small papillæ on the 17th bristled foot, attain considerable size at the 20th foot, and almost reach the tip of the tail. Below the foot from the 18th to the 30th bristled segment (fewer in some) a papilla occurs on the side of the body.

To Baron de St. Joseph *, who has done such excellent work amongst the annelids of the French shores, belongs the credit of pointing out the differences between the northern species—the typical *Scoloplos armiger* of O. F. Müller—

* Ann. Sci. Nat. 8e sér. v. p. 356, pl. xx. fig. 167 (1898).

and the southern, which he terms *Aricia Mülleri*, H. Rathke. He founds this distinction mainly on the tapering or subulate condition of all the bristles (dorsal and ventral) in the anterior region of *Scoloplos armiger*, O. F. M., whereas in what he calls *Aricia Mülleri* such are accompanied by shorter blunt forms, and, moreover, in the first six segments of the posterior region of the body the ventral division has two protuberances below it, with a minute elevation near them, and a conical papilla on the body below. It is not explained, however, that a similar papilla occurs in the typical *Scoloplos armiger* from Greenland and the northern waters. The two forms very closely resemble each other, the main features which differentiate them being the somewhat longer rows of ventral bristles in the southern, and the better developed fleshy ridge behind them with its flattened conical elevation in the ventral division, and the two papillæ just below it; whilst the ventral row of bristles has a variable number of short and somewhat truncate forms, which must not, however, be regarded as specific. They are simply modified forms of the ordinary tapering serrate kind belonging to the division, and probably are due to the circumstances of habitat, and are perhaps more abundantly present in those from the Channel Islands than in the more northern examples. In this form a papilla appears in the middle of the fillet behind the ventral bristles of the anterior region about the 5th foot, and is very conspicuous from the 10th to the 13th. At the 17th foot two papillæ occur, by the addition of one below the median, whilst at the 18th there are three, the bristles being somewhat above (dorsal to) the upper. At the 19th foot the lateral ridge ends dorsally in three conical processes, with a thick papilla beneath. In very fine examples from Lochmaddy the papilla below the foot commenced on the 15th and continued to the 22nd foot.

The minute differences alluded to in the foregoing paragraphs show the slender grounds on which specific differentiation may be founded. The divergent surroundings may be accountable for some of these, and certainly many examples of *Scoloplos Mülleri* show the effects of abrasion in the anterior bristles of the ventral rows in the first region of the body.

In the typical *Scoloplos armiger*, O. F. M., from Greenland, the first fifteen anterior feet have somewhat shorter (*i. e.* from above downwards) ventral rows of bristles. The dorsal cirrus is a well-marked conical process which gradually increases in length posteriorly. The fillet behind the

ventral row of bristles forms a convex flap—highest in the middle—and without any evident differentiation till the 15th foot, when a papilla projects from its median convexity (one or two of the preceding feet showing a slight thickening at the same part). The row of ventral bristles is shorter. Though the bristles are longer, the row is still shorter at the 16th foot, and a papilla occurs on each side behind it. The 17th foot has three papillæ, whilst the 18th has the enlarged lateral fillet with an isolated papilla below it, and this for three or more segments.

A form like *Scoloplos* *, dredged at Station 6, 1100 fathoms, in the 'Valorous' Expedition of 1875, differs from *S. armiger* and *S. Mülleri* so distinctly that its features may be mentioned. The snout forms a short cone in front of the large peristomial segment which has the triradiate mouth inferiorly. The snout in *Scoloplos armiger* is considerably longer and the peristomial segment smaller. The body is rounded anteriorly, and indeed—so far as the fragmentary specimen goes—throughout, and is thus in contrast with the flattened anterior region of *S. armiger* and *S. Mülleri*. The dorsal surface of each segment is marked by a narrow ridge round the borders with a depressed area in the middle. Ventrally each segment of the first fifteen has a slight elevation in the middle. The great length and curvature of the dorsal bristles anteriorly is noteworthy. The foot in the anterior region is characterized by the tapering condition of all the bristles, both dorsal and ventral, and in the absence of the marked differentiation between them. Almost from the 1st foot a minute dorsal and ventral papilla are present, and they increase in the subsequent feet. These processes in the anterior region form a prominent pair of cirri, which are nearer each other than in the ordinary form. It is difficult to say where the change in the anterior feet occurs, but apparently the first nine are thus differentiated, though it is at the 12th foot that another flattened and broader process appears above the subulate ventral process or cirrus. The yellowish dorsal bristles have smooth shafts with long, curved, and minutely serrated tips, which vary in appearance according to position, giving a camerated aspect in whole or in part, from the peculiar arrangement of the spinous rows. The dorsal cirrus is in the typical foot a long flat cone. The ventral cirrus is a short conical papilla. The ventral bristles are shorter, with tapering and finely serrated tips which project only a short distance beyond the

* Should this prove to be new, the specific name *Jeffreysii* would be appropriate.

cirrus. Amongst these are slender, elongate forms which taper to a fine point and do not appear to be serrated. It would seem that the habits of this deep-water form differ from those of *S. armiger*, in which the anterior ventral bristles are much worn.

The processes of the foot become more distinct and gradually pass upward (dorsally), and they are joined by the branchia on the 20th foot. About the 30th foot the segments increase in antero-posterior diameter, and show a deep furrow laterally and dorsally at the segment-junction, whilst a prominent flap or ridge on the dorsum slopes backward with the various processes, which consist from within outwards of a somewhat short branchia, then of a lanceolate dorsal cirrus with a constriction at the base and the small tuft of long slender bristles, and, lastly, of a larger and a smaller process, the latter probably representing the cirrus—besides a few slender bristles.

The foot thus differs from the ordinary type (*S. armiger*) in the less elongate dorsal and ventral cirri.

Canadian examples are characterized by the small size and filiform condition of the dorsal cirrus, and also by the somewhat reduced size of the ventral processes. In *Scoloplos armiger* procured by the 'Valorous' in the same expedition the processes are also more elongate.

A species of *Theodisea*, viz. *T. mammillata*, Claparède, has been described by Cunningham and Ramage * from Granton Quarry in the Forth. The details given of this species do not render its exact structure quite clear, and it certainly differs from the Mediterranean fragment procured by the 'Porcupine.'

Naidonereis quadricuspida, Fabr., was procured in considerable abundance between tide-marks at Lochmaddy, North Uist, in 1865. The head forms a round button-shaped process, the peristomial segment being notched at each side. The body is about 3 inches in length, slightly tapered in front, and considerably diminishing towards the tail, which ends in two rounded dorsal papillæ and two short ventral cirri. The anterior region has thirteen bristled segments. The branchiæ commence on the 6th foot, are of comparatively large size, and continue to the 8th or 10th segment from the tip of the tail. At the 10th foot the branchia is flattened and acutely lanceolate, and it is separated by a space from the dorsal division of the foot, which bears a fan-like tuft of tapering bristles with smooth shafts

* Trans. R. S. E. vol. xxxiii. p. 642, pl. xxxviii. fig. 8, & pl. xl. fig. 8.

and spinose tips. The dorsal cirrus behind has an enlarged base and gently tapered tip. After an interval the slightly convex and long inferior division occurs, with a prominent blunt lobe or papilla rather below its middle posteriorly, and directed inward and backward. A dense series of the strong and slightly brownish curved (club-shaped) bristles occupies the whole length of the division, with a few tapering, serrated forms amongst them. Most of the short strong forms show distinct serrations towards the curve. The ventral division ends in a notch ventrally. After the change in the structure of the foot occurs, as at the 23rd, the slightly tapered dorsal cirrus has in front of it a group of long tapering bristles with smooth shafts and serrated tips, which are supported by four spines. A low rounded papilla closely adjoining the foregoing represents the inferior division, with two spines and a few slender serrated bristles. Posteriorly a ventral cirrus appears beneath the division.

3. *On the* Goniadidæ, Glyceridæ, *and* Ariciidæ *of the 'Porcupine' Expeditions of* 1869 *and* 1870.

Goniada pallida, Arwidsson.

In a large but fragmentary example from 81 fathoms, off Cape Finisterre, dredged by the 'Porcupine' in 1870, the processes of the feet are proportionally long. A similar form comes from Cape Sagres in the same expedition. In both the ventral bristles are long and strong. The examples are the largest of the series. The head appears to be typical. The body is massive, glistening, and characterized by the elongate feet. It is incomplete posteriorly. The proboscis has two larger teeth, which are somewhat irregular in outline, and more numerous smaller denticles than in *G. maculata*.

The V-shaped denticles are more numerous than in the common species, viz. 12–13 in number. It is the apex of these which acts on the food. The larger denticles (Pl. IV. fig. 3) are less regular in outline than those of *G. maculata*, and the teeth are not in a uniform series. One, indeed, has only a median large and two smaller curved teeth without the lesser processes.

The individuals in the row of smaller denticles varied considerably among themselves, but they did not seem to diverge much from the type seen in the ordinary form. They were, however, much more numerous—smaller being intermingled with the larger. The papillæ observed did not differ from those of the ordinary form (Pl. IV. fig. 5).

Arwidsson does not show a posterior foot (*e.g.* about 100th), so that there is doubt, but, so far as observed (Pl. IV. fig. 1), it bears a close resemblance to his *G. pallida*. The compound bristles have the form shown in the same plate (fig. 2).

In the 'Porcupine' Expedition of 1869, *Glycera lapidum*, De Quatref., was dredged off Bundoran in Donegal Bay, on muddy sand, in 20–30 fathoms.

Glycera siphonostoma, Delle Chiaje, occurred off Cape Guardia in 1870.

Glycera alba, H. Rathke, in 1869, was found on muddy sand, in 165 fathoms, off Ireland; on muddy sand in Donegal Bay, off Bundoran, in 20–40 fathoms; and in 30–40 fathoms, Dingle Bay, amidst stones and mud. In 1870 it was dredged in 45 fathoms off Cape Sagres, as well as off Cape Guardia.

Aricia Cuvieri was dredged in 164 fathoms in greyish sand and gravel in the expedition of 1869.

The second species is *Aricia Kupfferi*, Ehlers *, which was dredged in the 'Porcupine' Expeditions of 1869 and 1870, and which likewise extends to Norway and Greenland. The head in this form is typical. The anterior region has fifteen bristled segments. Each foot has a dense tuft of spinose bristles finely tapered, with a stout dorsal cirrus posteriorly. An interval separates it from the ventral division, which has a series of similar but shorter bristles, many of which have shafts with rounded tips. The last three feet of the region have dark brownish spines with long hastate tips. The rows of papillæ posteriorly are separated by a space from the bristles. These papillæ occur in rows on the ventral surface of bristled segments 13, 14, 15, and 16, and, it may be, on one or two of the succeeding segments. The 23rd foot has the broadly lanceolate branchia internally on the dorsum, then the elongated dorsal cirrus shaped like a pointed shoe, and a tuft of long serrated bristles, amongst which are some simple forms. There are four spines. In the interval between this and the ventral division is a short and rather broad conical papilla. The ventral division presents a somewhat clavate setigerous region supported by two spines and a prominent lanceolate lobe (cirrus) in front of it. The bristles are long and translucent, with smooth shafts and tapering, curved, and closely serrate tips.

* Tauber seems to be somewhat doubtful if this is other than a var. of *A. norevgica*, but no papilla exists in the latter, so that this differs.

4. *On the* Goniadidæ, Glyceridæ, *and* Ariciidæ *procured by Dr. Whiteaves in the Gulf of St. Lawrence in* 1872 *and* 1873.

Goniada maculata, Œrsted.

In the Canadian examples the V-shaped denticles at the sides of the proboscis ranged from eight upwards. The larger jaws guarded the lateral regions of the organ, their tips pointing dorsally, three bifid denticles occurring ventrally and two V-shaped ones dorsally. When the basal region is fully extended the papillæ form a frill at the tip, the teeth of the larger jaws point inwards and backwards, those of the bifid denticles and the tips of the V-shaped forms having a similar direction. Three small separate denticles appeared outside this circle dorsally. The opening of the proboscis in this condition is oblique, pointing upwards and backwards.

Goniada norvegica, Œrsted.

Dredged at A, no. 4, 1872, in 150 fathoms, between Griffin's Cove and Cape Rosier, Gulf of St. Lawrence.

The head is proportionally massive and appears to consist of eight rings in front of the large basal (peristomial) segment. The terminal region has four short cirri, the distal being shorter than the terminal pair. A lateral line or groove on each side dorsally and ventrally cuts off a lateral fillet. The peristomial segment has a slight imprint of the lateral grooves in front dorsally, while ventrally it is split by a wide longitudinal fissure with a flap at each side, forming the lips. No trace of eyes exists in the preparation. The body is about 8 inches in length, though incomplete, and at its widest part is fully 10 mm. across the feet and bristles. It is slightly rounded dorsally, flattened ventrally, with a shallow but broad median groove along the latter. The first segment is connected by a broad median neck with the peristomial, and from this point backward the segments dorsally have a distinct pattern, viz. a broad prominent fillet at each side continuous with a narrower median region, and a narrow fusiform central region clasped by the former in front and behind. By-and-by, proceeding backward this pattern becomes less marked, the lateral fillets being broader, whilst the median lozenge now extends to the fillet on each side, making, with the former connecting-bridge, two belts between the fillets in each segment. The projecting fillets also show furrows (longitudinal). About the

middle of the body considerable flattening occurs and the markings just described fuse and disappear, the segment, with the foot on each side, being only variegated by pigment; and this continues to the posterior end of the fragmentary specimen, in which reproduction of the caudal region had commenced in the form of a short median papilla with two proportionally large caudal cirri. On the ventral surface the segments are simple in front, then show a tendency to two lateral fillets and two median parts—an anterior broader and a posterior narrower. Posteriorly the segments become simple, as on the dorsal surface, a dimple marking the median region and then disappearing.

The proboscis is a long, tough, and muscular organ, having at the base of its first region two long rows of V-shaped denticles, eighteen in number, with a speck in addition beyond them. At the distal end of this region (in extrusion) are a pair of jaws, near each other, with a dense series of denticles between them, whilst the longer ventral space has a linear series of upwards of twenty in number behind the papillæ. The latter are about seventeen or eighteen in number, blunt and flattened. One of the larger jaws has three prominent teeth, the other three. They lie just within the ring of bluntly conical papillæ.

The first segment bears at each side a small lanceolate lobe on the anterior edge, and on the posterior a foot of three lobes, the ventral being the larger and the dorsal next. No bristles were present in the example. The succeeding feet have four or five lobes, and they increase in size.

Five lobes exist on the 10th foot (Pl. IV. fig. 5), the dorsal being large and lanceolate, with an indentation on the dorsal edge, so that the lobe has the aspect of a foot, the three middle digit-like, and the ventral being a long lanceolate process. The dorsal, ventral, and the posterior lobes reach to the same vertical plane, whilst the two shorter anterior lobes fall considerably within it. Of the two latter (anterior) the upper is the longer.

The 20th foot has the same number of lobes, the large dorsal and ventral, two anterior in front of the bristles, and a much larger lobe behind the bristles.

Only compound bristles are present.

About the 35th foot a small lobe appears in front of the flattened dorsal lobe or cirrus, with a spine and a series of dorsal bristles, thus completing the bifid condition of the foot.

At the 40th foot is a superior division with a second spine and a group of simple dorsal bristles, the dorsal cirrus or lobe

being somewhat shorter than in front, whilst beneath it is a smaller lanceolate lobe.

The inferior division consists of the three lobes (two anterior and one posterior) and the ventral cirrus. The compound bristles have the same structure.

At the 60th foot a decided increase in the size of all these flattened lobes is observable, especially in the inferior division, and when the 100th foot is reached all may be called foliaceous. The lower dorsal far exceeds the upper in size. The anterior lobes of the inferior division form thin but broadly lanceolate flaps, whilst the posterior is as broad as both and of an ovato-lanceolate outline. The ventral cirrus, again, is shorter than in front, but still broad and thin.

At the change from the more rounded form to the flattened condition of the body the whole of the processes of the foot become enlarged and flattened. Thus the secondary dorsal lobe in front of the superior tuft of bristles has become a double flap with the bristles between. The two anterior and the posterior lobes are also flattened out, whilst the ventral lobe is proportionally less than in front.

Posteriorly the feet diminish in size, but they retain a similar character, the lobes, however, being much less, the largest in proportion being the dorsal (Pl. IV. fig. 6, 90th foot).

The example is a female laden with large ova.

In considering the relationship of this to the widely distributed *Goniada maculata* two factors have to be weighed, viz. the effects of environment in causing variation of the several parts of the foot and the influence of sexual conditions.

The addition of two lobes to the foot in the anterior region of the body is perhaps the most marked divergence between this and the ordinary type; but as there is variability in the latter on this head, too much reliance need not be placed on it.

There is less difficulty with the posterior feet, which diverge from the ordinary form only by the foliaceous expansion of the identical lobes of the feet, both dorsally and ventrally.

Glycera capitata, Œrst., was dredged at Station 54, 1873, off Prince Edward Island, from St. Jaques to Sea-Cow Head.

Glycera siphonostoma, Delle Chiaje, occurred in 1872, locality not stated.

Glycera dibranchiata, Ehlers.

1868. *Glycera dibranchiata*, Ehlers, Borstenw. ii. p. 670, Taf. xxiv. figs. 1, 3–8, & 19–28.

From Station no. 7, 1873, viz. between Anticosti and the Gaspé Peninsula, in 100–220 fathoms, come one or two examples of a species which most nearly approaches the *Glycera dibranchiata* of Ehlers. The form is comparatively small, none apparently exceeding 3 or 4 inches in length. The head appears to be typical, with numerous closely arranged rings. The proboscis forms a boldly clavate organ in extrusion, and the teeth at the end of the first region can readily cross each other, dorsally and ventrally. The papillæ are elongate, and, by a constriction at the base, somewhat elliptical. At the 10th foot, two long and somewhat lanceolate lobes occur in front, a short upper one posteriorly, and below it a longer conical lobe. The ventral cirrus is short and conical. The dorsal cirrus is above the base of the foot and of same size. At the 20th foot the chief change is the increase of the upper posterior lobe, which is a flattened conical plate. The 30th foot presents both a dorsal and a ventral branchia, and these are found as far back as the 90th (Pl. IV. fig. 7), and probably behind it in perfect examples. The size of the somewhat ovoid dorsal cirrus remains considerable throughout.

The only example of the Ariciidæ is *Scoloplos armiger*, O. F. Müller, which was dredged at various stations in 1873, viz., no. 15, in August, in the Baie des Chaleurs, between Capes Despair and Grand; off Pabore, in 70 fathoms; off Cape Hood, Cape Breton, in 45 fathoms, between Bradelle Bank and Miscou Island.

5. *On the same Groups procured by Canon Norman, D.C.L., F.R.S., in Norway and Finmark.*

Of the Goniadidæ, *Goniada maculata*, Œrst., and *G. norvegica*, Œrst., were obtained, and three of the Glyceridæ, viz.: *Glycera capitata*, Œrst., *Glycera unicornis*, Savigny (= *G. Goësi*, Malmgren), and *Glycera alba*, H. Rathke. Amongst the Ariciidæ are *Aricia Cuvieri*, Aud. & Ed., *Aricia norvegica*, Sars, and a form near *Aricia Kupfferi*, Ehlers, from Norway, and *Scoloplos armiger*, O. F. M., from Finmark.

6. *On some Japanese* Glyceridæ.

Four species of *Glycera* have recently been described

from Japanese waters by Mr. J. Percy Moore *, viz. : *Glycera Goësi,* Malmgren, *G. tessellata,* Grube, *G. alba,* Œrst., and *G. robusta,* Ehlers.

It is difficult to diagnose the species mentioned by Schmarda from Chili, as the figures and descriptions of the feet are too indefinite. In his first species, *Glycera micrognatha,* he describes the branchia on the foot as terminal, but whether the description applies to the terminal papilla of the foot or a branchia is doubtful. The dorsal cirrus is also situated above the foot. In *G. macrorhiza* the terminal papilla of the foot appears to be his branchia, and the dorsal cirrus is neither shown in the figure nor referred to in the text; yet the form of the foot closely approaches that in the Japanese species. *Glycera monodon,* Schmarda, again has only a single tooth (?), the same kind of branchia (the terminal papilla), and a short ventral and a dorsal cirrus. The form of the tooth approaches that of the Japanese example. His *G. diodon* is described as having no branchiæ, two processes to the teeth, and conical, dorsal, and ventral cirri. The setigerous lobe has a clavate papilla at the tip. It is possible that all the foregoing species and the *Hemipoda patagonica* of Kinberg may be identical with the Japanese form, as Ehlers thinks, and all appear to belong to the genus *Hemipodus,* De Quatrefages.

Hemipodus simplex, Grube, var.

Procured at Koba, Japan, lat. 34° 27′ N., long. 156° 50′ E., by Capt. St. John, in 1874.

Externally this form differs from *Glycera* in the somewhat more elongate condition of the body, which appeared to be about 3 or 4 inches in length, and by the wide spaces between the feet. The latter, however, were closer anteriorly and posteriorly than they were in the middle of the body. The head was absent, having been detached after rupture by the proboscis. Posteriorly the body gradually tapered to a tail, which ended in two short cirri.

The first region of the proboscis was longitudinally streaked. The teeth are rather short, with a single slightly curved spur (Pl. IV. fig. 4), which is situated near the basal part or socket of the tooth.

The papillæ of the proboscis are simple and filiform throughout (Pl. IV. fig. 4), tapering gently from the base to the tip, finely streaked longitudinally and with minute

* Contrib. Zool. Lab. Univ. Pennsylvania, x. p. 464 (1904).

granules. They arise from a translucent basement-membrane. They are often curved, but whether this condition has given rise to De Quatrefages's description of falcate is a question. No other form of papilla is present, and hence the surface differs from the figure and description of Ehlers in regard to *H. simplex*, which has clavate or slightly globular forms amongst the filiform. Much depends on the state of the preparation, for a softened one might assume the condition in Ehlers's figure.

The anterior feet are moderately elongate, the dorsal cirrus being above the base of the foot. The setigerous region is bluntly rounded at the tip, which is pierced by the spines, and from the anterior border projects a long digit-like papilla with a constriction at the base. The bristles are placed symmetrically above and below the spine. They all have the same structure, with pale translucent shafts, dilated and split at the end for the insertion of the base of the terminal piece, which is of moderate length with a thick back piece and a thin edge minutely serrated, the whole being finely tapered to a sharp point. None are seen to be bevelled in lateral view—apparently because they differ in this respect from those of such as *Nereis*. The ventral cirrus is situated at the base of the foot and is somewhat ovoid with a blunt tip—its outline resembling that of the dorsal cirrus.

The posterior feet differ from the anterior in so far as the dorsal cirrus with its constricted base is now situated on the foot, whilst the ventral cirrus has moved outwards to the middle of the foot, is much longer and more pointed. The terminal anterior papilla is also somewhat longer. The bristles do not materially differ: they show a gradation in each bundle, those nearest the spine being more slender than those dorsally and ventrally.

This form has considerably longer feet than that shown by Ehlers, and the ventral cirrus is longer and more pointed posteriorly—in this respect agreeing with De Quatrefages's description of his *Hemipodus roseus*.

Glycera alba, H. R.

This form (not to be distinguished from *Glycera alba*, H. Rathke) comes from a depth of 30 fathoms in the Japan Sea. The papillæ of the proboscis are lanceolate.

A specimen of *Glycera siphonostoma*, 6–7 inches in length, was found by Captain St. John at low water, Tukura, Japan,

in 1874. A comparison with specimens of the species from various localities shows that it is only a variety of this widely distributed form.

7. *On the Form described as* Hemipodus (?) magellanicus *in the Annelids of the 'Challenger'* *.

This remarkable type of the Glyceridæ requires, as indicated by the query in the 'Challenger' volume, a new generic name, since it so materially diverges from *Hemipodus*, De Quatrefages, and also from the types of Kinberg and Schmarda. It is difficult to see why Ehlers † has grouped these different forms under his *Hemipodia magellanica*, Kinberg; for Kinberg's type, like that of De Quatrefages, whom he followed, had essentially a simple foot (Schmarda's Monosticha) with a single spine and one kind of bristles, whereas the form described in the 'Challenger,' whilst having a simple foot in front, had a bifid one throughout the rest of the body, and two kinds of bristles. The structure of the head of the 'Challenger' species also diverges from that of the types of De Quatrefages and Kinberg. The term *Breviglycera magellanica* was therefore suggested as more appropriate. Now, however, Arwidsson's paper ‡ has priority, and his generic name of *Glycerella* may be accepted for this peculiar type, all the features of which were duly pointed out in the 'Challenger' volume.

EXPLANATION OF PLATE IV.

Fig. 1. Posterior foot of *Goniada pallida*, Arwidsson. Magnified about 50 diam.
Fig. 2. Two compound bristles of the same species. Magnified, Zeiss oc. 2, obj. D.
Fig. 3. One of the denticles of the foregoing. Magnified.
Fig. 4. Papillæ of the proboscis of *Hemipodus simplex*, Grube. Magnified.
Fig. 5. Tenth foot of *Goniada norvegica*, Œrst., from the St. Lawrence. Magnified.
Fig. 6. Ninetieth foot of the foregoing. Similarly magnified.
Fig. 7. Ninetieth foot of *Glycera dibranchiata*, Ehlers. Magnified.

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* *Op. cit.* p. 349, pl. xlii. figs. 11–15, pl. xxii. A. figs. 12–15, pl. xxxv. A. figs. 5–7.

† Hamburger Magalhaensischen Sammelreise, Polychæten, p. 81 (1897).

‡ Bergens Mus. Aarbog, 1898, xi. p. 26, figs. 22 & 57.

M'Intosh, William Carmichael. 1905. "IV.—Notes from the Gatty Marine Laboratory, St. Andrews. No. XXVI." *The Annals and magazine of natural history; zoology, botany, and geology* 15, 33–57. https://doi.org/10.1080/03745480509443636.

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