SOME HYDROIDS OF BEAUFORT NORTH CAROLINA

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SOME HYDROIDS OF BEAUFORT, NORTH CAROLINA.

By C. McLEAN FRASER, Pa. D.
University of Iowa.

INTRODUCTION.

During the two weeks from August 31 to September 12, 1911, at the United States Bureau of Fisheries Laboratory at Beaufort, N. C., the facilities for collecting were put at my disposal to such an extent that, although the time was so limited, I was enabled to make a very interesting collection of hydroids. Since very little systematic work has been done on the Beaufort forms, and as the material seemed promising, it was suggested by Prof. H. V. Wilson that a key be made out for the use of others who might wish to study the hydroids of that region. When the material was examined, 51 species were found and seemed to make such work worth while. It is fully recognized that with such a scant survey as the limited time made necessary, this key must be very far from complete, but such as it is it may be useful until somebody has opportunity to make a more careful survey of the whole region.

In writing this paper an endeavor has been made to have the account of each species as explicit as possible, with illustrations to indicate all special points, so that the casual student of hydroids may be able to make a diagnosis of any specimen of species herein described. For those who wish to go into the matter more deeply, a synonymy reference list has been given, not complete by any means, but including a reference to the original description and to well-known papers or those mentioned in the context.

To make the paper especially applicable to Beaufort, ail the descriptions are made from the Beaufort specimens, except that in some cases others were used in comparison. All trophosome drawings, unless for comparison, were made from Beaufort specimens and all gonosome drawings also, when the gonosome was found. The drawings are all made to the same scale (a magnification of 20 diameters) except where enlarged drawings were needed for detail, in which case this enlargement is indicated in the explanation of the figure.

Of the 51 species obtained but one is new, though several are new to this part of the coast and four gonosome descriptions are new. Much of the material was in such good condition and contained so many good specimens, that many interesting points were made out. The discussion of these points has been introduced with the regular description of the species, so that the paper, besides being a key, introduces a large amount of new matter which may prove of interest.

The material was obtained from four different sources:

(1) From the piles and rocks at low water. This included the piles of the United States Bureau of Fisheries Wharf, of the Beaufort wharves, of the railroad bridge, all the way from Beaufort to Morehead City, of the boathouse of the life-saving station at Cape Lookout, and of the wharves of Marshallberg and the rocks that form the jetties at Bogue and Shackleford Banks. Some specimens obtained from the sea buoy might be mentioned here, but as this had been changed a short time before, there were not many to be found.

(2) By dredging. This was done to the greatest extent in Bogue Sound, nearly opposite Morehead City, in 10 or 12 feet of water, but dredgings were also made in the North River and at various points along the straits, from the west end nearly to the east end, and in the harbor near Shackleford, all at a depth of from 8 to 15 feet; near Cape Lookout in 15 to 20 feet, with little success, and near the sea buoy in 6 or 7 fathoms. These forms, in general, were little different from the shore forms as the water was so shallow. The bottom is nearly all sandy, but shells are plentiful to give a means of attachment for hydroids and other forms on which hydroids grow.

(3) From floating gulfweed. This provided a large number of the best specimens. A severe southwest storm, a few days previous, had torn loose a large amount of this gulfweed, and in consequence it was drifting in during the whole of my stay. The greater portion of it belonged to the genus *Sargassum* but some *Turbinaria* was also present. The most suitable place to collect it was on the seaward side of Bogue Bank, where it could easily be obtained before it reached the shore, and while it was still alive. An hour in or on the hot sand on the beach was enough to destroy many of the more delicate specimens. Much of the gulfweed drifted right into the harbor and up into Bogue Sound, so that it was available at any time. Sometimes the local seaweed was found floating, but the forms on it usually corresponded with the shore forms.

(4) From material dredged by the Fish Hawk. On May 14 and 15, 1907, the United States Fisheries steamer Fish Hawk was used for dredging at a point 20½ miles SSW. W. from the sea buoy at the entrance to Beaufort Harbor, or about 23 miles from the United States Fisheries Station at Beaufort. The dredging, which was done in 13 or 14 fathoms of water, was done largely to obtain seaweed from the coral bottom, but some other material was obtained. The seaweed was taken away for examination but some sponges and crabs were stored at the Beaufort station. The Bureau kindly allowed me to look over this material for hydroids, and several interesting specimens were found.[a]

According to general opinion, large collections of hydroids from Beaufort could not be expected, but I am doubtful whether in such a limited time, within such a limited area, so much interesting material could be collected at many other localities along the coast.

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[a] I wish to express my obligation to Prof. C. C. Nutting, of the State University of Iowa, who, besides giving invaluable advice, placed his fine collection of hydroid material, his extensive literature, and even his manuscript, at my disposal. To my wife I am indebted for the drawings of the numerous illustrations in the paper. These were taken from pencil drawings made with the camera-lucida.

GEOGRAPHICAL DISTRIBUTION.

A lengthy discussion on geographical distribution would be out of place in connection with so limited a number of species, but a few general remarks may be appropriate. The locality is of very great interest because it is less than 100 miles from Cape Hatteras, which has been considered somewhat a rival of Cape Cod as a divisional point for different groups of marine forms. A study of the distribution of these few species is illuminating, though what may be true of hydroids is not necessarily true of other forms and in some cases might seem to be necessarily untrue of them.

Of the 51 species described in this paper, only one, *Hydractinia carolinæ*, is new, and only four others are new to the east coast of North America, namely, *Scandia mutabilis*, *Aglaophenia acacia*, *Plumularia setaceoides*, and *Halecium repens*, this last not being diagnosed with certainty. Two more, *Halecium bermudense* and *Halecium nanum*, have not been reported near the mainland, the former only by Congdon from the Bermudas, and the latter by the same investigator and also by Billard from the Antilles. *Thuiaria fabricii* and *Filellum expansum* have not been reported south of Greenland. Thirty-one species have been reported north of Beaufort, along the Atlantic coast of North America, and 24 south (this does not include the Bermuda forms), while 10 species have been reported both north and south. Of these 10 latter, 4 are usually considered northern forms and 6 are forms usually found in tropical or subtropical waters which have been carried northward largely with the sargassum in the Gulf Stream. Of the 19 species described by Congdon from the Bermudas, 11 were found at Beaufort. With the exception of two that are northern or have a general range, all of these are tropical or subtropical forms. Fifteen species have been reported from the west coast of North America and 18 from Europe, while 12 are common to the west coast of North America and to Europe. Seventeen species have been reported from the west coast of Africa, only 7 of which are warm-water forms. Ten species have been reported from Australia, 5 of which are cosmopolitan and the other 5 warm-water forms. Six species are reported by Hartlaub from the Strait of Magellan and the Chile coast, but they are all cosmopolitan forms.

From these few comparisons some generalizations may be made. In the first place, when 31 species out of a total of 51 have been reported from the east coast of North America farther north, there is no evidence, as far as hydroids are concerned, that Cape Hatteras with its storms is any decisive barrier. When there is such a large percentage of shore and shallow water forms common to the north and the south, one should readily suppose that if the forms of the deeper water were studied, the similarity would be still more marked. As it is, there is no more difference than would be found in the same distance on almost any coast, due to the dropping out of certain forms and the appearance of others in natural succession. It is true that only 10 of these 31 forms have been reported still farther southward, but that is not surprising when it is taken into consideration that, with the exception of the species described by McCrady more than half

a century ago, there has been practically no work done on shore and shallow water forms in the region to the south of Beaufort. Of the species reported farther south the great majority are floating forms.

In the second place, what little evidence there is goes to sustain the conclusion that many of the hydroids have been distributed from a circumpolar area, southward along meridional lines. When out of 51 species collected as far southward as Beaufort there are included as many as 12 species that have been found on the west coast of Europe and also on the west coast of North America, it seems scarcely possible to come to any other conclusion. It might be said that the 17 species reported from Africa would indicate a transference to North America by the Equatorial Current, and that certainly must have a great influence, but when it is noted that 10 out of the 17 are European forms as well, it may readily be, and probably is, the case that these 10 were carried southward in both cases and have direct connection only through the Arctic Regions, while the other 7, being tropical forms, were carried across the ocean by the Equatorial Current, and carried northward with the Gulf Stream. It would seem that the Equatorial Current and its related currents must account for a connection with far-off Australia, as 5 out of the 10 forms are tropical or subtropical floating forms that have been reported along the paths of these currents. On the other hand, the 6 species reported by Hartlaub from the South American coast include none of these forms. None would likely be carried either way across the Equator against the currents, and none could go otherwise unless the Equatorial Current should distribute them both to the north and to the south.

In the third place, there is a further indication as to the way in which the Bermudas are populated. The Gulf Stream flows northward between Beaufort and the Bermudas. Of the 11 species common to the two places, only 2 are of general distribution. The other 9 are all forms that would likely be carried on the sargassum with the Gulf Stream. As only 19 species were reported by Congdon, evidently nearly 50 per cent have been carried there from the south by the Gulf Stream. A more detailed survey of each field would naturally indicate a much higher percentage. On the other hand, there is little evidence to show that any of them have been carried directly across, in either direction.

Finally, it adds to the evidence, if further evidence was needed, that there is no limit to the distribution of hydroid forms. When, by hydroid distribution, Beaufort, in low latitude, is connected with such distant places as Australia, Chile, Bering Sea, and the White Sea, all in high latitudes, not by one but by several species, nothing further need be said.

The accompanying table puts these comparisons in a more concrete form, especially for the individual species. It is not intended to be exhaustive by any means. It is merely a specific way of stating the comparisons made above.

TABLE OF GEOGRAPHICAL DISTRIBUTION OF HYDROIDS FOUND AT BEAUFORT.

Species.	Beaufort.	North America north of Beaufort.	North America south of Beaufort.	Bermudas.	West coast of North America.	European.	west Africa.	Strait of Magellan and Chile.	Australian.
Turritopsis nutricula	X		X						
Gemmariacostata	X		X						
Syncoryne mirabilis	X	X			X			X	
Bougainvillia rugosa	X	X							
Eudendrium album	X	X				X			
Eudendrium capillare	X	X			X	X			
Eudendrium carneum	X	X							
Eudendrium ramosum	X	X	X	X	X	X	X		
Hydractinia Caroline	X								
Hydractinia echinata	X	X				X			
Pennaria tiarella	X	X		X					
Campanularia integra	X	X			X	X			X
Campanularia raridentata	X	X			X	X	X		
Clytiacoronata	X		X						
Clytia cylindrica	X	X							
Clytia johnstoni	X	X			X	X	X		
Clytia longicyatha	X		X				X		
Clytia noliformis	X	X	X	X					
Gonothyræa gracilis	X	X				X	X	X	
Obelia bicuspidata	X							X	X
Obelia dichotoma	X	X			X	X	X		
Obelia geniculata	X	X	X		X	X		X	X
Obelia hyalina	X	X	X	X			X		
Cuspidella humilis	X	X			X	X	X		
Lovenella clausa	X	X				X			
Halecium beani	X	X				X	X	X	X
Halecium bermudense	X			X					
Halecium nanum	X		X	X			X		
Halecium repens	X					X			
Halecium tenellum	X	X	X		X	X	X	X	X
Filellum expansum	X	X			X	X			
Filellum serpens	X	X			X	X	X	X	
Hebella calcarata	X	X		X		X	X		X
Scandia mutabilis	X						X		
Pasythea quadridentata	X	X	X						X
Sertularella conica	X		X		X				
Sertularia cornicina	X	X	X		X				X
Sertularia stookeyi	X		X						
Sertularia versluysi	X	X	X	X					
Thuiaria fabricii	X	X			X				
Aglaophenia acacia	X						X		
Aglaopheniaminuta	X		X						
Aglaopheniarigida	X		X						
Lytocarpus philippinus	X		X	X					
Monostæchas quadridens	X	X	X				X		
Monotheca margaretta	X		X						
Plumularia alternata	X		X	X					
Plumularia floridana	X		X						
Plumularia inermis	X		X						
Plumularia setaceoides	X								X
Schizotricha tenella	X	X	X						

SYSTEMATIC DISCUSSION.

The method of classification and the nomenclature followed in this paper correspond to that used by me in the paper entitled "Hydroids of the west coast of North America," with the papers by Nutting, Allman, and Hincks as a basis. One family name appears that has not been used previously in any published paper, but it is used by Prof. Nutting in his manuscript, not yet complete, to be published as another volume

of his monograph on American Hydroids. This family is the Hebellidæ. The reasons for adopting the name are given in the text where the family appears in the regular course of the paper. In the synonymy, reference to the original description is always given, together with references to some of the well-known papers in which a description of the species appears. In no case is the author's name given with the family or genus, but the characteristics of each, as significant of what it means in this paper, is always given.

KEY TO THE HYDROID FAMILIES FOUND IN THE BEAUFORT REGION.

A. GYMNOBLASTEA.
- *a.* Hydranths with scattered filiform tentacles. ..... Turridæ.
- *b.* Hydranths with one whorl (or two whorls closely approximated) of filiform tentacles around the base of the proboscis.
  - 1. Proboscis conical or clavate.
    - 1. Colony regularly branched. ..... Bougainvillidæ.
    - 2. Colony not branched, with basal encrusting cœnosarc ..... Hydractinidæ.
  - II. Proboscis trumpet-shaped or hemispherical. ..... Eudendridæ.
- *c.* Hydranths with scattered capitate tentacles but no filiform tentacles. ..... Syncorynidæ.
- *d.* Hydranths with a single row of filiform tentacles around the base and capitate tentacles scattered over the proboscis. ..... Pennaridæ.

B. CALYPTOBLASTEA:
- *a.* Hydranths with trumpet-shaped proboscis and campanulate hydrotheca:. ... Campanularidæ.
- *b.* Hydranths with conical proboscis and tubular or turbinate hydrothecæ.
  - I. Hydrothecae with operculum of converging segments. ..... Campanulinida:.
  - II. Hydrotheca: without operculum.
    - 1. Stem fascicled, gonosome a Coppinia mass. ..... Lafœidæ.
    - 2. Stem simple, gonangia not collected into a mass. ..... Hebellidæ.
- *c.* Hydrothecae reduced to saucer-shaped hydrophores. ..... Halecidæ.
- *d.* Hydrothecae sessile, adnate to main stem or branches.
  - I. Hydrothecae arranged on both sides of branches. ..... Sertularidæ.
  - II. Hydrothecae on one side only of the branches. ..... Plumularidæ.

Suborder GYMNOBEASTEA.

Hydroids with hydranths unprotected by hydrothecz and gonophores unprotected by gonangia.

Family TURRIDÆ.

Trophosome.—Hydranths with scattered filiform tentacles. Colony simple or branched.

Gonosome.—Gonophores give rise to free medusæ with simple radiating canals and simple marginal tentacles.

Genus TURRITOPSIS.

Trophosome.—Small colonies with few branches from a much branched stolon. Perisarc reaching to the base of the hydranth.

Gonosome.—Gonophores give rise to medusae with four radial canals and several simple marginal tentacles.

Turritopsis nutricula McCrady.

Oceania nutricula McCrady, Proc. Elliott Soc., **1856, p. 1-56.**
Turritopsis nutricula McCrady, Gymnoph. Charleston Har., **1857, p. 25.** **Brooks,** Mem, Boston Soc. Nat. Hist., **1886, p.** 388. Mayer, Hydromedusz, vol. I, 1910, p. 143.

Trophosome.—Mature colony slightly branched, each branch bearing a single hydranth. Perisarc thick, ending abruptly immediately below the hydranth. Proboscis clavate, elongated. Tentacles arranged in a series of somewhat regular rows.

Gonosome.—Gonophores, each giving rise to a single medusa, appear on short pedicels at the base of the hydranth. Each medusa bud is invested with perisarc. At the time of liberation the medusa has eight tentacles, but the number is greatly increased later. The mature medusa has a quadrate stomach and a four-lipped mouth.

Color.—Pale yellowish red.

Distribution.—At low water on piles of the Norfolk Southern railway bridge at different points between Morehead City and Beaufort; in Bogue Sound 10 feet; on piles for the boathouse for the life saving station at Cape Lookout.

Dr. W. K. Brooks made an exhaustive study of this species while pursuing investigations in this locality. He found the medusæ in large numbers but was not so successful with the hydroids, as he found them at one point only, viz, the steamboat wharf at Morehead City. The specimens obtained in this collection were by no means numerous, although they were obtained from several different points. At all these points, however, the conditions were much similar to those at Morehead City wharf. Many of the specimens were unbranched and hence were probably young colonies, at which time they resemble the figures given by Hincks of *Turris neglecta* Lesson. Very few of them had developing medusæ present. Those specimens found at Cape Lookout had a peculiar appearance. Either they were growing through a sponge so that little more than the hydranths were showing outside, or, as is more likely, the sponge was growing up around the hydroid colony as far as the perisarc reached, because the hydroid colony had begun to grow on the living sponge. The sponge was semitransparent so that the colony could readily be traced as it appeared within.

Though no special medusa collecting was attempted, on September 4 I was fortunate enough to get a large number of mature medusæ of this species in the large chamber of the crab float at the United States Bureau of Fisheries wharf. At other times I saw an occasional one at the same place but at no other time did they appear so plentiful.

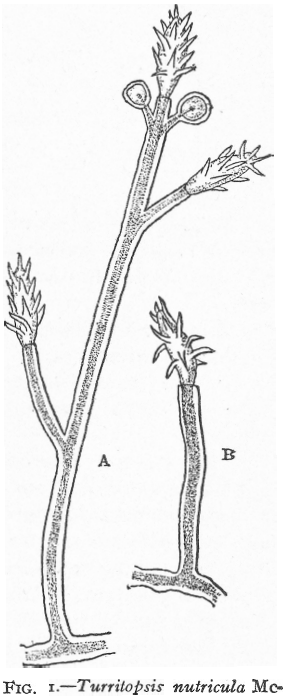

FIG. 1.—*Turritopsis nutricula* McCrady. A, mature colony with gonosome; B, young colony.

Brooks, and later Mayer, in describing the hydroid of this species, speaks of it as being a *Dendrocluva* much similar to the species described by Weismann as *Dendroclava dohrnii*.[a] Weismann, in giving the original description of this genus, mentions the fact that it differs from the *Clavidæ* in general, in having gonophores that produce free medusæ. I prefer to follow Allman in making that a family difference. For that reason I have retained the generic name *Turritopsis* which has been applied to the medusa and have placed the genus in the family Turridæ.

Family SYNCORYNIDÆ.

Trophosome.—Hydranths with no filiform tentacles; capitate tentacles numerous with little regularity of arrangement.

Gonosome.—Gonophores borne on the hydranth among or near the proximal tentacles, give rise to free medusæ with four radial canals and four tentacles, some or all of which may be rudimentary.

[a] Enstehung Sexualzellen bei Hydromedusen, **1888, p. 26, 215.**

KEY TO GENERA OF THE SYNCORYNIDÆ FOUND IN THE BEAUFORT REGION.

A. Chitinous perisarc absent or slightly developed. Hydranths elongated with the stem shorter than the hydranth or absent. ..... *Gemmaria.*

B. Chitinous perisarc well developed. Hydranth body shorter than the stem. ..... *Syncoryne.*

FIG. 2.—*Gemmaria costata* (Gegenbaur).

Genus GEMMARIA.

Trophosome.—Perisarc absent or slightly developed; colony consists of a single elongated hydranth growing from a stolon; short capitate tentacles scattered over the whole body of the hydranth.

Gonosome.—Gonophores producing medusae with two of the tentacles rudimentary, the other two well developed and supplied with stalked bodies especially well provided with nematocysts.

? **Gemmaria costata** (Gegenbaur).

Zanclea costata Gegenbaur, Zeit. fiir Wissen. Zool , bd. VIII, 1856, p. 229.
Gemmaria gemmosa Mayer, Bull. Mus. Comp. Zool., Harvard, 1900, p. 35.
Gemmaria costata Mayer, The Hydromedusæ, vol. I, 1910, p. 87.

Trophosome.—Hydranth elongated, supported by a short pedicel provided with an annulated perisarc. The perisarc of the stolon is not annulated. Tentacles are arranged in numerous fairly definite whorls.

Gonosome.—Gonophores growing from the hydranth body near the proximal tentacles.

Color.—Perisarc opaque yellow, hydranths pale red.

Distribution.—On sargassum collected on the seaward side of Bogue Rank.

There has been much discussion regarding *Gemmaria* as to whether it is a genus distinct from *Zanclea*, but all such discussion has been from the medusa standpoint. As all the hydroids so far described have been called *Gemmaria* I have used that name. Mayer, who first described and figured this hydroid, confused it, at that time, with *Gemmaria gemmosa* McCrady, but later recognized the difference. This latter species has also given rise to much confusion, being described by various authors as *Corynitis agassizii* and *Halocharis spiralis*. Hargitt finally cleared up the matter by showing it to be the same species as *Halocharis spiralis* Agassiz and entirely different from *Corynitis agassizii* McCrady.[a]

Gemmaria costata resembles *G. gemmosa* very much, but can readily be distinguished from it by the short stalk of the hydranth that is supported by the strongly annulated perisarc. G. *gemmosa* bas no pedicel and hence no perisarc except on the stolon. I have made this note because, though I did not find *G. gemmosa,* it is quite possible that it grows in the vicinity, since it is plentiful at Woods Hole and was found as far south as Charleston by McCrady, who first described it.

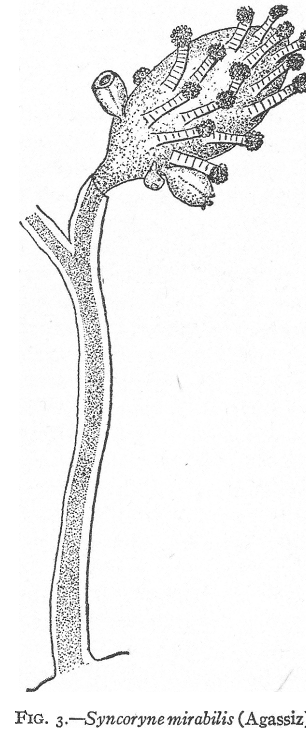

FIG. 3.—*Syncoryne mirabilis* (Agassiz).

Genus SYNCORYNE.

Trophosome.—Colony simple or slightly branched; perisarc well developed; tentacles stout, very strongly capitate.

Gonosome.—Gonophores usually few in number; medusæ with four rudimentary tentacles.

[a] Biological Bulletin, 1908, p. 100.

Syncoryne mirabilis (Agassiz).

Coryne mirabilis Agassiz, Cont. Nat. Hist. U. S., IV, 1862, p. 185.
Syncoryne mirabilis Nutting, Hydroids of the Woods Hole Region, 1901, p. 328. Hargitt, Am. Nat., 1901, p. 386.

Trophosome.—Colony unbranched or slightly and irregularly branched; hydranth body large, very stout for its length; perisarc smooth, reaching to the base of the hydranth.

Gonosome.—Gonophores borne below the proximal tentacles; medusae become sexually mature before being liberated.

Color.—Hydranth rose red.

Distribution.—On floating sargassum from the seaward side of Bogue Bank.

Family BOUGAINVILLIDE.

Trophosome.—Colony usually branching; hydranths that may change from conical to a low dome shape; tentacles filiform but rather short and rigid, arranged in one whorl around the base of the hydranth body.

Gonosome.—Gonophores producing free medusae borne on the hydrocaulus below the hydranth body; the marginal tentacles may be in clusters.

Genus BOUGAINVILLIA.

Trophosome.—Perisarc well developed on the branches as well as on the main stem.

Gonosome.—Gonophores supported on short pedicels, medusae with four radial canals and four clusters of tentacles.

Bougainvillia rugosa Clarke.

Bougainvillia rugosa Clarke, New Hydroids from Chesapeake Bay, 1881, p. 140.
Mayer, The Hydromedusæ, vol. I, 1910, p. 171.

Trophosome.—Stem growing from a stolon, fascicled at the base, reaching a height of about 3 inches; branching irregular. None of the branches are so large as the main stem. Commonly these branches remain unbranched, but each gives rise to three or four pedicels for the hydranths. The perisarc extends well up on the hydranth body, and the portion thus extended is much corrugated with ridges that pass around the hydranth parallel to one another. The proboscis is ordinarily conical, but may be much flattened. The tentacles are few in number, 8 to 10, and short.

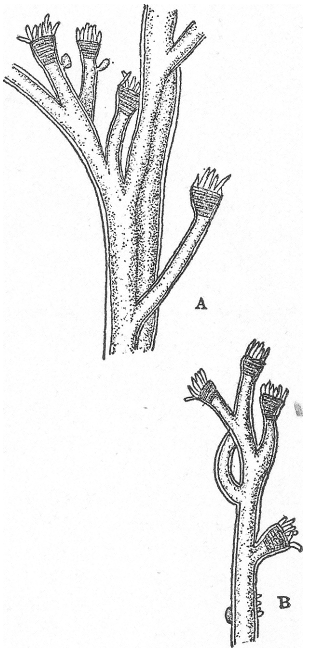

FIG. 4.—*Bougainvillia rugosa* Clarke. A, a fascicled portion of the stem; B, a portion of a branch.

Gonosome.—Gonophores produced from the hydrocaulus below the hydranth body, covered with perisarc. In the free medusa there are four oral tentacles and four groups of three marginal tentacles.

Color.—Light brown.

Distribution.—Dredged in Bogue Sound at a depth of 10 or 12 feet; on piles of the wharf at Marshallberg, near low-water mark.

Family EUDENDRIDE.

Trophosome.—Colony branching; perisarc well developed; proboscis trumpet-shaped, but with much freedom of movement; tentacles all filiform, in a single whorl.

Gonosome.—Male and female gonophores bear little resemblance to each other. Male gonophores are usually in whorls, female gonophores usually in clusters. Free medusas are not produced.

Genus EUDENDRIUM.

This is the only genus of the family Eudendridæ.

KEY TO THE SPECIES OF EUDENDRIUM FOUND IN THE BEAUFORT REGION.

A. Main stem simple, colony minute.
- *a.* Hydranths which bear gonophores showing little or no abortion. ..... *E. album.*
- *b.* Hydranths which bear gonophores much aborted. ..... *E. capillare.*

B. Main stem fascicled, colony large.
- *a.* Hydranths which bear gonophores with little or no abortion. ..... *E. rumosum.*
- *b.* Hydranths which bear gonophores much aborted. ..... *E. carneum.*

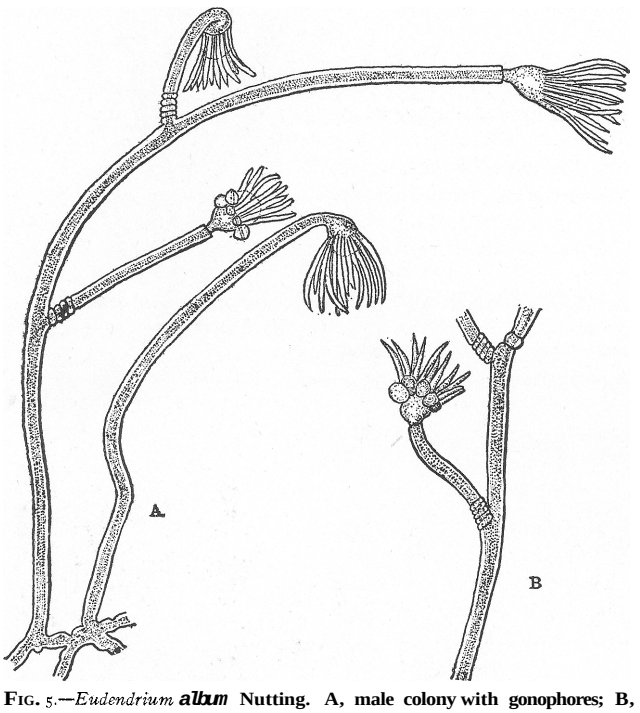

FIG. 5.—*Eudendrium album* Nutting. A, male colony with gonophores; B, hydranth with female gonophores.

Eudendrium album Nutting,

Eudendrium album Nutting, Ann. and Mag. Nat. Hist., 1898, p. 362. Nutting, Hydroids of the Woods Hole Region, 1901, p. 334. Hargitt, Biol. Bull, 1908, P. 97.

Trophosome.—Colony minute, seldom more than one-quarter of an inch in height; stem unbranched or with a few straggling branches, very slender. Annulations may be present, but not in any very definite arrangement.

Gonosome.—Gonophores borne on the hydranth body immediately below the tentacles. The hydranth may be smaller and the tentacles may be reduced in number, but the abortion is never complete. Male gonophores two or three chambered, few on a hydranth; female gonophores similar to the type for the genus, but small and few in number.

Color.—Hydranths and female gonophores white, male gonophores pale yellow, hydrocaulus nearly transparent.

Distribution.—On shells, Bogue Sound, 10 feet; on sponge, North River, 6 to 10 feet; on piles at Marshallberg, near low water.

Eudendrium capillare Alder.

Eudendrium capillare Alder, Cat. Zooph. Northumberland and Durham, 1857, p. 15. Nutting, Hydroids of Woods Hole Region, 1901, p. 334.

Trophosorne.—Colony small, not more than one-half inch in height, usually branched; annulations at the base of the branches and pedicels.

Gonosome.—Female gonophores borne on aborted hydranths which may spring from a branch or directly from a hydrorhiza. They form a very noticeable cluster. Male gonophores with an arrangement similar to the fernale gonophores, and like them found on pedicels arising from a branch or the hydrorhiza. They are two or three Chambered.

Color.—Hydranths and male gonophores light green, female gonophores reddish orange.

Distribution—-On shells in Bogue Sound, 10 feet.

Only a few specimens of this species were obtained and among them there were no male colonies. On that account I have copied Allman's figures and made use of his description.

Eudendrium carneum Clarke

Eudendrium carneum Clarke, Hydroids of Chesapeake Bay, 1882, p. 137. Nutting, Hydroids of Woods Hole Region, 1901, p. 333.

Trophosome.—Colony much branched, attaining a height of 4 or 5 inches; stem fascicled; annulations at the base of tlie branches and pedicels.

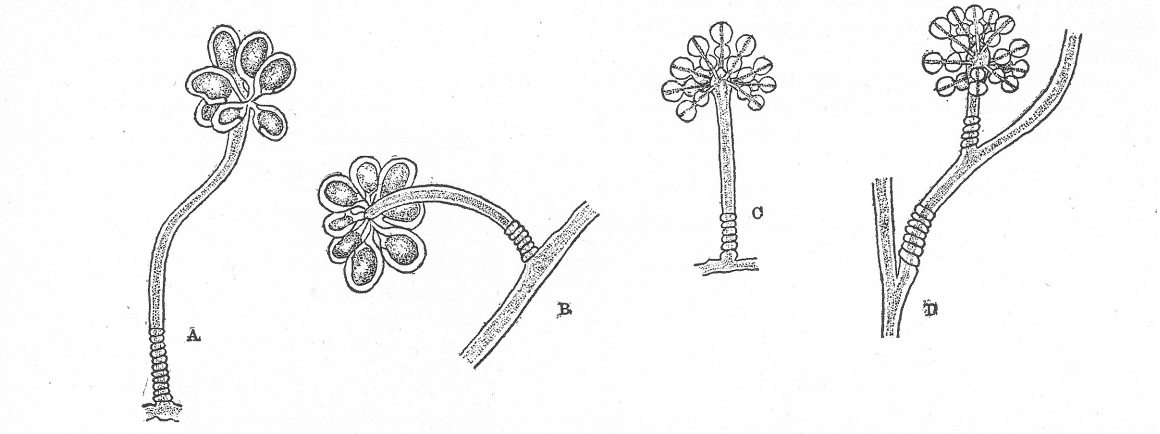

FIG. 6.—*Eudendrium capillare* Alder. A, cluster of female gonophores growing from the hydrorhiza; B, cluster of female gonophores growing from the stem; C, cluster of male gonophores growing from the hydrorhiza (after Allman); D, cluster of male gonophores growing from the stem (after Allman).

Gonosome.—Female gonophores borne on aborted hydranths, commonly with a zigzag arrangement from the end of the pedicel, this pedicel being more or less annulated throughout; often a series of pedicels appear in succession from a single branch. They may be close enough together so that the series of gonophore clusters may look like a single cluster. Over a large portion of the surface of each gonophore the perisarc is very much thickened. Male gonophores are clustered about an aborted hydranth. The cluster is much larger than in any other species found in this locality, five chambers being common. The reproductive hydranth is attached to the pedicel of an ordinary hydranth a short distance from where the latter is attached to the branch.

Color.—Hydranths and gonophores red.

Distribution.—Common on piles of United States Bureau of Fisheries wharf and on piles of the Norfolk Southern Railroad bridge from Morehead City to Beaufort; dredged near Shackleford, 12 feet.

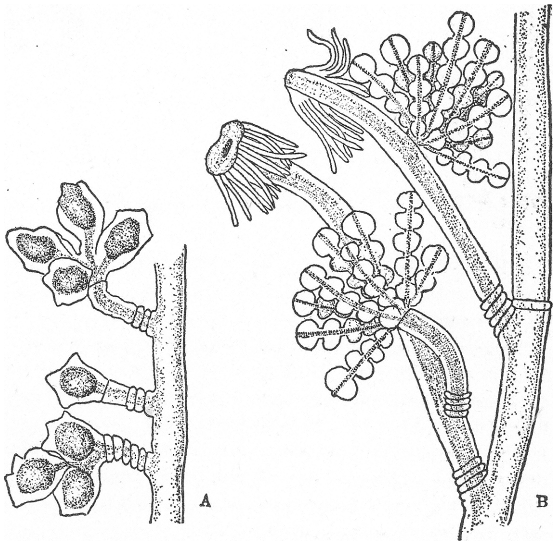

FIG. 7—*Eudendrium carneum* Clarke. A, portion of female colony: B, portion of male colony.

Eudendrium ramosum (Linnæus).

Tubularia iamosa Linnæus, Systema Naturæ, 1767, p. 1302.

Eudendrium ramosum Hargitt, American Naturalist, 1901, p. 309. Nutting, Hydroids of the Woods Hole Region. 1901, p. 332.

Trophosome.—Colony much branched, reaching a height of 5 or 6 inches; stem fascicled; annulations at the base of the pedicels and branches and sometimes at the base of the internodes.

Gonosome.—Female gonophores borne on hydranths that are scarcely aborted, though they may be smaller than the ordinary hydranths. They are rather below the hydranth body than on it, and even may be found straggling down the pedicel for some distance. The pedicels are sometimes annulated throughout, but are not always so. Male gonophores are borne at the base of the body of the hydranths, which show much variation in the extent of the abortion; some of them are scarcely aborted, some are more so, and some have the tentacles reduced to mere buds. Gonophores are few in number, commonly three, with three chambers, or only two. They stand out very conspicuously almost at right angles to the axis of the hydranth.

Color.—Hydranths and male gonophores vermilion or pink; female gonophores bright orange-red.

Distribution.—On the piles of the United States Bureau of Fisheries wharf and of the railroad bridge from Morehead City to Beaufort, usually growing on large tunicates; on shells in Bogue Sound, 10 feet.

Congdon reports specimens from Bermudas in which the hydranths bearing the gonophores are entirely aborted, but I have found no specimens of such a nature in this region.

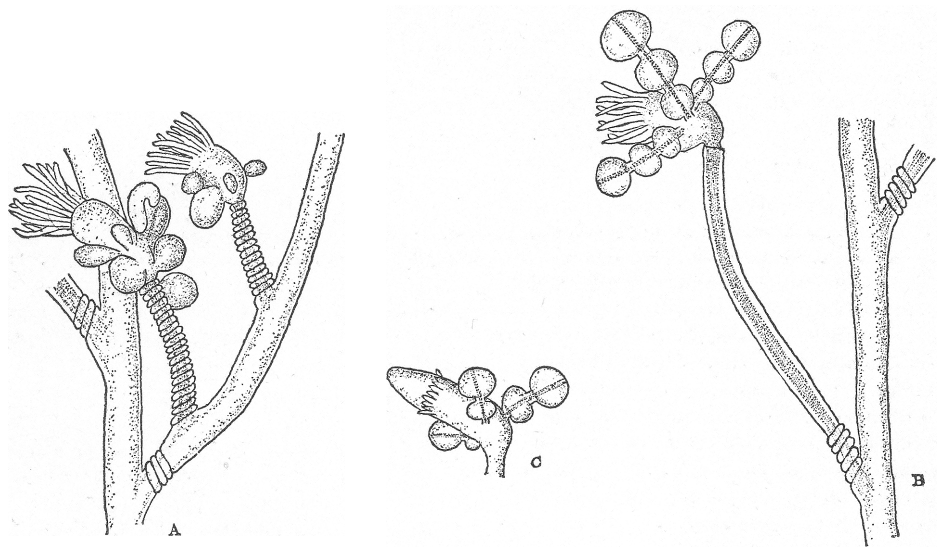

FIG. 8.—*Eudendrium ramosum* (Linnæus). A, portion of a female colony; B, portion of a male colony; C, a male hydranth much aborted.

Some difficulty may be experienced in distinguishing the different species of Eudendrium. It may be impossible to do so from the trophosome alone, because the general appearance is so much the same in each case. We speak of a difference of size, but that is very little to depend on, as, in the case of *E. ramosum* in particular, there is very wide variation. Though this hydroid may attain a height greater than any of the others, and usually is large when it is found near tide mark, in deeper water the forms dredged may be mature before the height of an inch is reached, at which time this species bears much resemblance to *E. capillare*, which, on the other hand, never reaches a great height. Mode of branching is a poor criterion upon which to depend, because there is not a definite method in any species, with the possible exception of *E. album*. The amount of annulation will not answer the purpose, because this is not constant, and, in any event, agrees fairly well in the four species under discussion. If the male and the female gonophores can be found in good condition the difficulty disappears. For that reason I have laid special stress on the gonophores in each species. Those of E. rumosum and *E. album* have the greatest resemblance to each other, but those of *E. album* are much smaller, corresponding to the minuteness of the species. Besides this, the male gonophores do not stand out at right angles as

they do in *E. ramosum.* I have never found any female gonophores arising from the hydrocaulus, as they often occur in *E. ramosum.* *E. ramosum* and *E. carneum* are found growing side by side in so many localities and have the general appearance so much alike that care must be taken to avoid confusion between the two.

Family HYDRACTINIDÆ.

Trophosome.—Colony formed of distinct nutritive and generative zooids growing from a common basal coenosarc, which ordinarily is beset with jagged spines. Other kinds of zooids may also be present. Hydranths with a single row of filiform tentacles; proboscis conical.

Gonosome.—Gonophores in the form of fixed sporosacs on special generative zooids.

Genus HYDRACTINIA.

This is the only genus of the family.

KEY TO SPECIES OF HYDRACTINIA FOUND IN THE BEAUFORT REGION.

A. Generative zooids without tentacles, ccenosarc beset with jagged spines. ..... *H. echinata.*

B. Generative zooids possessing tentacles, jagged spines not present in the cœnosarc ..... *H. carolinæ.*

Hydractinia carolinæ new species.

Trophosome.—Colony composed of persons less crowded than in *H. echinata,* arising from an encrusting mass which does not have the strongly jagged spines, these being so much reduced as to be scarcely noticeable as little nodules on the surface; hydranths much similar to those of *H. echinata.* There were no dactylozooids present nor could any of the long, slender, sensitive zooids be seen.

Gonosome.—Gonophores borne on generative persons not very much unlike the nutritive persons, except that they are smaller and the tentacles are somewhat less numerous. No batteries of nematocysts except those ordinarily found on tentacles are present. In no case were there more than two gonophores attached to one person. Six ova could be made out in the majority of the sporosacs.

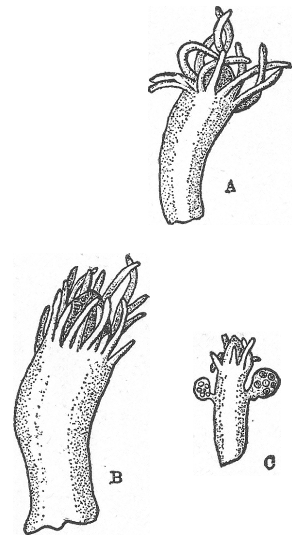

FIG. 9.—*Hydractinia carolinæ,* new species. A and B, nutritive zooids; C, generative zooid.

Color.—As the specimens had been in alcohol for a long time, naturally no very definite color could be made out.

Distribution.—Found growing on the legs of a crab dredged by the United States Fisheries steamer Fish Hawk about 23 miles southwest of Beaufort, in 13 or 14 fathoms of water.

This species differs from other species of *Hydractinia* in the nature of the gonosome, in the absence of other than the nutritive and generative zooids, and in the absence of pronounced spines on the basal expansion.

As all the specimens obtained were from the legs of an individual crab, the zooids were all of one sex, female. The presence of several tentacles and the absence of special batteries of nematocysts readily distinguish it from almost all other species. The number and arrangement of the gonophores are distinctive, but these vary with different species. The absence of the dactylozooids and of the basal spines may be due to the same cause. There is not much necessity of these, as the surface of the crab's legs is well protected, in the first place, by large, sharp spines, and, in the second, in some places at least, with a regular thicket of stiff bristles. These must offer as good protection as is afforded in other species by the special protective persons.

The fact that the long, slender, sensitive persons were not observed does not necessarily indicate their absence, as it is seldom that they can be observed, except when they are in the active state in live colonies, and even then they are not very numerous.

This species resembles *Hydractinia verdi* Ritchie,[a] but he found three or four sporosacs on each generative zooid and only three eggs in each. The spines in his species are better developed also.

Hydractinia echinata (Fleming).

Alcyonium echinatum Fleming, British Animals, **1828,** p. 517.
Hydractinia echinata Hincks, British Hydroid Zoophytes, **1868,** p. 23. Allman, Ray Society, 1871, p. 345.
Hydractinia polyclina Agassiz, Cont. Nat. Kist. U. S., **1862,** p. 227.
Hydractinia echinata Hargitt, American Naturalist, 1901, p. 310.
Hydractinia polyclina Nutting, Hydroids of the Woods Hole Region, 1901, p. 335.

Trophosome.—Colony arising from a basal cœnosarc which overlies a chitinous, encrusting plate. Hydranths with great power of contractility and extensibility. Thus they may appear long and slender or short and-stout. They are generally contracted in the preserved specimens. Tentacles vary much in number. The whorl may appear very definite or may be so irregular as to appear as though there were several approximated whorls.

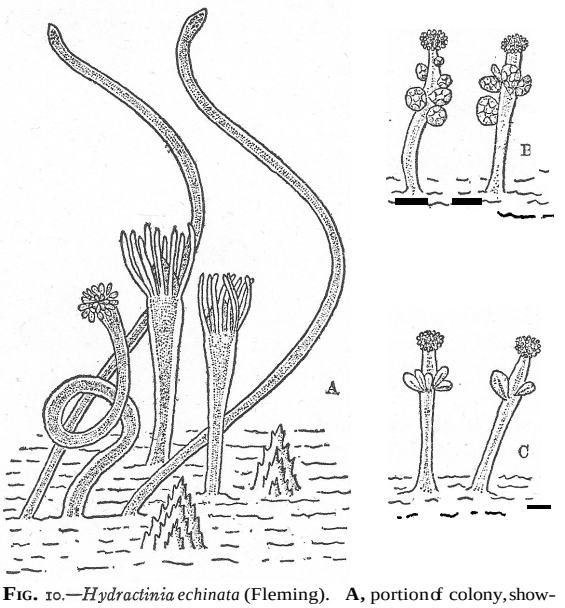

FIG. 10.—*Hydractinia echinata* (Fleming). **A,** portion of colony, showing nutritive zooids, defensive zooids, and sensory zooids, as well as the basal spines; B, female generative zooids; C, male generative zooids.

Gonosome.—The sporosacs, male and female, in different colonies, are found on special generative zooids which are devoid of tentacles but instead have extensive batteries of nematocysts. They are usually noticeably smaller than the nutritive zooids.

Other zooids.—At intervals among the nutritive and generative zooids there are zooids which look much like the generative zooids, except that they are much longer and more slender and are devoid of sporosacs. They are even more mobile than the nutritive zooids and may ever, double on themselves to form spirals. They probably serve for the defense of the colony.

Near the outer margin of the colony still other zooids may be found. They are even longer than the spiral zooids, but they do not possess the nematocyst batteries. They appear specially sensitive, and probably serve for the sense of touch for the colony. They are few in number and are likely to escape notice, even in the living colony, unless they are in active movement. Unless preserved specimens have been specially fixed they seldom show these zooids.

Color.—Whitish to reddish. Female gonophores orange red or bright red.

Distribution.—Bogue Sound, on shells, 10 to 12 feet.

Since the time when Agassiz, in his Contributions to the Natural History of the United States, described a species of *Hydractinia* and called it *H. polyclina,* there has been much discussion as to whether this species is identical with the British species *H. echinata* Fleming. Eincks placed the American species with the British, but Allman separated them, accepting Agassiz's opinion, though, at the same time, expressing grave doubts as to the propriety of doing sa. Among American naturalists Hargitt has followed Hincks, while Nutting has taken the opposite view. With the exception of Nutting, none of these ever had specimens from both sides of the Atlantic to compare, and it would seem, therefore, that his opinion should have the soundest basis.

[a] Eydroids from Cape Verde Islands, 1907, p. 498.

During the past summer I obtained specimens of *Hydractinia* from South Harpswell, Me., from different localities near Woods Hole, Mass., and from Beaufort, N. C. In working up the Beaufort hydroids it was necessary to come to a decision as to this species. With that end in view comparison was made, not only of the specimens referred to, but also specimens that had been used by Prof. Nutting from Woods Hole, Mass:, Grand Manan, New Brunswick, and from Plymouth, England, as well as some specimens collected some years ago at Canso, Nova Scotia.

In comparing Prof: Nutting's specimens from Woods Mole and from Plymouth it was an easy matter to see the difference in size of hydranth and number of tentacles that he mentions, but in comparing the Plymouth specimens with some of the specimens obtained during the past summer, the same dif-

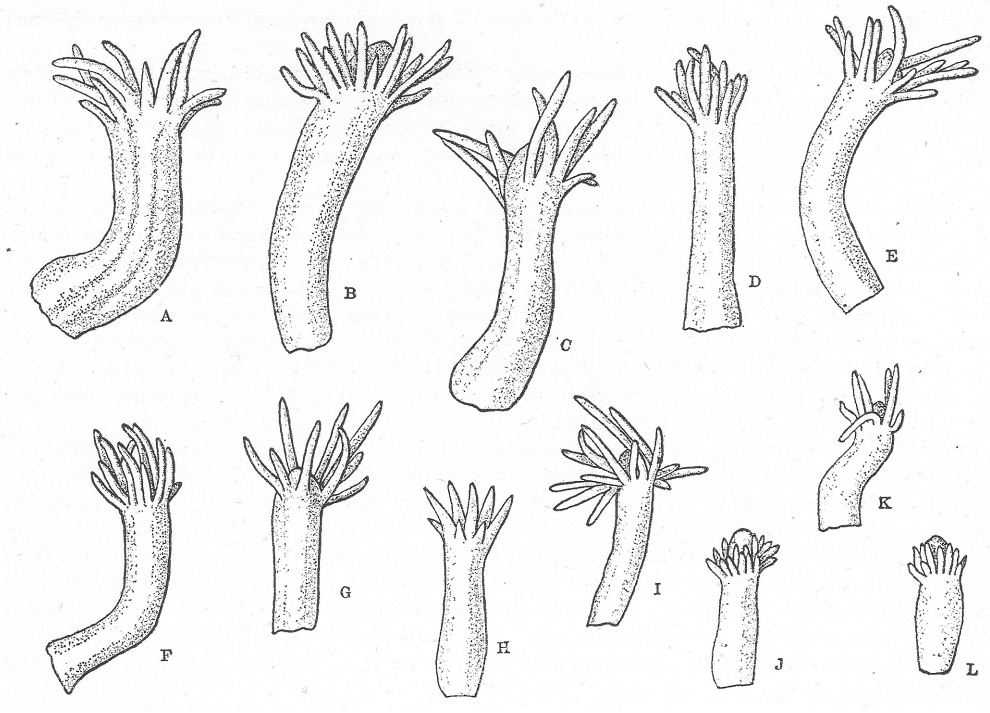

FIG. 11.—*Hydractinia echinata* (Fleming). A to I, nutritive zooids from various localities to show variation in size and number of tentacles.

ference could not be observed. The individuals of several colonies from Vineyard Haven (near Woods Hole), from Canso, and from South Harpswell were larger than any of the Plymouth individuals and many of them had even fewer tentacles. On the other hand, some from Tarpaulin Cove (near Woods Hole) were as small as Prof. Nutting's specimens from Woods Hole, and those from Beaufort were still smaller. That the difference may be appreciated several drawings have been made (fig. 11), in all cases from among the largest individuals of mature colonies. A, C, and G are Vineyard Haven specimens, B from Canso, D from South Harpswell, E, F, and I from Plymouth, H from Grand Manan, J from Woods Hole, K from Tarpaulin Cove, and L, from Beaufort. They are made from preserved specimens and hence show the individuals in the state of contraction.

With such a gradation shown, I do not see how it is possible to consider that there are two distinct species, for certainly one who did not know the specimens or drawings could not pick the three British specimens out of the lot. The difference in size could not be influenced particularly by the bases for

attachment as there was much variation in these. The Plymouth specimens were attached to gastropod shells, the Canso specimens to shells and stones, the Grand Manan specimens to seaweed, the South Harpswell specimens to shells and to rock, the Vineyard Haven specimens to piles of a bridge, the Tarpaulin Cove specimens to shells, and the Beaufort specimens to shells.

It is possible that the general habitat has something to do with size. At Vineyard Haven, where the largest specimens were obtained, the colonies form encrusting masses completely covering the piles from low-water point to a depth of several feet. That there is only one colony on each pile is indicated by the fact that all the individuals on one pile are of the same sex. This bridge spans the narrow entrance to a large body of water known as Lagoon Pond. With every turn of the tide a strong current is produced, a condition which is notably suitable for hydroid life, as an abundant food supply is assured. If any other evidence were necessary it might be stated that a dozen species of hydroids were obtained from these piles in less than half an hour.

At South Harpswell the conditions were similar. The specimens were obtained at the site of an old tide mill, where the current was strong enough to turn the mill wheel 8 hours out of 12. Large surfaces of rock were covered with the colonies in much the same way that the biles were at Vineyard Haven, though gastropod shells inhabited by hermit crabs were numerous also to provide a basis of attachment.

At Canso, the colonies were found along the shore at low water or on the bottom a short distance below low water. As the Canso Peninsula projects so far into the Atlantic Ocean a tide current is running almost continually either into or out of Chedabucto Bay, past this point. Furthermore, as there is a fringe of rocky islands and reefs surrounding the peninsula at a short distance out from shore, this tide current is broken up into innumerable small currents, some of which attain to a much greater velocity as they move through the narrow passages. Here also an abundant food supply is assured. I do not know the exact conditions at Grand Manan, but no place in the Bay of Fundy is likely to be without a good supply of current. It seems as though in all these cases the food supply was abundant, and large specimens as well as large colonies were the result.

In contradistinction to this, the small colonies were all found in quiet water. At Tarpaulin Cove the colonies came up on the tangles used for collecting sea urchins or were obtained along the shore at low tide. The cove serves as a good anchorage because of its sheltered waters. If the movement of the water is slight the food supply of the hydroids can not be abundant. At Beaufort the specimens were obtained where the conditions were much similar to those at Tarpaulin Cove, at a depth of 10 or 12 feet in Bogue Sound, on sea-urchin ground, where the bottom is sandy with here and there lamellibranch and other mollusk shells. There are 3 or 4 miles of shallow water before the open ocean is reached and even the ocean is shallow for a long distance out. It is not surprising then that the colonies and the individuals are even smaller here than at Tarpaulin Cove, for the latter is at least close to the deep weter of Vineyard Sound.

In many cases temperature appears to have much to do with the distribution of hydroids, and one might suppose that the influence of temperature might account for the difference of size in this species, since the larger specimens, in general, as far as this collection is concerned, are confined to the colder waters and the smaller specimens the warmer. There is one difficulty in the way of accepting such a conclusion. The large specimens from Vineyard Haven were obtained but 7 or 8 miles from the very small specimens at Tarpaulin Cove, and as there is direct water connection between the two places there can be little difference in temperature.

The variation in depth in the whole series is not enough to make any material difference in growth, and it is hard to conceive of any other influence that might do so besides those mentioned.

Difference in the food supply must be an important factor in producing this difference of growth and it would seem, if one can judge from the specimens considered in this discussion, that it is the most prominent factor.

Family PENNARIDÆ.

Trophosome.—Colony branched; hydranths with a proximal whorl of long filiform tentacles around the body of the hydranth and several capitate tentacles on the proboscis, these usually in a series of whorls.

Gonosome.—Gonophores producing free medusze with four radial canals and four rudimentary tentacles.

Genus PENNARIA.

Trophosome.—Colony large, much branched, often with a distinct pinnate or twice pinnate arrangement; hydranth with a large proboscis, very noticeable when extended, well supplied with whorls of capitate tentacles.

Gonosome.—Gonophores borne on the hydranth body just distal to the proximal whorl of tentacles; medusz very large, often mature, when liberated. They may even liberate the sex products before being set free from the hydranth.

Pennaria tiarella McCrady.

Pennaria tiarella McCrady, Gymnoph. of Charleston Har., 1857, p. 51. Hargitt, American Naturalist, 1900, p. 387. Hargitt. American Naturalist, 1901, p. 311. Nutting, Hydroids of the Woods Hole Region, 1901, P. 337.

Trophosome.—Colony large, sometimes reaching the height of 6 inches; branching twice pinnate. A varying number of annulations, never very many, occur on the main stem above the origin of the branch and on the branches above their origin. The hydranths are large, narrowing distinctly to form the proboscis. There are 10 or 12 filiform tentacles and a varying number of capitate tentacles which are usually arranged in four or five quite regular whorls in the fully developed hydranth. Often a hydranth bud appears growing directly from the wall of the main stem or branch.

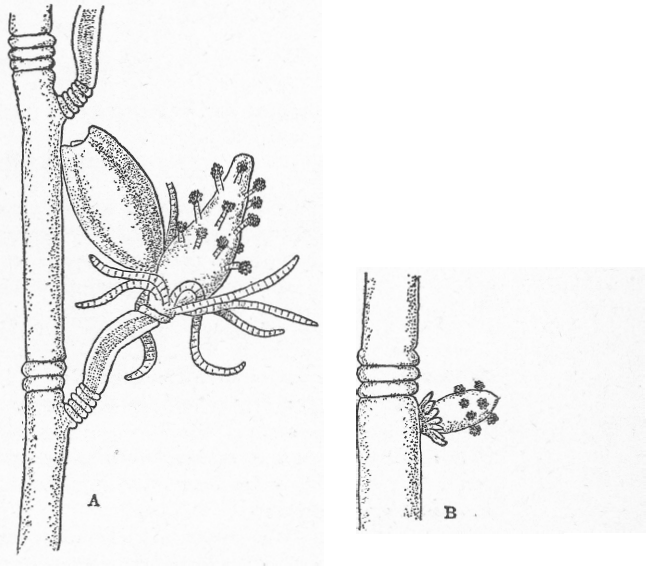

FIG. 12.—*Pennaria tiarella* McCrady. A, hydranth and gonosome; B, bud growing directly from the branch.

Gonosome.—Gonophores few in number; when there are more than one on a hydranth at the same time they seldom are at the same stage of development. The medusz are oval or ovate; rudimentary tentacles, radial canals, and the manubrium with its gonads are all well developed, and the sexual products may be dehisced before the medusze are set free.

Color.—Stem and main branches of dark horn color; hydranths and medusa markings similar to each other in color; they may be a vermilion or pink or they may be a light gray, almost a white; tentacles white.

Distribution.—On the crab float and the piles of the United States Bureau of Fisheries wharf, on the piles of the railway bridge at all points from Morehead City to Beaufort, on stones and shells in shallow water in many near-by localities.

Hargitt, in his 1900 paper, speaks of two varieties of this species as it is found at Woods Hole: The one occurring early in the season, a deeper form with little tendency to bilateralism, with little coloration in hydroid or medusa, the medusa being inactive or never becoming free; and a shallow water or surface form, occurring later, which is distinctly bilateral, with higher coloration in hydranth and medusa, the medusa being active, the whole colony having a more rapid growth than the former. He

suggests that the bilateralism and higher coloration in the latter is due to exposure at the surface while it is floating, and that this might account for its rapid development as well.

Whatever bearing that may have on the Woods Hole *Pennaria*, it does not seem to apply to the Beaufort forms. At Woods Hole the eelgrass variety had become common early in August. The Beaufort specimens were examined a month later, and therefore, as far as time is concerned, should agree with the later eelgrass variety. Growing side by side on the crab float, and therefore always at the surface, were found colonies as close as it is possible for colonies to grow—the one with the hydranths and medusa markings pink or vermilion and the other grayish or milky white. Both exhibited marked bilateralism and both appeared to retain the medusæ at least until the sex products were mature. In the specimens obtained from the piles of the railroad bridge under nearly the same conditions, the two varieties were found similarly. As far as I can make out, there are no structural differences. I had no time to make any investigations, and consequently have no explanation or even suggestion to account for the differences, but I can not see that Hargitt's suggestion will in any way apply to the Beaufort specimens, except that regarding bilateralism, which, I think, may hold good.

Suborder CALYPTOBLASTEA.

Hydranths protected by hydrothecae and gonophores by gonangia.

Family CAMPANULARIDÆ.

Trophosome.—Hydrothecæ campanulate, never sessile, never adnate to or immersed in the stem or branches; no operculum; diaphragm always present; hydranth with trumpet-shaped proboscis.

Gonosome.—Gonophores producing sporosacs or free medusae. These medusæ usually have otocysts and have the ovaries along the course of the radial canals.

KEY TO THE GENERA OF THE CAMPANULARIDÆ FOUND IN THE BEAUFORT REGION.

A. Gonophores do not produce free medusa
  a. Reproduction by sporosacs which remain in the gonangium; these give rise to planulæ. *Campanularia.*
  b. Reproduction by sporosacs which are extruded into a sac at the summit of the gonangium, in which sac the planulæ are produced. ..... *Gonothyræa.*
B. Gonophores produce free medusae.
  a. Medusae, with 4 tentacles at time of liberation..... *Clytia.*
  b. Medusæ, with 16 or more kentacles at liberation..... *Obelia.*

There are few distinguishing differences in the trophosomes of these genera.

Genus CAMPANULARIA.

Trophosome.—As in the family.

Gonosome.—Gonophores producing sporosacs from which planulae develop within the gonangia.

KEY TO SPECIES OF CAMPANULARIA FOUND IN THE BEAUFORT REGION

A. Hydrotheca, with entire margin. ..... *C. integra.*
B. Hydrotheca, with margin toothed. ..... *C. raridentata.*

Campanularia integra MacGillivray.

Campandaria integra MacGillivray, **Ann.** and Mag. Nat. Hist., 2d ser., **9**, 1842, **p.** 465. Hincks, Br. Hydroid Zoophytes, 1868, **p. 163.** Frsser, West Coast Hydroids, 1911, **p. 31.**

Trophosome.—Colony usually unbranched, arising from a stoloniferous network; pedicels long and slender, varying much in the amount of annulation, some being almost smooth and some being annulated throughout. There are always two or three annulations below the hydrotheca. Hydrotheca with entire margin tapering very gradually from rim to base.

Gonosome.—Gonangium very large, deeply corrugated, the corrugations having a distinct keel; attached by a short annulated pedicel to the stolon.

Distribution.—On a piece of board found floating on the open ocean near Cape Lookout.

No gonosome was found on these specimens. The drawing was made from a Puget Sound specimen.

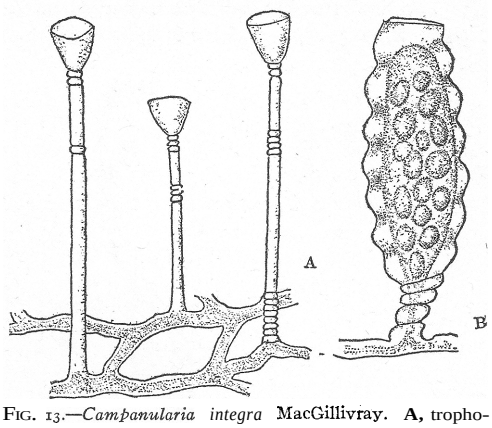

FIG. 13.—*Campanularia integra* MacGillivray. **A,** trophosome; B, gonosome.

? **Campanularia raridentata** Alder.

Campandaria raridentata Alder, Ann. and Mag. Nat. Hist., 3d ser., IX, 1862, p. 315. Hincks, Br. Hydroid Zoophytes, 1868, p. 176. Fraser, West Coast Hydroids, 1911, p. 32.

Trophosome.—Colony unbranched, arising from a stolon which at this point has a distinct elevation somewhat bulbous in appearance; pedicel annulated at the base and below the hydrotheca, sometimes throughout almost the whole length; hydrothecae long and narrow, tapering but slightly from margin to base; teeth usually five in number, deep and rounded at the tip.

Gonosome.—Unknown.

Distribution.—Dredged near the sea buoy in 6 or 7 fathoms of water.

Since the gonosome has not been observed, this species can be put in the genus *Campanularia* only provisionally.

There has been much confusion of this species with *Thaumantias inconspicua* Forbes, though when the two are compared the resemblance is not marked. The matter has been discussed in my West Coast paper.

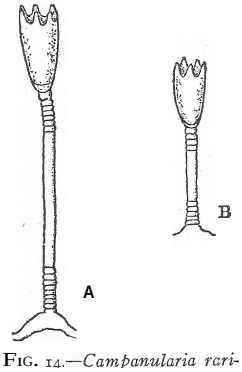

FIG. 14.—*Campanularia raridentata* Alder. A and E, single colonies.

Genus CLYTIA.

Trophosome.—Colony unbranched or irregularly branched.

Gonosome.—Gonophores produce medusae with 4 radial canals and 4 marginal tentacles when liberated, 8 lithocysts between the bases of the tentacles.

KEY TO SPECIES OF CLYTIA IN THE BEAUFORT REGION.

A. Hydrothecæ deeply campanulate, with few teeth. .....*C. coronata.*
B. Hydrothecæ cylindrical, with sharp teeth. .....C. *cylindrica.*
C. Hydrothecae broadly campanulate, with sharp teeth.. .....*C. johnstoni.*
D. Hydrothecæ large, cylindrical, with deeply cut teeth. ....*C. longicyatha.*
E. Hydrothecz broadly campanulate, with rounded teeth.. ...*C. noliformis.*

? **Clytia coronata** (Clarke).

Campanularia coronata Clarke, **Bull. Mus.** Comp. Zool., Harvard, 1879, p. 242.

Trophosome.—Colony unbranched or with a few irregular branches which take an abrupt bend near their origin and pass out parallel and close to the main stem. When the colony is unbranched the pedicel is strongly annulated proximally and distally and may be annulated throughout. This also applies to the individual pedicels in the branched forms, but besides this the main stem is annulated above the origin of the branch or pedicel. The hydrotheca are rather long, tapering gradually from below the margin to the base. There are eight or nine distinctly cut teeth that are not especially acute.

Gonosome—Gonophores appear both on the stolon and on the stem borne on short annulated pedicels. The gonangia are oblong-oval in shape with the opening occupying the greater part of the upper surface.

Distribution.—On seaweed floating in Beaufort Harbor.

The gonosome has not been described hitherto. Many gonangia were present on this material but almost all were empty. Some of them had two or three medusz but they were not in agood state of preservation. They were certainly not *Obelia* medusæ and probably not *Thaumantias*. They had the shape of *Clytia* medusæ and I have little doubt that they belong to that genus.

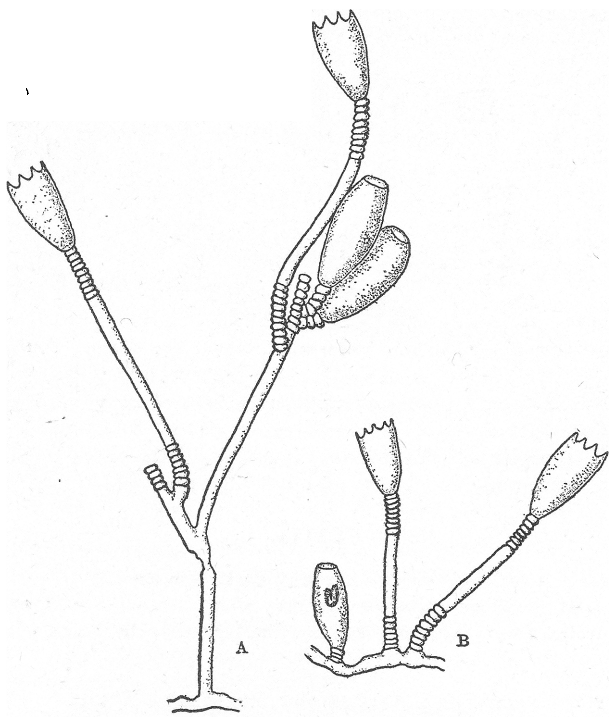

FIG. 15.—*Clytia coronata* (Clarke). A, branched colony; B, unbranched colonies.

Clytia cylindrica Agassiz.

Clytia cylindrica Agassiz, Cont. Nat. Hist. U. S., IV, 1862, p. 306.' Hargitt, American Naturalist, 1901, p. 381. Nutting, Hydroids of Woods Hole, 1901, p. 342.

Trophosome.—Stem unbranched with slender pedicel, annulated proximally and distally; hydrothecz cylindrical, more than twice as deep as wide, suddenly constricted at the base at the point where the diaphragm appears inside, the part below the diaphragm being little larger than the end of the pedicel; teeth 10 to 12, sharp-pointed and deeply cut.

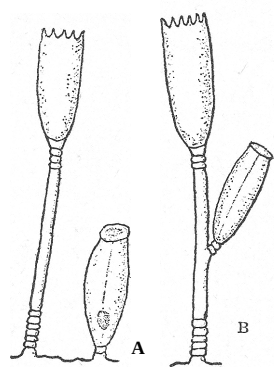

FIG. 16.—*Clytia cylindrica* Agassiz. A, hydrotheca and gonangium growing from the stolon; B, gonangium growing from the pedicel.

Gonosome.—Gonophores arising either from the hydrorhiza or from the pedicel by means of short pedicels with one or two annulations; gonangium smooth, oblong, slightly narrowed just below the rim.

Distribution.—Very common, growing on *Pennuria*, *Eudendrium*, alcyonarians and many other forms, on the piles of the railroad bridge, on floating sargassum, on the piles at Marshallberg; dredged in 6 to 12 feet of water in Bogue Sound, North River, and the Straits.

Clytia johnstoni Alder.

Campanularia johnstoni Alder, Ann. and Mag., 2nd ser., XVIII, 1856, p. 359.
Clytiajoknstoni Hincks, Br. Hydroid Zoophytes. 1868, p. 143.
Clytia bicophora Agassiz, Cont. Nat. Hist. U. S., IV, 1862, p. 304. Hargitt, American Naturalist, 1901, p. 381. Nutting, Hydroids of Woods Hole, 1901, p. 343.

Trophosome.—Stem unbranched or sometimes with a single branch; pedicels long and slender, annulated proximally and distally; hydrothecæ broadly campanulate, not much deeper than wide, with 12 to 14 sharply pointed, rather shallow but distinctly cut teeth.

Gonosome.—Gonophores growing either from the stem or the hydrorhiza attached by short annulated pedicels; gonangia strongly corrugated, each corrugation with a distinct keel; oval, truncate at the distal end.

Distribution.—On floating sargassum from the seaward side of Bogue Bank.

I can see no good reason for separating *Clytia bicophora* Agassiz from *Clytia johnstoni* (Alder). They seem to agree in every particular.

Clytia **longicyatha** (Allman).

Obelia longicyatha Allman, Mem. Mus. Comp. Zool., Harvard, 1877, p. 10.
Clytia longicyatha Pictet, **Revue** Suisse de Zoologie, 1893, **p.** 28.

Trophosome.—"Hydrocaulus attaining the height of nearly an inch, fascicled below, alternately branched; main stem annulated for a short distance above each ramulus; ramuli annulated at their origin; hydrothecal peduncles of moderate length, more or less annulated.

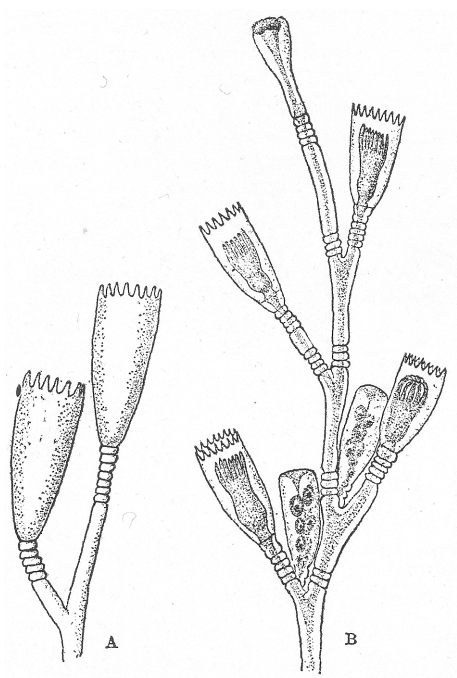

FIG. 18.—*Clytia longicyatha* (Allman). A, two hydrothecæ; B, portion of colony to show gonosomes. (After Pictet.)

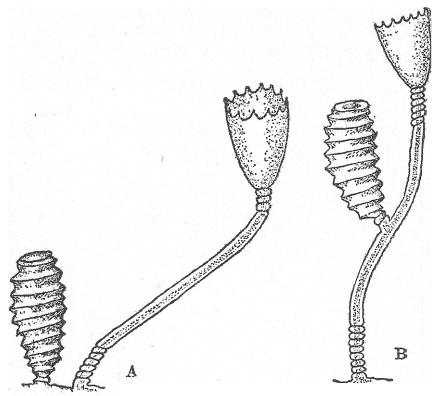

FIG. 17.—*Clytia joknstoni* (Alder). A, hyclrotheca and gonangium growing from the stolon; B, gonangium growing from the pedicel.

Hydrothecæ narrow, deep, nearly cylindrical above and then tapering toward the base; the orifice cut into about 20 acute, deep, narrow teeth." (Allman.)

Gonosome.—Gonangia with smooth walls, borne on the hydrorhiza or the stem, inclosing the deep bell-shaped medusa buds, arranged on the blastostyle in pairs, the one opposite the other. Length of gonangium 1 to 1.1 mm., diameter 0.4 mm. (From Pictet.)

Distribution.—On floating sargassum off Bogue Rank; on sponge dredged by Fish Hawk.

Allman described this species from Florida without finding the gonosome and judged it to be *Obelia.* Later Pictet found what he considered to be the same species from the Bay of Amboine, with the gonosome present. This showed it to be a *Clytia* instead of an *Obelia.* There seems little doubt that this is Allman's species, although the depth of the hydrotheca is not so great as in Allman's specimens or in those I have obtained. I obtained only a fragment of a colony with two perfect hydrothecæ and another with but one. Consequently, I have copied Allman's description of the trophosome and have translated Pictet's description of the gonosome. The figure of the gonosome is from Pictet.

Clytia noliformis (McCrady).

Campanularia noliformis McCrady, Proc. Elliott Soc., 1857, p. 92.
Clytia noliformis Nutting, Hydroids of Woods Hole, 1901, **p.** 343.

Trophosome.—Stem unbranched; pedicels short, stout, extensively annulated, sometimes throughout the whole length; hydrothecæ broadly campanulate, sometimes broader than deep **but usually** with length and breadth about equal; teeth 10 to 12, rounded at the tip.

Gonosome.—Gonophores growing from the hydrorhiza, almost sessile; gonangia broadly oval in general shape but narrowing distinctly just below the rim, which is expanded, so that it appears to have a distinct but very short neck.

Distribution.---Very common on the sargassum that drifted in to Bogue Bank and even into Beaufort Harbor.

The gonosome has not been described for this species under this name but it seems probable that this is the species that Congdon has described as C. *simplex*,[a] the gonosome being figured and described and also the species that Hargitt has described as *C. volubilis*.[b] The fact that in both cases the specimens were found on the sargassum makes it even more probable.

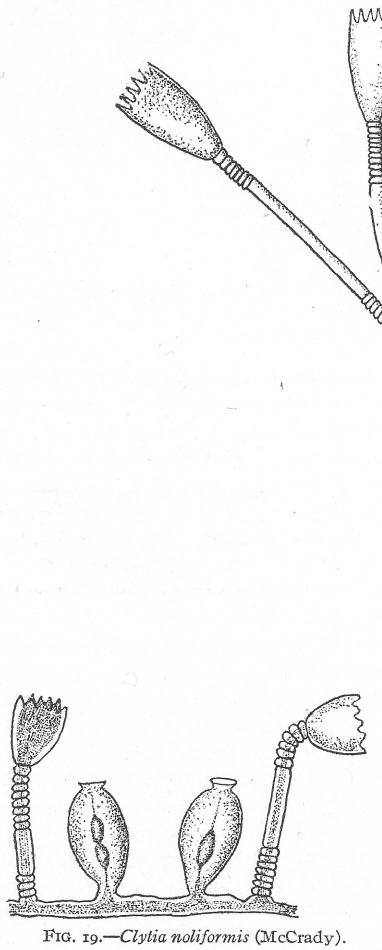

FIG. 19.—*Clytia noliformis* (McCrady).

FIG. 20.—*Gonothyræa gracilis* (Sars).

Genus GONOTHYRÆA.

Trophosome.—As in the family.

Gonosome.—Gonophores giving rise to sporosacs which are provided with short filiform tentacles. Before maturity these sporosacs pass out of the gonangia but remain attached to the top until the planulae are liberated.

Gonothyræa gracilis (Sars).

Laomedea gracilis Sars, Beretning om en zoologisk Reise i Lofoten og Finmarken, 1851, p. 18.
Gonothyræa gracilis Allman, Ann. and Mag. N. H., 3d ser., XIII, 1864, p. 374. Hincks, Br. Hydroid Zoophytes, 1868, p. 183.

Trophosome.—Colony irregularly branched; stem, branches, and pedicels long and slender; branches and pedicels bend abruptly near the origin and pass upward in the same direction as the main stem; stem with several annulations at the base and above the origin of each branch and pedicel; each pedicel with several annulations at the base and below the hydrotheca; hydrotheca long for its width, cylindrical for the upper half or two thirds and gradually tapering to the base; teeth 10 to 14, deeply cut and rather sharp.

Gonosome.—Gonophores borne on the hydrorhiza and on the stem, with distinct, annulated pedicels; gonangia oblong-oval in shape, flaring a little at the rim. Each gonophore bears four or five sporosacs.

Distribution.—On *Pennaria* growing on the piles of the railroad bridge near Beaufort and on gulf-weed collected on the seaward side of Bogue Bank. This species bears much resemblance to *Clytia edwardsi* (Nutting) in its general appearance, particularly in the mode of branching and in the shape of the hydrotheca, but the gonosome is entirely different.

Genus OBELIA.

Trophosome.—As in the family.

Gonosome.—Gonophores producing medusae, which when set free have 4 radial canals, more than 8 marginal tentacles and 8 lithocysts borne on the base of the tentacles; umbrella disk-shaped.

KEY TO THE SPECIES OF OBELIA FOUND IN THE BEAUFORT REGION.

A. Hydrothecæ with toothed margin.
  Each tooth is provided with two sharp points. ..... O. *bicuspidata*,
B. Hydrothecz with entire margin.
  a. Hydrothecæ with straight sides. ..... O. *dichotoma*.
  b. Hydrothecæ nearly bell-shaped, coming off alternately from a geniculate stern which supplies a shoulder for each. ..... *O. geniculata*.
  c. Hydrothecæ bell-shaped with a tendency to a flaring rim. Stem and pedicels much annulated. O. *hyalina*.

Obelia bicuspidata Clarke.

Obelia bicuspidata Clarke, Trans. Conn. Acad. Sc., vol. III, 1876, p. 58.
Obelia bidentata Clarke, Trans. Conn. Acad. Sc., vol. III, 1876, p. 58.
Obelia bicuspidata Nutting, Hydroids of Woods Hole, 1901, p. 351.
Obelia bidentata Nutting, Hydroids of Woods Hole, 1901, p. 351.

Trophosome.—Colony small, not much branched; main stem geniculate, annulated at the base and above each branch or pedicel; hydrothecæ on short pedicels, except the terminal one, annulated throughout, standing well out from the stem; long and slender, tubular but tapering slightly to the base; margin toothed, each tooth provided with two sharp points; lines are usually found running from the base of the indentations, lengthwise of the hydrothecz.

Gonosome.—Gonophores very small, borne in the axils of the hydrothecal pedicels, supported on short, annulated pedicels; gonangia ovate or oval, with the top truncated or, in some cases, slightly inverted at the center; some of them are shorter than the hydrothecæ.

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[a] Hydroids of the Bermudas, 1907, p. 472. [b] Biological Bulletin, 1909, p. 373.

Distribution.—On *Pennaria, Eudendrium* and gorgonian stems, common; on piles of the United States Bureau of Fisheries wharf, on the piles of the railroad bridge, Bogue Sound 10 feet, North River 8 to 10 feet.

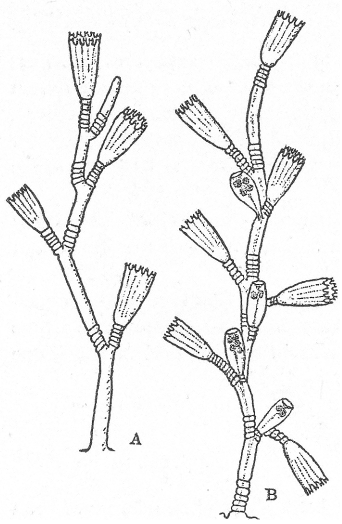


FIG. 21.—*Obelia bicuspidata* Clarke. A, small colony; B, colony showing gonosome.

In the colonies found on the *Pennuria* stems it is possible to find enough variation to cover all the points given as difierences between O. *bicuspidata* and *O. bidentata,* in Clarke's descriptions, so that it is hardly possible that there are the two distinct species. The gonosome has not been described hitherto

Obelia dichotoma (Linnæus).

Sertularia dichotoma Linnæus, Systema Naturae, 1767, p. 1312.
Obelia dzchotoma Nargitt, American Naturalist, 1901, p. 382. Nutting, Hydroids of Woods Hole, 1901, p. 350.

Trophosome.—Colony branching, usually in a dichotomous manner, though in the branches this may be quite irregular; two or three annulations on the main stem and branches above each branch and pedicel; pedicels short, annulated throughout or at each end only; hydrothece much deeper than wide, with straight sides; margin entire, though in some cases it appears slightly wavy or crenulated.

Gonosome.—Gonophores usually borne in the axils of the pedicels, obovate with a distinct collar which narrows from base to tip, somewhat rounded at the end, making a collar quite characteristic; pedicels distinct, with 3 to 6 annulations.

Distribution.—On barnacles found growing on the sea buoy.

The hydrothecze are smaller in these specimens than in those found farther north.

Obelia geniculata (Linnæus).

Sertularia geniculata Linnæus, Systema Naturae, 1767. p. 1312.
Obelia geniculata Hargitt, American Naturalist, 1901, p. 382. Nutting, Hydroids of Woods Hole, 1901, p. 351.

Trophosome.—Colony usually consisting of a single geniculate stern, an inch or less high, bearing alternate pedicels on shoulder processes; pedicels short, curved so that their hydrothecæ often lie with their long axes horizontal; annulated throughout or with the central portion smooth; hydrothecæ broadly campanulate, depth and width being nearly **equal;** margin entire.

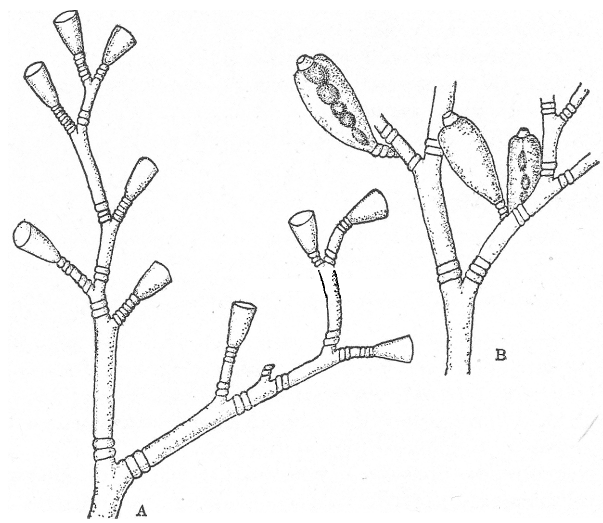


FIG. 22.—*Obelia dzchotoma* (Linnæus). A, part of colony to show mode of branching; B, gonosome.

Gonosome.—Gonophores borne in the axils of the pedicels; gonangia nearly oval but tapering slightly to the base, distally provided with a distinct collar that is the same size throughout.

Distribution.—On the crab float at the United States Bureau of Fisheries wharf.

Obelia hyalina Clarke.

Obelia** hyalina* Clarke, **Bull. Mus.** Comp. Zool., Narvard, 1879, p. ***241.

Trophosome.—Colony small usually from 15 to 20 mm. in height; some colonies scarcely branched, others of about the same height with several branches; stem distinctly geniculate with several annulations above the origin of each branch and pedicel; branches sometimes coming from the axil of a pedicel and sometimes taking the place of pedicels; pedicels either short and annulated throughout or longer and annulated at each extremity; hydrothecae campanulate, depth and width nearly equal; sometimes there is a tendency to flaring of the margin; margin entire.

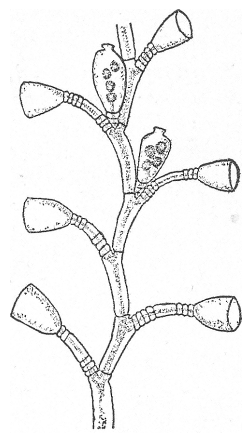


FIG. 23.—*Obelia geniculata* (Linnæus).

Gonosome.—Gonophores borne in the axils of the pedicels; gonangia oval but slightly tapering at the base; distal end either rounded or provided with a distinct collar; length of the gonangium from two to four times the length of the hydrotheca.

Distribution.—Commonon sargassum collected off Bogue Bank, but found also growingon tunicates, growingon the piles at Marshallberg and on sponge dredged by the Fish Hawk.

Congdon found some specimens in the Bermudas which he considered to be *Obelia hyalina* Clarke.[a] Hargitt later found specimens on floating sargassum at Woods Hole which he considered to be the same species as Congdon's specimens, but he did not agree with Congdon that it was **O.** *hyalina.*[b] He called his species **O.** *congdoni.* Clarke says that in **O.** *hyalina* "the gonangia are small, about twice the length of the hydrothecae, rounded off at the distal end, with a simple, spherical, terminal opening which stretches across the distal end," and that the "colony is about 12 mm. in height and but little branched," while in Hargitt's specimens "the gonangia are large, about four times the length of the hydrothecz, and the opening is not simple, but there is a terminal neck with an everted rim," while "the colony is from 20 to 30 mm. in height and much branched."

In the Beaufort material there were many colonies branched and many unbranched. Those that were branched had the branches coming out either at the axil of the pedicel or taking the place of pedicels. Gonangia with rounded distal ends were found in the same colony as those with distinct collars. There was much variation in size, and though I found few in my own material bearing a ratio of 4 to 1, as compared with the length of the hydrothecz in tlie same colony, there were plenty of them with an absolute measurement as high as 7 mm., which is evidently as large as that figured by Congdon. This shows that the size of tlie ratio is increased by the smaller size of the hydrothecae, rather than by the larger size of the gonangia, as I found to be the case in the few specimens where I found the ratio as high as 4 to 1. Moreover, in the specimens obtained onthe Bahama expedition by Prof. Nutting and diagnosed by him as *Obelia hyalina* Clarke[c] (in this diagnosis he had the use of Prof. Clarke's specimens for comparison), the gonangia show a 4 to 1 ratio.

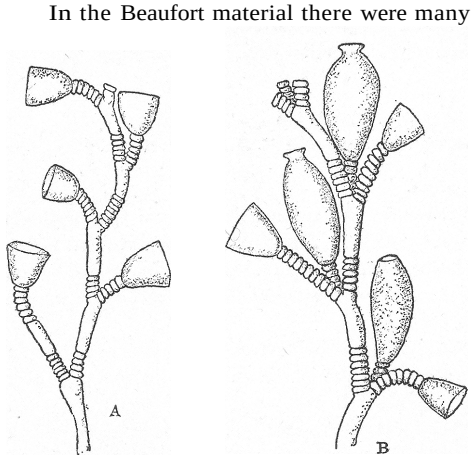


FIG. 24.—*Obelia hyalina* Clarke. A, portion of colony; B, gonangia.

I did not find any colonies as much as 30 mm. high, but that is scarcely a criterion to base a difference of species upon, at any rate, in a branched form. Without being able to compare the specimens visually it is impossible to say with certainty that the specimens all belong to the same species, but from the facts above stated I can not think otherwise than that they do.

[a] Hydroids of the Bermudas, 1907, p. 468.
[b] Biol. Bulletin, 1909, p. 375.
[c] Narrative of the Bahama Expedition, 1895, p. 89, fig. 3.

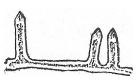
Family CAMPAMULINIDÆ.

Trophosome.—Colonies usually small, often unbranched; hydrothecz not always pedicellate, tubular, provided with an operculum of converging segments; diaphragm present; hydranths with conical proboscis.

Gonosome.—Gonophores producing sporosacs or free medusae.

KEY TO THE GENERA OF CAMPANULINIDÆ FOUND IN THE BEAUFORT REGION.

A. Colony unbranched, hydrothecz sessile, tubular. ..... *Cuspidella.*
B. Colony branched or unbranched, hydrothecæ turbinate. ..... *Lovenella.*



A

Genus CUSPIDELLA.

Trophosome.—Colony unbranched; hydrothecæ sessile, tubular, with conical operculum which is not distinctly marked off from the remainder of the hydrotheca.

Gonosome.—Unknown.

Cuspidella humilis (Alder),

Campanularia humilis Alder, Trans. Tyne. F. C., V, *1862,* p. 239.
Cuspidella humilis Hincks, British Hydroid Zoophytes, *1868,* p. 209.

B

FIG. 25.—*Cuspidella humilis* (Alder). A, portion of stolon with three hydrothecæ; B, hydrotheca more highly magnified.

Trophosome.—Sessile, tubular hydrothecz arise from a creeping stolon; very small, 0.2 mm. in height; operculum of 10 to 12 converging segments.

Gonosome.—Unknown.

Distribution.—Growing on a branching bryozoan on the piles of the railroad bridge, near Beaufort.

Genus LOVENELLA.

Trophosome.—Colony usually branched; hydrothece turbinate; operculum sharply defined by a sinuous margin on the tube of the hydrotheca.

Gonosome.—"Gonangia borne on the sterns, producing free, bell-shaped medusæ with eight tentacles in two sets, and four lithocysts." (Nutting.)

Lovenella clausa (Loven).

Campanularia clausa Loven, Bidrag till Kannedomen om Släktena Campanularia och Syncoryna, *1836,* p. 262.
Lovenella clausa Hincks, Br. Hydroid Zoophytes, *1868,* p. 177. Hincks, Ann. and Mag. N. H., 4th ser. 8, *1871,* p. 79.
Lovenella gracilis Clarke, Hydroids of Chesapeake Bay, *1882,* p. 139.
Lovenella clausa Hartlaub, Die Hydromedusen Helgolands, 1897, p. 501.

Trophosome.—Colony unbranched or slightly branched. In the unbranched forms the pedicels are long and slender, varying much in the extent of their annulation. The stem in the branched forms may be annulated more or less, or wavy in outline. Hydrothecae are long, turbinate, with much space between the diaphragm and the base; operculum formed of eight wedge-shaped segments, each with a distinct, rounded base, showing plainly the margin of the hydrotheca.

Gonosome.—Gonophores appearing on the stem in much the same way as the hydrothecz but with short pedicels; gonangia much elongated, about twice the length of the hydrothecae, somewhat tubular but wider at the distal end or near it and tapering very gradually to the base; distal end truncated. Each gonangium contains about five medusae, which, when liberated, are globose, have four radial canals and eight tentacles, two of which are rudimentary. Two are large and bulbous at the base; these are opposite two of the radial canals; at the end of the other two canals are the two rudiments! the other four are smaller and are not bulbous at the base. Four lithocysts are present.

Distribution.—Dredged in Bogue Sound, 10 feet.

When Hincks described this species in 1868, he had not seen the gonosome, but later, on finding it, he described and figured it. When Clarke described his species from Chesapeake Bay, he evidently looked up Hincks' first paper but not the second. He obtained specimens of *Lovenella clausa* with the gonosome, and as he considered that the gonosome had not been described, he hesitated to put the

specimens in that species, but named them instead *Lovenella gracilis,* though he states that the trophosomes appear to be identical. To quote the descriptions of the gonosome given by these two investigators is sufficient to show that there is strong evidence of the identity of the species.

Hincks' description is as follows:

"Gonothecæ borne on the stems and producing free medusiform zooids.

"Gonozooid.—Umbrella (at the time of liberation) globose; manubrium short, with a simple orifice; radiating canals 4; marginal tentacles of two kinds—4 in connection with the radiating canals, of which 2 only are fully developed at the time of birth, springing from nonocellated, bulbous bases, 4 intermediate, of small size, without bulbs, slightly clavate, with thread-cells only toward the extremity (?); lithocysts 4, one of which is placed halfway between each pair of the larger tentacles and close to one of the smaller.

"The gonotheca of *Lovenella clausa* is borne on a rather long-ringed pedicel, which rises from the stem a short distance below the calycle. It is elongated in form, tapering off from the truncate top

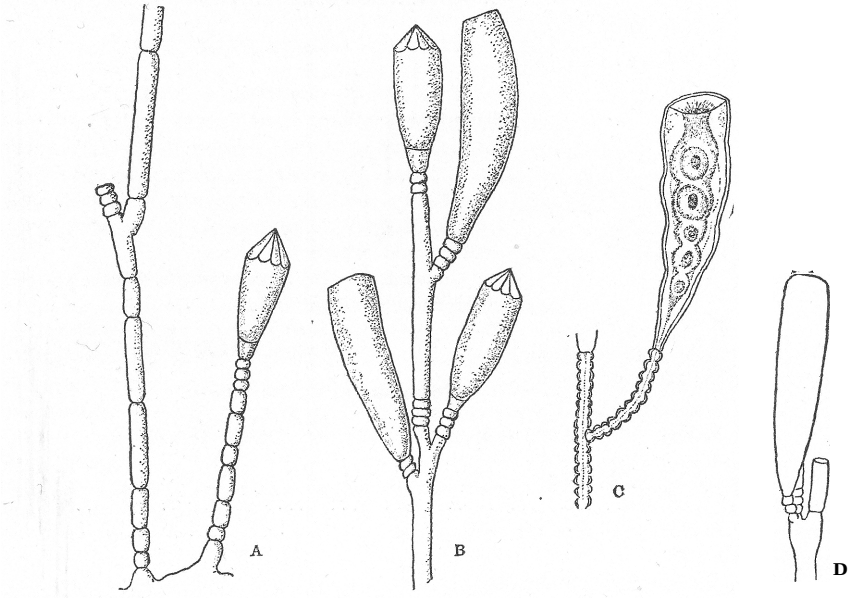


FIG. 26.—*Lovenella clausa* (Loven). **A,** trophosome; B, gonangia (after Hartlaub); C, gonangium (after Hincks); D, gonangium (after Clarke).

to the base, the sides present a slightly sinuated outline. It contains many gonophores, from each of which a medusiform zooid is liberated."

Clarke says:

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

"Planoblasts 24 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, separated at the peripheral extremities by two opposite chymiferous tubes, the four smaller tentacles disposed one on either side of each of the large ones; at the points of the margin of the bell where the two other chymiferous tubes join the peripheral canal there are rounded processes which have the appearance of rudimentary tentacles, as yet undeveloped; lithocysts four in

number are located midway between the points where each of the adjoining chymiferous tubes connect with the circumferential tube; the tentacles and the entire surface of the bell are well supplied with nematocysts."

Still later, in 1897, Hartlaub concluded that he was the first to discover the gonosome of the species. It is not necessary to go over his description as his species would naturally agree with Hincks's. This point might be mentioned, however: The length of the gonothecal pedicel described and drawn by Hartlaub more nearly agrees with Clarke's than with Hincks's.

The specimens obtained in this material resemble those of Clarke's in that the annulations of the stern are single and same distance apart, giving the stem a segmented appearance, like the stem of a coralline.

No gonosome was present. In the figure, the gonophores, as drawn by Hincks, Clarke, and Hartlaub, are shown for comparison.

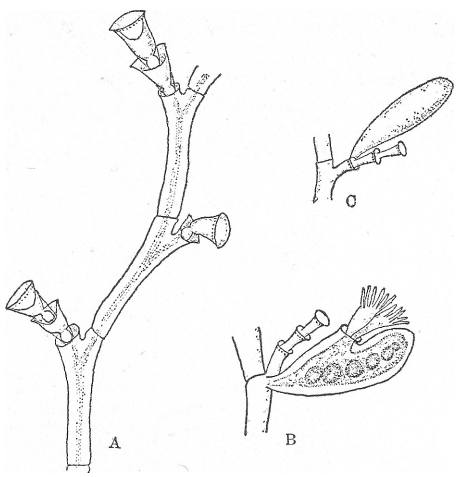


FIG. 27.—*Halecium beani* (Johnston). A, portion of colony; B, female gonosome (alter Hincks); C, male gonosome (after Kincks).

Family HALECIDÆ.

Trophosome.—Hydrothecæ reduced to saucer-shaped hydrophores, which usually pass without constriction, into the broad tubular pedicels; they are too small to lodge the contracted hydranth; margin entire, often flaring; reduplication common; hydrophore with a circle of bright dots just below the rim; hydranth with conical proboscis.

Gonosome.—Gonophores produce sporosacs, usually different in the two sexes.

Genus HALECIUM.

Characters as in the family.

KEY TO SPECIES OF HALECIUM FOUND IN THE BEAUFORT REGION.

A. Female gonangia surmounted by hydranths.
   - *a*. Colony large, stem fascicled. ..... *H. beani.*
   - *b*. Colony minute, branches not all in the same plane. ..... N. *nanum.*
   - *c*. Colony minute, creeping. ..... *H. repens.*

B. Female gonangia not surmounted by hydranths.
   - *a*. Stem fascicled. ..... *H. bermudense.*
   - *b*. Stem minute, simple. ..... *H. tenellum.*

Halecium beani (Johnston).

Thoa beanii Johnston, British Zoophytes, 1847, p. 120.
Halecium beanii Hincks, Br. Hydroid Zoophytes, 1868, p. 224. Hargitt, American Naturalist, 1901, p. 388.
Halecium beani Nutting, Hydroids of Woods Hole, 1901, p. 358.

Trophosome.—Colony consisting of a fascicled stern which gives off branches at irregular intervals, the largest of these may also be fascicled; these branches may branch again in such a way as to give a zigzag appearance; the branches are divided into internodes by oblique nodes. The hydrophores are given off immediately below the nodes; not flaring very much; margin often reduplicated.

Gonosome.—Gonangia borne at the base of the hydrophore; male, regular, oblong-oval; female mitten-shaped, with the aperture at the end of the portion corresponding to the thumb; two hydranths arise from the aperture.

Distribution.—On red algæ floating on the surface, off Bogue Bank.

The drawing of the gonosome was taken from Hincks as there was no gonosome on the Beaufort material.

? **Halecium bermudense** Congdon.

Halecium bermudense Congdon, Hydroids of Bermuda, 1907, p. 473.

Trophosome.—Colony not very large, sometimes reaching a height of 35 mm.; main stem fascicled; branches may be slightly geniculate, divided into regular internodes by transverse nodes. Hydrophores alternate, shallow, often reduplicated; when reduplication does take place the succeeding rims are very close together.

Gonosome.—"Colonies diecious. Gonothecæ sessile at the axils of hydrophores, sometimes found arising from hydrophores. Female gonothecæ ovoid, flattened, with a short pedicel-like base, one side open for two-thirdsof its length, the edges of the opening forming two similar compound curves. The blastostyle extends **up** around the opposite side, curving toward the opening. The developmentof the eggs is accompanied by the breaking down of the tissue between them and the opening. Male gonotheca cylindrical and usually slender, truncate, and tapering toward base, often marked by an irregular encircling groove somewhat wavy in outline one-third of the way from the base." (Congdon.)

Distribution,—On sponge dredged by the Fish Hawk.

The trophosome, which was all that was found in this case, resembles the trophosome described and figured by Congdon, but without the gonosome it is impossible to be sure of the identification. Congdon's description and figures are given.

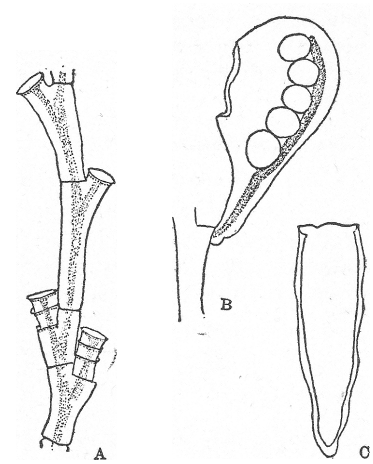


FIG. 28.—*Halecium bermudense* **Congdon. A, portion of colony; B, female gonosome (after Congdon); C, male gonosome (after Congdon).**

Halecium nanum Alder.

Halecium nanum **Alder, Ann. and Mag. N. H., 3d ser. 3, 1859, p. 355.**
Halecium marki **Congdon, Hydroids of Bermuda, 1907, p. 474.**

Trophosome.—Colony minute, 1.5 to 2 mm. high (Congdon reports them as high as 3 mm.), arising from a much branched stolon, which seems to have more free ends than usual. On one small piece of sargassum may be found colonies in several stages of growth, from those with a single hydrophore only, supported on a tubular pedicel, to those that have attained adult growth. The mode of branching is irregular and characteristic. Usually the main stem consistsof the original hydrophore and its pedicel, though that may be extended by reduplication. Just below the hydrophore another pedicel may be given off, which may reduplicate or give off one or two branches and this may be repeated. Branches

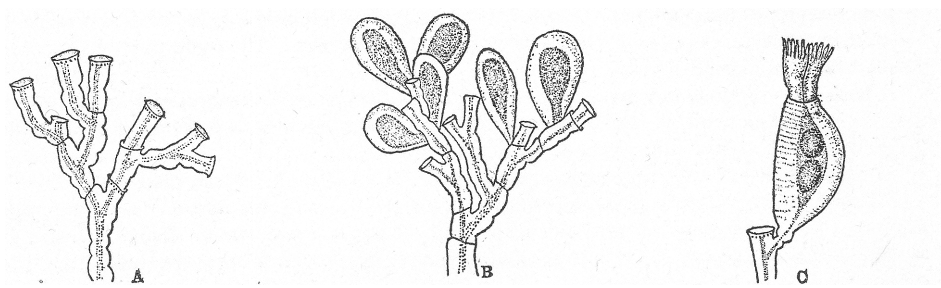


FIG. 29.—*Halecium nanum* **Alder. A, portion of colony; B, portion of colony to show male gonosome; C, female gonosome.**

may be given off at both sides to make a rather regular bilateral arrangement or they may be almost all on the one side. Frequently they are not all given off in the same plane, though they can scarcely be said to be given **off** on all sides. The hydrophores are longer than usual among the *Halecidæ*.

Gonosome.—Gonangia given off similar in position to the lateral hydrophores or branches; male ovate or obovate, with a narrow attachment but broadly rounded at the distal end; female larger, with

a straight annulated support passing up the one side and the other side forming the segment of a circle; the two unite distally to form a hydrophore for the two hydranths that are given off. In each gonangium there are usually two large ova, the one above the other.

Distribution.—Common on the floating sargassum, collected on the seaward side of Bogue Bank.

There can be little doubt that this species, which is the same that Congdon described from Bermuda as new, is the same that Alder obtained on sargassum from the Azores. Figures and description agree perfectly. Since Alder described it, it was found by Jaderholm [a] in material obtained from the Antilles and by Billard [b] in the Sargasso Sea, consequently its distribution agrees with several other sargassum forms.

? **Halecium repens** Jaderholm.

Halecium repens Jaderholm, Zool. Anzeiger, bd. XXXII, 1907, p. 373; Northern and Arctic Invert., IV, 1909, p. 54.

Trophosome.—Colony minute, 2 to 5 mm. high, growing from a stolon that creeps over the surface of other hydroids, without giving off any very regular branches. The whole colony may consist of a single hydrophore growing from the stolon, either simple or reduplicated. In other cases a branch is given off from the pedicel just below the hydrophore and this may be repeated to form a secondary

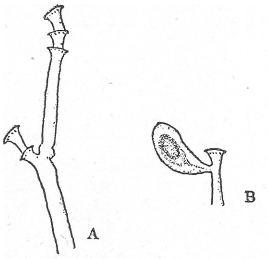


FIG. 30.—*Halecium repens* Jäderholm. A and B, colonies growing from stolon; C, female gonosome (after Jaderholm).

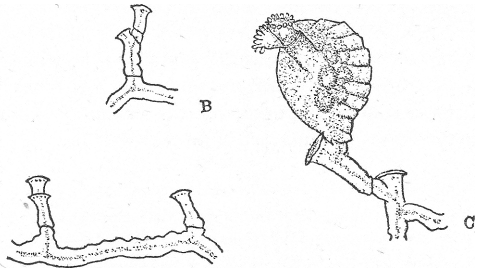


FIG. 31.—*Halecium tenellum* Hincks. A, portion of colony; B, gonosome (after Nincks).

branch, but each branch consists of a single hydrophore and its pedicel, single or reduplicated. Near the proximal end of the pedicel there is an annulation that appears like a wrinkle formed by shoving down the distal end. The perisarc is evidently weak at this point, as many of the colonies are broken off here, leaving a basal stump. Besides this wrinkle, which seems to be always present, there may be oilier annulations or parts of annulations much less distinct. The hydrophore has a widely flaring rim and tlie usual circle of dots.

Gonosome.—Female gonangia pear-shaped, somewhat laterally compressed, with the aperture in the side in a distinct collar. From the base of the collar flutings radiate to form incomplete rings around the gonangia. Two hydranths pass out through the aperture.

Distribution.—Found creeping over a colony of *Pasythea quadridentata*, dredged by the *Fish Hawk*.

There were no gonangia on the specimens, and in the genus that is almost necessary to insure identification. The trophosome answers to Jäderholm's description and figure, though I found no colonies as large as those he reports. Some of the features, notably the wrinkling of tlie pedicel and the creeping nature, seem to be quite distinctive.

One hesitates to place a specimen found at Beaufort with one that has been reported from northern Europe only, but since this is such a minute species it might be readily overlooked, and many other species, among them some described in this paper, have as wide and as varied a range.

I have depended on Jäderholm's description and figure for the characters of the gonosome and evidently he found only female colonies.

[a] Aussereuropean Hydroiden, 1903, p. 267. [b] Exped. Sc. du Travailleur et du Talisman, 1907, p. 164.

Halecium tenellum Hincks.

Halecium tenellurn **Hincks, Ann.** and Mag. **N.** H., 3d ser., 8, 1861, **p.** 252. **Mincks,** Br. Hydroid Zoophytes, 1868, **p.** 226. Nutting, Hydroids of Woods Hole, 1901, **p.** 354.

Trophosome.—Colony small, not over one-half inch in height; stem delicate, sometimes annulated or wavy, irregularly branched; branches given off below the hydrophores, making almost a right angle with the stem; hydrophores strongly Baring, usually reduplicated.

Gonosome.—Gonangia oval or ovate, smooth, borne at the base of the branches or below the hydrophores.

Distribution.—On sponge dredged by the Fish Hawk, on which were specimens of *Aglaophenia rigida.*

There was no gonosome; the figure is taken from Hincks.

Family LAFŒIDÆ.

Trophosome.—Hydrothecæ tubular, margin entire, operculum absent, no diaphragm; hydranth, with conical proboscis.

Gonosome.—Gonangia forming a Coppinia mass.

The genus *Filellum* is the only genusof this family represented in this material.

Genus FILELLUM.

Trophosome.—Stem a slender stolon, parasitic on other hydroids; hydrothecz, partly adherent, curved outward from the support at the point of separation.

Gonosome.—A Coppinia mass.

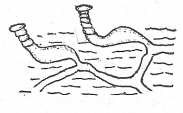
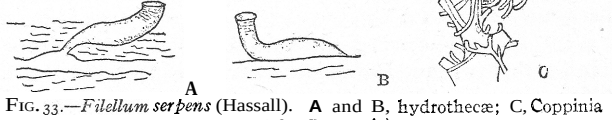


FIG. 32.—*Filellum expansum* Levinsen.



A B C

FIG. 33.—*Filellum serpens* (Hassall). A and B, hydrothecæ; C, Coppinia mass (after Bonnevie).

Filellum expansum Levinsen.

Filellum expansum Levinsen, Hydroider fra Grönlands Vestkyst. 1893, **p.** 30. Fraser, West Coast Hydroids, 1911, **p.** 50.

Trophosome.—Stolon creeping over other hydroids, Bryozoa, etc.; hydrotheca minute, adherent for about half of its length, to the surface over which the stolon creeps, then abruptly turned away. The free portion is provided with three or more annulations, in the form of ridges, that may be either transverse or oblique. The free portion is more slender than the adherent portion. The margin is flaring.

Gonosome.—Unknown.

Distribution.—On sponge dredged by the Fish Hawk.

Filellum serpens (Hassall).

Campanularia serpens Hassall, Trans. Micro. Soc., III, **1852, p. 163.**
Filellum serpens Kincks, Br. Hydroid Zoophytes, 1868, **p. 214.**
Lafœa serpens Bonnevie, Norske Nordhavs, Ex., **1899, p. 63.**

Trophosome.—Stolon usually creeping over other hydroids; hydrotheczelarger than in *F. expansum,* adherent for about two-thirds of the length; not annulated but sometimes striated transversely just below the rim; margin not flaring.

Gonosome.—"Coppinia with thin soft tubes, lying close to the gonangia; irregularly curved." (Bonnevie.)

The gonosome was not found. The description given by Bonnevie is the only one I have seen.

Family HEBELLIDÆ.

(Used by Nutting in MSS.)

Trophosome.—Colony simple, creeping; hydranth with conical or dome-shaped proboscis; hydrothecæ tubular, diaphragm present, no operculum.

Gonosome.—Gonangia separate, not collected in a mass.

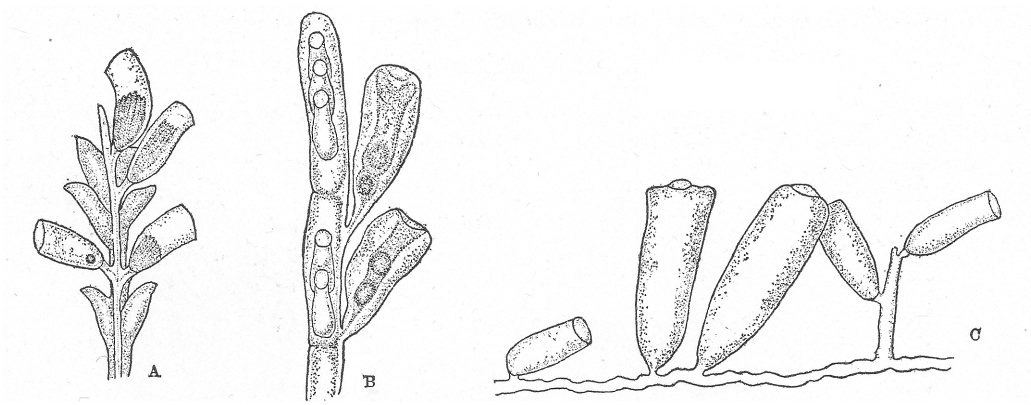


FIG. 34.—*Hebella calcarata* (A. Agassiz). **A, colony** growing over ***Pasythea quadridentutu; B,*** gonosome from stolon growing over the same hydroid; C, stolon growing on the surface of gulfweed, with hydrothecze and gonangia.

As indicated in my paper on "West Coast Hydroids," I have felt that there was no proper place for the genus *Hebella* among the Calyptoblastic families that up to the present have been established. To this difficulty another was added, when I came to the study of the Beaufort material, as I found a species that agreed with the genus *Hebella* in every respect except that the gonophores produced sporosacs instead of free medusæ. This was not a new species, as it was described by Ritchie under the name, *Campanularia mutabilis*[a] and by Warren, under the name *Lafœa magna.*[b] It can not belong to the genus *Campanularia,* as it has a tubular hydrotheca and a donie-shaped or conical proboscis, nor to the genus *Lafœa,* as there is a diaphragm present in the hydrotheca and the gonangia are not collected into a Coppinia mass.

In discussing the matter with Prof. Nutting I found that in his manuscript dealing with the *Lafœa* group, a portion of his Monograph of American Kydroids not yet published, he had instituted a new family, the Hebellidæ, to include the genus *Hebella,* the. absence of the Coppinia mass and the presence of a diaphragm at the base of the hydrotheca distinguishing it from the Lafœidæ and the conical proboscis separating it from the Campanularidæ. This seemed a satisfactory solution to the difficulty, as it would not only supply a home for the genus *Hebella,* but would also include the other species to which reference has been made. To accommodate this species a new genus must be estab-

[a] The Marine Fauna of Cape Verde Islands, **1907,** p. 504. [b] Natal Hydroids, **1908,** p. 342.

lished, since the gonophores do not produce free medusæ. To that genus I have given the name *Scandia*. The specific name "*mutabilis*" has priority and has therefore been retained.

Prof. Nutting has kindly given me permission to use the family name, Hebellidæ, in this paper. It thus appears containing the two genera *Hebella* and *Scandia*.

KEY TO THG GENERA OF THE HEBELLIDÆ FOUND IN THE BEAUFORT REGION.

A. Gonophores producing free medusae. ..... *Hebella.*
B. Gonophores producing sporosaes. ..... *Scandia.*

Genus **HEBELLA.**

Trophosome.—Colonies consisting of single hydranths attached by short pedicels to a stolon, which usually creeps over other hydroids. A distinct diaphragm is present in the hydrotheca.

Gonosome.—Gonophores producing free medusae.

Hebella)calcarata (A. Agassiz).

Lafœa calcarata **A. Agassiz, North American Acalephæ, 1865, p. 122. Hargitt, American Naturalist, 1901, p. 387.**
Hebella calcarata **Nutting, Hydroids of the Woods Hole Region, 1901, p. 353.**

Trophosome.—Colony commonly creeping on other hydroids, especially sertularians, in which case the stolon may creep along the axis of the sertularian and give off its hydrothecse more or less regularly

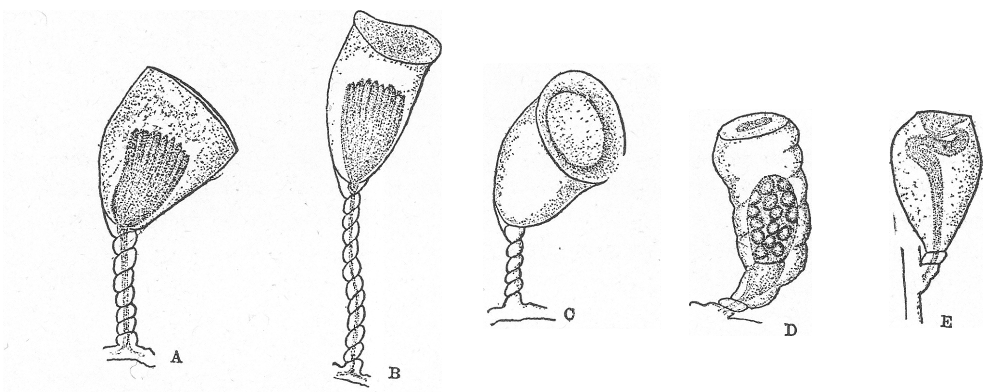


FIG. 35.—*Scandia mutabilis* **(Ritchie). A, B and** C, **different forms of hydrothecae;** D, **female gonosome; E, male gonosome,**

and symmetrically, so that at first glance it looks like part of the sertularian colony. Occasionally a small portion may become erect without support. When the stolon creeps over an erect hydroid, the hydrothecae may be given off in pairs, but this is not always the case. When a stolon creeps over a horizontal surface, the hydrothecae are given off singly. They are tubular, about three times as long as broad, with a smooth surface, attached by means of a very short pedicel; they may be bent so that the sides may form a very distinct curve.

Gonosome.—Gonangia quite large, from one and a half to two times the length of the hydrothecze, attached to the stolon by short pedicels; they are broad at the distal end and taper gradually to the proximal; the opening does not occupy the whole of the distal end.

Distribution.—Found most commonly growing over *Pasythea quadridentutu,* but occasionally on other hydroids and quite often directly on the surface of the gulfweed to which these hydroid hosts were attached.

Genus **SCANDIA,** new genus.

Trophosome.—Colony simple, creeping, giving off single individuals at intervals along the stolon; hydrothecze tubular, with narrow diaphragm and entire margin; proboscis dome-shaped.

Gonosome.—Gonophores producing sporosacs.

Scandia mutabilis (Ritchie).

Campanularia mutabilis Ritchie, Hydroids from Cape Verde Islands, 1907, p. 504.
Lafœa magna Warren, Natal Hydroids, 1908, p. 342.

Trophosome.—Colony creeping, giving off single individuals at fairly regular intervals; pedicels short but varying somewhat in length, strongly annulated, the annulations having a spiral arrangement; hydrothecæ large, with flaring rim, often placed obliquely and sometimes reduplicated; shallow corrugations sometimes present; diaphragm narrow but readily distinguishable; proboscis dome-shaped.

Gonosome.—Gonangia borne on the stolon, with shorter pedicels than are usually found for the hydrothecse, oval in shape; the male much the same shape and size as the hydrothecae, the female longer and more slender, more or less corrugated; truncate, with the opening much smaller than the whole upper surface.

The gonosome has not been described hitherto.

Distribution.—On *Aglaophenia rigida* and *Aglaophenia minuta* and occasionally directly on the sargassum to which these plumularians were attached; on the seaward side of Bogue Bank.

Family SERTULARIDÆ.

Trophosome.—Hydrothecæ sessile, arranged on both sides of the stem and branches and more or less adnate to them; hydranths with conical proboscis.

Gonosome.—Gonophores producing sporosacs, never free medusae.

KEY TO THE GENERA OF SERTULARIDÆ FOUND IN THE BEAUFORT REGION.

A. Hydrothecae in opposite pairs.
  a. One pair of hydrothecae to each internode. ..... *Sertularia.*
  b. Hydrothecae arranged in groups of pairs. ..... *Pasythea.*

B. Hydrothecae alternate.
  a. Operculum with one abcauline flap or two flaps ..... *Thuiaria.*
  b. Operculum with three or four flaps. ..... *Sertularella.*

Genus PASYTHEA.

Trophosome.—Hydrothecæ opposite, arranged in groups of two or more pairs, the differentpairs of each group being unequal in size; margin with two or three teeth; operculum usually with two flaps.

Gonosome.—Gonangia oval with large aperture.

Pasythea quadridentata (Ellis and Solander).

Sertularia quadridentata E. & S., Nat. Hist. Zooph., 1786, p. 57.
Pasythea quadridentata Bale, Australian Hydroid Zoophytes, 1884, p. 112. Bale, Proc. Linn. Soc. N. S. W., 2d ser., III, 1888, p. 770. Nutting, American Hydroids, pt. II, 1904, p. 75.
Pasythea nodosa Hargitt, Biological Bulletin, 1908, p. 114.

Trophosome.—Colony usually from 3 to 8 mm. in height, but sometimes reaching 20 mm.; stem unbranched or slightly branched, arising from a creeping stolon; divided into quite regular nodes, bearing from one to five pairs of hydrothece; nodes running obliquely from front to back. Commonly, the first internode has one pair of hydrothecæ and all the others have more than one pair; three pairs are the commonest in the Beaufort specimens. The hydrothecz of the lowest pair are bent out nearly at right angles, the next pair less so, and the distal pair adhere for the greater part of their length. The members of each pair are united in front, but are some distance apart behind. Most of the colonies have but two, three, or four internodes, but one specimen with as many as 13 was obtained. The margin of the hydrothece has two or three teeth.

Gonosome.—A single gonophore is borne on the front of the stem just at the base. The gonangium is large, nearly oval, but broader at the distal end than at the proximal, provided with five or six broad corrugations; aperture large, circular, occupying all, or nearly all, of the distal end. An operculum is stretched tightly across the aperture.

Distribution.—Found abundantly on floating sargassum off Bogue Bank.

In his paper mentioned in the synonymy, Hargitt gives a full description of a species of *Pasythea* which he calls *P. nodosa*, under the impression that it is different from *P. quadridentata*. My specimens would answer his description exactly, but I believe they belong to the species *P. quadridentutu*. I have found numerous gonangia and they agree exactly with those of that species. This resemblance is really the determining factor, and I think if Hargitt had found gonangia on his specimens he would have come to the same conclusion. I have compared my specimens with Nutting's types, and I find that the stem supporting the groups of hydrothecze is much shorter and stouter in mine than in his, but the gonosome is exactly similar. Furthermore, I find that mine agrees perfectly with the figures given by Bale, in both of his papers, and he found his gonangia agreeing with those of *P. quadridentata*.

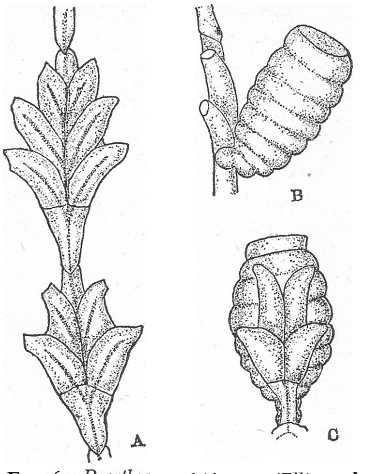


FIG. 36.—*Pasythea quadridentutu* (Ellis and Solander). A, portion of colony; B and C, gonangia.

Genus SERTULARELLA.

Trophosome.—Stems and branches usually divided into distinct internodes; hydrothecze alternate; margin commonly with three or four teeth; operculum with three or four flaps.

Gonosome.—Gonangia large, often annulated.

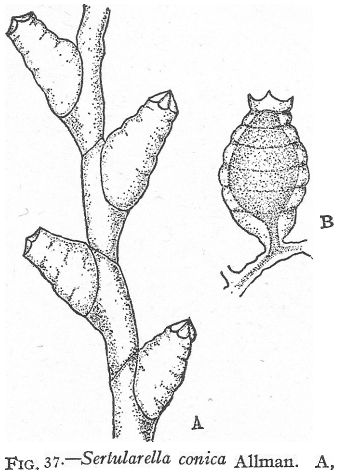


FIG. 37.—*Sertularella conica* Allman. A, portion of colony; B, gonosome.

Sertularella conica Allman.

Sertularella conica Allman, Hydroids of the Gulf Stream, *1877*, p. *21*. Clarke, Bull. Mus. Comp. Zool., *1879*, p. *246*. Nutting, American Hydroids, pt. II, 1904, p. 79. Fraser, West Coast Hydroids, 1911, p. *68*.

Trophosome.—Colony attaining a height of *20* mm. in Beaufort specimens, but reported elsewhere as high as 45 mm.; unbranched, or sparsely or irregularly branched; stem divided into regular internodes by oblique nodes, slanting upward to the one side and to the other alternately; hydrothecze free for about two-thirds of their length, swollen proximally and narrowing distally; shallow corrugations present; margin provided with four rather acute teeth and a four-flapped operculum, the four flaps meeting to form a cone-shaped extremity for the hydrotheca.

Gonosome.—Gonangia on very short pedicels grow directly from the hydrorhiza, oval, corrugated; collar distinct, but little smaller than the part of the hydrotheca on which it rests; margin with four distinct teeth, less acute than those on the margin of the hydrotheca. Apparently the gonophores are produced while the colony is still young, as in the same specimens in which they were present there were stems with only one hydrotheca, some with two and none with more than three or four.

Distribution.—On sponge dredged by the Fish Hawk.

No gonosome was found in these specimens. The description and the drawing have been made from specimens obtained from Vancouver Island and reported in the paper referred to in the synonymy.

Genus **SERTULARIA.**

Trophosome.—Stem and branches divided into regular internodes, each of which bears a pair of opposite hydrothecae; operclum of two flaps.

Gonosome.—Gonangia oval or ovate.

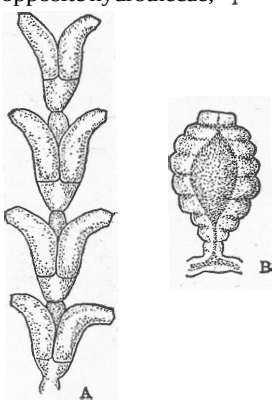


FIG. 38.—*Sertularia cornicina* (McCrady). A, portion of colony; B, gonosome.

KEY TO THE SPECIES OF SERTULARIA FOUND IN THE BEAUFORT REGION.

A. Colony with alternate branches.

Hydrothecae with free portions almost at right angles to adnate portions..... *S. versluysi.*

B. Colony unbranched.

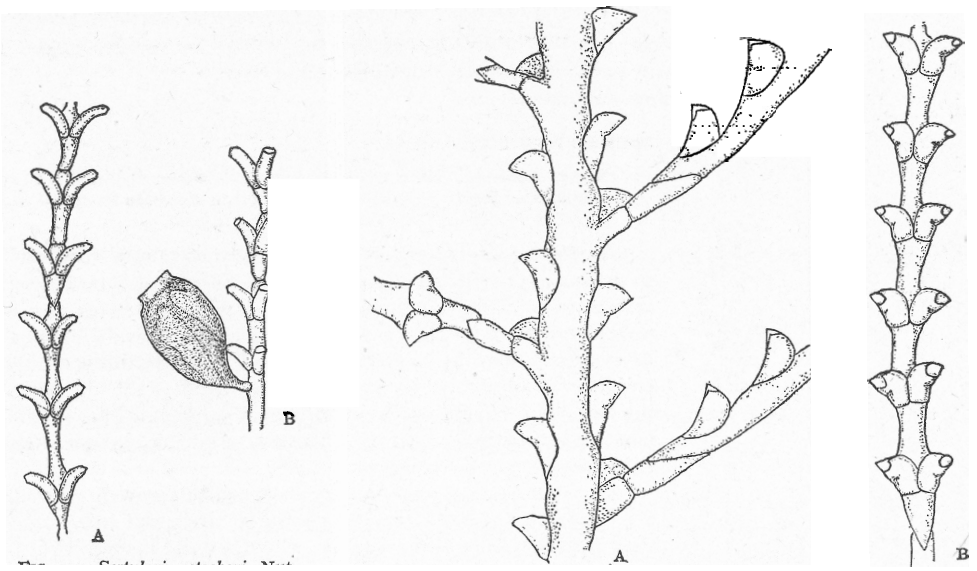
a. Hydrothecae adnate for two-thirds of their length. . .*S. cornicina.*

b. Hydrothecæ small, adnate for less than one-half their length, *S. stookeyi.*

Sertularia cornicina (McCrady).

Dynamena cornicina McCrady, Gymn. Charleston Harbor, 1858, p. 294.
Sertularia cornicina Nutting, Hydroids of Woods Hole, 1901, p. 359. Hargitt, American Naturalist, 1901, p. 390. Nutting, American Hydroids, pt. II, 1904, p. 58.

Trophosome.—Colony in the form of an erect stem, usually less than one-half an inch high, without branches; stem divided into regular internodes, each of which bears a pair of opposite hydrothecae; hydrothecae tubular, adnate in front for about two-thirds of their length and then turned rather abruptly outwards; margin with two teeth and a two-parted operculum.



ting. A, portion of colony; B, gonosome.

FIG. 40.—*Sertularia versluysi* Nutting. A, portion of main stem; B, portion of branch.

Gonosome.—Gonangia borne on the stolon, oval with a distinct but rather short collar; regularly annulated.

Distribution.—On floating seaweed and gulfweed in Bogue Sound; in North River and the Straits at a depth of about 10 feet; an sponge dredged by Fish Hawk.

In some cases *Hebella calcarata* was found associated with this species, but not so commonly as has been reported from other localities.

Sertularia stookeyi Nutting.

Sertularia stookeyi Nutting, American Hydroids, pt. II, 1904, p. 59.

Trophosome.—Colony an unbranched stem which may reach a height of one-half inch, very slender. The proximal part of the stem is not divided into distinct internodes, but the remainder is divided into long, slender internodes, each of which bears a pair of opposite hydrothecz. In conformity with the slenderness of the stem, the hydrothecz are smaller than are usually found in this genus. The two on one internode are adnate in front of the stem for not more than the proximal third of their length, after which they gradually diverge, so that the distal third is free from the stem. In some colonies, probably old ones, these portions were much prolonged, The margin has two teeth and a two-parted operculum.

Gonosome.—Gonangia borne on the front of the stem, immediately below the proximal pair of hydrothecz, oval with a distinct collar and operculum; no annulations on the surface; pedicel short and curved.

Distribution.—Common. Often accompanying S. *cornicina* on floating seaweed and gulfweed; dredged in Bogue Sound, North River and the Straits in 10 feet; on sponge dredged by the Fish Hawk.

Sertularia versluysi Nutting.

Desmoscyphus gracilis Allman, Challenger Report, Hydroids, 1888, p. 71.
Sertularia versluysi Nutting, American Hydroids, pt. II, 1904, p. 53.

Trophosome.—Colony branched, varying much in height, but not reaching higher than 2 inches. Sometimes the stem is divided into regular internodes, with a branch and two hydrothecz on one side and one hydrotheca on the other, but at other times the nodes are indistinct or absent. Branches are given off alternately and regularly. The main stem may be straight, in which case the branching gives it a regular appearance, or it may be more or less geniculate with the branches given off at the bends, so that it seems almost dichotomous. Each branch has a transverse node followed by an oblique node before the proximal hydrothecae are given off. As in the case of the stem, the nodes may be indistinct, absent, or distinct and regular. The hydrothecae are arranged alternately on the stern, but are strictly opposite on the branches, the pairs being rather distant. The hydrothecae are short and stout, the proximal portion being very turgid, those of the pair being adnate. The distal portions are bent so abruptly as to produce a wrinkle on the concave side. The margin has two teeth and an operculum of two flaps.

Gonosome.—Unknown.

Distribution.—On *Sargassum* collected on the seaward side of Bogue Bank.

Genus THUIARIA.

Trophosome.—Stem divided into irregular internodes with more than one hydrotheca to each internode, or undivided; hydrothecæ alternate; margin entire or with one or two teeth; operculum with one abcauline flap or two flaps.

Gonosome.—Gonangia oval or obovate, often supplied with spines on the shoulder.

Thuiaria fabricii (Levinsen).

Sertularia fastigiata Fabricius, Fauna Grœnlandica, 1780, p. 458.
Sertularia fabricii Levinsen, Vid. Middel. Naturh. Foren., 1892, p. 48.
Thuiaria fabricii Nutting, Hydroids of the Harriman Ex., 1901, p. 185. Nutting, American Hydroids, pt. II, 1904, p. 71.

Trophosome.—Colony reaching a height of 2 inches; main stern straight, divided into irregular internodes, the distal ones each giving rise to one or more branches, which come off on all sides to give a bushy appearance; branches divided dichotomously; irregular internodes give rise to a varying number

of hydrothecae, five to seven being common; hydrothecae slightly flask-shaped but slightly outcurved, distal portion free; margin with two blunt teeth; operculum with a large adcauline flap and a smaller abcauline flap.

Gonosome.—Gonangia borne on the upper sides of branches and branchlets, often forming a row; oblong-obovate in shape, With a tapering collar and circular opening; two small spines may be present on the shoulder.

Distribution.—Found in the Fish Hawk material, some specimens attached to a crab and some growing on *Aglaophenia rigida.*

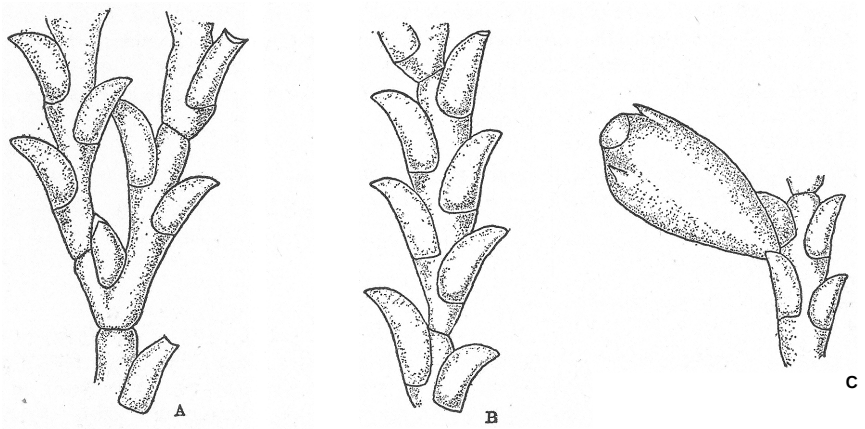


FIG. 41.—*Thuiaria fabricii* (Levinsen). A and B, portions of colony; *C*, gonosome.

There was no gonosome present in the material obtained. The drawing and description were made from a specimen of Prof. Nutting's, obtained at Orca, Alaska, during the Harriman Alaska expedition.

Family PLUMULARIDÆ.

Trophosome.—Hydrothecæ sessile, usually adnate by one side, arranged on the upper side of the hydrocladia; nematophores always present.

Gonosome.—Gonophores producing sporosacs, which are often protected by corbulae.

KEY TO THE GENERA OF PLUMULARIDÆ FOUND IN THE BEAUFORT REGION.

A. Statoplean forms, i. e., those with fixed nematophores which are usually monothalamic.
  a. Gonosome protected by corbulæ, each of which is a modified hydrocladiurn .... *Aglaophenia.*
  b. Gonosome provided with protective branchlets, each of which is a modified hydrocladium *Lytocarpus.*

B. Eleutheroplean forms, i. e., those with moveable nematophores which are usually bithalamic.
  a. Gonangia not especially protected.
    I. Hydrocladia pinnately arranged.
      1. Each hydrocladium bears more than one hydrotheca ..... *Plumularia.*
      2. Each hydrocladium bears a single hydrotheca. ..... *Monotheca.*
    II. Hydrocladia all springing from upper side of branches. ..... *Monostæchas.*
  b. Gonangia protected by a forking of the hydrocladia. ..... *Schizotricha.*

Genus AGLAOPHENIA.

Trophosome.—Hydrothecal margin provided with sharp teeth; posterior intrathecal ridge present; one mesial and two supracalycine nematophores for each hydrotheca always present.

Gonosome.—Gonangia inclosed in true corbulæ, formed of modified pinnæ. There are no hydrothecae at the bases of the gonangial leaves.

KEY TO THE SPECIES OF AGLAOPHENIA FOUND IN THE BEAUFORT REGION.

A. Colonies branched.
  a. Branching regularly pinnate or twice-pinnate ..... *A. acacia.*
  b. Branching irregular, branches coming off singly or in pairs from the anterior of the stem. *A. rigida.*
B. Colonies unbranched. ..... *A. minuta.*

Aglaophenia acacia Allman.

Aglaophenia acacia **Allman, Challenger Report, pt. xx, Hydroida, 1883, p. 38.**

Trophosome.—Colony reaching a height of 6 inches. There are no branches on the proximal portion of the stem, but distally they are given off regularly, in opposite or subopposite pairs. These branches

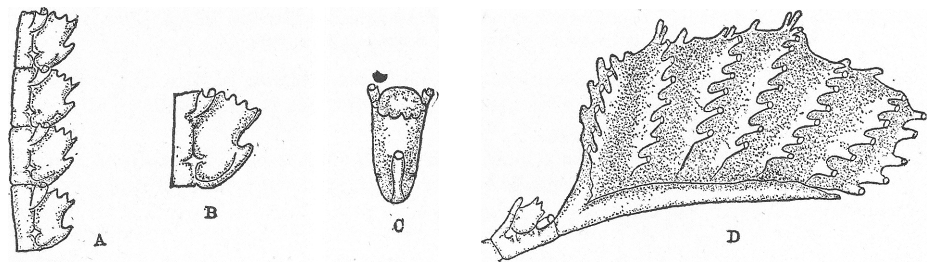


FIG. 42.—*Aglaophenia acacia* **Allman. A, portion of hydrocladium; B, hydrotheca, side view, more highly magnified; C, hydrotheca, front view, more highly magnified; D, corbula (after Allman).**

may also give off branches in pairs to form a twice-pinnate arrangement. The whole colony has a much more spreading appearance and is much more gracefulthan *A. rigida.* The internodesof the main stem are not distinctly marked off, or at any rate not so distinctly as some other species; the hydrocladial shoulder is near the middle of each internode. Each internode has two nematophores, one above and one below the shoulder. The hydrocladia are very regularly arranged, are all nearly the same length, from 5 to 8 mm., throughout the larger portion of the branch or branchlet, but gradually shorten toward the distal end to produce a gracefully rounded effect. The hydrocladia are divided into regular internodes, each of which has an internal ridge at the base of the supracalycinenematophore and one opposite the intrathecal ridge. The hydrothecae are rather deep in comparison with their width. The margin has about nine teeth, rather sharp and deeply cut. The intrathecal ridge is short but very distinct. The supracalycine nematophores are stout, reaching to about the margin of the hydrotheca or a little above it. The mesial nematophore reaches more than half way up the anterior wall of the hydrotheca; the distal portion is free.

Gonosome.—"Corbulæ rather short and deep, with about six pairs of closely adnate costæ."—Allman.

Distribution.—From fishing grounds outside of Beaufort Harbor.

As there was no gonosome present, the description and the figure are taken from Allman's paper.

Aglaophenia minuta Fewkes.

Aglaophenia minuta **Fewkes, Bull. Mus.** Comp. **Zool., 1881, p.** *132.* **Nutting, American Hydroids,** pt. 1, 1900, **p. 96.**

Trophosome.—Colony unbranched, usually from 10 to 15 mm. high, but reaching as high as 20 mm.; the stolon is regularly annulated; stem with one or two oblique nodes near the base and the remainder divided by transverse nodes into regular internodes each of which gives off a hydrocladium near its distal end; hydrocladia divided into regular internodes, each of which has two internal ridges, the one at the base of the supracalycine nematophore and the other opposite the intrathecal ridge; hydrothecae short and stout, turned well outward at the distal end; margin with sharp teeth; intrathecal ridge extending well across; a broad keel present which passes up the anterior surface to the top of the

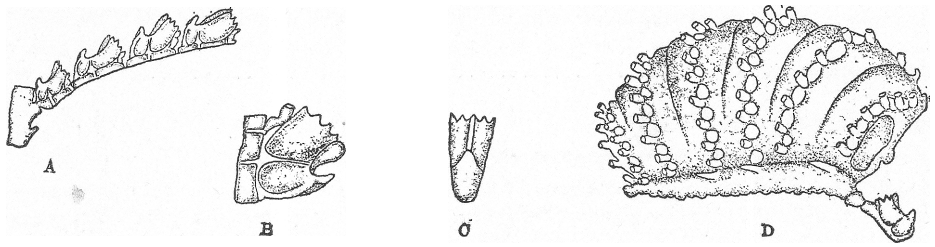


FIG. 43.—*Aglaophenia minuta* **Fewkes. A,** portion **of hydrocladium; B, hydrotheca, side view, more highly magnified; C, hydrotheca, front view, more highly magnified;** D, **corbula.**

hydrotheca; supracalycine nematophores small, geniculate, not reaching so high as the margin of the hydrotheca; mesial nematophore short, with distal end free, the free portion being partially separated from the remainder by a deep constriction.

Gonosome.—Corbulæ large, borne on a modified hydrocladium, which is usually the one nearest the base; corbulæ short, stout, rounded, composed of 7 or 8 pairs of leaves, which meet only at the base of the nematophores, thus leaving a pair of perforations for each row. Each leaf has a row of nematophores and a large spine at the base.

Distribution.—Found plentifully on the *Sargassum* that floated in to the seaward side of Bogue Bank.

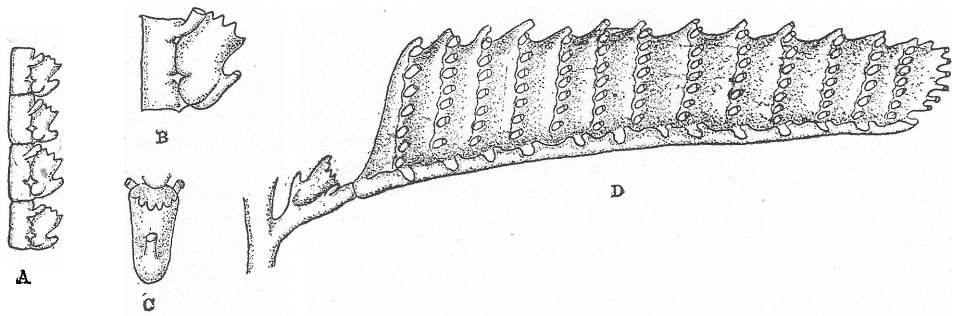


FIG. 44.—*Aglaophenia rigida* **Allman. A, portion of hydrocladium; B, hydrotheca, side view, more highly magnified; C, hydrotheca, front view, more highly magnified;** D, **corbula (after Nutting).**

Aglaophenia rigida Allman.

Aglaophenia rigida **Allman,** Mem. **Mus. Comp.** Zool., *1877,* **p.** *43.* **Nutting, American Hydroids, pt. 1,** 1900, **p. 91.**

Trophosome.—Colonies reaching a height of 8 inches in specimens obtained but reported as high as 24 inches; stem simple, slender and wiry, divided into regular internodes, each of which gives rise to a hydrocladium; branches few in number, often absent, usually given off in pairs from the front of the stem. Hydrocladia up to 10 mm. in length, divided into regular internodes; two internal ridges present in the usual position. The hydrotheca occupies almost the whole length of the internode, so that there

is little space between any two in succession; it is stout as compared with its depth and is provided with eight deeply cut marginal teeth; supracalycine nematophores reach about to the level of the margin of the hydrotheca and the mesial nematophore is about half the height of the hydrotheca; a small portion of its distal end is free.

Gonosome.—"Corbulæ long, cylindrical, with 12 to 14 pairs of leaves when mature; leaves closed, each with a row of nematophores along its distal edge, and a short, stout spur at its base."—Nutting.

Distribution.—On floating *Sargassum* and on sponge dredged by the Fish Hawk.

Many specimens of this species were obtained but there was no gonosome present. The description and the figure were taken from Prof. Nutting's monograph.

Genus LYTOCARPUS.

Trophosome.—Stem fascicled, with large, triangular nematophores and a perforated process at the base of each hydrocladium; both the supracalycine and the mesial nematophores may have two openings.

Gonosome.—"Gonangia borne on hydrocladia which are modified to form protective branchlets often aggregated into a pseudo-corbula, which differs from a real corbula in the fact that its leaves are formed by modified hydrocladia instead of appendages to hydrocladia, as in the genus *Aglaophenia*. The gonangia take the place of hydrothecæ in the species which I have examined, and there is a hydrotheca on the proximal part of each protective branch."—Nutting.

Lytocarpus philippinus (Kirchenpauer).

Aglaophenia philippina Kirchenpauer, Ueber die Hydroidenfamilie, Plumularidæ, pt. 1, 1872, p. 45.

Lytocarpus ***philippinus*** Nutting, American Hydroids, pt. 1, 1900, p. 122.

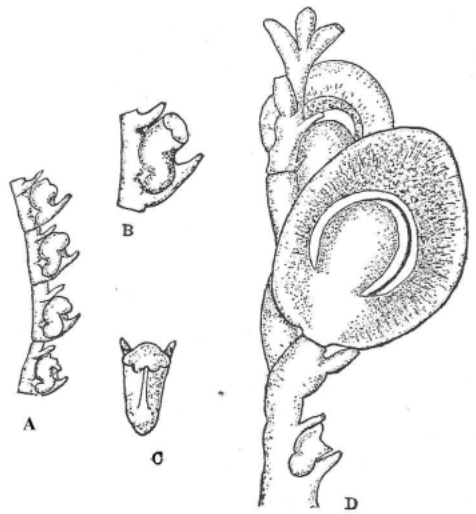


FIG. 45.—*Lytocarpus philippinus* (Kirchenpauer). **A**, portion of hydrocladium; B, hydrotheca, side view, more highly magnified; C, hydrotheca, front view, more highly magnified; **D**, gonosome with phylactocarp (after Nutting).

Trophosome.—Colony twice pinnately branched, the secondary branches bearing the hydrocladia; no complete specimens were obtained, but a height of 8 inches has been reported; stern, primary and secondary branches fascicled; hydrocladia alternate, divided into regular internodes, the nodes not very distant; each internode with two internal ridges; hydrotheca with a deep constriction in front, around which the hydrotheca seems to bend, so that the margin is nearly parallel with the axis of the hydrocladium; margin wavy but not very definitely toothed; intrathecal ridge distinct but not very long; supracalycine nematophore long, tubular, extending past the margin of the hydrotheca; mesial nematophore long, tubular, reaching (in these specimens) beyond the margin of the hydrotheca. Supracalycine and mesial nematophores have two openings each.

Gonosome.—"Gonangia flattened, ovoid, borne on modified hydrocladia, each with a hydrotheca on its proximal end; the next hydrotheca is replaced by a gonangium, and there is usually a second gonangia above the first, the remaining portion of each phylactocarp is straight and armed with nematophores."—Nutting.

Distribution.—Dredged in Bogue Sound, 10 feet; on seaweed growing in shallow water off Shackleford.

These specimens agree with those referred to by Congdon[a] in having the mesial nematophore long, and not ending below the level of the margin of the hydrothecæ as Nutting describes. No gonosome was obtained. The description and the drawing for this was taken from Prof. Nutting's monograph.

[a] Hydroids of Bermuda, 1907, p. 484.

Genus MONOSTÆCHAS.

Trophosome.—Colony dichotomously branched; hydrocladia all springing from the upper side of the branches; cauline nematophores absent.

Gonosome.—Gonangia without special protection; oval or ovate.

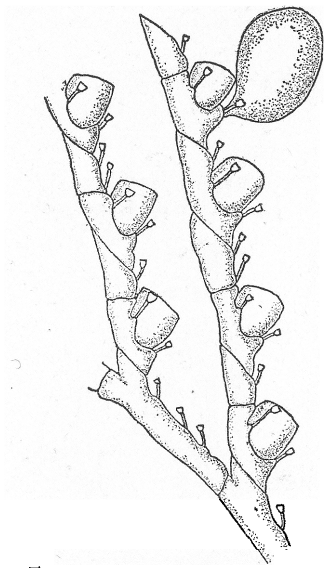


FIG. 46.—*Monostæchas quadridens* (McCrady).

Monostæchas quadridens (McCrady).

Plumularia quadridens **McCrady, Proc. Elliott Soc., 1857, p. 97.**
Monostachas quadridens, **Nutting, American Hydroids, pt. I, 1900, p. 75.**

Trophosome.—Colony attaining a height of 6 inches, dichotomously branched; branches coming off from the main stem at irregular intervals; branches divided into long internodes, each internode giving rise to a hydrocladium from its upper side and distal end; several long, slender nematophores are present on the upper side of each internode. The hydrocladia are given off at such an angle that they all pass up in the same general direction as the main stem and hence run parallel to one another. Each hydrocladium is divided into alternate hydrothecate and intermediate internodes, the proximal one being hydrothecate. Each hydrothecate internode is oblique proximally and straight distally, each intermediate, straight proximally and oblique distally. Hydrothecæ large, campanulate; supracalycine nematophores, borne on distinct internodal processes, reach to or above the margin of the hydrothecze; mesial nematophore present; one or two nematophores to each intermediate internode.

Gonosome.—Gonangia oval to spherical, borne on a process immediately below the hydrotheca, often occurring in series, one for each hydrotlieca for some distance along the hydrocladium. Each gonangium is provided with a pair of nematophores at the base.

Distribution.—On sponge dredged by the Fish Hawk.

Genus MONOTHECA.

Trophosome.—Stem usually unbranched; hydrocladium consisting of a proximal nonhydrothecate and a distal hydrothecate internode. The latter is terminated by a pair of nematophores.

Gonosome.—"Gonangia borne on the stem, usually on the proximal portion, ovate or sac-shaped and without protective appendages."—Nutting.

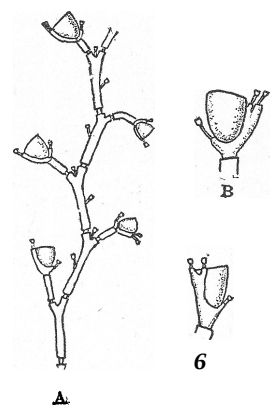


FIG. 47.—*Monotheca margaretta* Nutting. A, portion of colony; B and C, hydrothecae.

Monotheca margaretta Nutting.

Monotheca *margaretta* **Nutting, American Hydroids, pt. I, 1900, p. 72.**

Trophosome.—Colony reaching a height of nearly half an inch, usually unbranched; stem divided into regular internodes by a double annulation, the portion between the rings being of less diameter than the remainder of the stem, regularly geniculate so that it looks like *Obelia geniculata* in miniature. A hydrocladium is given off at the distal end of each internode. The proximal internode of each hydrocladium, which is nonhydrothecate, is connected with the stem by a joint, similar to those on the stem. The distal internode (there are but two) is curved to support the hydrotheca and is bifid at the extremity, each portion of the fork having a nematophore; these would correspond to the regular supracalycine

nematophores of the genus *Plumularia.* **A** mesial nematophore is present, situated on a process below the hydrotheca. The hydrotheca is deeply campanulate. **A** single nernatophore is found on each stem internode and one or two in each of the axils.

Gonosome.—Unknown.

Distribution.—On floating ***Sargassum*** off Bogue **Bank.**

Genus PLUMULARIA.

Trophosome.—Hydrocladium unbranched, pinnately arranged, each having more than one hydrotheca; hydrothecae with entire margins; all nematophores movable.

Gonosome.—Gonangia without extra protection.

KEY TO THE SPECIES OF PLUMULARIA FOUND IN THE BGAUFORT REGION.

A, Hydrocladia arising from alternate internodes only. *P. alternata.*
B. Hydrothecz cylindrical, but slightly adnate ..... *P. floridana.*
C. Hydrocladia usually without intermediate internodes. *P. inermis.*
D. Hydrocladial internodes with numerous internal ridges, *P. setaceoides.*

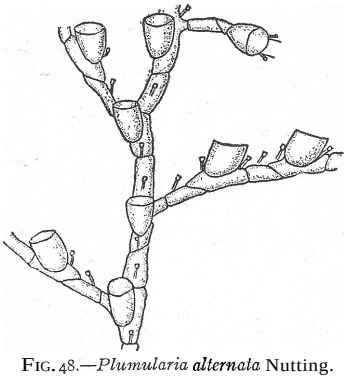


FIG. 48.—*Plumularia alternata* Nutting.

Plumularia alternata Nutting.

Plumularia alternata Nutting, American Hydroids, pt. I, rgoo, p. 62.

Trophosome.—Colony attaining a height of about half an inch, simple, unbranched; stem geniculate, divided into internodes, of which every alternate one bears a hydrotheca and a hydrocladium. This makes the hydrothecæ more distant than usual. Hydrocladia divided into regular internodes, hydrothecate and nonhydrothecate alternating; hydrothecate internodes bounded by oblique nodes proximally and transverse nodes distally; hydrothecze deeply campanulate with about one-third of the distal end free; supracalycine and mesial nematophores present. There is one nematophore on each internode, one at the axil of the hydrocladium and one on each internode of the stern.

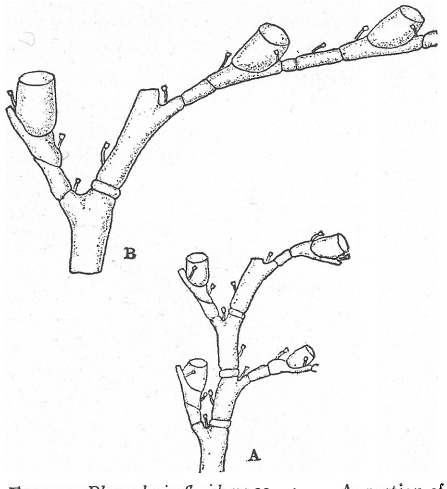


FIG. 49.—*Plumularia floridana* Nutting. A, portion of colony showing part of main stem; B, portion of colony, more highly magnified.

Gonosome.—Unknown.

Distribution.—Found in abundance on floating *Sargassum* and ***Turbinaria.***

Plumularia floridana Nutting.

Plumularia floridana Nutting, American Hydroids, pt. I, 1900, p. 59.

Trophosome.—Colony attaining a height of about half an inch, simple, unbranched; stem divided into regular internodes, each of which gives rise to a hydrocladium from a process at its distal end. There may be two or three annulations at each node. Hydrocladia divided into alternate hydrothecate and nonhydrothecate internodes, the proximal being nonhydrothecate. Sometimes the intermediate internodes may be again divided. Hydrothecæ large, when the small size of the hydrocladia is considered, nearly cylindrical, with sometimes more than the distal half free; nematophores small, supracalycine and mesial nematophores present, one on each of the intermediate but none on the proximal internode, one in the axil **of** each hydrocladium and one on each internode of the stem.

Gonosome.—Unknown.

Distribution.—On floating *Sargassum* **off** Bogue Bank, rare.

Plumularia inermis Nutting.

Plumularia inermis Nutting, American Hydroids, pt. 1, 1900, p. 62.

Trophosome.—Colony simple, unbranched, reaching the height of about half an inch; divided into regular, long, slender internodes, each of which bears a hydrocladium from a process at its distal end. The hydrocladia are divided into regular internodes, all of which, including the proximal, bear hydrothecz, except very occasionally when there may be an intermediate internode. These internodes are long and slender, so that there is a long interval between two successive hydrothece. Hydrothecz shallow campanulate; supracalycine nematophores are absent. There is a nematophore above and one below the hydrotheca and one at the axil of each hydrocladium; hydranths too large to be entirely retracted into the hydrothecze.

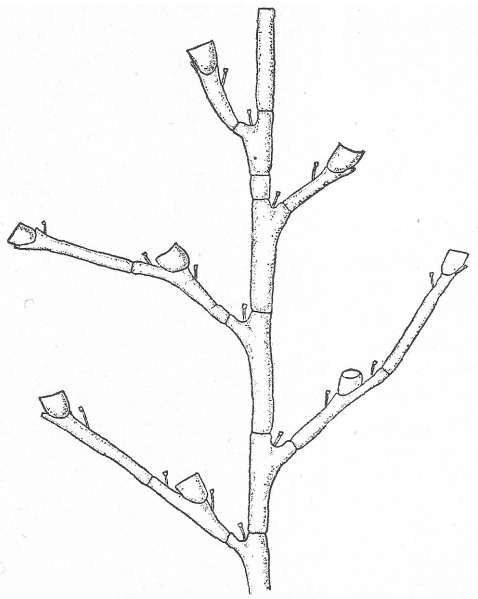


FIG. 50.—*Plumularia inermis* Nutting.

Gonosome.—Unknown.

Distribution.—On *Turbinaria* off Bogue Bank.

Plumularia **setaceoides** Bale.

Plumularia setaceoides Bale, Hydroida of Southeastern Australia, 1881, p. 28.

Trophosome.—Colony, in Beaufort specimens, not more than 1 inch in height, but Bale reports them up to 3 inches; simple, unbranched, divided into regular internodes, each giving off a hydrocladium from a process near the distal end; two or even three or four annulations at each node; hydrocladia slender, recurved, with alternating nonhydrothecate and hydrothecate internodes, the proximal being nonhydrothecate. This and all the intermediate internodes have two internal ridges. The hydrothecate internodes have one or two ridges proximal to the hydrotheca and one opposite the base of the hydrotheca. Hydrothecæ cup-shaped, with about one-third of the distal end free; supracalycine nematophores present, one nematophore below the hpdrotheca, one on each intermediate internode but none on the proximal, one in the axil of each hydrocladiurn and one on each internode of the stem.

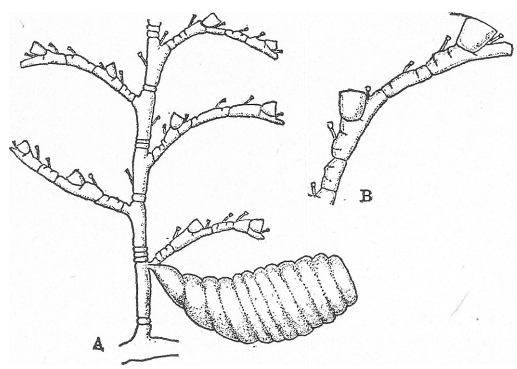


FIG. 51.—*Plumularia setaceoides* Bale. A, portion of colony with gonangium; B, hydrocladium, more highly magnified.

Gonosome.—Gonangia very large for such a slender colony, borne on the face of the stem, at the base of the hydrocladium. Bale reports them as sometimes forming two rows reaching halfway up the stem, but I found them singly only. They are oblong in shape but are curved so that the convex lower surface is much longer than the concave upper surface, and the whole gonangium projects outward almost at right angles to the stem. Proximally it tapers gradually to the point of attachment, distally it is truncate. There are several distinct, though not very deep corrugations.

Distribution.—On floating *Sargassum* and *Turbinaria* off Bogue Bank.

Genus SCHIZOTRICHA.

Trophosome.—Colony simple, branched, with hydroeladia pinnately arranged.
Gonosome.—Gonangia springing from the stem, branch or hydrocladiurn, not directly protected.

Schizotricha tenella (Verrill).

Plumularia tenella Verrill, Invert. **An.** Vineyard **Sound,** 1874, **p.** 731.

Schizotricha tenella Nutting, American Hydroids, pt. 1, 1900, p. 80.

Trophosome.—Colonies usually growing in clusters, reaching **a** height of 2 inches but usually much less than that in the Beaufort specimens; sterns dichotomously branched; divided into internodes, each alternate one bearing a hydrocladium and a hydrotheea; hydrocladia slender, often branched, divided into three kinds of internodes, the one following the other in regular succession, the first a short internode without any nematophore and-with a transverse node at its distal end, the second somewhat longer, with one *or* two nematophoresand with an oblique node at its distal end, the third about the same length as the second or longer, bearing a hydrotheca, with two supracalycine nematophoresand a nematophorebelow the hydrotheca; hydrotheca cup-shaped to cylindrical, with about one-half of the distal end free. There are two or more nematophores on each of the stem internodes.

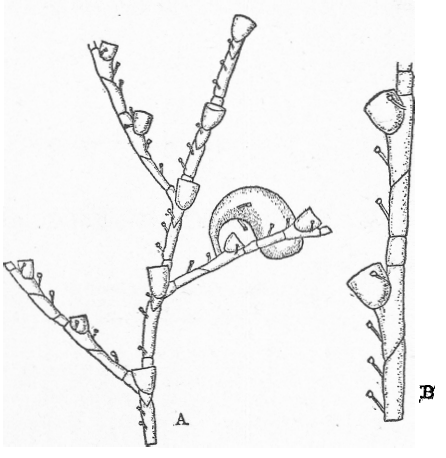


FIG. 52.—*Schizotricha* ***tenella*** (Verrill). **A,** portion of colony showing gonangium; B, portion of hydrocladium, more highly magnified.

Gonosome.—Gonangia appearing at the base of the hydrothecae, curved-cornucopia-shaped, with three or four nernatophores not far from the base.

Distribution.—Rathercommon in water about 10 feet deep in Bogue Sound and North River; found also on the piles at Marshallberg.

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