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XXXIV.—*On the Larval State of* Molgula; *with Descriptions of several new Species of Simple Ascidians.* By Albany Hancock, F.L.S.*

Until quite recently it was generally considered that all the Ascidians, Simple, Social, and Compound, assumed in the larval condition the tadpole form. M. Lacaze-Duthiers, however, has lately shown† that, in a certain species of the genus *Molgula* this peculiar larval condition does not exist, but, on the contrary, the young, on issuing from the egg, is a comparatively inactive Amœba-like creature, in no way resembling the usual lively tadpole-like larva, either in form or mobility. From this discovery it might be inferred (and apparently M. Lacaze-Duthiers does infer) that all the members of the genus will present this exceptional feature. Such, however, is not the case.

In 1846, M. Van Beneden published his researches on the embryogeny &c. of the Simple Ascidians‡. This author described and figured at that time the tadpole larva of a *Molgula*, and, in fact, gave the whole history of the development of the species, which he considered new, and described under the name of *Ascidia ampulloides*. That this species is a true *Molgula* does not admit of a doubt; both the figures and description prove this, although there are one or two slight discrepancies, which may perhaps be accounted for by inaccurate observation. The head of the tadpole-like larva is represented as rather long and inclined to ovate, with the anterior extre-

* Communicated by the Author, having been read at the Meeting of the British Association held at Liverpool, Sept. 1870.

† Ann. Nat. Hist. July 1870, and Comptes Rendus, May 30, 1870.

‡ Recherches sur l'Embryogénie, l'Anatomie, et la Physiologie des Ascidies Simples (Mémoires de l'Académie Royale de Belgique, tome xx. p. 93).

mity a little constricted and produced, and the tail with the extremity furnished with a long filamentous process.

This memoir has apparently been overlooked by M. Lacaze-Duthiers; and this might easily happen, since we have seen that the species was described as an *Ascidia*.

But this is not all. We have ourselves detected the tadpole-like larva in another species of *Molgula*, which is described in the sequel of this communication, under the name of *M. complanata*. This is assuredly a true *Molgula*, having, however, one or two peculiar characters, the most striking of which is the unusual arrangement of the oviducts, which in this species pass from the posterior extremity of the genital masses, and are directed towards the dorsal region, while in all the other species of the genus they issue from the opposite extremity of the organs, and open directly into the atrium; and, moreover, the eggs are retained in the water-spaces between the branchial sac and the mantle until the larvæ are hatched. This is also a peculiar feature; for in all the other species that we have examined the eggs appear to escape at once by the excurrent tube, and to be developed externally.

There can be no mistake in regard to the fact respecting *M. complanata*, as we have taken the tadpole-like larvæ, in various stages of development, out of the water-spaces in this species. In several instances the larvæ were completely developed; and it is interesting to observe that in these instances they closely resemble in character those figured and described by Van Beneden in the memoir already alluded to. The head has the same elongated form, with the produced anterior extremity; and the tail is terminated by a similar filamentous process, which, however, when seen laterally, is found to be broad and fin-like.

Thus we have two species of well-characterized *Molgulæ* that pass through the tadpole- larval stage. Is it then really a fact that in this genus there are two distinct modes of development, as would seem to be the case from the researches of M. Lacaze-Duthiers? It may, however, be doubted whether or not the species investigated by that distinguished biologist is indeed a *Molgula*. It is named *M. tubulosa*. Now, if this be identical with *M. tubulosa* of Forbes and Hanley's 'British Mollusca,' it is certainly not a member of that genus. The *M. tubulosa* of the 'British Mollusca' is the *M. arenosa* of Alder and Hancock, described in the 'Transactions of the Tyneside Naturalists' Club' (vol. i. p. 197); but the characters of this species were, on subsequent examination, found to differ so much from those of the genus to which it had been assigned, that the late Mr. Alder and myself thought it neces-

sary to separate it generically, and to establish a new genus for its reception, to which we gave the name of *Eugyra*. This genus has not hitherto been published, but is now characterized in the following pages, and a new species of it described. It would seem probable, then, that Lacaze-Duthiers's *M. tubulosa* is no other than *Eugyra arenosa*, and consequently does not belong to the genus *Molgula*.

M. Lacaze-Duthiers's discovery, however, is not the less interesting on that account. It is a matter fraught with much importance, as it seems to establish the fact that the Tunicate organization can be developed without passing through the tadpole-condition—or, in other words, that this condition is non-essential in the development of this molluscous group. When Lacaze-Duthiers's memoir is published in full, it will be time enough to speculate on the effect his discovery may have on the recent investigations and theory of Kowalevsky respecting the relationship of the Tunicata to the Vertebrata.

I shall avail myself of the present opportunity to describe several new species of the Simple Ascidians, some of which were determined before Mr. Alder's death, others since that sorrowful event, by myself: the former will stand in our joint names; for the latter I am alone responsible.

Ascidia plana, Hancock.

Body ovate, pellucid, yellowish, smooth, except at the orifices, which are tuberculated; attached by the lower half. *Apertures* not much produced, the branchial one subterminal, the anal about halfway down. *Test* firm, rather thick, cartilaginous, smooth, hyaline, with numerous blood-channels of a yellowish flesh-colour, the terminal twigs much elongated and a little enlarged. *Mantle* rather delicate, and with the apertures not much produced. *Tentacular filaments* close-set, numerous, rather stout and long. *Branchial sac* minutely plicated, not quite so wide as the visceral mass, with short rounded papillæ at the intersections of the meshes, and small intermediate ones on the longitudinal bars. *Ventral plait* rather wide, ribbed and pectinated. Length upwards of two inches.

Two specimens of this species were dredged at Hastings by Dr. Bowerbank. It is closely related to the species next described, *A. Alderi*. The loop of the intestine, as in the latter, is placed crosswise, and the viscera are attached to the test by a membranous process that passes into the intestinal loop, just as a similar process does in that species. *A. plana*, however, is sufficiently distinguished by the number and arrangement of the tentacular filaments, the form of the branchial

papillæ, and the character of the vascular ramifications of the test.

Ascidia Alderi, Hancock.

Body irregular ovate or pyriform, produced towards the upper end, of a yellow colour, inclining to flesh-tint, with a few small scattered tubercles, attached diagonally by the base, and about halfway up the side. *Apertures* produced, distant, with longitudinal tuberculated ridges; the branchial aperture terminal; the anal about two-thirds down the body, and inclining towards the left side; ocelli red. *Test* moderately thick, firm, transparent, with the terminal twigs of the blood-channels appearing at the surface of a crimson colour, much enlarged and widely fusiform. *Mantle* rather delicate, with the apertures well produced. *Tentacular filaments* slender, distant, not numerous. *Branchial sac* minutely plicated, narrower than the visceral mass, with papillæ at the intersections of the meshes, and smaller ones on the bars between them, all having on each side a tubercular swelling. *Ventral plait* transversely ribbed and pectinated. Length upwards of two inches.

We are indebted to the Rev. A. M. Norman for the acquisition of this interesting species. Only one specimen was obtained; it was found between tide-marks at Herm, in 1865.

A. Alderi is distinguished from *A. plana*, to which it is closely related, by the arrangement of the tentacular filaments, by the form of the branchial papillæ, by the colour and peculiar character of the blood-channels of the test, and by several other minor features. This species is dedicated to the memory of my late coadjutor. I do this, with great satisfaction, at the request of its discoverer, the Rev. A. M. Norman.

Ascidia rubro-tincta, Hancock.

Body pretty regularly oval, smooth, or only very slightly wrinkled, of a pale-reddish flesh-colour, adhering by the middle portion of the side. *Apertures* distant, with the tubes not much produced, the branchial one terminal, the anal more than halfway down the side: ocelli red. *Test* rather thin, cartilaginous, pellucid, of a reddish flesh-colour, smooth, slightly wrinkled longitudinally. *Mantle* rather delicate, yellowish, tinged in parts with reddish flesh-colour; tubes short, the anal inclining backwards. *Tentacular filaments* numerous, delicate, unequal in size. *Branchial sac* minutely plicated, with rather long conical papillæ. *Ventral plait* rather narrow, strongly ribbed transversely, with the margin pectinated. Length about $2\frac{1}{2}$ inches.

A. rubro-tincta is a near ally to *A. mentula*, from which, however, it is distinguished not only by its colour, but also by several points of detail. The test is thinner and less coarse than it is in that species; and the tubes are more conspicuous, particularly the branchial one; the ventral plait, too, differs in some particulars, as well as the reproductive organs.

We have seen only one individual of this somewhat critical species; it was taken between tide-marks at Guernsey, by the Rev. A. M. Norman, in 1865.

Ascidia rubicunda, Hancock.

Body much elongated, irregularly oval, depressed, coarse, of an obscure flesh-colour, adhering by the whole side, with imperfect marginal expansions. *Apertures* a little produced, the branchial one almost sessile, terminal; the anal turned backwards from a bulging at the side, more than halfway down: ocelli small, crimson. *Test* thick, coarse, wrinkled, cartilaginous, semitransparent, of a flesh-colour, most rosy towards the apertures, occasionally overgrown with zoophytes. *Mantle* of a brilliant rose-colour, much intensified at the tubes, the alimentary tube of a greenish hue, probably from the nature of the contents; tubes distant, short, the branchial one terminal, the anal a little more than halfway down the side and turned backwards. *Tentacular filaments* short and delicate, varying in size. *Branchial sac* minutely plicated, with large conical papillæ, and intermediate ones nearly as large. *Ventral plait* transversely ribbed, finely pectinated from end to end, and of equal breadth throughout. Length upwards of $4\frac{1}{2}$ inches.

This fine species was discovered by the Rev. A. M. Norman in 1866, between tidemarks at Tobermory, in the Isle of Mull, where it occurred in considerable abundance. It was also taken abundantly by the same gentleman on the stems and roots of *Halidrys siliquosa*, and procured at extreme low tides at Portaferry, Strangford Lough, 1869. More recently we have had a few specimens sent to us by Mr. A. G. More, of Dublin, who collected them in Bertraghbuy Bay, Connemara.

A. rubicunda is related to *A. mentula*, on the one hand, and to *A. robusta*, to be immediately described, on the other, but is distinguished from both by many characters. It is always more extensively attached, and is more elongated and depressed than the former, from which it likewise differs in colour. From *A. robusta* it is also distinguished by its great brilliancy of colour, as well as by its general form, its shorter tubes, and the less robust character of the test.

Ascidia robusta, Hancock.

Body elongated, irregularly ovate, produced in front, very coarse, with a tinge of red, particularly towards the apertures; adhering by the whole side; but sometimes much distorted, and with adherent root-like prolongations. *Apertures* tubular, much produced, the branchial one terminal, the anal more than halfway down and inclining backwards; ocelli red. *Test* extremely thick, tough, hard, and cartilaginous, usually with root-like prolongations, semitransparent, very coarse and rough, irregularly furrowed and pitted, and frequently much overgrown with zoophytes. *Mantle* tinged with red, deepened towards the apertures; tubes long, the anal one much produced and turned backwards. *Tentacular filaments* rather slender, not crowded, alternately large and small. *Branchial sac* extending a little behind the visceral mass, minutely plicated, with well-developed papillæ, alternately large and small. *Ventral plait* transversely and strongly pectinated near the mouth. Length 4 or 5 inches.

Several of this large coarse species were obtained, in 1865, at the island of Herm, during spring-tides, by the Rev. A. M. Norman. They were mostly so firmly inserted amidst the roots of *Laminaria digitata*, that they were with difficulty removed. It is closely related to *A. mentula* and *A. rubicunda*; the extreme hardness and thickness of the test, however, and the great length of the respiratory tubes, sufficiently distinguish it from both. From the former it is likewise distinguished by its colour and other minor characters.

Ascidia mollis, Alder & Hancock.

Body ovate, lobated, of a rosy flesh-colour, attached by a limited portion of the side. *Branchial aperture* terminal; anal from half to two-thirds down, rather inconspicuous. *Test* firm, thick, semitransparent, smooth and soft to the touch, rather shining, obtusely lobed, of a rosy flesh-colour, showing minute punctures and veinings of crimson. *Mantle* rather large in proportion to the test, of a pale flesh-colour, with a few rosy streaks; the apertures crimson. *Tentacular filaments* numerous, rather slender, varying in size. *Branchial sac* with stoutish papillæ at the intersections of the meshes, and comparatively slender intermediate ones. *Ventral plait* very narrow, strongly ribbed transversely, and pectinated at the margin.

Three or four specimens of this distinct species were dredged in 1865, in Bertraghbuy Bay, Connemara, Ireland, by Mr. G. S. Brady. And we have recently examined two more speci-

mens of it which were obtained by Mr. A. G. More, in 1869, in Kilkieran Bay, Connemara.

A. mollis is a well-marked species, and is not likely to be confounded with any known form. It can always be distinguished by the soft though firm and shining test, which, on close inspection, is observed to be marked all over with minute crimson punctures (the terminal extremities of the blood-channels, which in it are more inflated and globular than in any other species).

Ascidia crassa, Hancock.

Body broadly oval, a little depressed, deeply and irregularly wrinkled, of a pale flesh-colour, adhering by various parts to sea-weeds. *Apertures* distant, sessile; branchial one subterminal; anal about halfway down the side. *Test* very thick, hard, cartilaginous, pellucid, irregularly and strongly wrinkled, of a pale flesh-colour. *Mantle* of a rose-colour, deepened towards the margins and over the alimentary canal; the tubes short, particularly the branchial one, which is subterminal; the anal is a little produced and doubled over towards the left side. *Tentacular filaments* numerous, well-developed, unequal in size. *Branchial sac* minutely plicated, with obtuse papillæ, alternately large and small; the stomata very small and elliptical. *Ventral plait* delicately ribbed transversely, and minutely pectinated; by the side of the mouth the pectinations are increased in size, and replace the laminæ. Length $2\frac{1}{4}$ inches, breadth $1\frac{1}{2}$ inch.

We have seen three specimens of this well-marked species; they are in the collection of the Rev. A. M. Norman, and were found by Mr. Dodd on the shore at Jersey in 1869.

This species is very easily distinguished: the broadly oval form, the sessile orifices, and hard cartilaginous test are very characteristic; but the branchial sac presents probably the most distinctive feature. The walls of this organ have a very peculiar appearance, on account of the grooves of the minute plications being formed into series of small, well-defined pouches, by the close-set primary vessels, thus rendering it very difficult to observe the secondary vessels, and the unusually diminutive elliptic stomata.

Ascidia inornata, Hancock.

Body elongated, oval, depressed, attached by the whole side, of a watery horn-colour. *Apertures* a little produced, with longitudinal ridges or folds; branchial one subterminal; anal about halfway down. *Test* rather thin, cartilaginous, transparent, with a few minute papillæ and some scattered agglu-

tinated particles of sand and shell, chiefly towards the margins of attachment. *Mantle* well supplied with interwoven muscular fibres. *Tentacular filaments* numerous and rather stout. *Branchial sac* narrow, with large papillæ at the intersections of the meshes, and small intermediate ones. *Ventral plait* wide, strongly ribbed; margin pectinated, and bordered on the left side with a band of tubercles. Length nearly 2 inches.

We are indebted for the knowledge of this species to Dr. Bowerbank, who obtained a single individual of it at Hastings. It is allied to *A. plebeia*, but differs from that species in many respects, and may at once be distinguished by the narrowness of the mantle and branchial sac, and likewise by the characters of the branchial papillæ and ventral plait.

Ascidia producta, Hancock.

Body much elongated, pyriform, depressed, attached by the entire length, of a pale green colour. *Apertures* tubular; the branchial one a little produced and turned towards the ventral margin; the anal three-fourths down, near the ventral margin: ocelli red. *Test* rather thick, pellucid, cartilaginous, covered with minute, distant, conical papillæ. *Mantle* delicate, of a full dark green, with the branchial tube considerably produced, terminal; the anal short and turned backwards. *Tentacular filaments* numerous, slender. *Branchial sac* minutely plicated, with moderate-sized papillæ at the intersections of the meshes. *Ventral plait* narrow, pectinated, ribbed, and tuberculated on the left side. Length $2\frac{1}{2}$ inches.

The Rev. A. M. Norman dredged this species in the Minch, in 1866, and also found it at extreme low-water during spring-tides in Strangford Lough, 1869.

A. producta evidently belongs to that group of which *A. depressa* and *A. inornata* are typical, but has many characters to distinguish it from all of them.

Ascidia elongata, Alder & Hancock.

Body elongated, slender, transparent, nearly colourless, attached slightly at the side of the base; the branchial aperture terminal, the anal about two-thirds down. *Test* hyaline, minutely tuberculated, the tubercles rather distant and pointed. *Tentacular filaments* numerous, long, and slender. *Branchial sac* with obtuse papillæ, minutely plicated; the stomata elliptical. *Ventral plait* ribbed, rather narrow. Length about two inches, breadth half an inch.

A single individual of this species was dredged in Seaham Harbour by Mr. George Hodge.

A. elongata is evidently related to *A. aculeata*, but it is

distinguished by many characters. Besides the very elongated form, the attachment is different, and the test is only slightly tuberculated; the tentacular filaments are differently arranged, and the minute structure of the branchial sac is quite peculiar, and alone sufficient for specific distinction.

Ascidia affinis, Alder & Hancock.

Body elongated, ovate, tapering upwards, semitransparent, dirty greenish white; surface smooth or only slightly wrinkled, echinated and somewhat rugose towards the base and apertures. *Apertures* prominent, large, tubular, longitudinally ridged, rugose or echinated; the branchial one terminal, the anal a little way down the ventral margin. *Test* semitransparent, thin, cartilaginous, of an obscure, pale, soiled greenish white, smooth above, and slightly roughened or echinated towards the base and tubes. *Mantle* pale olive-brown, almost colourless and transparent at the tubes, which are well-produced, wide, and strongly ribbed longitudinally, both directed upwards. *Tentacular filaments* numerous, moderately stout, alternately large and small. *Branchial sac* minutely plicated; papillæ only at the intersections of the meshes, thick, but very slightly produced. *Ventral plait* wide, smooth or only slightly ribbed at the base, margin entire; the left oral appendages seven or eight, large, triangular, flattened, and denticulated. Length upwards of two inches.

Obtained in great abundance in Roach River, Essex, by Dr. Baird, when examining the state of the river to report on its suitableness for the maintenance of oyster-fisheries. They have usually a soiled appearance, and are much infested by parasitic zoophytes, and are generally united at the base into clusters, the base being considerably prolonged, forming a sort of irregular flat pedicle.

Ascidia Normani, Alder & Hancock.

Body elongated, pretty regularly oval, white, delicately tinged with rosy flesh-colour, attached by the side of the base, transparent, strongly echinated, particularly towards the base and apertures, where the spines are usually compound. *Apertures* of a rose-colour, wide, produced, strongly ridged and echinated longitudinally; the branchial one terminal, the anal about a third down the ventral margin; ocelli small, inconspicuous. *Test* thin, transparent, white, or only slightly tinged with pale flesh-colour, covered with simple and compound spines, strongest towards the apertures and base. *Mantle* delicate, of a pale buff flesh-colour or almost colourless; the tubes well produced, and of a rosy colour. *Tentacular*

filaments rather long, white, wide at the base, distant, alternately large and small, not very numerous. *Branchial sac* minutely plicated; stomata long; papillæ confined to the intersections of the meshes, delicate, scarcely (if at all) produced. *Ventral plait* well developed, ribbed, margin entire; the left oral appendages five or six, denticulated, flat, placed diagonally. Length sometimes $2\frac{7}{8}$ inches, but usually under 2 inches.

Several of this pretty species were collected by the Rev. A. M. Norman in 1869, between tide-marks in Strangford Lough; and lately Mr. A. G. More has sent to us several specimens of it dredged by himself in Bertraghbuy Bay, Connemara. We have received it also from Mr. Robertson, who obtained three or four individuals in the Frith of Clyde.

We have named this species after our friend the Rev. A. M. Norman, to whom we are indebted for a great number of new forms of both the simple and compound Tunicata.

Genus Corella, Alder & Hancock, MS.

Body subquadrate or more or less rounded, coriaceous, very slightly contractile, rather compressed, attached mostly by the base. *Apertures* as in *Ascidia*; the branchial 8-lobed, the anal 6-lobed, each with small ocelli. *Test* smooth and diaphanous. *Mantle* often bright-coloured, and with a few radiating muscular fibres. *Tentacular filaments* linear, unbranched. *Branchial sac* with the secondary vessels regularly and beautifully convoluted, framed in squares formed by stout secondary rectilinear vessels and primary transverse channels. *Viscera* sinistral, the stomach placed low, with the intestine bending backwards and downwards on the left side, passing along the base of the mantle, and rising in front to the anal aperture. *Reproductive organs* also on the left side, the oviduct following the line of the intestine.

The above genus was characterized some time previously to the death of my late collaborator, Mr. Alder, for the reception of the so-called *Ascidia parallelogramma*, which differs in so many important characters from the species with which it was associated that we deemed ourselves justified in making the change. It is a sinistral animal; the alimentary tube is very differently disposed from that of *Ascidia*; the heart occupies a different position; and, above all, the spiral arrangement of the secondary branchial vessels seems sufficient to warrant the establishment of this genus.

Since then two very interesting species have been discovered which agree in all essential characters with the type form, thus justifying the separation of *Corella parallelogramma* from the genus with which it was placed.

Corella larvæformis, Hancock.

Body irregularly rounded or subquadrate, compressed, adhering by the base. *Branchial aperture* terminal, only slightly prominent; anal one at the upper part of the ventral margin, a little removed from the branchial aperture, at the extremity of a tube which is considerably longer than the entire body, and projects diagonally upwards; ocelli red. *Test* firm, smooth, shining, thin above, rather thick below, perfectly crystalline, exhibiting not only the colour of the mantle, but likewise much of the internal structure. *Mantle* delicate, adhering to the test, of a yellowish or reddish colour, with a few scattered small red spots, and so transparent that it does not in the least obscure the view of the contained visceral organs. *Branchial sac* with inconspicuous papillæ at the intersections of the meshes forming the framework of the spiral secondary vessels. *Tentacular filaments* numerous, not crowded, long, delicate, and colourless. *Ventral plait* replaced by a series of rather minute tentacular points situated a little distance apart, and corresponding in number (twelve or fourteen) to the primary vessels, dividing the rows of spirals. Length from the base to the branchial aperture $\frac{5}{8}$ of an inch, and to the anal aperture $1\frac{1}{2}$ inch.

We are indebted to Mr. A. G. More for the knowledge of this interesting and very distinct species. Two specimens were obtained at Roundstone, Connemara, in 1869.

C. larvæformis is distinguished at once from *C. parallelogramma* by the extraordinary elongation of the anal tube, and the comparative deficiency of colour, though much reliance cannot be placed on this character, as the specimens had been some time in spirit before they came into our possession. The fewness of the rows of branchial spirals, and the consequent comparative largeness of the spirals themselves, also distinguish this species.

Corella ovata, Hancock.

Body ovate, widest above, not much compressed, adhering by the base, where there are a few root-like processes. *Apertures* very little produced, almost sessile; the branchial one terminal, the anal placed at a little distance down the ventral margin. *Test* soft, smooth, delicate, and perfectly transparent, revealing the colours and structure of the enclosed mantle and viscera. *Mantle* thin, transparent, of a buff flesh-colour, sometimes with a few obscure reddish markings; tubes very short, with the margin of the apertures of a pale flesh-colour; muscles few and delicate, of a reddish colour. *Branchial sac* with thin, delicate papillæ, very slightly produced; the spirals com-

posed of only two or three stout coils. *Tentacular filaments* numerous, slender, not very long, set rather close together, in a single line on a narrow muscular band. *Ventral plait* broken up into upwards of thirty tentacular processes, which are wide at the base, attenuated upwards, and produced and pointed at the extremity. Length $1\frac{3}{4}$ inch, but usually smaller.

C. ovata was found by the Rev. A. M. Norman at low-water at Tobermory, in the island of Mull, in 1866, associated with *Ascidia rubicunda*, and adhering to *Plocamium coccineum*. It has also been found at Roundstone, Connemara, by Mr. A. G. More, occurring in clusters attached to the test of *Ascidia Normani*.

This delicate species is distinguished from its two congeners by the general form, and particularly by the character of the branchial spirals, which in *C. ovata* are not by any means so many times coiled as they are in both the other species; and the coils themselves are much stouter. In *C. parallelogramma* and *C. larvæformis* the spirals are six or seven times coiled, while in *C. ovata* they are only two or three times coiled.

Genus Ciona (Savigny), Fleming.

Body subcylindrical, gelatinous, very contractile, attached more or less by the right side. *Apertures* generally nearly terminal, and not far apart; the branchial 8-lobed, the anal 6-lobed, with conspicuous ocelli. *Test* soft, smooth, and flaccid. *Mantle* with strong longitudinal muscular bands. *Tentacular filaments* numerous and slender, linear. *Branchial sac* narrow, not reaching to the bottom of the mantle; the meshes rectilinear, with papillæ at the intersections. *Ventral plait* replaced by a series of tentacular points. *Stomach*, *intestine*, and *reproductive organs* extending below the branchial sac.

After some hesitation, and in conjunction with the late Mr. Alder, we determined to remove *Ascidia intestinalis* from the species with which it was usually associated, and place it apart as the type of a distinct genus, as Dr. Fleming had previously done, by raising Savigny's third tribe, *Phallusiæ Cionæ*, to generic rank. It is therefore satisfactory to have to record the occurrence of a new species, agreeing in all the essential characters with the type form.

Ciona fascicularis, Hancock.

Body much elongated, subcylindrical, flaccid, highly contractile, colourless, or tinged yellowish from the mantle and viscera appearing through; attached by the side of the base; the lower extremity with numerous rather long, cylindrical

papillæ. *Apertures* tubular, short, yellowish, with red ocelli; branchial one terminal, anal at a short distance down the ventral margin. *Test* soft, smooth, gelatinous, perfectly hyaline. *Mantle* delicate, pale yellow, and extremely transparent, all the visceral organs being distinctly seen through it; tubes short, cylindrical, and more highly coloured than the rest of the mantle. *Branchial sac* long, narrow, cylindrical, with rather long papillæ, non-plicate. *Tentacular points* of the ventral margin long, slender, numerous. *Tentacular filaments* numerous, long and slender, with short intermediate ones, set in a single row on a narrow scalloped fold or collar. Length from 2 to 3 inches, breadth about $\frac{1}{2}$ an inch.

For specimens of this very distinct and interesting species we are indebted to Mr. A. G. More, who collected it in considerable abundance in Kilkieran Bay, Connemara, in 1869. The specimens were for the most part united towards the base into dense bundles, the upper portions being quite free. The aggregation is produced by the agency of the papillæ that clothe the sides of the basal extremity of the test; the attachment is consequently lateral. The common mass had apparently been fixed by the same means to some foreign body.

The papillæ at the posterior extremity of the test, the peculiar mode of aggregation, and the narrow cylindrical form of the body distinguish at once this species from *C. intestinalis*, from which it also differs in the respiratory tubes being further apart.

Molgula simplex, Alder & Hancock.

Body globular, subpellucid, nearly smooth, free, or very slightly attached. *Apertures* nearly terminal, not far apart, slightly tubular and retractile. *Test* rather soft, but tough, generally rather thinly clothed with linear fibrils, which are rarely forked, and seldom with any sand or shell adhering to them. *Tentacular filaments* branched, irregularly tripinnate; there are about eleven, with minute ones interspersed. *Branchial sac* with six folds on each side, the meshes distinctly but irregularly convoluted. *Ventral plait* smooth, broad below. *Intestine* forming two loops, confined to the lower half of the sac. *Reproductive organs* forming a slightly arched mass on each side, with the margins divided into numerous irregular lobes, that of the right side within the second intestinal loop. Diameter $\frac{1}{2}$ to $\frac{3}{8}$ inch.

A few specimens were found by the late Mr. Alder at Plymouth and Oban; it has also been obtained at Lough Strangford and Ballywater, Ireland, by Mr. W. Thomson. It has considerable resemblance to *Ascidia ampulloides* of Van Beneden, which is undoubtedly a *Molgula*. That species appears

to be larger than *M. simplex*, and with more extended tubes; the test, too, is described as solid and thick, which is not the case with our species.

Molgula inconspicua, Alder & Hancock.

Body globular, rather firm, covered with sand and shell, unattached. *Apertures* approximated. *Test* tough, clothed with irregular linear fibrils. *Mantle* rather thick and muscular towards the upper part, thinner below, the intestine showing through. *Tentacular filaments* bipinnate. *Branchial sac* with six folds on each side, the meshes very slightly convoluted or almost linear. *Ventral plait* smooth. *Intestinal canal* large, reaching nearly to the top of the sac, twice looped. *Liver* dark, obscure green. *Reproductive organs* forming a long, curved, elliptical mass on each side, with the margins divided into irregular lobules, that on the right side within the second intestinal loop. Diameter $\frac{3}{10}$ inch.

One specimen only has come under our notice; it was dredged in Guernsey by Mr. Jeffreys and the Rev. A. M. Norman in 1865.

This rather obscure species is remarkable on account of the nearly linear arrangement of the branchial meshes, which, however, preserve sufficient curvature to bear out the character of the genus to which it belongs. It is nearly allied to *M. simplex*, from which it differs in the character of the branchial meshes already noticed, as well as in the less bushy tentacular filaments and the more voluminous intestine.

Molgula complanata, Alder & Hancock.

Body much depressed, rather longer than broad, adhering by its whole length, covered with sand and small fragments of shell. *Apertures* at a little distance apart; the branchial one towards the margin, the anal about the centre of the disk. *Test* rather thin, covered with long simple fibrils, to which the sand is attached; under surface very thin and smooth, with only a few grains of sand. *Mantle* transparent, slightly attached to the test, and with strong radiating muscles round the apertures. *Tentacular filaments* simply pinnate. *Branchial sac* with six folds on the right side and seven on the left; the meshes a good deal convoluted. *Intestinal canal* forming a single long loop. *Liver* pale green, folded or laminated. *Reproductive organs* composing an oblong ovate mass on each side; that on the right side placed immediately above the intestinal loop; the oviducts turned to the posterior side. Length $3\frac{1}{2}$ tenths of an inch.

We have seen only one specimen of this well-characterized species. It was adhering to the inside of a dead shell of *Patella vulgata* dredged in Guernsey by Mr. Jeffreys and the Rev. A. M. Norman in 1865.

The depressed form and large surface of attachment in this little *Molgula* are characters very unusual in this genus. Another peculiarity is observed in the reversed position of the oviducts.

Genus Eugyra, Alder & Hancock, MS.

Body globular, unattached, covered with glandular fibrils and a coating more or less complete of fine sand. *Test* usually thin and transparent, hispid. *Branchial aperture* 6-lobed, anal 4-lobed, placed on slight tubes, nearly inconspicuous when contracted. *Tentacular filaments* branched. *Branchial sac* without folds, but with longitudinal plates or bands; the meshes regularly convoluted and produced into little cones, each being composed of a double spiral coil of vessels, which spirals, turning in opposite directions, meet at the apex. *Reproductive organs* in a single mass placed on the right side within the intestinal loop.

Molgula arenosa varies so extensively from the other *Molgulæ* that we thought it necessary to place it in a genus apart. This we did several years ago in our MS., and characterized the genus as above. Since then, another species of *Eugyra* has been discovered, and has now to be recorded.

Eugyra globosa, Hancock.

Body globular, unattached, entirely covered with sand and fragments of shell. *Apertures* not quite terminal, a little apart, somewhat produced, rather wide, cylindrical, resembling a pair of teats, colourless, transparent, placed in a well-defined, bilobed, narrow area, devoid of attached sand. *Test* soft, thin, with very delicate and for the most part simple fibrils. *Mantle* thin, colourless, or slightly tinged with yellow, transparent, the viscera showing through; tubes hyaline, with delicate membranous walls. *Branchial sac* with the vessels of the double spiral coils rather stout. *Intestine* forming a single loop, short and constricted towards the anal extremity, and widening at its junction with the stomach. *Liver* bulky, of a black olive-green. *Reproductive organs* of a pale yellow, placed partly within the intestinal loop, and partly above it. Diameter half an inch.

A single specimen of this interesting species was dredged by Mr. Jeffreys and the Rev. A. M. Norman in Guernsey in 1865. *E. globosa* is distinguished from *E. arenosa* by the

form and larger size of the tubes, by the less voluminous intestine, by the shortness of its loop, and by the darkness and colour of the liver.

XXXV.—*On* Georissa, Acmella (Cyclostoma tersum, *Bens.*), Tricula, *and* Cyathopoma millium, *Bens.* By William T. Blanford, F.G.S., C.M.Z.S.

Dr. v. Martens, in the 'Malakoz. Blätter' for 1869*, p. 223, has pointed out that I was in error (Ann. & Mag. Nat. Hist. March 1869, p. 177) in supposing *Hydrocena* of Parreyss to be a marine shell, and, consequently, that the only essential ground of distinction between it and my genus *Georissa* disappears. I had overlooked Frauenfeld's mention of the shell in the 'Verhandl. der zool.-bot. Gesellschaft' for 1866 until after sending off my note, and at the time of writing was mainly guided by Martens himself (conf. Malakoz. Blätter, 1864, p. 142, and Ann. & Mag. Nat. Hist. 1866, vol. xvii. p. 202) in rejecting Küster's habitat. I fully agree that there is no further reason for distinguishing the genera, and that *Georissa sarrita*, *frustillum*, *pyxis*, *Rawesiana*, and *illex* must be restored to the genus *Hydrocena*. At the same time it is very desirable that the animal of *H. cattaroënsis* should be reexamined with regard to the position of the eyes and the mode of carrying the operculum; and it is only proper to add that I had myself observed the animal of *H. pyxis*, Bens., and found it very similar to *H. sarrita* as figured by Major Godwin-Austen, and very different from *H. cattaroënsis* as figured by Küster.

I cannot, however, coincide with Dr. v. Martens in his opinion, founded solely on Major Godwin-Austen's drawings, that *Cyclostoma tersum*, Bens., is an *Assiminea*; and I am persuaded that an inspection of the shell would very soon undeceive my critic. *C. tersum* possesses a very distinct sculpture, whilst *Assimineæ* are always, so far as I have seen, smooth; and whereas every species of true *Assiminea*, so far as I am aware, is an estuarine shell, living between tide-marks on mud, the little shell from the Khasi hills is found, as I am informed by Major Godwin-Austen, in company with *Pupa plicidens*, in moist places near small streams, but not upon their edges, at a height of 4000 feet above the sea.

The only species of *Acicula* which I possessed for comparison with *C. tersum* was *A. spectabilis*, Rossm., which is similar

* But, as is only too frequently the case, published some months after the close of the year.