

XV.—Notes on the Hydroid Zoophytes. By Prof. ALLMAN.

I. *Laomedea flexuosa*, Hincks.

IN the polypes of *Laomedea flexuosa*, the ectoderm of the tentacles is extended laterally between these organs for a distance of about a fourth of their entire length from their origin, so as to form a web-like membrane, similar to that already pointed out by Mr. Alder in *L. acuminata*.

This peculiarity in a very common zoophyte seems to have been hitherto overlooked, though, in a morphological point of view, it is a character of much importance.

II. *The extra-capsular medusiform sporosacs ("meconidia") of Laomedea, and the determination of the species in which they are found.*

In a communication on the Reproductive Organs of the Hydroid Zoophytes, read last year before the Royal Society of Edinburgh*, I referred to the extra-capsular medusiform sporosacs, so well known from Lovén's description of them in a zoophyte which he names *Campanularia (Laomedea) geniculata*, and expressed my opinion that Lovén's zoophyte was not truly *Laomedea geniculata*, but *L. flexuosa* of Hincks, a species to which I referred similar bodies which I had myself examined.

Mr. Alder, writing to me since then, suggests the possibility of the species which gives rise to these sporosacs being neither the one nor the other, but a distinct, though not yet discriminated, species.

As we know that both *L. geniculata* and *L. flexuosa* give rise also to a different kind of sexual bud, it will be at once seen that this question has an important physiological significance apart from its bearing upon simple descriptive diagnosis; and I therefore availed myself of the first opportunity to inquire critically into the subject. The result has been a conviction that Mr. Alder's doubts are well-founded.

A few weeks since, I obtained upon the shores of Cramond Island, in the Firth of Forth, a *Laomedea*, growing on the fronds of *Fucus vesiculosus*, and loaded with gonophores, most of which carried upon their summits the peculiar bodies under consideration.

The only described species of *Laomedea* with which it is possible to confound the Cramond zoophyte are *L. flexuosa*, *L. geniculata*, and *L. dichotoma*. From *L. flexuosa*, however, it differs in the more elongated form of the polype-cells, in the more conical form of the gonophores, and in the absence of the web

* Proc. Roy. Soc. Edinb. 1858.

which, as already mentioned, connects the bases of the tentacles in *L. flexuosa*. From *L. geniculata* it differs not only in its being much branched, but in the form of the gonophores, which in *L. geniculata* are provided with a short tubular orifice, while here they have a broad truncated summit. From *L. dichotoma* it differs in its mode of branching; but it may be more decidedly distinguished by the form of its gonophores, which in *L. dichotoma* open by an elevated tubular orifice, as in *L. geniculata*.

The following diagnosis will serve to give, in a condensed form, the leading characters of the species:—

Laomedea Loveni, nov. sp.

Char.—Stem alternately branched, but at irregular intervals. The ultimate ramuli regularly alternate, given off at nearly equal intervals from a distinct geniculation of the supporting branch, which is annulated for a short distance above the origin of each ramulus. The ultimate ramuli are annulated in their entire length, and are nearly or fully as long as the polype-cells.

Polype-cells deep (a little more than twice as deep as wide), with an even rim.

Gonophores tapering from a broad flat summit to a narrow base, so as to present the form of an inverted cone, seated on short annulated peduncles, which spring from the stem close to the origin of a polypiferous ramulus.

Polypes with from 22 to 30 tentacles, which are not united at their base by a membrane.

Reproduction by fixed sporosacs which ultimately become medusiform and extra-capsular (*meconidia*).

Two distinct forms of this zoophyte must be noticed, which, though very different in general appearance, cannot be specifically distinguished from one another.

Var. α . Forming continuous meadow-like growths upon the surface of sea-weeds, &c., scarcely exceeding one inch in height.

Var. β . In long lax tufts, attaining a height of 3 or 4 inches.

It appears to me that it is the var. α . of this species which was originally described by Lister* under the name of *Campularia geniculata*, and afterwards by Lovén†, and again by Schultze‡, under the same name, while I have myself§ fallen into the error of describing it under the name of *Laomedea flexuosa*. It is also probably the same which Dr. Wright|| has described as *Laomedea dichotoma*.

It is possible there may be more than one species of *Laomedea*

* Phil. Trans. 1834.

† Wiegmann's Archiv, 1837.

‡ Müller's Archiv, 1851.

§ Proc. Roy. Soc. Edinb. 1858.

|| Edinb. New Phil. Journ., Jan, 1859.

which give origin to extra-capsular medusiform sporosacs; as yet, however, we have no evidence of any other than that here described. Though Lister is the first author who has spoken of the remarkable bodies in question, having figured male examples of them in the paper referred to, yet it is to Lovén we are indebted for the first accurate and full description of them. I have therefore thought it right to dedicate the present species to the Danish naturalist whose name has already become intimately associated with these medusiform sporosacs, and to designate it as *Laomedea Loveni*.

In the paper above referred to, I mentioned my having failed to detect in the extra-capsular sporosacs, whether male or female, any trace of the radiating canals first described by Lovén. In my more recent examination of these bodies, I was for a long time, notwithstanding the most careful scrutiny, equally unsuccessful; but at last a specimen occurred, with female gonophores, in which the appearance figured by Lovén was not only apparent but strikingly obvious. I am still, however, of opinion that this peculiarity of structure is not constant, many specimens presenting not the slightest trace of it.

The real meaning of these rib-like lines is, after all, a matter not easily settled. They may be proper tubes, the true representatives of the radiating canals of a Medusa; but there seems at least equal reason to consider them as mere folds of a membrane which lies immediately within the ectothecal covering of the sporosac, and I confess myself unable to give a decided opinion on this point. In favour of the former view may be adduced their undoubtedly tube-like appearance, their occurrence in fours, and the fact that their presence would be quite in accordance with what analogy would lead us to expect. On the other hand, against their being gastro-vascular canals may be urged their obliteration under slight pressure, the absence of all trace of motion in their interior, and, above all, their frequent, if not most usual, non-existence.

The opportunities I have just had of examining these extra-capsular sporosacs have enabled me to determine their exact structure more fully than appears to have been yet done. I now find that three separate membranes enter into the composition of their walls. Most internally is a membrane which immediately confines the ova or spermatozoa, and which was originally the ectodermal layer of the manubrium. This investment is generally of short duration, becoming absorbed or ruptured under the increasing volume of the generative products. It is the endotheque, according to the terminology I have already ventured to propose (Proc. Royal Soc. Edin. Dec. 1858). Most externally is a thick ectodermal layer loaded with thread-cells

(the ectotheque); and between these two is a third membrane, which has been hitherto overlooked, and which is the true representative of the umbrella of a Medusa. It is on the summit of this middle sac, or *mesotheque*, as it may be appropriately called, and not on that of the ectotheque, as I formerly believed, that the short tentacles which crown the sporosac originate; they surround an orifice in the mesotheque, and pass out through a corresponding orifice in the ectotheque. The walls of the mesotheque are thickened round the orifice, and here apparently contain a circular canal, as indicated by the presence of coloured granules: if radiating canals really exist, it is in this membrane that they are developed.

The tentacles possess, like the marginal tentacles of a true Medusa, considerable contractility. They may frequently be seen of very different lengths in different sporosacs of the same specimen; and this, which is really the result of different degrees of contraction, may be easily taken for different degrees of development, the tentacles being especially sluggish in the act of extension or contraction. Their length when fully extended, in the female sporosac, will equal about half the diameter of the sporosac, while under external irritation they will slowly contract to a third of their original length, and will then show themselves as a little stellate crown on the summit of the sporosac. They vary in number; I have counted in the female sporosac from 8 to 16 or 20. They are composed of ectoderm and endoderm, the ectoderm containing thread-cells, and the endoderm presenting the usual septate appearance. They are less numerous and less developed in the male than in the female.

That the bodies now described belong to the class of sporosacs rather than Medusæ, must, I think, be admitted. In all essential points they agree with the sporosacs of *Tubularia indivisa*, in which a mesotheque is fully developed*; and it should also be borne in mind that when Medusæ are produced in the *Laomedææ* and *Campanulariæ* they belong to a different type, the generative products being developed upon the course of the radiating canals, and not, as in these medusiform sporosacs, in the walls of the manubrium.

They are thus of no little interest in the morphology of the zoophytes; and it will be found convenient to speak of them by a special name. Their singular resemblance, especially when their tentacles are contracted, to a poppy-capsule with its sessile stellate stigma, will instantly strike us, and has suggested to me the name of *meconidia*†, by which I propose to designate them.

* See "Notes on Hydroid Zoophytes" in a previous Number of the 'Annals.'

† From *μήκων*, a poppy.

III. *Coryne eximia*, nov. sp., and its Medusa.

Attached to rocks and the stems of *Laminaria digitata*, there may be met with, at low spring tides in the Firth of Forth, a *Coryne* which I am unable to refer to any described species. It grows in large entangled masses, attaining the height of 3 or 4 inches. It is much and very irregularly branched, but with the ultimate (polypiferous) ramuli mostly unilateral and springing nearly at right angles from the supporting branch. The larger branches are about 0.02" in diameter, and the polypiferous ramuli about 0.01". The branches are for the most part annulated at their origin; and the short polypiferous ramuli are similarly annulated throughout their entire length. The whole zoophyte is of a pale pink colour, becoming somewhat brighter in the polypes, and caused by the fine carmine-coloured granules of the cœnosarc and stomach, with their tint more or less modified by transmission through the surrounding structures.

The polypes have from 20 to 30 tentacula. In all the specimens I examined, four tentacles were situated in a regular verticil immediately behind the mouth; and the remaining tentacles were scattered over the body of the polype, with scarcely any tendency to a verticillate arrangement*.

From many of the polypes, gonophores were abundantly evolved. They budded forth from the upper side of the roots of the tentacles, each supported on the summit of a rather long peduncle, and including a single Medusa. Some polypes thus carried a gonophore at the base of almost every tentacle.

If this fine *Coryne* should really prove, as I believe, undescribed, I would propose for it the name of *C. eximia*, with the following diagnosis:—

Char.—Stem much and irregularly branched, forming dense entangled masses, with the ultimate ramuli mostly unilateral. Polypary corneous, with the ultimate ramuli annulated in their whole length, and the greater number of the other branches with annulations at their origin.

Polypes with from 20 to 30 tentacula, which are scattered over the surface of the body with scarcely any tendency to a verticillate arrangement, except the first four, which are disposed in a crucial verticil behind the mouth.

Gonophores simple, medusiferous, peduncled, springing from the bases of the tentacles over the greater part of the body.

The Medusæ, when liberated from the ectothecal investment

* A point of some interest in the structure of the polype may here be mentioned. The stomach is not a direct continuation of the canal of the cœnosarc, but the latter enters it upon the summit of a large papilliform lobe of the endoderm. This condition will, I believe, be also found in *Hydractinia*, and is probably not unfrequent among the Tubularidæ.

of the gonophore, are seen to be deeply bell-shaped. They are remarkable for their large size, measuring in their transverse diameter about 0.06", and a little more in their vertical diameter. The manubrium extends to about the middle of the umbrella; and the mouth is destitute of tentacles or lobes. There are four radiating canals—each continuous, at the point where it intersects the circular canal, with a very extensile marginal tentacle. The tentacles are four in number, and originate in a large bulb containing carmine-coloured granules, while a dark-reddish-brown ocellus is superficially imbedded in a thickened portion of the ectoderm on the outer side of the bulb.

The bulbous base of the tentacle consists of a dilatation of the tubular system of the Medusa at the point where the radiating canals enter the circular, and having its endoderm greatly thickened and lobed, and secreting coloured granules. The ectoderm is here also much thickened on the inner side of the base of the tentacle, so as to constitute a cushion-like lobe containing imbedded thread-cells.

In its extended state the tentacle is seen to have its thread-cells grouped into very distinct knot-like clusters, which towards the end of the tentacle are spherical, and so situated as to appear to be strung upon the tentacle at intervals of about three times the diameter of a cluster, but are less regular in form, and more lateral and alternate in position near the base. The terminal group of thread-cells forms a spherical bulb on the tip of the tentacle, somewhat larger than any of the knot-like groups along its length.

There is no doubt of the complete continuity of the tube of the tentacle, and coloured granules may be traced from the bulb at the base to the very tip, though the peculiar arrangement of the cells of the endoderm near the base would easily give rise to the belief that the tube was interrupted by transverse septa.

There is a wide velum; and lithocysts are entirely wanting.

The peculiar motion of the corpuscles in the tubular system of Medusæ would naturally be referred to the action of vibratile cilia lining the walls of the canals, though I believe that these cilia have never yet become an object of direct observation. In the present little Medusa, however, I have distinctly seen them in the radiating canals near the spot where these vessels enter the circular canal, and again in the upper part of the canals near their origin in the stomach.

It will be at once apparent that the Medusa of *C. eximia* closely resembles that already described by Dujardin under the generic name of *Sthenyo*, as proceeding from a *Coryne* which he calls *Syncoryne decipiens**. Indeed, though the *Syncoryne*

* Ann. Sc. Nat. 1845.

decipiens of Dujardin is undoubtedly distinct from the species of the present note, it is difficult to find, in Dujardin's figure and description of *Sthenyo*, any character which can be justly considered as pointing to a specific distinction between the two Medusæ. It is probable that a more exact comparison with the living animal would result in the detection of differences not now apparent; but it is also by no means impossible that we should fail in the discovery of any such difference, and then we should have two Medusæ with characters specifically identical proceeding from two polypes with characters specifically distinct,—a fact, it will be at once seen, of great importance in its bearing on the general question of specific distinction.

At all events, it is quite certain that the value of the differences between the Medusæ of zoophytes is by no means necessarily parallel with that between the zoophytes themselves. An illustration of this remark is afforded by the Medusa of a *Coryne* which I described in the last Number of the 'Annals,' under the name of *C. Briareus*, and which is assuredly a true *Coryne*, though its Medusa is at least generically distinct from that just described as produced by *C. eximia**.

* Since the appearance, in last month's Number of the 'Annals,' of my note containing a description of *Coryne Briareus*, Dr. Strethill Wright has stated to me his belief that *C. Briareus* is the same zoophyte as one already provisionally described under the name of *Tubularia implexa* by Mr. Alder, who had not seen the polypes. To Mr. Alder's *Tubularia implexa* Dr. Wright had referred a *Coryne* which he describes in the July Number of the 'Edinburgh New Philosophical Journal' under the name of *C. implexa*. I am not, however, prepared to admit the identity of *Coryne Briareus* with either of these zoophytes, though Dr. Wright has allowed me an opportunity of inspecting specimens of his *Coryne* preserved in spirit.

It has so happened that Dr. Wright and I have been simultaneously engaged in the investigation of some portions of the invertebrate fauna of the Firth of Forth; and though our explorations have been conducted quite independently of one another, it is not to be wondered at, that, working as we have been over the same zoological ground, identical species should occasionally be discovered by both of us. This will explain how it has occurred that two other zoophytes which I have described as new in the paper just referred to, namely *Manicella fusca* and *Eudendrium baccatum*, have been simultaneously described by Dr. Wright in the same month's Number of the 'Edinburgh New Philosophical Journal,'—for I have no doubt of the identity with these species of Dr. Wright's *Bimeria vestita* and *Garveia nutans*. Dr. Wright's paper, however, purports to be a report of a communication made by him to the Royal Physical Society of Edinburgh in November 1858. Under these circumstances, I am quite willing to yield the priority of discovery and the right of naming to Dr. Wright, without, however, thereby admitting that claims of priority are necessarily valid when based only on communications to Societies which preserve upon their records no authenticated abstract of the facts communicated, and which defer publication until many months after the date claimed for the transaction. Such a practice, at the best, is sure to be

In this department of research, we are indeed placed in the anomalous position of being obliged to designate by distinct generic and specific names two organisms, as if they were totally independent, instead of being merely zooids of the same ovum—terms of one and the same unbroken life-series.

The necessity, however, which we are under of subjecting to distinct treatment, in descriptive zoology, the polypal and the medusal terms of this series, renders it impossible to abandon the practice, even though it be to a certain extent modified when continued observation shall enable us to refer every polype-sprung Medusa to its proper zoophyte.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

November 9, 1858.—Dr. Gray, F.R.S., V.P., in the Chair.

ON A LIVING OCTOPUS. BY J. P. G. SMITH, ESQ.
IN A LETTER TO DR. GRAY, F.R.S.

“We found a Sea-spider at Goldthorpe Roads, in St. Bride’s Bay, which I brought home, and have examined with much interest. Its habits and attitudes are very different from anything I ever saw figured. I enclose a sketch of its appearance when at rest. It seems very well, and shows great objection to be disturbed.

“I noticed that the habit of the Cuttle-fish, when in a large pool on the sands, was to get into a corner formed by a piece of rock, and to fix itself by the suckers of the arms, sac downwards—and that much more flattened and spread out than when lying on the bottom of the vase; the eyes made the apex of an irregular obtuse pyramid. It assumed at times a much darker and richer colour, almost chestnut, mottled with lighter shades; and its skin became more wrinkled; and instead of two inspirations and exhalations in succession, it only made *one* at about the same intervals, but with a much stronger jet of water through the siphon. Upon my return, I placed it in a pitcher of salt water inside the large foot-bath; and while I ran to the sea to fill a vessel with fresh salt water, it had leaped out upon the verandah, and then fallen into the road beneath, by which it was so much injured that it died in the night. After death it became pallid, with scarcely a trace of colour left, and the eyes wide open, round, and black. I felt quite sorry to lose the brute: there was something exceedingly interesting and grotesque about its habits.

attended with loss of time and labour to others who may be working on the same field, and would admit of great abuse in the hands of less scrupulous investigators than my friend Dr. Wright.



Allman, George James. 1859. "XV.—Notes on the Hydroid zoophytes." *The Annals and magazine of natural history; zoology, botany, and geology* 4, 137–144.

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