# IV. New and Interesting Hydroids from Chesapeake Bay.

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WHILE connected with the Chesapeake Zoological Laboratory in the summer of 1879 I had opportunities for studying some of the Hydroids of Chesapeake Bay. During the early part of the summer we were stationed at Crisfield, Maryland, and later at Fort Wool, Virginia. Again this summer I have had opportunities for work at Fort Wool and continued the studies begun there in 1879. My time was too limited to permit of more extended work on the hydroids although there was a great supply of new and attractive material. It will be noticed that all of the six forms described are of the gymnoblastic group; all but one are new species and for one of them a new genus has been established.

The most interesting of the six forms is *Stylactis arge*, which has the remarkable habit of dividing its hydranths by a transverse partition, leaving the distal half free, which latter with its two or three hydrorhizal processes that are developed before the division takes place, floats away free, being carried about by currents; finally it settles down, becomes attached and by growth and budding gives rise to a new colony. It is another method, in which the hydroids are already so rich, by virtue of which they increase their numbers and their geographical distribution. A second interesting feature of this species is the fact that the gonophores in the female are quite highly developed, having radial and circular canals and may or may not become free.

Calyptospadix is another interesting hydroid, especially in its hydrotheca-like processes of perisarc, which are more like the genuine hydrothecae of the Calyptoblasts than any thing else known among the Gymnoblastea. The species here described are

*Calyptospadix cerulea*, gen. et sp. nov.
*Eudendrium carneum*, sp. nov.
*Stylactis arge*, sp. nov.
*Lovenella gracilis*, sp. nov.
*Bougainvillia rugosa*, sp. nov.
*Hydractinia echinata* Fleming.

## Calyptospadix gen. nov.[1]

Trophosome. Hydrophyton consisting of a branching hydrocaulus rooted by a creeping, filiform hydrorhiza. Hydranths fusiform with filiform tentacles which are arranged in a single verticil round the base of a conical hypostome. Perisarc developed into large hydrotheca-like processes.

Gonosome. Sporosacs developed on the ultimate ramuli beneath the terminal hydranths.

### Calyptospadix cerulea nov. sp. Plate 7, figs. 1 to 9.

**Trophosome.** Hydrocaulus simple, not much branched, of equal size throughout and attaining a height of three to four inches; branches irregularly arranged upon all sides of the stem; those of the proximal third of the hydrocaulus are very short, while those of the remaining portions are the longest in the colony, some of them being half the length of the main stem; branchlets arranged alternately; hydranths fusiform with a conical proboscis and eight to ten, occasionally twelve, tentacles, the latter arranged in a single verticil, protected by cup-shaped processes of the perisarc, roughened exteriorly by circular ridges and which very nearly cover the entire hydranth when it is fully retracted; perisarc annulated at the bases of the branches and branchlets. Gonosome. Sporosacs developed in clusters of from three to five on the ultimate ramuli just beneath the hydrotheca-like expansions; a large number of planulae developed in each female sporosac, the spadix unusually large.

**Color.** The female gonophores, the ova, and the planulae in their earlier stages, bright blue.

Development of gonosome. July and August.

Bathymetrical distribution. Littoral and coralline zones.

Habitat. Spiles of wharf and old shells.

Locality. Fort Wool, Virginia.

It is very interesting to notice the approximation to the calyptoblastic forms indicated in this species, shown by the hydrothecae, which are of fully as much protection to the hydranths as are the slightly developed hydrothecae of many species of Halecium. The reproductive zooids have a perfect chitinous covering, but it is developed around a sporosac and so is not a gonangium according to Allman. This author states that a gonangium is developed about a blastostyle. His definition of the Calyptoblastea is, "A sub-order of Hydroida in which an external protective receptacle (hydrotheca or gonangium) invests either the nutritive or generative buds." According to this, any hydroid having hydrothecae or gonangia belongs to this suborder, and as this species possesses developments of perisarc, which are so much like hydrothecae that there is only an artificial, no natural, distinction, it follows that we are dealing with a form that stands very close indeed to the sub-order Calyptoblastea of Allman.

[1] From καλυπτὸς, covered, and spadix, the hollow process in a sporosac about which the generative elements are developed.

**Eudendrium carneum**, nov. sp. Plate 7, figs. 10 to 17.

**Trophosome.** Hydrocaulus much branched, fascicled at its base and attaining a height of 75 to 125 mm.; primary branches irregularly arranged on all sides of the hydrocaulus, occasionally some of the branches near the base very large, being little less than the main stem; the secondary branches or branchlets arranged alternately on the upper side of the branches; hydranths supported at the summits of small ramuli borne on opposing sides of the branchlets and also at the extremities of the branches, branchlets and ramuli; perisarc firm, nearly colorless at the distal ends, deepening to a dark brown at the base, annulated at the bases of the branches, branchlets and ramuli. Hydranths large and usually with about twenty-four tentacles.

**Gonosome.** Sporosacs in the male, composed of a number of spherical receptacles arranged in a moniliform series of from three to five and borne in a crowded verticil. Sporosacs in the female arranged in irregular, elongated groups of three to six, several of which spring from one side of a branchlet or a ramulus; the distal end of the ramulus may or may not support a hydranth, each sporosac ornamented by a thickening of the perisarc which leaves only the distal portion thin; this latter part finally breaks away, forming a means of exit for the planula. The different sexes are usually found in different colonies.

Color. Hydranths vermillion, perisarc darkest in oldest parts; female gonophores red, planulae red, male gonophores red.

Habitat. Attached to spiles of wharves, rocks and shells, in the littoral and coralline zones.

Locality. Fort Wool, Virginia, in the entrance to Hampton Roads.

The rocks forming the piers and also the spiles of the old wharf at Fort Wool are coated during June, July and August with immense quantities of these showy colonies that form a miniature forest, extending at low tide as far as the eye can reach. The lower parts of the colonies form dense tangled masses all matted together with thick growths of Perophora, two or three kinds of sponges, Vesicularia, various forms of Vorticellidae, etc., etc.

The arrangement of the branches and consequently the forms of the colonies vary much according to the surrounding conditions; if the colony is not restricted the branches diverge from all sides and give a full, well-rounded growth about the main stem; but they are often so crowded that the branches are twisted and bent round into one plane, looking as though they all sprung from two sides of the stem. I succeeded in raising a number of colonies from the eggs; the eggs passed into the planula stage, these became free-swimming, finally they resorbed their cilia, became attached, and developing a hydranth and hydrorhiza, with a covering of perisarc, began the formation of a new colony.

One of the many planulae observed, developed after becoming attached, two hydranths at once; the two trending away from each other in nearly opposite directions, see Plate 7, fig. 14. So many planulae were developing at the same time that the clear glass dish became dotted all over with bright rosy spots where they had attached themselves.

**Sytlactis arge**, nov. sp. Plate 8, figs. 18 to 20.

**Trophosome.** Hydrocaulus undeveloped; hydranths with very much elongated, slender bodies, occurring in colonies of ten to thirty tentacles, arranged in two verticils below the hypostome, from six to eight in each circlet, those of the lower circlet sometimes shorter than those of the upper one; hypostome large and rounded at the distal extremity.

**Gonosome.** Sporosacs developed on the bodies of the hydranths beneath the tentacles; two are first developed from opposite points on the hydranth and then two others, also opposite one another and on different sides of the hydranth from the first pair, make their appearance; the gonophores are quite well developed, having a large cavity, and four radial canals connected distally by a peripheral canal; slight processes project from the rim of the bell, which appear to be rudimentary tentacles; a large number of planulae developed in each female gonophore and these may be liberated while it is attached or after it becomes free; if the planulae are liberated while the gonophore is attached, the latter never becomes free, but in many cases the gonophore becomes freed from the hydranth and with its freight of planulae leads a free-swimming life.

Color. **The entire colony a delicate opaque white.**

Development of gonosome. **June and July.**

Habitat. **On stems of *Zostera marinum*.**

Locality. **Crisfield, Maryland, on the Chesapeake Bay.**

I became very much interested in this hydroid after seeing under the microscope a gonophore detach itself from the hydranth on which it had developed and swim away free. It accomplished this by a considerable number of very energetic, convulsive contractions, which were sufficiently violent to rupture its peduncle. I had often seen the planulae discharged from the attached gonophores and was much surprised to see in a number of cases, and where the specific identity of the different colonies was undoubted, that the gonophores with their contained planulae became detached.

Another remarkable habit possessed by this species consists in the detachment of the distal portion of a hydranth, which settles down in some new locality and gives rise to a new colony. This takes place in this way: a constriction appears around the body of a hydranth; from a point just above which two or three cylindrical processes are developed which are to serve as a hydrorhiza to the new colony; the constriction then becomes complete and this short-bodied hydranth is carried by the currents to a considerable distance, perhaps, before it attaches itself by means of its hydrorhiza, when by growth and budding it soon forms new colonies.

This method of multiplying colonies and of planting them in new and possibly distant places is a new feature in the hydroids. In Schizocladium there is an approach to this same thing, but even in that case the method is distinctly different.

In the possession of gonophores which may or may not become free, we are reminded of the *Syncoryne mirabilis* of L. Agassiz, and the facts in this case lend support to the characters claimed for *S. mirabilis*. I greatly regret that my investigations upon this interesting form were so suddenly terminated. I was obliged to leave the locality where this species is found at a few hours notice, and have never found an opportunity to continue

my work there. I was anxious to obtain a more detailed knowledge of the structure of the gonophores and to make out if there were any differences between the attached and the free forms. To its interest scientifically it adds the attraction of beauty, for it is one of the most graceful and beautiful hydroids I have ever seen.

**Lovenella gracilis**, nov. sp. Plate 9, figs. 25 to 39.

**Trophosome.** Hydrocaulus very slender, sparingly branched, with one or two annulations at the base of each branch and hydrotheca, divided by transverse septa into numerous short segments, three between each two hydrothecae; branches simple and similarly divided as the main stem; hydrothecae arranged alternately on the stem and branches, hyaline, rather stout, the length not more than twice the breadth, closed at the top by a conical operculum usually consisting of eight pieces; hydranths large and active with a single verticil of ten or twelve tentacles and a large prominent proboscis.

**Gonosome.** Gonangia developed from the bases of the hydrothecal peduncles, very long and slender, largest at distal end and tapering toward the base, supported on short pedicils consisting of one to three annulations; from three to five planoblasts developed in each gonangium, aperture terminal.

Planoblasts, twenty-four hours after liberation round and somewhat flattened in outline, microscopic in size; radial canals four, connected by a circumferential canal at the periphery; marginal tentacles six, of which two are very large, situated at the peripheral extremities of two opposite chymiferous tubes, the four smaller tentacles disposed one on either side of each of the large ones; at the points on the margin of the bell where the other two chymiferous tubes join the peripheral canal there are rounded processes which have the appearance of rudimentary tentacles, as yet undeveloped; lithocysts four in number and located midway between the points where each two adjoining chymiferous tubes connect with the circumferential tube; the tentacles and the entire surface of the bell are well supplied with nematocysts.

Until we have a more complete knowledge of the *Lovenella clausa* of Loven and Hincks, it is a question of doubtful issue as to the relationships and systematic position of this species. The genus Lovenella as characterized by Hincks is distinguished from its allies by the possession of elongated, turbinate hydrothecae, crowned with a distinct conical operculum composed of many convergent segments; polypites with a large and prominent proboscis. Reproduction unknown. The species *L. clausa* has a habit of growth very similar to that of *L. gracilis*, the opercula of the hydrothecae are usually of eight segments in both species, the tentacles are of about the same number and they both possess the same style of large prominent proboscis. From these various points of similarity I consider it better to put this new form in this genus rather than to create a new one for it. When the reproduction of *L. clausa* has been made out we shall have an opportunity of deciding the true relations of these two forms.

The form of the hydrothecae are similar to those of Leptoscyphus and also those of some species of Campanulina, but from the characters of both gonosome and trophosome, *L. gracilis* can have no genetic relationships with either of these From a study of the growing

colony it was determined that terminal growth takes place by the development of a lateral bud from a point on the terminal segment just below the annulated pedicel of the terminal hydranth; as this process elongates it is divided by four septa into four segments, from the distal one of which a new hydranth is formed, so that each hydranth on the main stem has in turn been the terminal zooid of the colony. From the series of figures 29 to 34 on Plate 9 some idea may be obtained of the rate of growth in the hydrocaulus of this species; figure 30 was taken eight hours subsequently to figure 28; figure 31 six hours later; figure 32 seven hours afterward; figure 33 after a lapse of four hours and figure 34 seventeen hours after figure 31 or forty-two hours later than figure 33. I also recorded the rate of growth in the hydrorhiza which is indicated in Plate 9 figures 27 and 28; the latter figure being made thirty-two hours after the other one. It should be remembered that the colony upon which these observations were made was in somewhat abnormal conditions. My specimens were procured from a depth of three to ten fathoms where the temperature was considerably below that of the atmosphere. I was unable to have them in an aquarium with a constant stream running through, and the water being changed but a few times during the day the specimens must have been subjected to a much higher temperature than they are generally accustomed to. It is possible moreover that a more, rather than a less rapid growth may have thus been induced, as it is well known that many hydroid colonies, especially of the Calyptoblastea, will, when stimulated by impure water in aquaria, develop long, slender processes at a very rapid rate. They seem to be endeavoring to get into a region where better conditions for their welfare exist.

**Bougainvillea rugosa**, nov sp. Plate 8, figs. 21 to 24.

**Trophosome.** Hydrocaulus large and compound at the base, tapering to the distal end where it becomes simple, rooted by creeping stolons and attaining a height of three inches; branches numerous, irregularly arranged, a few that arise from near the proximal end of the main stem nearly equal the latter in length; most of the branches are short and delicate, bearing small branchlets which give origin to three or four ultimate ramuli; hydranths fusiform with a rather small, conical hypostome, protected by an expansion of the perisarc very much roughened by circular ridges, into which the hydranths are partially retractile; tentacles short and eight to ten in number.

**Gonosome.** Planoblasts borne by the hydrocaulus on the ultimate ramuli below the hydranths, having at the time of liberation a deep umbrella, somewhat pyriform; hypostome short and thick, chymiferous tubes four with circular canals, proboscidial tentacles four, capitate, unbranched, marginal tentacles twelve, three of equal size at extremity of each radial canal, where they originate from a common highly colored bulb; ocelli developed at the bases of those two tentacles of each group which become first and second as one passes round the bell from left to right; with increased age they gain in size and the

tentacles become elongated but they show no indications of developing other tentacles or of producing ocelli at the bases of the third tentacles.

Color. The colonies are light brown.

Bathymetrical distribution. Laminarian zone.

Development of gonosome. August and September.

Habitat. Growing in large colonies on Alcyonidium.

Locality. Hampton Roads, lower parts of Chesapeake Bay.

The best diagnostic characters of this species are found in the shape of the planoblast and the number of marginal tentacles. All other species of Bougainvillea have primarily but two marginal tentacles in each group. It is very possible of course that the labial tentacles become branched and the marginal tentacles increase in number when they are in a state of nature, but as already remarked they developed no indications of such a change after living in my aquaria for a number of days. The absence of an ocellus from the base of one tentacle of each group is also anomalous.

**Hydractinia echinata** Fleming. Plate 9, fig. 40.

Some of the outer spiles of the wharf at Fort Wool were completely covered from low-water mark to the bottom with a delicate moss-like growth of a milk-white color, which upon close inspection proved to be colonies of this delicate hydroid. I tried in vain to find any mouths to the blastostyles and finding also that the two circlets of tentacles are of quite different lengths, I concluded that they were specimens of *H. echinata* and not the *H. polyclina* of Agassiz, although from their habitat and locality one would expect that they might be the latter.

I was unable to find any of the capitate, spiral zooids, but found a great many of the simple, tentacular forms described by Wright and Hincks. Among these I noticed one interesting zooid that in its long, slender form was quite like the others, but was provided with an enlarged hollow portion at its distal extremity surmounted by a conical or rounded hypostome and a circlet of tentacles. I was unable to detect any mouth in the hypostome though I spent a number of hours in the attempt. The tentacles were not fully developed; some of them, five of the nine, being only rudimentary while the other four were a little more than twice the length of the short hypostome and of equal size.

It is worthy of notice that this form is intermediate between the ordinary tentacular zooid and the normal feeding polypite, and thus offers an explanation of the origin of the tentacular members of the colony.

From the fact that these forms have been noticed by Wright, Hincks and myself, and from their existing in such considerable numbers in the colonies found at Fort Wool, I am led to believe that the tentacular zooids are regular, normal members of the colony and not abnormal forms as suggested by Allman.

A peculiar, evidently abnormal form of the feeding polypite I also noticed; the body was in a greatly swollen condition and remained as represented in figure 40 during the three days that it was under observation.

[1] A Monograph of the Gymnoblastic Hydroids. By J. Allman, F.R.S., etc. Vol. II, p. 346.

## Explanation of Plates.

### PLATE VII.

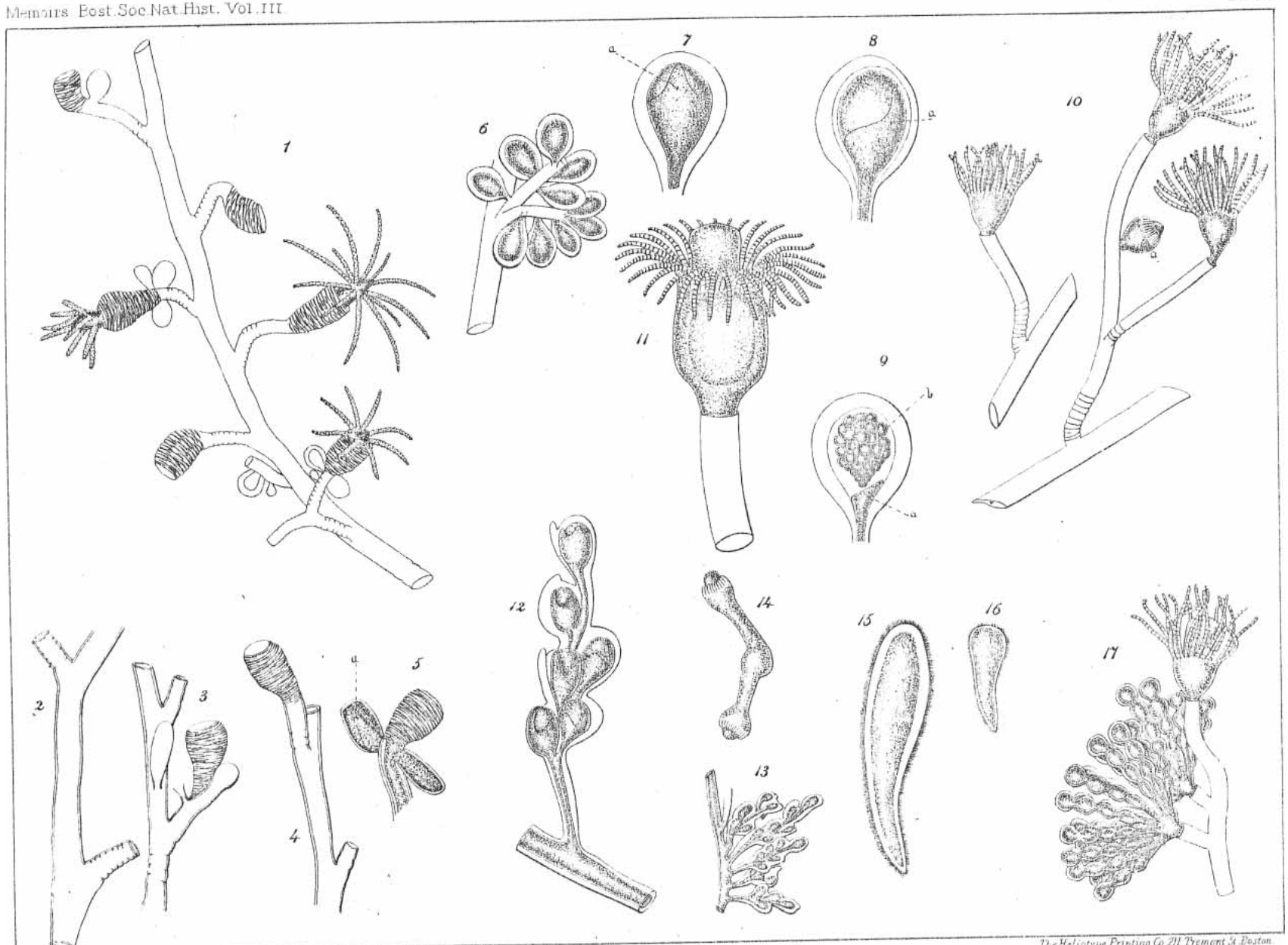
1. *Calyptospadix cerulea*, ×25, portion of a branch.
2. The same, ×25, portion of the main stem.
3, 4. The same, ×25, portions of branches.
5. The same, ×25, male sporosacs; *a*, spadix.
6. The same, ×25, female sporosacs.
7. The same, ×80, a female sporosac, *a*, the large spadix.
8. The same, ×80, a female sporosac, side view, *a*, spadix.
9. The same, ×80, a female sporosac, *a*, spadix; *b*, developing ova.
10. *Eudendrium carneum*, ×25, portions of branches, *a*, a young hydranth.
11. The same, ×25, a large terminal hydranth.
12. The same, ×80, female sporosacs.
13. The same, ×25, female sporosacs.
14. The same, ×25, an abnormal twin planula or two hydranths developing simultaneously from one planula.
15. The same, ×80, a normal planula.
16. The same, ×25, a normal planula.
17. The same, ×25, a branch with male sporosacs.

### PLATE VIII.

18. *Stylactis arge*, ×25, an adult hydranth; *a*, constriction in stem; *b*, *b*, hydrorhizal growths by which the hydranth will attach itself after becoming free.
19. The same, ×25, a hydranth with female medusoids.
20. The same, ×$\frac{2}{3}$, a colony.
21. *Bougainvillea rugosa*, ×25, a portion of a branch with hydranths and sporosacs.
22. The same, ×25, portion of main stem with hydranths and sporosacs.
23. The gonocheme of the same, ×80.
24. The same individual gonocheme two days later, ×80; showing the great increase of the tentacles in length but no addition to their number. The oval, granular mass that has become separated from the manubrium I do not understand; it may be abnormal.

### PLATE IX.

25. *Lovenella gracilis*, ×25, portion of main stem and hydrorhiza.
26. The same, ×25, a hydranth expanded.
27. The same, ×25, the hydrorhiza.
28. The same, ×25, the hydrorhiza thirty-two hours later.
29. The same, ×25, terminal portion of stem with lateral bud, the latter to form the next internode of the stem.
30. The same portion, ×25, eight hours later.
31. The same portion, ×25, six hours later.
32. The same portion, ×25, seven hours later.
33. The same portion, ×25, four hours later.
34. The same portion, ×25, seventeen hours later.
35. The same, ×25, female gonangium with developing blastochemes.
36. The same, ×25, gonangium.
37. The same, ×25, gonangium.
38. The same, ×25, gonangium and hydrotheca.
39. The same, ×80, blastocheme; *a*, lithocysts, *b*, marginal tentacles, *c*, sporosacs, *d*, manubrium.
40. *Hydractinia echinata*, *a*, feeding zooids, *b*, reproductive zooids, *c*, tentacular zooids, *d*, chitinous spines, *e*, an abnormal form of feeding zooid, *f*, an abnormal tentacular zooid.

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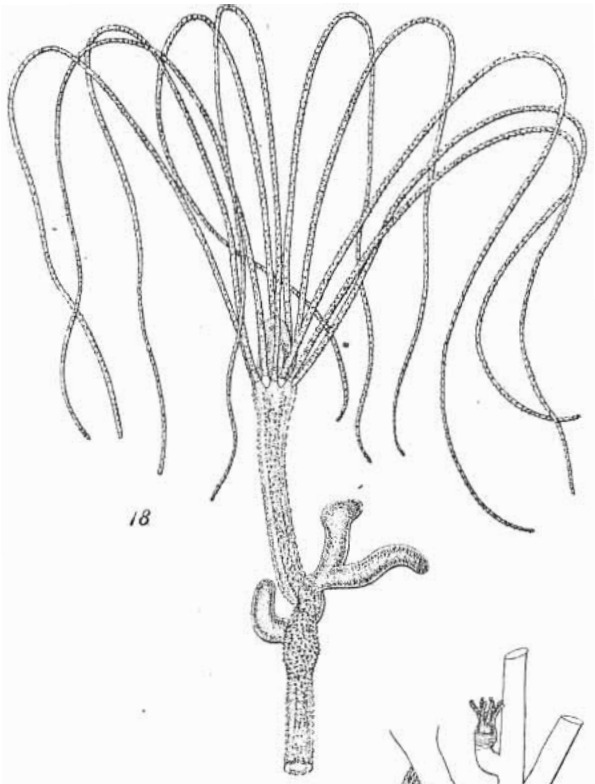


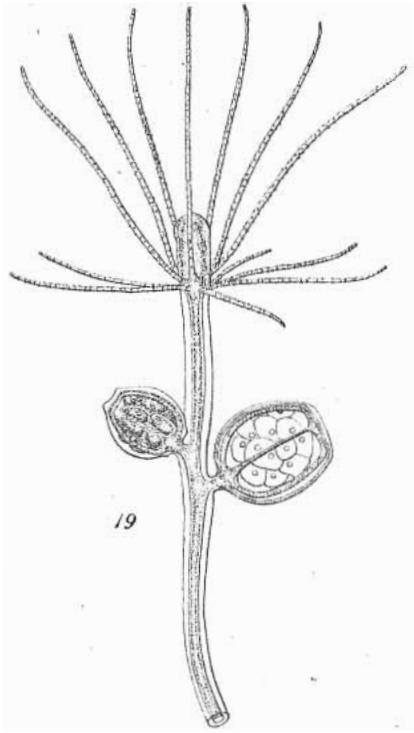


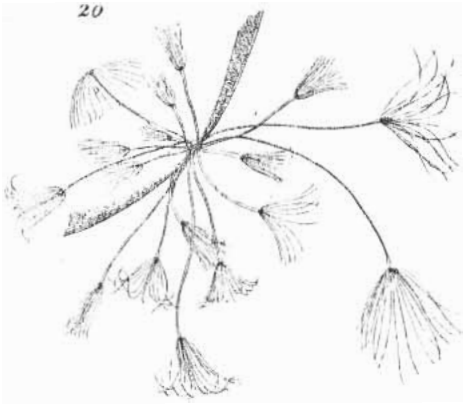


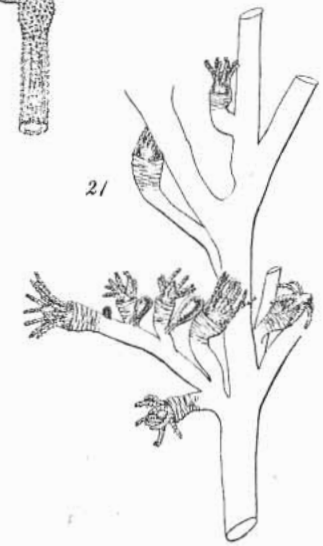



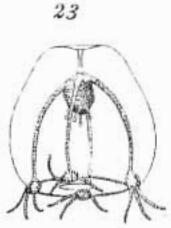


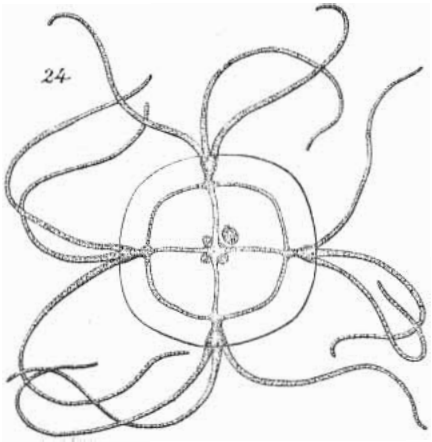


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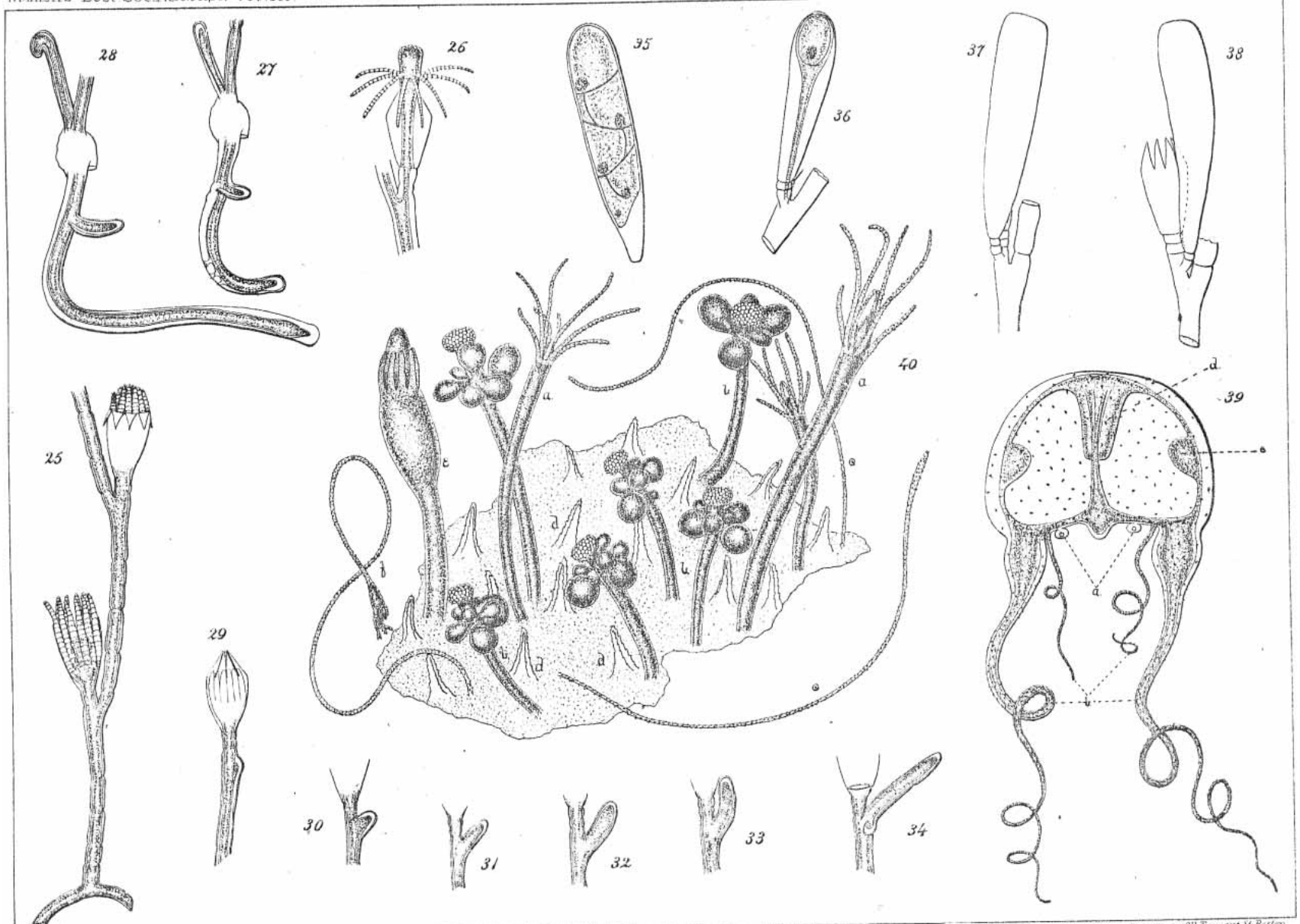


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