

2. PLATYPELTIS, FITZ. Os cervicale vertebralibus conjunctum, in medio tantum rugosum. *Testudo ferox*, GM. Am. s. 2.
3. PELODISCUS, FITZ. Os cervicale a vertebralibus separatum, in medio tantum rugosum. *Aspidonectes Sinensis*, WEIGM. As. or. 1.
 † † Ossa costalia postica interpositis vertebralibus discreta.
4. AMYDA, FITZ. Os cervicale a vertebralibus separatum, in medio tantum rugosum. *Trionyx subplanus*, GEOFFR. As. m. 2.
23. TRIONYX, WAGL. (*Emyda*, GRAY. BELL. *Cryptopus*, DUM.) Testa ossiculis marginalibus aucta: sternum latum, lateribus valvis munitum: pedes retractiles.
Testudo granosa, SCHOEPP. As. m. Afr. 2.

FAMILIA III. CHELONIDAE.

SUBFAMILIA 6. CHELONINA.

24. CHELONIA, BRONGN. (*Caretta*, MERR.) Sternum latum, scutis tredecim scutello intergulari, ope scutorum humeralium, pectoralium, abdominalium et femoralium metathoraci affixum: scuta disci tredecim.
1. CHELONIA, NOB. (*Chelonées franches*, DUM.) Scuta disci postposita: nasus prominulus: mandibulae denticulatae: gnathotheca tribus partibus constans. *Testudo mydas*, LINN. Atl. Pac. 3.
2. CARETTA, NOB. (*Chelonées imbriquées*, DUM.) Scuta disci imbricata: nasus productus: mandibulae integrae: gnathotheca individua.
Testudo imbricata, LINN. Atl. Pac. 1.
25. THALASSOCHELYS, FITZ. (*Chelonées Caouanes*, DUM.) Sternum angustum, scutis duodecim sine scutello intergulari, ope scutorum pectoralium, abdominalium et femoralium metathoraci affixum: scuta disci quindecim.
Testudo caretta, LINN. Med. Atl. Pac. 1.

SUBFAMILIA 7. SPHARGIDINA.

26. SPHARGIS, MERR. (*Coriudo*, FLEM. *Dermochelys*, BLAINV. *Scytina*, WAGL. *Dermatochelys*, FITZ.)
Testudo coriacea, LINN. Med. Atl. Pac. 1.

V.—*Miscellanea Zoologica*. By GEORGE JOHNSTON, M. D. Fellow of the Royal College of Surgeons of Edinburgh. Plates II. III.

III.—THE BRITISH ARICIADÆ.

THE Annelides, say MM. Audouin and Milne-Edwards, * which we group round the genus *Aricia* of Savigny, and of which we form the fifth family in the order ERRANTES, present very considerable dissimilarities in their external structure,—a circumstance

* Ann. des Sciences Nat. Vol. xxix. p. 388.

which ought not to surprise us, for whenever organs, because of their minor developement, become of slight importance in the economy of the animal, and are about to be obliterated more or less entirely from its anatomy, we find them to vary proportionably in their forms. Such is the case with the exterior appendages of the ARICIADÆ, a small family which intervenes to smooth the abruptness of the passage between the more typical AN. ERRANTES, and the Annelides of the orders TERRICOLÆ and TUBICOLÆ.

It is probably from this discrepancy among them that, up to this time, no naturalist has seized upon the characters which seem to us to unite them in one, but every one has scattered its members among different groups. Several of them have been considered as related to the Earth-worms, others to the Nereides, and a certain number have been collected together by M. de Blainville in his family “*Nereiscoles*.” The end which that zoologist had in view in the establishment of that family is very nearly the same which has led us to unite in one distinct group the Annelides in question; and it is probable that if Blainville had personally observed a greater number of species, his opinions relative to the *composition of the family* would have been more in unison with ours than they happen to be.*

The ARICIADÆ have in general the elongated linear form of the Nereides and Euniciadæ, but their body is not truncated in front as in these Annelides, rather diminishing, on the contrary, in thickness at the cephalic extremity. It is nearly cylindrical, and is composed of a very considerable number of narrow segments. The head is small,—often not to be distinguished from the superior lip, and it is not distinctly separated from the body. The antennæ are in general obsolete, but in some of the genera more than usually developed; while the eyes are either wanting or very minute. The proboscis is very short, and does not perceptibly exceed the cephalic segment: it is rather membranous than fleshy, and is never furnished with jaws, but sometimes we observe tentacula in it. The anterior rings of the body are narrow, and have always ambulatory feet, which, in general, are slightly prominent, and divided into two

* A great number of the *Nereiscoles* of M. de Blainville are only imperfectly known by the descriptions of Muller, Otho Fabricius, &c. and ought, in the opinion of Audouin and M. Edwards, to be referred to the *Euniciadæ*; while in the works of these authors the Annelides, with a few exceptions, which constitute the present family, are not to be found, and could not take a place among the *Nereiscoles*, if regard were to be had to Blainville’s character of it. Hence Audouin and M. Edwards have found a new designation necessary to prevent confusion.

branches, and in no instance replaced by tentacular cirri. The bristles with which they are garnished are too weak to be of much use as defensive organs. In most of the genera all the feet are similar on all the rings, but in some we find those of the anterior portion of the body to differ from the succeeding ones, and of which the ventral branch at least resembles those feet with crotchets which we meet with so constantly in the order Tubicolæ. The soft appendages are subject to much variety in the Ariciadæ. The cirri never fail at least on one of the branches of the foot, but commonly we do not find them on both; they have sometimes the form of fleshy filaments, more or less delicate, at other times they constitute flattened tonguelets. Branchiæ properly so called are in general defective; sometimes, however, they exist under the form of well-developed lobules fixed to the feet, and in other cases they consist in a certain number of tentacular filaments, similar to the cirri, and fixed upon the dorsal arch of some of the rings of the anterior part of the body,—a disposition of parts which evidently leads us to that more peculiarly characteristic of the *Annelides tubicolæ*.

The character of the family may be summed up as follows:

FEET slightly prominent in general and of little complexness of structure, sometimes alike throughout, sometimes dissimilar in different parts of the body, but never alternately furnished with, and destitute of certain soft appendages: *BRANCHIÆ* none or very simple: *HEAD* rudimentary: *ANTENNÆ* and *EYES* frequently wanting: *no JAWS*: *PROBOSCIS* very short and indistinct: *no TENTACULAR CIRRI*: In general a single *CIRRUS* to each foot, and when a second exists, this is rudimentary.*

Of the four genera which Audouin and Milne-Edwards include in this family, we have two native species of one only; but it is remarkable that our other species, which as yet are limited to the number of three, constitute two new genera in it very distinct from any hitherto characterized. The fact is an additional illustration of an axiom in natural history,—that all aberrant and osculant groups are not only comparatively few in species, but at the same time these species are so dissimilar among themselves that each, or every two or three of them, will be found to have characters which are properly generical.

It may be useful to give the characters of all the genera hitherto proposed, for as the British species are probably more numerous than has been ascertained, so it is not unprobable we may have a representative of each genus.

* Translated, but not always closely, from Audouin and M.-Edwards, ut sup. cit.

* *Feet of two kinds, dissimilar.*

- I. **ARICIA.** *Feet* raised upon the back, those of the anterior part of the body composed of two very dissimilar branches, the ventral branch having some analogy to the feet with crotchets,—the other feet with two branches nearly alike: *Head* conical: *Antennæ* none or rudimentary: *No oral Tentacula.*
- II. **LEUCODORE.** *Feet* papillary and setigerous, the first four pairs abranthial, the fifth with crotchets; the following like the anterior, but with a cirrus reflected on the back, and becoming branchial: *Head* conical: *Antennæ* two, occipital, setaceous: *Proboscis* none.

** *Feet co-ordinate, and alike.*

- III. **NERINE.** *Head* small but distinct, furnished with two long occipital *antennæ*: no oral *tentacula*: *Feet* biramous, each branch consisting of a membranous lobe and a short setigerous pedicle: *Branchiæ* forming a series of short setaceous filaments along each side reflected on the back, with a small *cirrus* at their base.
- IV. **AONIA.** *Head* small but distinct, surmounted with a conical very short *antenna*: no oral *tentacula*: *Feet* divided into two branches each garnished with a lamellar lobe: a dorsal but no ventral *cirrus*: no *branchiæ*.
- V. **OPHELIA.** *Head* indistinct, terminated by two large tentacular horns, surmounting a circle of oral *tentacula*: *Feet* with two branches scarcely protruding, and without membranous lobes: no dorsal *cirrus*: a ventral *cirrus* upon the rings of the middle part of the body.
- VI. **CIRRATULUS.** *Head* conical indistinct, and destitute of all soft appendages: *Feet* scarcely projecting, with two branches widely separate: no ventral *cirrus*: the dorsal *cirri* filiform and very long: in general *branchiæ* exactly similar to the *cirri* and fixed upon the back of one of the rings of the anterior part of the body.

II.—LEUCODORE, * Johnston.

CHARACTER.—*Body* vermiform: *head* conical: *mouth* simple, *emandibulate*: *eyes* four: *antennæ* 2, occipital, large, long, and setaceous, ciliated: *four anterior segments with papillous setigerous feet,*

* Name from λευκος white, and δωσ a gift: The naturalist who has experienced the joys of finding a hitherto unseen animal, and to whom the pleasing duty has been reserved of publishing an additional illustration of the wisdom of his

the fifth with crotchets, the rest with papillous feet like the anterior segments, but furnished besides with a branchial cirrus reflected on the back: anal segment campanulate, the anus opening in its concave centre.

L. CILIATUS. Plate III. Fig. 1-6.

Hab. In crevices of slaty rocks near low-water mark. In Berwick Bay.

Description.—Worm from 6 to 8 lines long, linear-elongate, or slightly tapered to the tail, somewhat quadrangular, of a yellowish or flesh colour, with a dark red line down the middle. Head small, depressed, in the form of a short cylindrical proboscis, encircled with a raised hood or membrane; mouth edentulous; eyes 4, minute, placed in a square at the base of the antennæ, which are more than a fifth of the length of the body, tapered, wrinkled, and clothed along their inferior sides with short cilia. Segments numerous, narrow, distinct, the first four with an inferior papillary cirrus on each side, and a brush of retractile bristles; the fifth with a series of bristles curved like an italic *f*, obtuse, not capable apparently of being protruded like the others, and having rather a more ventral position; the following segments have on each side an obtuse branchial cirrus originating from the dorsal margin, as long as half the diameter of the body, held either erect, or reflected across the back to meet its fellow on the mesial line, beneath it a small mammillary foot, armed with five or six sharp slightly curved bristles of unequal lengths, under this a bundle of much smaller bristles (crotchets?) with a small conical cirrus with a still more ventral position. The branchial cirrus is clothed on its lower aspect with rather long moveable cilia; it becomes very small or entirely disappears on the posterior segments, in which the bristles on the contrary appear to be longer and more developed; bristles simple, unjointed; anal segment conformed into a circular cup or sucker, in the centre of which the anus opens by a small round aperture.

In this worm the cilia which cover the under sides of the branchial processes are remarkable for their size and length, for they can be seen with a common magnifier fanning the water with equal and rapid beats, and driving the current along their surface. Their analogy with the cilia of zoophytes is obvious, but here their motion

Creator, and of filling up a blank in our knowledge of His works, will at once divine the origin of this name so strangely applied to a worm.

“Nomen habes niveis nunc inscriptum ergo lapillis.”

The scholar may remember that the name was originally formed by some classical wit for Dr Whitgift, the famous Archbishop of Canterbury, temp. reg. Elizab.—See Walton's *Lives by Zouch*, p. 209. York, 1807.

is certainly dependant on the will of the animal, for I have repeatedly seen it begin and stop, and be again renewed after an interval of repose, and again be checked in a manner that could leave no doubt but that the play of the organs was entirely voluntary. The cilia of the antennæ, notwithstanding the larger size of the organs, are less than half the length of those of the branchiæ.

Leucodore ciliatus lives between the seams of slaty rocks near low-water mark, burrowing in the fine soft mud which lines the fissures. Its motions are slow. When placed in a saucer it keeps itself rolled up in an imperfectly circular manner, lying upon its side, and the painful efforts made to change its position, and with little or no success, shew too plainly that it is not organized to creep about like the *Annelides errantes*, but on the contrary that its proper habitat must be a furrow similar to those of the *Tubicolous* worms, to which, in structure, it evidently approximates in several particulars.

Plate III. Fig. 1. *Leucodore ciliatus* of the natural size. 2. The same magnified. 3. An antenna more highly magnified. 4. The bristles of the fifth segment. 5. A branchial process separated to shew the cilia. 6. A few of the oviform bodies which lie between the intestine and skin.

III. NERINE,* Johnston.

CHARACTER.—*Body vermiform, subquadrangular : head small, distinct : mouth sub-inferior, with a very short edentulous proboscis : eyes minute : antennæ two, occipital, large, long, tapered : branchiæ forming an uninterrupted series of short tapered ciliated filaments along each side reflected on the back, with a lobe at their base : feet all alike, well developed, biramous, each branch consisting of a compressed lobe and a short pedicle armed with simple bristles : anus stellated.*

OBSERVATIONS.—The body of the *Nerines* is elongated and vermiform, narrowed a little at the head, and tapered gradually towards the anal extremity. It is somewhat quadrangular, and is formed of numerous narrow segments. Each segment has on each side, affixed to its dorsal margin, a subulate branchial process, as long as the semidiameter of the animal, and of a fine red colour, which proceeds from two large blood-vessels running up within it. A cuticular fold or membrane invests the base of each branchial filament, and mounts along the side to an extent which varies with its position ; for on the filaments of the anterior third of the body

Nērínē, a patronymic of the daughters of Nereus.

the membrane rises to the very apex and is comparatively broad, but posterior to this the point of the filament is free, and still further back the membrane gradually shortens until it at length is no longer to be traced,—the branchiæ at the same time becoming gradually less, and ultimately obsolete on the caudal segments. (Pl. II. fig. 12, 5, 6, 13.) When in water the branchiæ are raised and extended, and in almost constant movement; but when the worm is removed from the water, they are laid across the back, their points meeting in the middle, and give the body the appearance of being marked with transverse folds or elevated striæ. They are fringed on both margins with a single series of vibratile cilia, discoverable with a magnifier of common powers, but these cilia are deficient on the apex, as well as on the lobe, while they extend over the dorsal arch of the segments. (Fig. 3.) The head is furnished with two large slightly tapering antennæ which originate from the occiput, and which are often cast off in the struggles of the animal: they consist of two large central vessels filled with red blood, and coated with a white mucous skin which, when magnified, appears roughish or crenulate, and one side has a row of minute cilia, not, however, to be seen except with a good glass. The antennæ can be directed to any point, and are capable of being rolled up in a spiral form. (Pl. II. Fig. 11.) There is a good deal of complexity in the structure of the feet, which renders their description and delineation difficult: they are lateral, and deeply divided into a dorsal and ventral branch, which is compressed, and armed with a series of retractile bristles of unequal lengths, and to each branch there is affixed a rounded plain compressed lobe, probably a modification of the cirrus of other annelides. The bristles are simple, curved, and acutely pointed, those of the dorsal branch longer than those of the ventral, and there is a small fascicle of longer ones at the root of the branchial filament. (Fig. 3.) The feet are apparently alike along each side until within a few segments of the tail, when the branchial filaments become very short or disappear, and the ventral branch seems to acquire a superior developement, and to be armed also with longer bristles. (Fig. 4.) The anus is dorsal in its aspect, and is surrounded with eight short equal papillæ, which assume a star-like form when the aperture is dilated.

The *Nerines* inhabit the sea shore, and the margins of our river, a little below high-water mark. They prefer a soil composed of sand and mud, and in which the latter rather preponderates. They are found lurking under stones, or burrowing in the soil, and in the latter situations, the surface to a great extent is seen full of small

round perforations, and covered with little heaps of its tubular and spiral excrements. When disturbed, they descend in their furrows with great rapidity, and to a considerable depth; when taken they throw themselves into violent contortions, as they "were waxed mad," during which the body generally separates into several portions, or loses its antennæ, which always separate at their very base. Their several portions retain their vitality for at least some days, which they evince not merely by their contortions when pricked, but even by moving from one place to another. The animals are named "Rag worms" by our fishermen, and are used in this neighbourhood as bait to take the fry of the coal-fish.

This genus is evidently very different from any characterized by Audouin and Milne-Edwards. I have seen two species, of which the characters are:

1. *N. VULGARIS*, head obtuse and lunated in front. Pl. II. Fig.

1-8. *Spio vulgaris*, Johnston in Zool. Journ. iii. 335 and 487.

HAB. The shore between tide-marks. Very common in Berwick Bay.

Description.—This worm is from 3 to 4 inches in length, of a yellowish-brown colour, dusky in places from the contents of the intestine, and marked with red cross lines from the overlapping branchial filaments. The head is prolonged above the mouth into a sort of triangle, the base being outwards, and each angle prolonged into a short conical point somewhat contractile. There is a black spot on the vertex, and the bases of the tentacula are also stained with black, where the eyes, which are very small, are placed in pairs, but in several specimens I have not been able to detect these organs. The antennæ are rather more than half-an-inch long. The last ten segments appear to be defective in the branchiæ, and to have a more developed ventral foot and longer bristles than any of the others.—Plate II. Fig. 1, *N. vulgaris* of the natural size. 2. The anterior portion enlarged. 3. A view of a segment cut transversely. 4. The caudal extremity. 5. A branchial filament separately. 6. Another view of a branchia. 7. Bristles much magnified. 8. Oviform bodies.

2. *N. CONIOCEPHALA*, head conical. Pl. II. Fig. 9-13. *Spio viridis*, Johnston in Zool. Journ. iii. 486.

HAB. In sand near low-water mark. Berwick Bay, not uncommon.

Description.—Worm from 4 to 8 inches long, as thick when full grown as the little finger of a boy, flattened dorsally, rounded on

the ventral aspect, down the centre of which a blood-vessel runs from one extremity to the other, of a flesh-red colour anteriorly, but backwards the colour is usually a dull dirty green, with red lines and dusky blotches. Head conical, pointed like a snout, pale: proboscis very short with a lobed orifice: eyes 4, minute, placed at the base of the antennæ in pairs, but apparently often wanting: antennæ approximate at the base, from half to an inch in length. Segments narrow, numerous; the filaments of the anterior fringed to the point with a broad membrane, those of the middle free and rather long, but becoming very short on the posterior. Feet much like those of the preceding, but proportionally less developed. Anus stellate.

This species inhabits our shore at low water-mark, and is seldom found with the preceding, which loves a station higher up. It is rare that an entire specimen can be got, the animal breaking with ease into several portions, and throwing off its antennæ.—Plate II. Fig. 9. *N. coniocephala* of the natural size, the tail wanting. The specimen was one of unusual size. 10. The proboscis. 11. An antenna magnified. 12. One-half of a cross section of an anterior segment. 13. A similar view of a segment from near the middle.

The *SPIO CRENATICORNIS* of *Montagu*, *Lin. Trans.* xi. p. 199. Tab. 14. fig. 6, is nearly related to this genus; but a new examination of the worm is necessary to determine its true place in the system.

VI. CIRRATULUS,* Lamarck.

CHARACTER.—*Body vermiform, subcylindrical, the segments narrow and numerous; head small, conical, labriiform, without any organ of sense; mouth inferior, naked, emandibulate; two or three first segments apodal and naked, all the others with small papillary setigerous feet forming a double series along each side, and many of them, especially the anterior, carrying dorsally long tubular tortuous filaments; anus dorsad, terminal, simple.*

1. *C. MEDUSA*, proper branchial filaments originating from the anterior margin of the 4th segment; the posterior filaments few and scattered. (Plate III. Fig. 7–12.)

Cirratus Medusa, *Johnston* in *Mag. Nat. Hist.* vi. 124. fig. 13.—*C. fuscescens* et *C. flavescens*, *Johnston* in *Jameson's Edin. Phil. Journ.* xiii. 219.

* *Cirratus*—formed from *cirratus*, curled.

HAB. Under stones between tide-marks ; abundant in Berwick Bay.

DESCRIPTION. Body from 3 to 6 and sometimes even 9 inches long, tapered a little towards each extremity, rather less than a quill in calibre, the ventral surface flattened and furrowed down the centre, of a dirty brown or yellowish colour much stained from the internal viscera : head somewhat flattened, biannular, small, naked, marked on each side with a curved black line, the two segments posterior to it without filaments or feet : segments numerous, rather narrow ; from the anterior margin of the fourth, which becomes suddenly larger, arises on each side, but dorsad, a bundle of filaments shorter, generally more tortuous and of a paler colour than the others, which arise from the sides of the following rings down about one-fifth of the length of the animal, and a few remote filaments are dispersed irregularly on the rest of the body : there are two rows of slightly protuberant small papillary feet on each side, with a considerable interval between the rows, each papilla armed with from 3 to 6 bristles, the bristles of the superior longer, slenderer and more acutely pointed than those of the inferior, which are few in number, stout and curved near the apex : no spines : anus terminal, forming a plain aperture with a dorsad aspect.

C. Medusa lurks under stones, in a somewhat muddy soil, in which it forms burrows similar to those of the earth-worm, and into which it retires slowly when disturbed. The filaments by which it is so remarkably distinguished, and which curl around it like as many parasitical worms, are the branchiæ, or organs through the medium of which the blood is exposed to the influence of the air, and fitted for the purposes of life. They take their rise from above the dorsal feet, some from the back itself, are about 20 in number on each side, tortuous or extended, unequal in their lengths, the shortest being placed anteriorly, but the gradation is not regular ; and they are very easily removed by handling or by immersion in fresh-water. They consist of a large central vessel carrying red blood, surrounded by a white gelatinous transparent membrane, and are consequently of a fine red colour ; but this is liable to variation, for some, particularly the anterior bundles, are often quite white, and others, again, are occasionally spotted, as from a partial stagnation of the blood in them. When magnified they appear to be crenulated, but are not fringed with cilia. Messrs Audouin and Milne-Edwards propose to restrict the term *branchiæ* to the paler kind which are inserted in fascicles on the margin of one of the anterior segments, and they call the scattered filaments *cirri*, but surely



Johnston, George. 1838. "Miscellanea Zoologica. Ariciadae." *Magazine of zoology and botany* 2, 63–73.

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