

**A Polynoid with Branchiæ (Eupolyodontes
Cornishii).**

By

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With Plate 27.

A SINGLE specimen of an interesting Polychæte was presented to the British Museum a short time ago by Mr. V. H. Cornish, of the cable-ship "Mirror," who had obtained it off the mouth of the river Congo. It was shown to me by Professor Bell, who was good enough to suggest that I should describe it, and Dr. Günther has kindly sanctioned my doing so.

The worm is evidently a Polynoid belonging to the sub-family Acoëtidæ. It is remarkably large even for that sub-family, the specimen, although incomplete, measuring over a foot in length, its breadth exceeding one and a half inches, and its depth being nearly half an inch. It is, unfortunately, somewhat mutilated, the alimentary canal being torn out, so that the pharynx, which is a characteristic feature of the group, cannot be diagnosed. The head and greater number of segments present are, however, complete externally, and while showing clearly the genetic position of the worm, present also characters of interest only slightly developed in other members of the group, and which therefore have not hitherto received sufficient attention.

Before describing the worm itself I think it will be advisable to review briefly the characteristics of the sub-family, and to enumerate the few known species belonging to it, especially as

most of them are described in scattered journals, and some have been overlooked by later writers on the group.

The Acoëtidae may be defined as elongate Polynoids, with the elytra alternating regularly with dorsal cirri throughout the body, except for the second and third pairs which are on consecutive segments, the 4th and 5th respectively. The dorsal surface of the body is generally transversely grooved, the grooves being very fine and close together, often quite obliterating the segment boundaries. The prostomium bears two large pupillated eyes, generally on well-developed peduncles; there may be in addition smaller eyes or pigment spots behind them. There is a single median prostomial tentacle and a pair of lateral ones: the former is sometimes rudimentary or even absent; when present it springs from the posterior part of the prostomium. The paired prostomial tentacles are also occasionally absent; when present they generally arise from the ventral surface of the prostomium. There is a pair of palps, usually very large and well developed. The parapodia of the buccal segment have moved forward so as to lie in front of the mouth; they consist each of a basal part bearing two peristomial tentacles corresponding to the dorsal and ventral cirri of the other parapodia, and sometimes also bearing chætæ. The parapodia of the following segments are either uniramous or biramous with the notopodial lobe very small; each one contains a much-coiled dorsal chætal sac, the "spinning gland" of Eisig (6), producing numerous exceedingly long, fine, silky capillary chætæ, which probably help to form the tube in which the creature lives; occasionally, however, the sac may be shorter, and the chætæ produced in it more like ordinary chætæ, projecting from the sac instead of being kept inside it. There is a median ventral longitudinal ridge protecting the nerve-cord; it is bounded on each side by a deep furrow, and widens in front just behind the mouth. The pharynx is exsertile, papillose on the anterior margin; the jaws large and horny, armed with two central and many lateral teeth.

The known species of the sub-family are only fifteen in number, and of most of these only single and incomplete speci-

mens have been seen; only two, the Mediterranean *Polyodontes maxillosus* and the Northern *Panthalis Oerstedii*, have been found by more than one observer, but even they are not very abundant. I will enumerate the species in the order of their foundation:

1817.—*Polyodontes maxillosus* (Ranzani), Audouin and Edwards. Mediterranean.

Described and figured by Claparède (4), who gives its synonymy and refers to previous descriptions and figures.

1832.—*Acoëtes Pleeci*, Audouin and Edwards. Martinique.

Single specimen, described and figured by the founders (2), and further described by Quatrefages (15). Grube (8) refers it to the genus *Polyodontes*.

1841.—*Polyodontes Blainvillei* (Costa), Claparède. Mediterranean.

Single specimen, imperfectly described by Costa (5), who calls it a "Sigalion." Referred to the genus *Polyodontes* by Claparède (4).

1855.—*Polyodontes gulo*, Grube. Red Sea.

Single specimen, described and figured by the founder (8).

1855.—*Eupompe Grubei*, Kinberg. Near Guayaquil. Single specimen.

Panthalis Oerstedii, Kinberg. British and Scandinavian coasts.

Panthalis gracilis, Kinberg. Near Rio Janeiro. Single specimen.

All three described (11 and 12) and figured (12) by their founder.

1855.—*Acoëtes lupina*, Stimpson. South Carolina.

Imperfect description by Stimpson (16).

1876.—*Eupanthalis Kinbergi*, McIntosh. Adventure Bank.

Described and chætæ figured by the founder (13).

1877.—*Panthalis bicolor*, Grube. Congo.

Two specimens differing greatly from one another, described but not figured by Grube (9).

1878.—*Panthalis melanotus*, Grube. Philippine Islands.

Panthalis nigromaculata, Grube. Philippine Islands.

Described but not very well figured by Grube (10).

1885.—*Eupompe australiensis*, McIntosh. Off Cape York, Australia.

Described and figured by the founder (14).

1887.—*Euarache tubifex*, Ehlers. Off Carysfort Reef, West Indies.

Described and figured by founder (7).

1887.—*Eupompe indica*, Beddard. Mergui Archipelago.

Described and head figured by the founder (3).

The new species which may now be added to the list bears most resemblance to the *Polyodontes gulo* described by Grube (8), and it has, indeed, certain characters in common with it in which they both differ from all the other known species. Like *P. gulo* and no other member of the group there are no long well-developed palps,¹ and the eye peduncles are lateral instead of being anterior, and fused with the sides of the prostomium, thus giving the prostomium a very broad appearance (figs. 1 and 2). The paired prostomial tentacles, when present, in all other Acoëtida with pedunculate eyes, arise from the ventral surface of the prostomium, or rather from the base of the anteriorly placed eye-stalks, and just in front of the palps (cf. fig. 10). Here and in *P. gulo* there are two small tentacles springing from the anterior (and slightly ventral) surface of the prostomium, which probably represent them (figs. 1 and 2, *t.*). Behind these (fig. 2) and springing from the base of the laterally placed eye-stalks are two other very minute tentacles, which probably represent the palps of

¹ McIntosh does not mention the palps at all in his *Eupanthalis*, but I conclude that he would have done so had they been greatly reduced in size or absent.

the other species although extremely reduced. Their relation to the eye-stalks suggests for a moment their homology with the paired prostomial tentacles ("antennæ" of authors) rather than with the palps, but if this were the case we should have not only to regard the palps as altogether absent, but we should also have to explain the presence of an extra pair of prostomial tentacles in front with no homology in other forms. A comparison of the arrangement of the different prostomial appendages¹ in the sessile-eyed forms shows that there also, as in *P. gulo* and the new worm, the paired prostomial tentacles arise close to the anterior edge of the prostomium, while the only other paired prostomial appendages, the palps, arise close behind them and are developed to their usual extent.² I think, therefore, that we may conclude that the relation of any of the prostomial appendages to the eye-stalks is a secondary one, while their relation to the prostomium is constant.³ The parapodia of *P. gulo* are not figured, but from the description they seem to resemble in arrangement those of the new species.

The only characteristic points of difference between *P. gulo* and the new worm is that while in *P. gulo* there is no trace of a median prostomial tentacle here there is one, although only a very rudimentary one; and that the few dorsal papillæ on the parapodia of *P. gulo*, some of which are described as elongated to cirri, are here enormously developed and very numerous and arborescent, resembling in appearance the branchiæ of other Polychætes. Both these points, however, seem to me to be only of specific importance, since they are characters which vary also in other members of the group. While the other characters of the prostomium, so much alike in these two species, but differing so markedly from all the other forms, seem to mark them off from all the others as a separate genus, for which I propose the name *Eupolyodontes*, calling the

¹ "Prostomial appendages" = 1 median and 2 paired "prostomial tentacles" + 2 "palps."

² Compare Ehler's figure of head of *Euarche tubifex* (7).

³ Not wishing to spoil the specimen I was unable to examine microscopically the structure of the different pairs of prostomial appendages.

new species, after the name of its discoverer, *E. Cornishii*. I would give the following as a definition of the genus and of its contained species :

1. Genus *EUPOLYODONTES*.

Acoëtidae with peduncles of eyes arising laterally from the base of the prostomium, and fused with it on either side ; short antennæ or paired prostomial tentacles arising from the anterior margin of the prostomium or slightly ventral to it ; median prostomial tentacle rudimentary or absent, arising from the posterior part of the prostomium when present ; palps small, no longer than the antennæ, situated very close to or on the bases of the eye-stalks. Dorsal surface of body very finely rugate transversely and segment boundaries thus obliterated. Parapodia with papillæ on the dorsal surface, which may be filamentous or even arborescent. Parapodia of buccal segment not chætiferous.¹

Sp. 1.—*E. gulo*, Gr. [*Polyodontes gulo*, Grube (8), 'Arch. f. Naturg.', xxi].

Eupolyodontes with antennæ arising from the anterior edge of the prostomium, but with no median prostomial tentacle. Parapodia with minute papillæ, sometimes elongated, two to five in number on the elytra-bearing segments, six or seven on the others. Only one acicle to each parapodium ; chætæ of three kinds :—a comb of short stiff chætæ slightly curved at apex, a fine bundle of bipinnate ventral chætæ, and a dorsal bundle of long delicate capillary chætæ, forming the thick silky thread of the " spinning gland." Hab. Red Sea. Living in tubes.

Sp. 2.—*E. Cornishii*, n. sp.

Eupolyodontes with a minute median prostomial tentacle situated on the posterior part of the prostomium, and just in front of a slightly raised part of the back which forms a kind

¹ This may turn out hereafter, when new species are discovered, to be only of specific value.

of "caruncle." Prostomium slightly bilobed, paired prostomial tentacles or antennæ arising one from each lobe just below the anterior edge; palps smaller than the antennæ, each with a minute swollen basal piece. Parapodia, both those bearing elytræ and those bearing dorsal cirri, with a very large number of filamentous and arborescent branchia-like looking structures along the anterior and posterior border of each, beginning on the posterior border of the 6th chætiferous parapodium, where there is only a single bifurcate filament; three segments further back they are present on both anterior and posterior border of the parapodium, and are already numerous; they increase in number and size and amount of branching for the next few segments, and are best developed on the parapodia of the 15th to the 50th segments; they then decrease in number and size, and become more papilliform. In structure each filament is hollow, its cavity being probably an extension of cœlom; the cells of the epidermis are laden with yellow granules, which look like excretory products, and there is a very thick cuticle. Only one acicle to each parapodium. Chætæ as in *E. gulo* (see figs. 8 B and 8 C), with in addition certain ones with double-brush shaped tips¹ (fig. 8 A), scattered amongst the comb of stiff chætæ dorsally. The "spinning gland" is well developed in every segment after the first few, being long and coiled and occupying the cavity of the parapodium, and opening on its dorsal surface; the long fine capillary chætæ produced by it are of a silky golden colour, generally retracted but readily drawn out an inch or two (fig. 4, *cap*). Elytra smooth, anteriorly flat, those of the 2nd parapodium (the first pair) overlapping one another, but the rest well to the side, leaving the whole of the dorsal surface except for the parapodia exposed, small (relatively to the size of the animal) and scarcely imbricate; posteriorly they are swollen and pear-shaped, each being attached to the parapodium by a stalk (fig. 5). Dorsal cirri short (no longer than the branchiæ where these are well developed), outside the elytra. Ventral

¹ Resembling those of *Eupompe Grubei*, Kinberg (12), more than those of any other of the species of which the chætæ have been figured.

cirri rather shorter, those of the 2nd pair of parapodia being larger than the rest.

Pharynx and jaws not present in the specimen.

Colour (in spirit): of the eye-stalks dark blue-black; of the prostomium itself dark, but not quite so dark; of the dorsal and ventral surface of the body dark brownish, the parapodia somewhat lighter, and the ventral ridge below the nerve-cord also of a lighter colour; "branchiæ" darker in colour than the rest of the parapodium.

Length of single specimen, consisting of ninety-two segments, but incomplete posteriorly, 32.5 cm.; breadth, including parapodia, 4.2 cm.; of the dorsal surface of the body alone 2 cm.

Hab.—Single specimen, obtained off the mouth of the river Congo, about thirty-five miles from land, at a depth of from forty-three to fifty-seven fathoms, from a bottom of mud and weed. The colour of the water where it was taken was of a uniform reddish orange.

It is probably tube-forming, although no tube was found with it. The various points are illustrated in the figures (1—8).

With regard to the other fourteen species of the sub-family (or rather thirteen, as the *Acoëtes lupina* of Stimpson is probably the same as *A. Pleei*), reference to the list given on p. 435 will show that six genera have been formed for them. Grube (8) has long ago disposed of one of these by placing *Acoëtes Pleei* in the genus *Polyodontes*. Beddard (3) has recently proposed to throw the genera *Eupompe* and *Panthalis* into one. I agree with him, but would go further, and place provisionally both these genera in one genus with *Polyodontes*, bearing in mind that closer acquaintance with the different species and the discovery of new ones will probably lead hereafter to a new subdivision into genera, but probably not—it seems to me, at least—coinciding with what we now know as the genera *Polyodontes*, *Eupompe*, and *Panthalis*. The number of genera needed in any group of animals depends entirely on which different forms and how many of them happen to be known at the time. When only three

species¹ of this sub-family were known, all about equally distant from one another, it was quite enough to have only one genus for them all, as Grube proposed. But the greater the number of species made known the less likely are they to remain equally distant from one another, and they then fall naturally into groups, only to be reunited when all the intermediate forms are known. In my opinion the sub-family of the Acoëtidæ falls now, in the present state of our knowledge, or rather of our ignorance, into three groups, which we may call genera. One of these, the genus *Eupolyodontes*, I have already defined. The other stalk-eyed forms (*Polyodontes maxillosus* and *Blainvillei*; *Acoëtes Pleei*; *Eupompe Grubei*, *australiensis*, and *indica*; *Panthalis Oerstedii*, *gracilis*, *melanotus*, and [in part] *bicolor*) I would propose to put together in the genus *Polyodontes*, defining this genus then in its widest sense as follows:

2. Genus POLYODONTES.

Acoëtidæ with peduncles of eyes arising from the front of the prostomium, and meeting, or nearly meeting, one another in the middle line in front; median prostomial tentacle well developed, paired ones present in all except *P. (E.) indica* and *P. (P.) melanotus*, and arising from the ventral surface of the prostomium at the base of the eye-stalks; palps large and well developed, arising close behind the paired prostomial tentacles; papillæ sometimes present on the parapodia, but not developed to any great extent (represented in *P. (A.) Pleei*, *P. (E.) australiensis*, *P. (E.) Grubei* [on elytra-bearing feet only], and *P. (P.) bicolor*?²). Parapodia of buccal segment sometimes chætiferous (at least in *P. maxillosus*, *P. (A.) Pleei*, *P. (E.) Grubei*, and *P. (P.) Oerstedii*, but not in *P. (E.) indica*, *P. (E.) australiensis*, or *P. (P.) bicolor*; in the other species the fact is not mentioned either way).

I have the less hesitation in placing these species of different

¹ At present, in this sub-family, it is easy to speak of these "different forms" as "species."

² If I understand Grube's description aright they would be here on the ventral surface of the parapodia, and not on the dorsal.

genera together into one genus, as I have been able to compare one species of *Eupompe* (*E. australiensis*) which was in the British Museum with a type specimen of *Polyodontes maxillosus* which Professor Bell kindly procured for me from Naples. Although the last-mentioned worm has been several times described, none of the figures of its head show very well the relations of the tentacles to the prostomium, and I have therefore figured the head from above and below (figs. 9 and 10).

The remaining species of the Acoëtidae (*Eupanthalis Kinbergi*, *Euarche tubifex*, and (?) *Panthalis nigromaculata*, and (?) part of *P. bicolor*) I would place provisionally, but only provisionally, in a third genus, which would bear the name *Eupanthalis*, defining it as follows:

3. GENUS *EUPANTHALIS*.

Acoëtidae with sessile eyes, four in number; three prostomial tentacles, except (?) in *E. tubifex*,¹ otherwise like *Polyodontes*.

Although it seems simplest to make one genus for all the sessile-eyed forms, I have a good deal of hesitation in doing so on account of Grube's description (9) of what he calls two forms of *Panthalis bicolor*, coming, by the way, from the same locality as the specimen sent by Mr. Cornish. Grube's two specimens agree in colour, and the parapodia are alike; moreover he found them in the same bottle, which he seems to think important. But while in the one the eyes are pedunculate and apparently anterior, the palps very large, the paired tentacles beneath the median one and the elytra large, in the other the eyes are sessile, the palps shorter, the paired tentacles on the front margin of the prostomium and the elytra much smaller. Grube has already remarked that it would be very strange and quite unheard of in this family of Polychætes to find such very different forms of a single species, and he is not quite convinced of it himself. If it were so it

¹ McIntosh's remark that there is "no" median "tentacle in the specimen" seems rather to imply that there may once have been one which has been lost by accident.

would be exceedingly interesting, as it would suggest that other sessile-eyed forms might be but second forms of other species with pedunculate eyes; but I think evidence is wanting of the fact that the two specimens described by Grube as *P. bicolor* do really belong to the same species. Unfortunately neither of them is figured at all. *Panthalis nigromaculata*, which I have also placed with a (?) in this genus, would appear from Grube's figure of its head to have quite sessile eyes. In his description of it, however, he speaks of them as on protuberances.

Besides throwing light on the intrinsic relationships of the sub-family, the new worm also, it seems to me, increases the probability of the existence of a relationship between the whole family of the Polynoidæ and the family Amphinomidæ. The Acoëtidæ, in common with certain other sub-families of the Polynoidæ, resemble the Amphinomidæ in the forward movement of the first pair of parapodia. The new Acoëtid resembles them further in another peculiarity of the head which I have already mentioned, namely, the ridging of the dorsal surface of the head behind the median tentacle. The resemblance may be only superficial, but one is certainly reminded by it at once of the "caruncle" of the Amphinomidæ, which is sometimes little more than a raised part of the dorsal surface of the head. Another and more striking point of resemblance, at first sight at least, is the presence of the arborescent or filamentous, branchia-like looking structures on the parapodia, and this brings me to what I consider the most interesting point about the new worm. I have already mentioned the position of these filaments and referred briefly to their structure in diagnosing the species. Their relation to the parapodium is shown in figs. 4 and 5, a single tuft of them in fig. 6, and a transverse section of one of them in fig. 7. The state of preservation they were in makes their minute structure difficult to interpret, and I cannot be at all certain whether the central cavity is really an extension of cœlom or a large blood-vessel,—that is to say, whether there is a true space between the epidermis and wall of this central cavity or not. I am inclined to think that there is no cavity

in the filament besides the central cavity, and that there is connective tissue between this and the epidermis which has not been preserved, except for a few nuclei (fig. 7 *c. t.*). The space would then be extension of cœlom, and I believe it to be lined by a definite epithelium, although the nuclei indicating this are few and far between. (One is shown at *n.* in fig. 7.) The clot inside the cavity is more like a cœlomic clot than a blood clot. If this central cavity be cœlom, I cannot be certain of there being blood-vessels going to the filaments at all (unless certain small structures, seeming to lie in the wall of the central cavity and marked "*bl. (?)*" in fig. 7, represent them), and the filaments cannot be termed "branchiæ" in the ordinary sense of the word. The extreme thickness of the cuticle would also seem to indicate that their function is other than respiratory, and the peculiar character of the epidermis helps to show what this function is. Although, owing to the method of preservation, it is scarcely possible to distinguish cell outlines, nuclei of the epidermis cells are here and there visible, and grouped around them and apparently densely loading all the epidermis cells are numerous yellow concretions, some of them refringent, others with a somewhat darker appearance, and often massed three or four together. These resemble so closely the concretions of nephridial cells and of the cells of other renal organs described by Eisig in the Capitellidæ, and behave in the same way towards chemical reagents in as far as I have been able to test them, that I think there can be little doubt of their excretory significance. Eisig has shown how in the genus Capitella, where the nephridia appear not to open to the exterior at all, the excretory products are stored in the epidermis cells, only to be got rid of when the animal changes its skin, and, as is well known, numerous Arthropods normally store their excretory products. The filaments, then, on the parapodia of Eupolyodontes Cornishii would seem to be special organs for storing the excretory products, and perhaps also for forming them.¹

¹ As far as I am aware nothing is known about nephridia or excretory organs of any sort in the sub-family Acoëtidae.

In spite, however, of their being so unlike respiratory organs in structure, their outward resemblance to the "branchiæ" of other Polychætes, and especially to those of the Amphinomidæ, struck me so forcibly that I was led also to examine microscopically the structure of these for the sake of comparison; and the results are, I believe, sufficiently interesting to warrant a mention of them here, although I must defer a more detailed description and more numerous figures to a future publication.

I have examined by means of sections the branchiæ of a *Euphrosyne*, of two or three Amphinomes, of *Chloeia flava*, of *Eunice gigantea*, *Diopatra neapolitana*, *Arenicola marina*, and a few others. The thickness of the cuticle, although most marked in the Amphinomids, is remarkable in all. In none of them nor on any part of them is the epidermis ciliated. Very minute concretions, nothing like so large as in *Eupolyodontes Cornishii*, are present in the branchiæ of the *Euphrosyne*, one of the Amphinomes, in *Arenicola marina*, and, although here they are present in other parts of the epidermis as well, in *Eunice gigantea*. Claparède (4, p. 110) has already remarked on the thickness of the cuticle, and the absence of blood-vessels and of axial cavity in the branchiæ of *Euphrosyne Audouini*, and speaks of them throughout as "prétendues branchies." Schmarda shows, however, that in *E. polybranchia* there is a vascular network penetrating into the final ramifications, and in the *Euphrosyne* of which I cut sections, and which I believe to be *E. borealis*, there were certainly two vessels traversing the main stem of each branchia, breaking up into a capillary network in the filaments. We have, then, within the same genus forms with vascular and with non-vascular "branchiæ." In most of the Amphinomes of whose branchiæ I cut sections the filaments appeared also to be solid. There was, however, in one of them at least (fig. 12) a central part very little blocked up by connective tissue. Between this and the epidermis is retiform connective tissue (*c. t.*), and in this on either side of each filament is a blood-vessel (*bl.*), giving off

numerous branches all lying in the connective tissue. Only quite at the extremity of the filaments the connective tissue and vessels seem to have disappeared altogether. In *Chloëia* (fig. 13) the two vessels have increased enormously in size, and, except for being connected with one another at intervals at the tip of each filament, give off no branches. No central cavity is distinguishable, all the space which is not blood-vessel underneath the epidermis being occupied by retiform connective tissue (*c. t.*). In the other *Polychætes* examined the branchiæ were more normal in structure, containing an afferent and efferent vessel lying close under the epidermis, but in a well-developed extension of cœlom.¹

From the above facts I conclude that the so-called "branchiæ" of polychætes do not necessarily serve only as respiratory organs, and indeed may even have no respiratory function at all (some species of *Euphrosyne*); and in the sense that we call them "branchiæ," on account of their representing the respiratory organs of allied forms, I claim to be able to apply the same term to the branching processes on the parapodia of *Eupolyodontes Cornishii*. When they are not respiratory, or at least not mainly respiratory in function, they may have to do with excretion, serving to store the excretory products, and probably, in the case of *Amphinome* at least, and those forms with blood-vessels immediately underlying the epidermis and with concretions in the epidermis cells, to form them from the blood.

In conclusion, I should like to draw attention to the minute structure of the filaments on the parapodia of the only other Acoëtid possessing them which I have been able to examine, namely, *Polyodontes (Eupompe) australiensis*. Although I think there can be no doubt, from their position in relation to the parapodium, as to their representing the more numerous filaments on the parapodium of *Eupolyodontes Cornishii*,

¹ Only in the *Diopatra* it was difficult to be certain of the blood-vessels, as the blood did not clot at all, and the two vessels in each of the filaments, each of them subdivided by connective-tissue partitions, would not be taken for blood-vessels, were it not for Claparède's statement that there is an afferent and efferent vessel in each filament.

their structure is very different, as will be seen by comparing the figures of two sections through one of them (figs. 11 A and B) with fig. 7. There is apparently no central cavity, nor is there anything looking at all like blood-vessel; the epidermis cells are flattened and contain no concretions: the only point of resemblance is the thickness of the cuticle. The substance of the filament near the tip seems to consist of concentrically arranged connective-tissue fibres, in which lie a few large clear cells with large distinct nuclei. Five of these (fig. 11A) are arranged radially round a common centre, and their appearance is extremely suggestive of the so-called "gill-glands" recently described in a Crustacean by Mr. Allen (1) (where, by the way, we have also an instance as shown by Kowalewsky of a branchia exercising some excretory function besides its normal function). It is true there is nothing to be seen here representing the duct described by him; but one could perhaps scarcely expect to find it, even if present, in material not preserved with a view to histological work, and also the plane of the sections might not be favorable for showing it. Nearer the base of the filament (fig. 11A) the whole space beneath the epidermis seems to be occupied by retiform connective tissue, except for a curious mass of what seem to be concentrically arranged connective-tissue fibres near the centre. The structure of these filaments bears most resemblance to that of the branchiæ of *Euphrosyne*—in as far as I have been able to examine them—amongst Polychætes. Here also, in the "*E. borealis* (?)" at least, we have similar large cells embedded in connective tissue near the apex of the filament, although not radially arranged round a common centre as in the *Eupompe* filament, and the large cells in a special swelling at the apex of the branchial filaments of so many *Euphrosynes* (including *E. Audouini*) are well known, although I do not know that sections of them have ever been described. The rest of the substance of the branchial filament is occupied by connective tissue, in which, however, in *E. borealis* (?) there are wall-less blood-vessels, though apparently there are not even these in *E. Audouini*.

It would be interesting if some one within reach of the other specimens of the sub-family Acoëtidæ with "branchial" filaments would examine and report on their structure.

LIST OF MEMOIRS REFERRED TO.

- (1) ALLEN.—"On the Minute Structure of the Gills of *Palæmonetes varians*," 'Quart. Journ. Micr. Sci.,' vol. xxxiv, pp. 75—84.
- (2) AUDOUIN and EDWARDS.—"Classification des Annélides," 'Annales des Sciences naturelles,' 1e sér., xxvii, 1832, pp. 435—438, pl. x, figs. 7—14.
- (3) BEDDARD.—"Report on Annelids from the Mergui Archipelago," 'Journ. Linn. Soc.,' xxi, 1887 (1889), pp. 256—258, pl. xxi, figs. 1 and 3.
- (4) CLAPARÈDE.—'Les Annélides Chétopodes du Golfe de Naples,' 1868, pp. 392—396, pl. iii, fig. 2.
- (5) COSTA.—"Description de quelques Annélides nouvelles du golfe de Naples," 'Ann. Sci. Nat.,' 2e sér., xvi, 1841, p. 269, pl. xi, fig. 1.
- (6) EISIG.—'Monographie der Capitelliden.'
- (7) EHLENS.—"Results of Dredging of the U.S. Coast-Survey Steamer 'Blake,'" 'Report on Annelids,' 1887, pp. 54—56, pls. xii and xiii.
- (8) GRUBE.—"Beschreibung neuer oder wenigbekannter Anneliden," 'Arch. f. Naturg.,' 21ter Jhrg., 1855, pp. 83—90, pl. iii, fig. 2.
- (9) GRUBE.—"Anneliden Ausbeute S.M.S. 'Gazelle,' Monatsber.," 'Berliner Akad.,' 1877, pp. 517—519.
- (10) GRUBE.—"Annulata Semperiana," 'Mém. Acad. St. Pétersbourg,' 7e sér., xxv, 1878, pp. 48—52, pl. iv, figs. 1 and 2.
- (11) KINBERG.—'Öfvers. af k. Vet. Akad. Fish,' 1855, pp. 386, 387.
- (12) KINBERG.—"Fregate Eugénies Resa," 'Zool. Annulater,' pp. 24—26, pl. vii, figs. 34 and 35 (published part); pl. x, figs. 59—61 (unpublished part).
- (13) McINTOSH.—"Annelida of the 'Porcupine' Expedition," 'Trans. Zool. Soc.,' ix, 1876, pp. 404, 405, pl. lxxii, figs. 12—15.
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- (15) QUATREFAGES.—'Histoire naturelles des Annélés,' i, p. 216.
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EXPLANATION OF PLATE 27,

Illustrating Miss Florence Buchanan's paper, "A Polynoid with Branchiæ (*Eupolyodontes Cornishii*)."

FIG. 1.—Dorsal view of head¹ and first ten segments of *Eupolyodontes Cornishii*. The elytra are represented as turned aside from their normal position to show the parapodia. Very slightly enlarged only. *t*. One of the paired prostomial tentacles.

FIG. 2.—Ventral view of head and first five segments.

FIG. 3.—Dorsal view of three segments some five or six inches from the anterior end. The elytra left in their normal position on the left side only. Turned aside to show the "branchiæ" on the right.

FIG. 4.—View from behind of a non-elytriferous parapodium from about the 50th segment. *d. c.* Dorsal cirrus. *ac.* Acicle, seen projecting behind the cut end of *sp. gl.*, the spin-gland. *d. s.* Dorsal chæta. *sp.* Spines or short stiff chætae of comb. *v. s.* Ventral chætae bundle. *cap.* Silky thread formed of capillary chætae of spin-gland, drawn out from the aperture of the gland.

FIG. 5.—Similar view of an elytriferous parapodium taken from a more posterior segment, showing the swollen elytron. The branchial filaments have become much fewer in number.

FIG. 6.—A single "branchial" tuft from a segment where they are well developed.

FIG. 7.—Transverse section of one of the "branchial" filaments. *c.* Cuticle. *ep.* Epidermis laden with concretions. *c. t.* Nucleus of connective tissue (?). *c. cav.* Central cavity. *n.* Nucleus in its wall. *bl.* (?) A blood-vessel (?).

FIG. 7A.—A portion of the epidermis of the same section, enlarged to show the nucleus (*n.*) of an epidermis cell.

FIG. 8A.—Tip of a dorsal chæta.

FIG. 8B.—Tip of one of the spines.

FIG. 8C.—Tip of one of the chætae of ventral bundle. There is not always such a marked difference at the apex as there is in the one here figured.

FIG. 9.—Dorsal view of head and first segment of *Polyodontes maxillosus*, much enlarged.

¹ "Head" here is used to include the prostomium and first or buccal segment which is fused with it.

FIG. 10.—Ventral view of head and first four segments of the same. Palps turned aside to show the underlying paired prostomial tentacles.

FIGS. 11A and 11B.—Two transverse sections of a "branchial" filament of *Eupompe australiensis*.

FIG. 12.—Transverse section of a branchial filament of an Amphinome (*Eurythoë*). *bl.* Blood-vessels. Other letters as in Fig. 7.

FIG. 13.—Transverse section of one of the filaments of a branchia of *Chloëia flava*.



Fig. 1

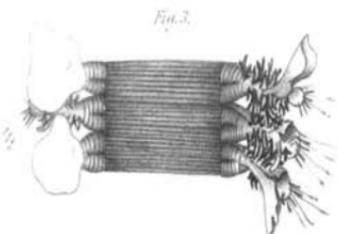


Fig. 3.

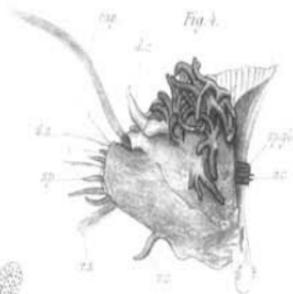


Fig. 4.



Fig. 2.



Fig. 5.



Fig. 6.



Fig. 7.

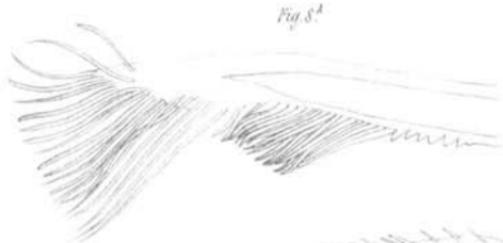


Fig. 8^A



Fig. 8^C

Fig. 8^B



Fig. 13.



Fig. 12.



Fig. 14.

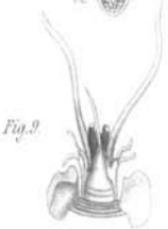


Fig. 9.



Fig. 10.



Fig. 11.



A

B