

424 DR. JOHNSTON ON THE BRITISH APHRODITACEÆ.  
XLVIII.—*Miscellanea Zoologica*. By GEORGE JOHNSTON,  
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burgh. With Plates XXI., XXII., and XXIII.\*

VI. THE BRITISH APHRODITACEÆ.

CLASS ANNELIDES.      Order ERRANTES.

CHARACTER. *Head* distinct, antenniferous: *proboscis* in general with four jaws in adjunct pairs: *feet* well developed, not uniform in structure, for some are furnished with a superior cirrus and usually with branchiæ, but without scales; while others, usually squamous, are neither branchial nor cirriferous, and these alternate, for a definite space, along the sides: *branchiæ* sometimes obsolete, always rudimentary and concealed, in the form of crests or tubercles situated on the upper part of the dorsal branch of the foot above the cirrus.

*General Observations*†.

Of the Annelides furnished with a distinct head, there are some which are flattish and of an oval form; others are slender, cylindraceous and almost filiform. The former constitute the genus *Aphrodita* of Linnæus, the latter his *Nereis*, but these genera embrace animals too dissimilar to be so closely associated. Bruguière, who saw this, began the reform and led the way to a more natural classification: he divided the *Aphroditæ* into two groups, to one of which he preserved the Linnæan name, and he called the other *Amphinome*. For the time this was considered a sufficient subdivision; and Bruguière was followed implicitly, in the first instance by Cuvier and Lamarck; but when Savigny, with richer materials and a deeper knowledge of them, had raised the *Aphroditæ* to the rank of a family with its several subordinate genera, his arrangement and nomenclature were readily adopted by Lamarck, Latreille, and Blainville, and, we may add, are now undisputed.

The *Aphroditaceæ* possess all the characters of the order to which they belong: the head is distinct, they have eyes, antennæ, a fleshy retractile proboscis, and feet to every ring of

\* [These Plates will be found in the SUPPLEMENT published with the present Number.—ED17.]

† Translated, but not literally, from Audouin and M. Edwards.

the body, armed with spines (*aciculi*), bristles (*festucæ*) more or less retractile, and with soft appendages highly developed, but in no instance with the crotchets (*uncinuli*) which belong to less typical orders. In form the *Aphroditaceæ* are in general very unlike the majority of Annelides, for the body in most of them is short, flattened, and more or less inclined to oval, although there are among them some which are slender, elongated, and nearly as cylindrical as the *Nereides*. But there is nothing more remarkable in the external structure of the generality of the *Aphroditaceæ* than the large membranous scales or *elytra*, as Savigny calls them, which lie along the back in a double series and cover it like a coat of mail. These organs are affixed to the base of the superior branch of the feet by means of a short pedicle, and are formed of two cutaneous or epidermoid layers applied the one against the other, but capable of being separated so as to become vesicular, and at certain seasons of the year they appear to be filled with ova. There are, however, in all *Aphroditaceæ* a certain number of feet which carry no scales or *elytra*, and which alternate with those that are provided with them. The first, the third, and the sixth pairs are almost constantly defective in this respect, and of the feet which follow, the alternate pairs for a more or less considerable extent of the body; but after the twenty-third, the twenty-fifth, or the twenty-seventh segment this regular alternation ceases, for posterior to one or other of these segments the feet may be either all squamous or all entirely naked, or the *elytra* may continue to appear and disappear alternately, but in an altered series; for it is now not every other but every third foot which bears an *elytron*. Instances, however, occur in which the binary alternation of squamous and naked feet prevails throughout the whole length of the body, as in the genus *Acœete*; and in the *Palmyre* of Savigny there are no *elytra* at all.

In some of the *Nereides* (*Phyllodoce*) we find on each side of the body a series of foliaceous lamellæ which resemble the scales of the *Aphroditaceæ*, but these are really very different organs, and never disposed in the alternating manner of the latter, the feet of *Phyllodoce* being all alike. No other Annelide offers any similar structure, so that the presence of feet

garnished with scales which alternate with other feet destitute of that appendage is unquestionably one of the most important characters of the present family and its leading peculiarity.

The elytra are very variable in number, and their shape is not always alike. From their structure it appears probable that they are subservient to respiration, yet we see them often associated with organs to which the name of branchiæ has been given. These are concealed below the elytra, and have the form of small crests or cutaneous nipples; they occupy the upper part of the base of the feet and are always placed within and above the cirrus of the dorsal branch. Sometimes these little appendages are scarcely visible, and they are very rarely to be detected on the squamigerous feet,—that is, on the feet of the second, the fourth, the fifth, the seventh, the ninth segments, and so on. This binary alternation of branchial with abbranchial feet is to be observed even in the species which have no elytra (*Palmyre*); but it is not so constant as has hitherto been believed, for in the genus *Acöete* branchial tubercles exist on all the feet, their number being only fewer on the segments which carry the elytra.

In the families allied to *Aphroditaceæ* there are species which present no visible branchiæ, but when these organs exist, their form or their position is essentially different. Thus in the *Nereides* they affect the form of little fleshy tongue-like processes placed at the end of the foot between the superior and inferior cirrus; and although in the *Euniceaceæ* and the *Amphinomenaceæ* they have nearly the same position as in the *Aphroditaceæ*, their configuration is very dissimilar; being in the form of filaments more or less pectinated, of tufts, of arbuscules, or of pinnatifid leaflets.

In the majority of *Aphroditaceæ* the presence of elytra coincides with the absence of *superior cirri*, that is, we find the latter only on such feet as carry branchiæ and do not bear scales. But this character, like the preceding, is liable to exception, for in *Sigalion* there is a superior cirrus to every segment of the body whether elytrous or not, and this fact appears to invalidate the opinion of those who maintain, with Blainville, that the cirri are the analogues of the elytra, or mo-

difications of the same organs, in those Annelides which are not shielded with dorsal scales,—an opinion which from the dissimilarity of their position on the body we might otherwise have hesitated to adopt. The feet of the *Aphroditaceæ* are divided into two branches, each furnished with a spine, with bristles, and with cirri, whose figures vary according to the species. We have spoken above of the superior cirri: the inferior are found on all the feet and offer nothing remarkable for notice, unless on the first segment, where they are very large, and with the superior, constitute *tentacular cirri*, a sort of antennæform filaments placed at each side of the head. But the true antennæ, however similar in appearance, are readily distinguished from them by their insertion on the head itself: of these we generally reckon three\*, a middle one and one on each side; and under and exterior to them there are two larger setaceous filaments, which may without impropriety be denominated *palpi*, since they are used to feel the way during the creature's progress. The *eyes* are black points on the upper surface of the head, usually four in number, sometimes only two, and in *Sigalion* their existence is doubtful. From the mouth a *proboscis* is at pleasure evolved, which is armed with four jaws united in pairs, two above and two below, opposed the one to the other by their cutting edge; and this disposition is one of the peculiarities of the family, for in the *Euniceaceæ* there are never less than seven jaws, and in the *Amphinomenaceæ* there are none. Such also is the case with many of the *Nereides*, although several genera in this family have two jaws, and a few even four; but the pairs, unlike those of *Aphroditaceæ*, are perfectly distinct and widely separate.

The British species of this family are few in number, so far as has been ascertained, and are referable to the four following genera.

1. APHRODITA. Body squamous, the scales and superior cirri not coexistent on the same foot, but alternating;

\* Savigny and Audouin and Milne Edwards say five; but if we limit, as I think we ought, the term *antennæ* to those filaments which are strictly cranial, there are only three; and what these celebrated naturalists call *external antennæ*, I have, in the following descriptions, called *palpi*, since they originate under the head, and are obviously different in structure, as they appear to be, also, in their functions.

- proboscis with rudimentary and cartilaginous jaws or none; antenna one only; palpi two, large; eyes two. (Scales concealed in the British species.)
2. **POLYNOË.** Body squamous, the scales exposed and alternating with the superior cirri; proboscis with corneous jaws; antennæ three, unequal; palpi two, large; eyes four.
  3. **PHOLOË.** Body squamous, the scales placed over every alternate foot; cirri none or rudimentary; proboscis with four corneous jaws, the orifice plain; antennæ five unequal, distinct; palpi two, large; eyes two.
  4. **SIGALION.** Body squamous, the scales and superior cirri coexistent on the same feet, the former placed over every alternate foot until the twenty-seventh segment, whence they follow uninterruptedly to the end of the body; proboscis with corneous jaws; antennæ rudimentary; palpi large; eyes none.

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#### 1. **APHRODITA\***, *Linnaeus*.

'The *Aphroditæ* are broader and more oviform than the rest of this family, and the segments of the body do not exceed thirty-nine. The head, more or less concealed by the scales or by the bristles, carries two somewhat pedunculated eyes, and a solitary small subulate antenna, but the palpi are comparatively very large. The orifice of the proboscis is encircled with penicillate tentacula and armed in general with thin cartilaginous jaws. The feet are distinctly bifid, and garnished with three bundles of bristles, two of which belong to the dorsal, and the third to the ventral branch; the first pair are small and furnished with long tentacular cirri; but the posterior do not differ observably from the rest. The bristles of the dorsal branch are sometimes very complicated; those of the ventral simple or forked: the cirri are subulate,—the inferior small, the superior long. The scales are large, and, in our native species, concealed by a coarse felt formed by the bristles of the dorsal branch of the feet; there are fifteen pairs

\* *Aphrodite*—the Greek name of Venus. In its application to a sea-worm, there may be some allusion to the supposed derivation from ἀφρός, "foam of the sea." Hesiod calls Venus ἀφρογύστια, "foam-sprung."

of them, and the thirteenth are always attached to the feet of the twenty-fifth segment,—the pairs which precede this \* alternate on every other ring with the superior cirri, and the pairs which succeed it are placed on every third ring. The branchiæ consist of tubercles sometimes indistinct, often broken on their edges, disposed in transverse rows, and, like the dorsal cirri, they cease to appear and disappear alternately posterior to the twenty-fifth pair of feet: they sometimes differ very little from the protuberances which afford attachment to the scales.

1. *A. aculeata*, scales concealed, blotched with black; hair-like bristles green and golden, the spine-like bristles dark brown. *Sea Mouse*. Plate XXI.

*Eruca marina* Rondeletii pilis in dorso instar Colli Columbini variegatis, *Sib. Scot. Ill. pars sec. lib. iii. p. 32.* Scolopendra marina, *Molyneux in Phil. Trans. abridg. iv. 133. and 368. pl. 3. fig. 6, 7.*—*Aph. nitens*, *Lin. Faun. Suec. 367. no. 1284.*—*Aph. aculeata*, *Lin. Syst. 1084. Pallas Misc. Zool. 77. tab. 7. fig. 1—13. Bast. Opusc. Subs. ii. 62. pl. 6. fig. 1—4. Pen. Brit. Zool. iv. 86. tab. 25. fig. 1. Mull. Zool. Dan. prod. 218. no. 2641. Turt. Gmel. iv. 79. Stew. Elem. i. 387. Turt. Brit. Faun. 136. Home Comp. Anat. pl. 39. fig. 1, 2. Blumenb. Elem. Nat. Hist. 245. Jameson in Wern. Mem. i. 557. Bosc Verz, i. 181. Cuv. Règ. Anim. iii. 206. Audouin and M. Edwards in Ann. des Sc. Nat. xxvii. 402. pl. 8. fig. 7. Edin. Journ. Nat. and Geogr. Sc. iii. 51. Roget Bridgew. Treat. ii. 102. and 298.—*Aphrodite hérissée*, *Brug. Encyclop. Méth. vi. 85.*—*Halithea aculeata*, *Lam. Anim. s. Vert. v. 307. and 2de édit. v. 542. Risso l'Europ. Mérid. iv. 412. Stark Elem. ii. 140. Edin. Journ. Nat. and Geogr. Sc. iii. 246.**

*Hab.* Common on most parts of the British coast. Found at Leith, *Sir Robert Sibbald*. Coast of Berwickshire, not common.

**DESC.** *Body* from three to five inches long, oval, narrowest behind, convex dorsally, the back of an earthy colour, roughish with a thick close felt of hair and membrane forming a sort of skin which entirely conceals the scales, the sides clothed with long silky green and golden hairs clustered in fascicles and glistening like burnished metal, with blackish-brown spiniform bristles intermixed: ventral surface flat, often light coloured and dotted, sometimes dark brown, obsoletely ribbed across. *Head* small, entirely concealed, roundish, with two round clear spots or *eyes* on the vertex: *antennæ* minute;

\* The fourth and fifth segments, however, are both squamiferous.

*palpi* large, subulate, flesh-coloured or dusky, jointed at the base, where they approximate, but are separated by a black membranous crest. *Mouth* inferior, with a large retractile edentulous proboscis; the orifice encircled with a short even thick-set fringe of compound penicillate filaments divided into two sets by a fissure on each side: each filament has a short stalk with a tuft of numerous forked papillæ on its summit; exterior to the orifice of the proboscis there are four fleshy tubercles placed at the angles. *Scales* fifteen pairs, roundish, smooth, thin and vesicular, blotched with black stains and specks, the first pair small, laid over the head, the anal pair oval: *Feet*, thirty-nine pairs\*, largest and most developed near the middle of the belly, very small and approximate at the anus, biramous, the branches wide asunder; the superior carries, in a sort of crest-like fashion, the long flexible brilliant coloured bristles which form the silky fringe on each side of the body, and above them some still more delicate hairs, which by their intertexture constitute the membrane covering the scales, and with which the strong spiniform bristles are intermixed, placed in a sort of cross series: the inferior branch is armed with three rows of stout short bristles, in the upper row only two or three which are longer and stouter than those of the next row in which there are five or six, and which again are stouter but less numerous than those in the lowest row: *spine* golden yellow, conical, smooth: *superior cirrus* long, subulate, bulged at the base; the *inferior* short and conical: *anus* large, with a dorsal aspect, encircled with several tentacular cirri.

The very vivid iridescent hues which the hairs of this remarkable worm reflect, render it an object of wonder and surprise to the most incurious: they are not equaled by the colours of the most gaudy butterfly, and rival the splendour of the diamond beetle †. It creeps at a slow pace, and in its progress a current of water is projected at short intervals,

\* Pallas says, "constanter 40—41. Horum 2 primi minuti, compressi submutici, ex oris quasi palato antrorsum producti, villo barbati, at setis et cirrho destituti."

† "The *Aphrodita aculeata* reflecting the sun-beams from the depths of the sea, exhibits as vivid colours as the peacock itself spreading its jewelled train." *Linnaeus* in Smith's 'Tracts relating to Nat. History,' p. 32.

and with considerable force, from the anus. When placed in fresh water the creature gives immediate signs of its painful situation and soon dies, first ejecting a white milky fluid, and in the agony of death a large quantity of a blackish-green turbid liquor. The size and strength of the proboscis is remarkable, and not less so the structure of the filaments which garnish the orifice. The œsophagus is short; the stomach and intestine seem to be alike and inseparable—together they form a straight intestine, sometimes with a wide dilatation in some part of its canal, with a velvety inner surface folded into longitudinal plaits near the termination at the anus. Although apparently planted round with offensive arms of considerable strength, the worm is said to be a favourite prey of the codfish, in whose stomach specimens, in a perfect condition, may be sometimes obtained. Baster tells us that the sexes are distinct. “*Hæ Aphroditæ eodem, quo pisces, modo generare videntur; et si quis earum quasdam Junio mense disseuerit, mares lactibus, fœmellas multis ovis instructas videbit.*”

PLATE XXI. Fig. 1. *Aph. aculeata* of the natural size. 2. The head uncovered. 3. The head detached and somewhat magnified. 4. Under view of the anterior part of the body. 5. The orifice of the proboscis. 6. The proboscis laid open by a longitudinal section. 7. A few of the penicillate filaments magnified. 8 and 9. Two views of the feet. 10. Various bristles. 11. The spine.

## 2. POLYNOË\*, *Savigny.*

*Polynoë* is readily distinguished from *Aphrodita* by the number of the antennæ, by the more powerful armature of the mouth, and by the part of the body at which the scales cease to alternate with the cirri. The form of the body, and the number of its component rings, varies much; all our known native species are linear or elliptic-oblong, but there are foreign species of a linear and worm-like figure. The back is either entirely covered with the scales or naked in the middle, the scales in the latter being less developed and not meeting on the mesial line.

The head of the *Polynoës* is large and corneous, with four eyes on its upper convex surface arranged in pairs: the antennæ are rarely two only, three being the usual number, of which the central one is longer than the lateral, and it again

\* *Polynoë*—one of the Nereids.



yields in strength and longitude to the palpi. The mouth has a projectile proboscis with a circle of little tentacula round its orifice and four large horny jaws curved at their points. The scales or elytra are always exposed, and are very variable in number, but the first twelve pairs regularly alternate with the superior cirri on the twenty-three first segments, and if more elytra exist they alternate in a different series, or on every third segment: they are lamellar or sometimes vesicular, and either smooth or covered with little granulations. The branchiæ, which are simple and obscure, exist only on the non-elytrous feet, and follow consequently the same alternating order. The feet are bifid, but the superior branch is small and almost confluent with the inferior, which is greatly developed. The superior cirri are long, the inferior short and conical: the bristles of the superior branch short and almost always slenderer than those of the inferior, subulate and smooth at the point, or like the inferior bristles, somewhat thickened and serrulate along the edge. The spines present no peculiarity. The first pair of feet are destitute of bristles, but are terminated by two long tentacular cirri, which advance on each side of the head and resemble antennæ; while on the last segment we find filiform appendages formed by a nutation of the superior cirri, and constituting in general terminal styles.

• *Scales immovably fixed.*

1. *P. squamata*, scales twelve pairs, ovate, imbricate, granulous, ciliated on the external margin. Plate XXII. fig. 1.

*Aphrodita squamata*, *Lin. Syst.* 1084. *Pallas Misc. Zool.* 91. *tab. 7. fig. 14. a—d.* *Bast. Opusc. Subs.* ii. 66. *pl. 6. fig. 5.* *Pen. Brit. Zool.* iv. *tab. 25. fig. 2.* *Turt. Gmel.* iv. 80. *Stew. Elem.* i. 387. *Turt. Brit. Faun.* 136.—*Aph. scabra*, *Penn. Brit. Zool.* iv. 88. *Turt. Gmel.* iv. 80. *Stew. Elem.* i. 387. *Turt. Brit. Faun.* 136. *Jameson in Wern. Mem.* i. 557.—*Aph. pedunculata*, *Pen. Brit. Zool.* iv. 87. *tab. 26. fig. 2.*—*Aph. longirostra*, *Brug. Encyclop. Méth.* vi. 86. *Bosc Vers.* i. 182.—*Aph. clava?* *Montagu in Lin. Trans.* ix. 108. *tab. 7. fig. 3.*—*Aph. punctata*, *Bosc Vers.* i. 182. *Jameson in Wern. Mem.* i. 558.—*Polynoë squamata*, *Lam. Anim. s. Vert.* v. 309. *Stark Elem.* ii. 139. *Audouin and Edwards in Ann. des Sc. Nat.* xxvii. 416. *pl. vii. fig. 10—16.*—*Polynoë scabra*, *Johnston in Zool. Journ.* iii. 331.

*Hab.* In deep water, frequent on the coast. Bighthelmstone and Anglesea, *Pennant*. Leith shore, and Orkney and Shetland Islands, *Prof. Jameson*. Berwick Bay, *G. T.*

**DESC.** *Body* generally about one, rarely two inches long, depressed, linear-oblong, of equal breadth at both ends, of a uniform cinereous colour, rough: *scales* twelve on each side, rather large, ovate, imbricate, rough, with brown granulations, ciliated on the external margin, the overlapped smoother than the exposed portion, for the granules on the former are more minute than on the latter; the anterior scales are smaller and rounder than the others and completely cover the head, which is a subtriangular pink or purplish corneous plate, furnished with four small *eyes*: *antennæ* three, the central one largest, bulbous near the point: *palpi* two, longer than the antennæ, swollen near the apex; the *tentacular cirri* similar to the superior *cirri* of the feet; these are white with a blackish ring at the bulb where the acumination commences, retractile, originating from above the dorsal branch of every alternate foot and under the scales; the three last pairs of feet each with a cirrus: *feet* twenty-five pairs, obtuse, subbifid, the dorsal branch shorter and less than the ventral, each terminated with a brush of stiff brown bristles, and under the ventral branch there is a small setaceous cirrus and also a fleshy spine at its junction with the belly: *bristles* when removed golden yellow, those of the dorsal branch slenderest, gently curved, acutely pointed, and serrulate for about half their length; those of the ventral branch stouter, slightly bent near the top, and serrulated with a double series of teeth on the outer side of the bend; each tuft of bristles inclosing a dark brown straight *spine*, the inferior stouter than the upper one: ventral surface straw-colour, prismatic, marked with the viscera, and sometimes spotted with black near the base of the feet.

This species differs remarkably from those which follow in the tenacity with which the dorsal scales adhere to their tubercles of attachment, from which they cannot be separated except by the dissecting knife; and this fact determines the species to be almost certainly the *Aphrodita squamata* of Linnæus. His *Aph. scabra* must ever remain in uncertainty, for no *Polynoë* has twenty scales, as he states them to be in that species. The *Aph. scabra* of Otho Fabricius is said to have fifteen pairs of scales; and overlooking this important fact, I, on a former occasion, much too confidently identified

it with the present, but the description is otherwise so very applicable, that, I must acknowledge, a suspicion of their being the same species still remains. That this is the *Aph. scabra* of British authors scarcely admits of a doubt. It is much less certain whether it is the *Aphrodita clava* of Montagu; but as he has himself suggested their possible identity, and as his description and figure are both of them too imperfect to characterize a species, we see no harm in reducing his to a conjectural synonym. In the description the scales are stated to be "twelve or thirteen pairs," but the figure shows thirteen scales on one side and fourteen on the other, with a naked space between the rows. Audouin and M. Edwards conjecture that *Aph. clava* may be the same as their *P. levis* characterized by having fourteen pairs of perfectly smooth scales.

PLATE XXII. Fig. 1. *Polynoë squamata*, nat. size. 1 a. The jaws, slightly enlarged. 1 b. A scale magnified. 1 c. A spine magnified. 1 d. A bristle from the ventral branch of the foot magnified.

•• Scales deciduous.

2. *P. cirrata*, scales 15 pairs, ovate or kidney-shaped, imbricate; bristles of the dorsal branch of the feet shorter than those of the ventral branch. Plate XXII. fig. 2.

*Aphrodita cirrata*, Mull. Zool. Dan. Prod. 218. no. 2644. Fabr. Faun. Grœnl. 290. tab. fig. 7. Bosc Vers, i. 183.—*Aph. squamata*, Penn. Brit. Zool. iv. 87. (excl. fig.)—*Aph. imbricata*, Penn. Brit. Zool. iv. 88. Stew. Elem. i. 388. Jameson in Wern. Mem. i. 558.—*Aph. violacea*, Mull. Zool. Dan. prod. 218. no. 2645. Turt. Gmel. iv. 81.—*Aph. plana*, Stew. Elem. i. 388.—*Polynoë imbricata*, Johnston in Zool. Journ. iii. 332.—*P. cirrata*, Audouin & Edw. in Ann. des Sc. Nat. xxvii. 422.

VAR. With a dark red fascia along the back.—*Aphrodita lepidota*, Pallas Misc. Zool. 94. tab. 7. fig. 15 a, b. and tab. 8. fig. 1, 2. Mull. Zool. Dan. prod. 218. no. 2643. Turt. Gmel. iv. 81. (exclus. syn.) Stew. Elem. i. 388. Bosc Vers, i. 183.—*Polynoë lepidota*, Johnston in Zool. Journ. iii. 333.

Hab. Under stones between tide marks, common. "Taken off Anglesey," Pennant. Leith shore, and Orkney and Shetland Islands, Jameson. Berwick Bay, common, G. J.

DESC. Body elliptic-oblong, somewhat narrowest posteriorly, about  $1\frac{1}{2}$  inch long, 3 lines broad, variously coloured, of a uniform olive, brown, or mottled, often marked with a series of pale spots along the sides, one to every scale, sometimes with a red band down the back, and sometimes pied

with lighter and dark shades; belly perlaceous, with a red central line from a blood-vessel appearing through the skin: *head* mostly concealed by the anterior scales, cordate with an impressed line in the middle, pink-coloured or reddish, with four *eyes* placed wide asunder: *antennæ* three, the medial largest, all bi-articulate, swollen near the apex, which is acutely pointed: *palpi* two, setaceous with a suddenly acuminate point, paler coloured, stouter and twice as long as the antennæ, somewhat annular: *tentacular cirri* two pairs, similar to the medial antenna, the bulb ringed with black, the acute points pale: *scales* fifteen pairs, imbricate, ovate or kidney-shaped, the anterior nearly circular, variously coloured and dotted, convex towards the centre, smooth to the naked eye, but really roughish with scattered short spines or processes visible only in certain lights or near the margin; they are attached to the 2nd, 5th, 6th, 7th, 9th, 11th, 13th, 15th, 17th, 19th, 21st, 23rd, 26th, 29th, and 32nd segments by mammillary tubercles, considerably larger than the alternating branchial ones, and when removed the back appears spotted over the base of the feet, the spots becoming quite distinct and regular near the tail, which is terminated by two *styles*: superior *cirri* eighteen, bulbous near the apex, which is pointed, with a dark ring at the bulb and blackish about the base: *feet* thirty-six pairs, each with a small inferior cirrus and garnished with numerous straw-yellow bristles, those of the dorsal branch shorter than those of the ventral, all slightly bent near the apex, which is minutely serrulate and acute: *spines* simply conical.

The animal moves quickly by means of its feet in a somewhat undulating manner, the medial antenna being held erect and reverted, the palpi stretched forwards and inclined to the ground, which it examines by their aid. When thrown into fresh-water it dies almost instantly, and the scales drop off; and even during life these organs are removed with so slight a friction that it is not easy to take up a specimen without depriving it of one or more of them.

Of his *Aphrodita Lepidota* Pallas says, "Certe in mari inter Angliam et Belgium satis copiose occurrit hæc species, et ex fascia plerumque longitudinali nigra facile adgnoscutur." A *Polynoë* marked in this fashion is common on our shore, which

answers well also to Pallas's figure, but our worm is certainly nothing more than a variety of the *P. cirrhosa*. Pallas, however, says that his *Lepidota* has only fourteen pairs of scales, and were this point found to be correct, it would certainly determine it to be a distinct species. We leave it to future inquiry.

*Polynoë cirrata*, it seems necessary to remark, is not identical with the *Aphrodita cirrhosa* of Pallas, for he expressly says that the bristles of the dorsal branch of the foot are longer than those of the inferior branch. Misc. Zool., p. 96. The species are otherwise very nearly allied.

PLATE XXII. Fig. 2. *Polynoë cirrata*, nat. size. 2 a. The head; ' the antennæ; " the palpi; "' the tentacular cirri. 2 c. A scale. 2 d. The proboscis laid open. 2 e. A foot, with a tentacular cirrus. 2 f. A foot, without the tentacular cirrus.

3. *P. impar*, scales thirteen pairs, imbricate, rough; tentacular cirri clothed with short spinous filaments. Plate XXII. fig. 3—9.

*Hab.* Under stones between tide marks. In Berwick Bay with the preceding, but rare.

*DESC.* *Body* linear-oblong, narrowing insensibly from the head to the tail, depressed, slightly convex on the back, of a freckled or mottled brownish colour. *Head* concealed by the anterior scales, square, sinuated in front, pale. *Eyes* very distinct, the posterior pair most approximated. *Proboscis* with four rather large corneous hooked maxillæ, the orifice encircled with a single series of simple filaments. *Antennæ* five, the central one setaceous, elongate, of a pink or flesh-colour; the middle pair very small; the outer pair as long and rather thicker than the odd one, but pale-coloured, all of them appearing roughish when highly magnified. *Scales* thirteen pairs, imbricate, covering the back entirely, some of them roundish, others subquadrangular, and others kidney-shaped, rough with miliary granules excepting on the covered side, the external margin fringed with short cilia. *Feet* uniramous, armed with two fascicles of very stout bristles, the superior with the most numerous and longest bristles. *Bristles* all of them simple, the longest formed like a lance, the shorter curved like a sword towards their points, which are concave and serrulate

along each margin: a single conical acuminate *spine* to each brush of bristles. *Tentacular cirri* alternating as usual, covered with short fleshy obtuse spines, the point of the cirrus suddenly acuminate, naked, and frequently spathulate at the apex. *Tail* with two of the filaments disproportionately elongate.

PLATE XXII. Fig. 3. *Polynoë impar*, nat. size. 4. Head uncovered and magnified. 5, 5\*, 6. Scales magnified. 7, 8. Two views of two feet, magnified; *b.* the tentacular cirrus. 9. Three bristles.

4. *P. viridis*, scales eighteen pairs.

*Aphrodita viridis*, Montagu in *Lin. Trans.* xi. 18. tab. iv. fig. 1.

*Hab.* South coast of Devonshire, Montagu.

DESC. *Body* long, greenish, with about thirty-six fasciculi on each side, and covered with *eighteen* pairs of squamæ, which appear a little speckled by reason of their being somewhat rugose: the *fascicles* are much divaricated, and between each scale is a fleshy filiform appendage terminated by an extremely fine fibre: *tentacula* four, setaceous: *eyes* four, small and black. Length three-fourths of an inch. Rare.

“Possibly this is the *cirrosa* of Pallas, as it nearly accords in the number of feet; and probably some of the scales of his were lost, as it is usual for them to be in number about half those of the feet.” Montagu.

*Obs.* In the figure there are only fourteen scales on each side.

The two worms described below are so obscure that we can say of them no more than that they appear to be referable to this genus:

*Aphrodita annulata*, “oblong, fusiform, annulated, smooth, excepting a row of minute spines (one on each ring) running along the back; feet small; size two inches and a quarter; of a pale yellow colour.” *Pen. Brit. Zool.* iv. 87. tab. 26. fig. 3. *Stew. Elem.* i. 388. *Turt. Brit. Faun.* 136.

*Aphrodita minuta*, “with small scales; slender; not an inch long. Taken off Anglesey.” *Pen. Brit. Zool.* iv. 87. tab. 26. fig. 4.—*Aph. lepidota*, *Turt. Brit. Faun.* 136.

### 3. PHOLOË\*, Johnston.

1. *Ph. inornata*. Plate XXIII. fig. 1—5.

\* A Nereid:

“As Pholoë, most that rules the monsters of the main.”

Drayton, *Polyolbion*, Song xx.

*Palmyra ocellata*, Johnston in *Zool. Journ.* iii. 329.

*Hab.* Amongst Confervæ between tide-marks. Berwick Bay, rare.

**DESC.** *Worm* half an inch in length, scarcely a line in breadth, almost linear but a little narrowed behind, rounded at the extremities, flattened, of a yellowish-brown colour, dusky along the sides, and marked there with a series of paler round spots indicating the point of fixture of the scales: *head* small and obscurely defined, corneous: *eyes* two, very distinct, black, placed backwards: *palpi*, long, conical, smooth, jointed at the base, pointing forwards: *antennæ* five, the outer pair larger than the three intermediate, and fringed on the inner sides with a few fleshy spines; the odd antenna superior and small: *mouth* inferior, provided with a firm cartilaginous *proboscis* armed with two pairs of jaws similar to those of the *Sigalion*; but the orifice appears to be plain: *body* with about forty pairs of *feet*, which seem to be all alike and destitute of tentacular cirri, but we find two minute fleshy papillæ near their bases on both the dorsal and ventral sides: the feet are not distinctly divided into two branches; but there is a fleshy fold behind the apex, and within which the apex can be retracted: from this fold there originate two bundles of *simple bristles*, one dorsal and the other ventral, the bristles short; the apex itself is armed with a bundle of *compound bristles*, jointed near the point and fashioned like those of a *Polynoë*: to each brush of bristles there is a conical *spine* placed in the centre of the brush. The *back* of the worm is partially covered with a row of *scales* placed over the bases of the feet down each side, but the middle of the back is naked: there are fourteen pairs of scales, some of them round, others oval, all spinous on the outer edge, smooth, raised in the centre: *belly* smooth, flesh-coloured: posterior extremity without styles.

PLATE XXIII. Fig. 1. *Pholœ inornata*, of the natural size. 2. The anterior portion of the body, magnified. 3. The proboscis laid open, magnified. 4. Two of the dorsal scales. 5. The foot.

#### 4. SIGALION\*, *Audouin and M. Edwards.*

This genus is distinguished from every known Annelide by

\* Perhaps formed from *σιγαλάσις*—curiously or anomalously made—but *Sigalion* is a name of Harpocrates, the companion of Esculapius and Hygeia, by whom physicians were obliged to swear that they would observe a religious silence in their profession. See Sprengel, *Hist. de la Médecine*, i. 136.

the co-existence of superior cirri and scales on the same foot. The body is elongate, depressed, almost linear, and formed of numerous segments. The disposition of the cephalic extremity is singular; for the head, in place of being exactly terminal, is overtopped by the first pair of feet, which are lodged underneath it and more or less approximated to the mesial line. In our native species there are three cranial tentacula, but in a foreign species the odd one is wanting, and the lateral are always small and lie upon the peduncles of the first feet. The palpi on the contrary are long, and are placed outside and under these feet, of which the two terminal cirri are pointed forwards and may be mistaken for true antennæ. There appear to be no eyes. The mouth is inferior, and is the outlet to a proboscis similar to that of *Polynoë*, but armed with less powerful jaws. At the superior base of every foot there is a rounded protuberance which gives origin to a cirrus, and which also carries a scale on such feet as have this appendage, a fact inconsistent with the theory which maintains that the scales are mere modifications of the cirri. On the anterior part of the body the scales appear and disappear on every other segment, but subsequent to the twenty-sixth pair of feet there is one to each segment, and two or more to the two last segments, so that their number is always considerable. The feet are distinctly divided into two branches; the superior branch terminated with a single brush of bristles, the inferior sometimes with one and sometimes with two, but the bristles are shorter. The inferior cirrus is very obvious and is inserted far from the extremity of the foot. The appendages of the anal ring form two tentacular styles. As to the branchiæ, there is no trace of them at the base of the feet, and when Audouin and Edwards inform us that they seem to be replaced by the fringes which garnish the external margin of the elytra, they surely forget that these fringes are not more developed than they are in *Polynoë*, and their structure is very unlike that of a respiratory organ.

1. *S. Boa*, scales entirely covering the back, reniform; antennæ three, the odd or medial one twice as long as the lateral; palpi elongate. Plate XXIII. fig. 6.

*Sigalion Boa*, Johnston in *Mag. Nat. Hist.* vi. 322. fig. 42.

*Hab.* Under stones near low water mark; not uncommon in Berwick Bay.



**DESC.** Body seven or eight inches long, linear, flattened, slightly tapered towards the tail, the anterior extremity obtuse and somewhat rounded, the beak covered with two rows of scales of an ash or sometimes reddish-brown colour, but as some of the scales are often paler or whitish, the body then appears piebald: head small, convex, corneous, concealed by the rounded anterior pair of scales, terminated in front with three short setaceous two-jointed antennæ, the central one larger and longer than the others: eyes none, but at the base of the least antennæ there are two depressed punctures very like eyes: palpi two, setaceous, half an inch long, arising above and at the sides of the mouth: mouth inferior, furnished with a retractile cartilaginous proboscis about an inch long, armed with two pairs of sharp horny teeth plain on the margin, the aperture encircled with a double series of papillary tentacula, the outer series much longer than the inner, which however is the most numerous: scales imbricate, kidney-shaped, convex, roughish, the concealed portion pale, the outer and larger margin fringed with very delicate hairs and some short anomalous processes; there are about 140 scales on each side, each affixed to a fleshy tubercle, from the end of which a tentacular filament is extended, equal to the feet in number, and placed exactly above them: feet extremely numerous, obtuse, bifid, the superior branch papillary with a brush of long unequal bristles curved upwards, the inferior branch truncate, somewhat sinuate, with two brushes of short bristles, and underneath with a setaceous cirrus equal to the superior: bristles of superior branch, setaceous, unjointed, serrulate on their upper half, with a spine in the centre of the brush; the bristles of the inferior branch are most of them stout, enlarged near the top, and terminated with a sort of claw toothed on the inner side; some of these are marked with a few circular striæ below the joint, and there is a spine in their centre; there are other more slender bristles which are two-jointed, the apical joint longish, acute, and smooth: ventral surface pale, perlaceous, marked down the middle with a red vessel: tail terminated with two short filaments. When killed in fresh-water the scales readily drop off, and the relaxed body of a large specimen will then measure ten or twelve inches. Young

individuals are generally of a light grey colour. When placed in a basin of sea-water it appears sluggish, but it burrows in loose sand with much rapidity, being enabled to do so by the play of its innumerable feet.

PLATE XXIII. Fig. 6. The proboscis of *Sigalion Boa* removed and laid open. Fig. 7. The head and anterior segments seen from above. Fig. 8. The head on the ventral aspect to show the mouth and origin of the palpi. Fig. 9. A scale from near the middle of the body. Fig. 10. A side view of a foot. Fig. 11. A bristle from the dorsal ramus of the foot, unjointed but finely serrulated on one side. Fig. 12. Another bristle from the same ramus, slenderer and quite smooth. Fig. 13. A bristle from the indentation of the foot between the dorsal and ventral rami. Fig. 14. A bristle of the ventral ramus. Fig. 15. Another bristle of the same, situated under the former and consequently next the ground.

**XLIX.—Enumeration of Plants collected by Mr. Schomburgk, British Guiana. By GEORGE BENTHAM, Esq., F.L.S.**

[Continued from p. 111.]

COMPOSITÆ.

37. *Leria nutans*, DC. Prod. vii. p. 42.—British Guiana. Schomburgk, n. 689.

Since the publication of my former article on Mr. Schomburgk's plants another package has been received from him, in which the *Wulffia platyglossa* has been again sent under the number 705, and the following additional species :

38. *Porophyllum latifolium*, n. sp., herbaceum, erectum, foliis longe petiolatis lato-ovatis obtusis grosse sinuatis ad sinus pellucido-glandulosis, involucri squamis mucrone calloso-acuminatis.—Dry Savannahs on the Upper Rupunoony. Schomburgk.

Differs from *P. ellipticum* in the upper leaves being scarcely longer than they are broad, and rounded, not narrowed at the base.

39. *Baccharis erioptera*, n. sp., caule subramoso pluri-alato, foliis ovatis alisque supra arachnoideo- subtus dense albo-tomentosis, spicis densis subinterruptis, capitulis sessilibus, involucriis ♂ tomentosis squamis subulato-acuminatis.—Dry Savannahs on the Upper Rupunoony. Schomburgk, n. 709.

GENTIANÆ.

In the arrangement of this order I have followed the excellent monograph lately published by Dr. Grisebach of Berlin, under the title of 'Genera et Species Gentianearum.'

40. *Schultesia stenophylla*. Mart. Nov. Gen. et Sp. 2, p. 106, t. 182. Griseb. Gent. 126.—*Exacum Guianense*. *Aubl. Pl. Guian.* i. p. 68. t. 26. f. 1. Moist Savannahs, British Guiana. Schomburgk.—French Guiana. Leprieur and Herb. Par. n. 143.