

# CANADIAN ATLANTIC FAUNA

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## 3a HYDROIDA

BY

C. McLEAN FRASER, Ph.D., F.R.S.C.

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OTTAWA

THOMAS MULVEY

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

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(With 109 Figures.)

## INTRODUCTION.

The hydroids found in the waters of Eastern Canada, so far as is known, with synonymy and distribution of each species as related to this area and the literature pertaining to it are given in the author's Hydroids of Eastern Canada (Contributions to Can. Biol., 1917, pp. 329-370, Supp. to 7th Ann. Rept., Department of Naval Services). Only in cases where specimens of the species recorded by other investigators were not available for description have quotations or copies been made from other authors. In the list there were thirteen of these species and in some other cases the description of the gonosome had to be obtained, but in all cases the authority for the description or figure has been given. The specimen of *Lafoea symmetrica* obtained some years ago at Canso has been lost and the drawing is made from a sketch made at the time, but it seems to agree with that given by Bonnevie, although it may not be exactly typical. Two species described by Stimpson, viz., *Eudendrium cingulatum* and *Grammaria gracilis*, were not figured by him, and apparently they have not been described or figured since, hence no figures of these appear. The only difference between *Tubularia spectabilis* and *Tubularia tenella* seems to be one of size, if that is sufficient difference to separate species. As *T. spectabilis* is too large to admit of the enlargement that is used throughout, the difference in size could not readily be shown, hence there is no figure given of *T. tenella*. All drawings taken from other sources have been reduced to one-third diameter. Figures 20, 21, 23 and 25 have been magnified but little, figures 37, 52, 53, 54, 56, 61, 69, 76 are magnified 30 diameters, figures 4, 6, 9, 10, 11, 26, 41 are magnified 15 diameters and the remainder of the figures 10 diameters. Mrs. Fraser has made the drawings for the paper.

## GLOSSARY.

*Acrocyst.* An extra-capsular marsupial sac, surrounded by a gelatinous covering, in which development of the ova takes place in certain species.

*Actinula* or *actinule.* A medusoid structure developed from the reproductive buds in the genus *Tubularia*, in which radial canals and rudimentary tentacles appear but in which no mouth is present. In this structure the ova are developed into the young hydroids while the structure is still attached.

*Cœnosarc.* The common flesh-like substance that binds the zooids together in a colony.

*Colony.* A number of zooids connected together by a common cœnosarc.

*Coppinia.* A mass formed of a close aggregation of gonangia, among which are scattered modified hydrothecæ, which serve as a protection for the mass. Found in the *Lafœidæ*.

*Corbula*. A specially modified branch or hydrocladium which forms an envelope for the gonangia in certain Plumularians.

*Diaphragm*. A cross partition in the hydrotheca which forms a support for the base of the hydranth.

*Fascicled*. A stem or branch is said to be fascicled when it consists of two or more tubes closely applied. There are varying degrees of intimacy in this application. The tubes may be only in loose contact or there may be cross communications.

*Gonangium* or *gonotheca*. The protective chitinous envelope that protects the developing reproductive elements in calyptoblastic forms.

*Gonophore* or *gonozooid*. A zooid specially modified for the purpose of reproduction.

*Gonosome*. A collective term for all the generative zooids of a colony and structures that are directly associated with them.

*Hydranth*. The nutritive zooid of a colony, consisting of a digestive sac, proboscis, mouth and tentacles.

*Hydrocladium*. A term applied to the hydrotheca-bearing branchlets in the Plumularidæ.

*Hydrophore*. A hydrotheca reduced to be saucer-shaped,—not deep enough to contain the contracted hydranth. Found in the *Halecidæ*.

*Hydrotheca*. A chitinous protection for the hydranth in calyptoblastic forms.

*Internode*. The portion of a stem or branch between two succeeding joints.

*Manubrium*. The hollow pedicel supporting the mouth of a medusa. It hangs freely into the sub-umbrellar cavity.

*Nematophore*. A chitinous receptacle into which the defensive zooid, in the form of a sarcodal process, retracts. Also applied to the receptacle and the sarcodal process taken together.

*Node*. A joint in the stem or branch.

*Operculum*. A chitinous structure of one or more segments, that closes the hydrothecal aperture when the hydranth is retracted within.

*Otocyst* or *lithocyst*. A small sac present in the margin of the umbrella of many medusæ, containing refractory spherules with a sensory function.

*Pedicel*. The stalk supporting a hydranth or a gonophore.

*Phylactogonium*. An appendage of a hydrocladium, protecting or assisting to protect the gonangia of certain Plumularians.

*Planula* or *planule*. An oval or pyriform, ciliated, free-swimming embryo, developed from the ovum, which later becomes attached to form the beginning of a hydroid colony.

*Proboscis*. The hollow elevation from the body of the hydranth which supports the mouth.

*Sessile*. A hydranth or a gonophore is said to be sessile when no pedicel is present.

*Simple*. A stem or branch is said to be simple when it consists of a single tube.

*Sporosac.* The sac that contains the generative elements.

*Stolon.* A creeping stem. This may be filiform, or may have cross communications with other stolons to form a network.

*Trophosome.* A collective term for all the nutritive zooids that go to make up a colony and structures that are directly connected with them.

*Zooid.* One of the individuals, more or less independent, that go to make up a colony. Zooids may be nutritive, generative, defensive or sensory.

## HYDROIDS OF EASTERN CANADA.

### KEY TO FAMILIES.

#### Sub-order A. GYMNOBLASTEÆ.

Hydroids with hydranths unprotected by hydrothecæ and gonophores unprotected by gonangia or other structures having a similar function.

- a* Hydranths with scattered filiform tentacles. *Clavida*.
- aa* Hydranths with one whorl (or two whorls closely approximated) of tentacles around the base.
  - b* Hydranths with tentacles much reduced in number, even on the nutritive zooids. *Larida*.
  - bb* Hydranths with tentacles not reduced in number.
    - c* Proboscis conical, dome-shaped or clavate.
      - d* Colony regularly branched.
        - e* Gonophores producing fixed sporosacs. *Bimerida*.
        - ee* Gonophores producing free-swimming sporosacs. *Dicorynida*.
        - eee* Gonophores producing free medusæ. *Bougainvillida*.
      - dd* Colony not branched, with basal encrusting cœnosarc. *Hydractinida*.
    - cc* Proboscis trumpet-shaped. *Eudendrida*.
- aaa* Hydranths with a proximal and a distal set of filiform tentacles.
  - f* Proximal set in a single whorl, distal set in several closely placed whorls. *Corymorphida*.
  - ff* Proximal and distal set each in a single whorl. *Tubularida*.
- aaaa* Hydranths with all tentacles capitate.
  - g* Tentacles scattered. Gonophores producing free medusæ. *Syncorynida*.
  - gg* Tentacles extremely numerous and closely set. Gonophores producing fixed sporosacs. *Myriothelida*.
- aaaaa* Hydranths with a single whorl of filiform tentacles around the base and capitate tentacles scattered over the rest of the body. *Pennarida*.

## Sub-order B. CALYPTOBLASTEÆ.

Hydroids with hydranths protected by hydrothecæ and gonophores protected by gonangia or other similar structures.

- a Hydranths with trumpet-shaped proboscis and campanulate hydrothecæ. *Campanularidæ.*
- aa Hydranths with conical proboscis and tubular or turbinate hydrothecæ.  
 b Hydrothecæ with an operculum of converging segments. *Campanulinidæ.*
- bb. Hydrothecæ without operculum.  
 c Gonosome a coppinia mass. *Lafæidæ.*  
 cc Gonangia not collected into a mass. *Hebellidæ.*
- aaa Hydrothecæ reduced to saucer-shaped hydrophores. *Halecidæ.*
- aaaa Hydrothecæ sessile, adnate to main stem or branches.  
 d Hydrothecæ arranged on both sides of branches. *Sertularidæ.*  
 dd Hydrothecæ on one side only of branches. *Plumularidæ.*

## Sub-order GYMNOBLASTEÆ.

## Family CLAVIDÆ.

*Trophosome.* Hydranths clavate or fusiform with scattered filiform tentacles.

*Gonosome.* Gonophores producing fixed sporosacs.

## KEY TO GENERA.

- a Colony branched. *Cordylophora.*
- b Zooids rising singly from the stolon. *Clava.*

## Genus CORDYLOPHORA.

*Trophosome.* Colony branched, main stem well developed; hydranths with scattered filiform tentacles; proboscis fusiform.

*Gonosome.* Gonophores borne on the stem or branches, produce fixed sporosacs.

*Cordylophora lacustris* Allman.

*Trophosome.* Colony regularly branched, main branches also branched, 6 cm. in height; branches and pedicels annulated at the base; hydranth with 16-20 scattered filiform tentacles.

*Gonosome.* Gonophores oval on very short, annulated pedicels, borne on the stem or branches, invested by a thin perisarcular covering.



No. 1.  
*Cordylophora lacustris*

## Genus CLAVA.

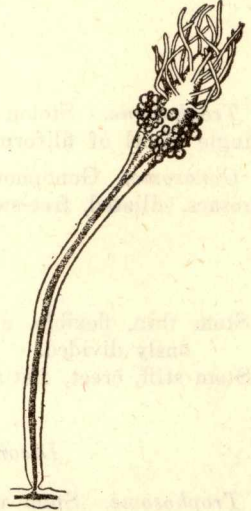
*Trophosome.* Zooids rising singly from a reticular stolon; tentacles numerous, scattered, filiform; proboscis clavate.

*Gonosome.* Gonophores produce fixed sporosacs in clusters a short distance below the proximal tentacles.

*Clava leptostyla* Agassiz.

*Trophosome.* Zooids clustered, 1 cm. in height, constricted at the base; proboscis clavate, tentacles 20-30.

*Gonosome.* Sporosacs spherical, appearing in large clusters just below the proximal tentacles.



No. 2.  
*Clava leptostyla.*

## Family LARIDÆ.

*Trophosome.* Zooids rising singly from a reticular stolon; tentacles much reduced in number, very extensile; proboscis fusiform.

*Gonosome.* Gonophores producing free medusæ.

## Genus MONOBRACHIUM.

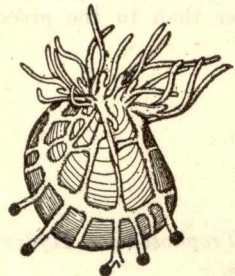
*Trophosome.* Zooids, each with a single tentacle which has great freedom of movement; mouth terminal.

*Gonosome.* Medusa buds grow from the stolon; medusæ with four radial canals.

*Monobrachium parasitum* Mereschkowsky.

*Trophosome.* Stolon growing over living mollusc shells; the zooids appear at the hinge of the shell and the network spreads over the surface to the margin, with a number of free ends supplied with batteries of thread cells, projecting beyond it; proboscis about one-third the length of the whole zooid; tentacle when extended longer than the body of the zooid; zooid 0.7 or 0.8 mm. long, tentacle extended 1 mm.

*Gonosome.* Gonophores grow on short pedicels from stolon, one medusa bud to each gonophore; medusa globular, with four radial canals.



No. 3.  
*Monobrachium parasitum.*

## Family DICORYNIDÆ.

*Trophosome.* Colony branched or unbranched; hydranths with a single whorl of filiform tentacles.

*Gonosome.* Gonophores producing free-swimming, ciliated sporosacs, each with two filiform, ciliated tentacles.

## Genus DICORYNE.

*Trophosome.* Stolon reticular; stem unbranched or branched; hydranths with a single whorl of filiform tentacles; proboscis conical.

*Gonosome.* Gonophores borne on aborted hydranths, from the stem or stolon; sporosacs, ciliated, free-swimming, with two ciliated tentacles.

## KEY TO SPECIES.

- a* Stem thin, flexible, not annulated, slightly branched and sometimes dichotomously divided. *D. flexuosa.*  
*b* Stem stiff, erect, distinctly annulated, not dichotomously divided. *D. conferta.*

*Dicoryne conferta* (Alder).

*Trophosome.* Stem unbranched or with irregularly arranged, erect branches, from a reticular stolon, annulated towards the base and more or less wrinkled throughout; 15 mm. in height; hydranth long-fusiform, with 16 tentacles.

*Gonosome.* Gonophores borne in a cluster at the base of an aborted hydranth, from the stolon and from the stem, oval; pedicel long, sporosacs oval.



No. 4  
*Dicoryne conferta.*

*Dicoryne flexuosa* Sars.

*Trophosome.* Stem flexible, slightly branched or dichotomously divided; 7 mm. in height; hydranth short fusiform with about 12 tentacles.

*Gonosome.* Gonophores on short pedicels, growing from the stem only; sporosacs more numerous in the cluster than in the preceding species.



No. 5.  
*Dicoryne flexuosa* (after Sars).

## Family SYNCORYNIDÆ.

*Trophosome.* Hydranths club-shaped, with numerous scattered, capitate tentacles.

*Gonosome.* Gonophores on body of the hydranth produce free medusæ

## Genus SYNCORYNE.

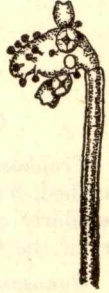
*Trophosome.* Colony unbranched or slightly branched; tentacles strongly capitate.

*Gonosome.* Gonophores producing free medusæ with four radial canals and four rudimentary tentacles.

*Syncoryne mirabilis* (Agassiz).

*Trophosome.* Colony unbranched or slightly and irregularly branched; hydranth stout; tentacles 15 or more.

*Gonosome.* Gonophores nearly spherical, borne among or below the proximal tentacles.



No. 6.  
*Syncoryne mirabilis.*

## Family BIMERIDÆ.

*Trophosome.* Hydranth with conical or dome-shaped proboscis, surrounded by a single whorl of filiform tentacles.

*Gonosome.* Gonophores producing fixed sporosacs.

## KEY TO GENERA.

- a* Sporosacs permanently surrounded by perisarc.  
*b* Sporosacs not permanently surrounded by perisarc.

*Bimeria.*  
*Garveia.*

## Genus BIMERIA.

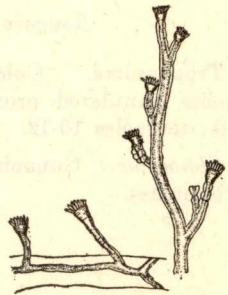
*Trophosome.* Colony usually branched, invested with a conspicuous perisarc, which covers the base of the tentacles; hydranths fusiform.

*Gonosome.* Gonophores covered with perisarc throughout the whole period of development.

*Bimeria brevis* Fraser.

*Trophosome.* Zooids often appearing singly but sometimes as unbranched or slightly branched colonies; 8 mm. in height; branches given off irregularly; perisarc wringled but not annulated; creased around the base of the small hydranth; tentacles 11-12.

*Gonosome.* Unknown.



No. 7.  
*Bimeria brevis.*

## Genus GARVEIA.

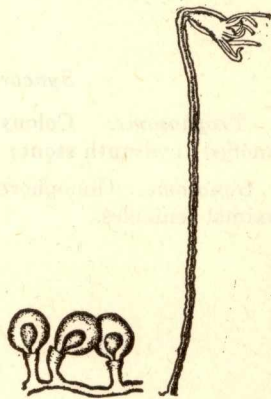
*Trophosome.* Colony branched or unbranched; perisarc conspicuous; hydranth fusiform.

*Gonosome.* Gonophores borne on branch-like pedicels; if perisarc covers the gonophore at early stage, it later bursts off, leaving a cup-like expansion around the base.

*Garveia grænlandica* Levinsen.

*Trophosome.* Stems unbranched or very slightly branched, 8 mm. high; perisarc wrinkled or sometimes irregularly annulated; perisarc passing over the lower part of the body of the hydranth; tentacles 10.

*Gonosome.* Gonophores borne on the stolon; pedicels short with wrinkled flap or cup of perisarc around the base of the gonophore.



No. 8.  
*Garveia grænlandica.*

## Family BOUGAINVILLIDÆ.

*Trophosome.* Hydranths fusiform or clavate; proboscis conical or dome-shaped; one whorl of short filiform tentacles.

*Gonosome.* Gonophores producing free medusæ.

## Genus BOUGAINVILLIA.

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

*Gonosome.* Gonophores supported on short pedicels; medusæ with four radial canals and four clusters of tentacles.

*Bougainvillia carolinensis* (McCrary).

*Trophosome.* Colony irregularly branched, 30 cm. high; branches annulated proximally; hydranths with long conical proboscis; tentacles 10-12.

*Gonosome.* Gonophores singly or in small clusters on stem and branches.



No. 9.  
*Bougainvillia carolinensis.*

## Family EUDENDRIDÆ.

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

*Gonosome.* Gonophores producing fixed sporesacs; male and female gonophores usually dissimilar; male gonophores in whorls, female gonophores in clusters.

## Genus EUDENDRIUM.

Characters as in the family.

## KEY TO SPECIES.

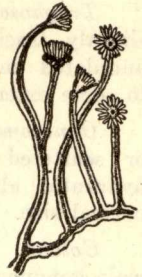
- a* Main stem, primary and even secondary branches, fascicled.  
*b* Branches and pedicels slightly annulated proximally or pedicels only annulated throughout. *E. rameum.*  
*bb* Branches and pedicels extensively annulated. *E. cingulatum.*
- aa* Main stem fascicled.  
*c* Colony very bushy with branches extremely numerous. *E. annulatum.*  
*cc* Colony not bushy.  
*d* Branches and pedicels annulated proximally. *E. ramosum.*  
*dd* Branches and pedicels entirely annulated. *E. dispar.*
- aaa* Stem simple.  
*e* Gonophores at the base of hydranths that are not aborted. *E. album.*  
*ee* Gonophores at the base of aborted hydranths.  
*f* Branches short and strong. *E. capillare.*  
*ff* Branches if present long; main stem, branches and pedicels tenuous. *E. tenue.*

*Eudendrium album* Nutting.

*Trophosome.* Colony minute, 8 mm., stem unbranched, or with a few straggling branches; stem, branches and pedicels very slender; annulations indefinite.

*Gonosome.* Gonophores borne at the base of the hydranth, which may be smaller but not entirely aborted; male and female gonophores in small clusters.

*Colour.* Hydranths and female gonophores white; male gonophores pale yellow; hydrocaulus nearly transparent.



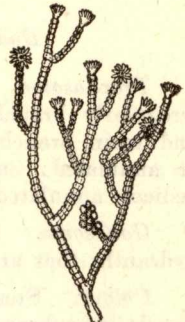
No. 10.  
*Eudendrium*  
*album.*

*Eudendrium annulatum* Norman.

*Trophosome.* Stem shrubby, covered with a dense network of anastomosing tubes, 10 cm., branches very numerous making the colony look bushy, fascicled in the proximal portion; ultimate branches slender, these and the pedicels closely annulated throughout.

*Gonosome.* Gonophores clustered at the base of hydranths that are on short, annulated pedicels.

*Colour.* Yellowish throughout in preserved specimens.



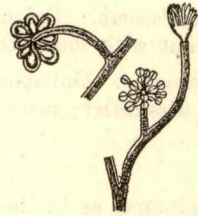
No. 11.  
*Eudendrium*  
*annulatum.*

*Eudendrium capillare* Alder.

*Trophosome.* Colony small, 12 mm., usually branched, with the branches as strong as the main stem; branches and pedicels annulated proximally.

*Gonosome.* Male and female gonophores at the base of aborted hydranths, on long, rather rigid pedicels, rising from either the stem or stolon.

*Colour.* Hydranths and male gonophores light green; female gonophores reddish orange.



No. 12.  
*Eudendrium capillare.*

*Eudendrium cingulatum* Stimpson.

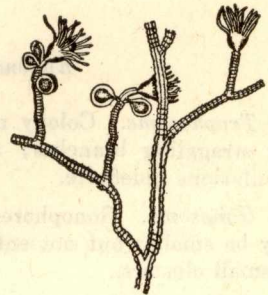
"Polypidom small, very irregularly branched, somewhat as in *E. rameum*, but not so thickly; branches strongly ringed, sometimes throughout their length, always near their origin; polypes small with long tentacles and broad blunt proboscis. It differs from *E. rameum* in the more numerous rings on the branches, and from *E. ramosum* in the mode of branching." (Stimpson).

*Eudendrium dispar* Agassiz.

*Trophosome.* Colony large, 10 cm., main stem slightly fasciated; branches and pedicels extensively annulated and the main stem wrinkled or annulated to some extent; branching irregular.

*Gonosome.* Gonophores at the base of the hydranth or scattered down the strongly annulated pedicel; hydranth, although sometimes smaller, is often of normal size.

*Colour.* Stem greenish; hydranths rose-coloured; male gonophores orange; female gonophores pink.



No. 13.  
*Eudendrium dispar.*

*Eudendrium rameum* (Pallas)

*Trophosome.* Stem large, fasciated, much and irregularly branched, large branches fasciated; stem and main branches, smooth or but slightly wrinkled or annulated; small branches annulated proximally; pedicels annulated throughout.

*Gonosome.* Gonophores borne at the base of hydranths that are normal or not entirely aborted.

*Colour.* Stem dark brown; hydranths reddish; female gonophores yellow.



No. 14.  
*Eudendrium rameum.*

*Eudendrium ramosum* (Linnæus).

*Trophosome.* Stem slightly fasciated, much and irregularly branched, height 15 cm.; hydranth pedicels usually vertically placed on the pinnately arranged branches; annulations at base of branches and pedicels.

*Gonosome.* Gonophores borne at the base of the hydranth or some distance down the pedicels; hydranths normal or reduced in size.

*Colour.* Hydranths and male gonophores vermilion or pink; female gonophores bright orange-red.



No. 15.  
*Eudendrium ramosum.*

*Eudendrium tenue* A. Agassiz.

*Trophosome.* Stem simple, height 15 mm.; branching irregular, the branches and pedicels long and very slender, scarcely annulated.

*Gonosome.* Gonophores borne on aborted hydranths on pedicels shorter than those supporting the normal hydranths.

*Colour.* Bright pink throughout.



No. 16.  
*Eudendrium tenue.*

## Family HYDRACTINIDÆ.

*Trophosome.* Colony formed of distinct nutritive and generative zooids from a common basal cœnosarc, which ordinarily is beset with spines; other kinds of zooids may be present; hydranths with one row of filiform tentacles; proboscis conical or clavate.

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

## Genus HYDRACTINIA.

Characters as in the family.

*Hydractinia echinata* (Fleming).

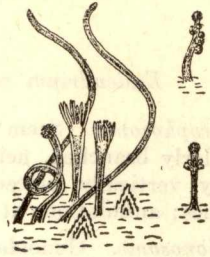
*Trophosome.* Colony rising from a basal cœnosarc, which overlies a chitinous, encrusting plate, provided with jagged spines at intervals; hydranths capable of

great contraction and extension, hence the body or the tentacles may be long and slender or short and stout.

*Gonosome.* Sporosacs borne on special generative zooids, usually smaller than the nutritive, without tentacles or mouth; male and female zooids in different colonies.

*Other zooids.* Defensive zooids are present, long, slender, often doubled on themselves to form spirals, without tentacles but well supplied with batteries of nematocysts.

Sensory zooids, longer even than the defensive zooids, without tentacles or nematocysts.



No. 17.  
*Hydractinia echinata*.

### Family MYRIOTHELIDÆ.

"Polypites solitary, with very numerous, minute, capitate tentacula scattered over the body" (Hincks).

#### Genus MYRIOTHELA.

*Trophosome.* "Polypites solitary, cylindrical, terminating above in a conical proboscis, springing from an adherent base, which is clothed with a chitinous polypary; tentacles very small, capitate, covering the greater portion of the body" (Hincks).

*Gonosome.* "Gonophores borne on coryniform processes, clustering around the base of the polypites, and containing fixed sporosacs" (Hincks).

#### *Myriothela phrygia* (Fabricius).

*Trophosome.* "Polypite cylindrical, very extensile; tentacles extremely numerous and closely set, covering about three-fourths of the body, with a reddish-brown spot on the capitulum; the basal portion of the body minutely speckled with white and crowded with the processes bearing the gonophores, which are slender, pointed above with a few wart-like tentacles on the upper portion; the adherent base massive, of a dark brown colour, sending out a few tubular and root-like prolongations" (Hincks).

*Gonosome.* "Gonophores produced a little below the tentacles, subsessile, globular, when mature of a very large size and a pink colour; embryo actiniform" (Hincks).



No. 18.  
*Myriothela phrygia* (after Hincks)

### Family PENNARIDÆ.

*Trophosome.* Hydranths with a proximal whorl of long filiform tentacles around the body, and several capitate tentacles scattered distally.

*Gonosome.* Gonophores producing free medusæ.

#### Genus ACAULIS.

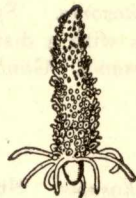
*Trophosome.* Hydranth stemless, sub-cylindrical; tentacles of proximal set filiform; tentacles of distal set, short, strongly capitate, numerous, scattered over the body of the hydranth. (From Stimpson's description.)

*Gonosome.* Gonophores scattered, sessile on the body of the hydranth between the proximal and distal set of tentacles. (From Stimpson's description.)

*Acaulis primarius* (Stimpson).

*Trophosome.* Hydranth with 8 proximal tentacles and numerous short capitate tentacles scattered over the distal two-thirds of the body. (From Stimpson's description.)

*Gonosome.* Gonophores thickly scattered over the space between the proximal and distal tentacles. (From Stimpson's description.)



No. 19.

*Acaulis primarius* (after Stimpson)

NOTE.—Allman came to the conclusion that this was really a stalked form in which the hydranth had merely broken away. He was also of the opinion that the specimens that Stimpson described as later stages of this species were really of an entirely different species, belonging to the genus *Corynitis* or *Halocharis*. As Stimpson gives but the one figure, that of the earlier form, and as it is impossible at present to place the other form, it has not been included.

## Family CORYMORPHIDÆ.

*Trophosome.* Zooids solitary, large; hydranths with a proximal and a distal set of filiform tentacles.

*Gonosome.* Gonophores producing free medusæ with four radial canals and three of the four tentacles aborted or very much reduced.

## Genus CORYMORPHA.

*Trophosome.* Pedicel with perisarc represented by a thin pellicle; tubular, fleshy processes growing from the pedicel near the base; hydranth abruptly distinct from the pedicel; proximal tentacles longer than distal; distal set in several contiguous rows.

*Gonosome.* Gonophores borne on branched pedicels between the two sets of tentacles.

*Corymorpha pendula* Agassiz.

*Trophosome.* Zooid 9 or 10 cm. high, when fully extended; pedicel with an anastomosing canals in the cœnosarc, but they usually run in the same direction; the place of the hydrorhiza taken by the free ends of the cœnosarcal tubes.

*Gonosome.* Gonophores producing medusæ with one long and three short tentacles.



No. 20.

*Corymorpha pendula*.

## Family TUBULARIDÆ.

*Trophosome.* Stem unbranched or irregularly branched; perisarc definite; hydranths with a distal and a proximal set of filiform tentacles.

*Gonosome.* Gonophores producing actinulæ.

## Genus TUBULARIA.

*Trophosome.* Stem unbranched or irregularly branched; proximal set of tentacles longer than the distal set, each set in one whorl.

*Gonosome.* Gonophores in clusters, attached by means of stalked peduncles to the body of the hydranth just distal to the proximal tentacles; female gonophores producing actinulæ.

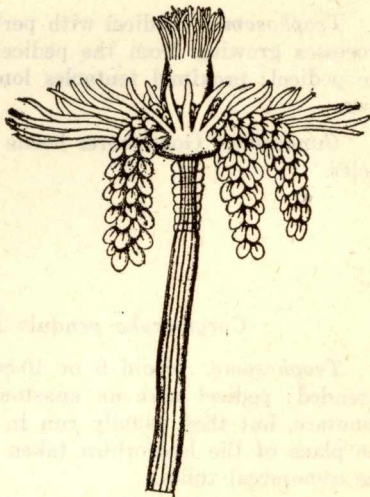
## KEY TO SPECIES.

- a Perisarc extensively annulated. *T. larynx.*
- aa Perisarc not extensively annulated.
- b Stems unbranched
- c Stems jointed. *T. couthouyi.*
- cc Stems not jointed. *T. indivisa.*
- bb Stem irregularly branched.
- d Medusoids with laterally compressed apical processes. *T. crocea.*
- dd Medusoids with conical apical processes.
- e Hydranths large *T. spectabilis.*
- ee Hydranths small. *T. tenella.*

*Tubularia couthouyi* Agassiz.

*Trophosome.* Stem unbranched, height 15 cm.; deep annulations at intervals dividing the stem; hydranth large, 3 or 4 cm. in diameter when tentacles are extended; proximal tentacles 30-40, long; distal up to 50, shorter and smaller.

*Gonosome.* Gonophores growing in dense racemes; sporosacs with 4 radial canals but without apical processes.



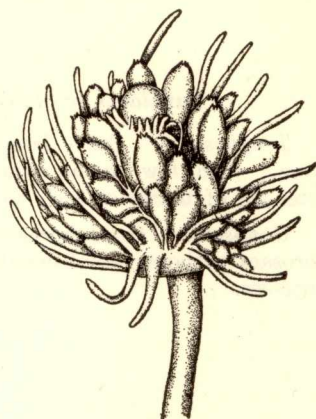
No. 21.

*Tubularia couthouyi.*

*Tubularia crocea* (Agassiz).

*Trophosome.* Colony growing in thick tufts which make a tangled mass below, but separate into long stems above which reach out of the mass; branching irregular; stems slightly and irregularly annulated; proximal and distal set of tentacles each 20-24.

*Gonosome.* Gonophores growing in long racemes, without radial canals, but with 4 laterally compressed apical processes.

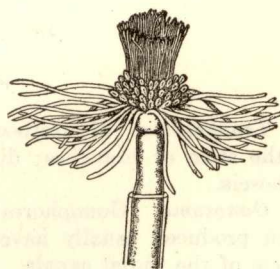


No. 22.  
*Tubularia crocea.*

*Tubularia indivisa* Linnæus.

*Trophosome.* Stems growing in clusters, unbranched, height 30 cm.; perisarc heavier than in other species; little or no sign of annulation; proximal tentacles up to 40, long and slender; distal set much more numerous but shorter.

*Gonosome.* Gonophores in racemes; sporosacs with 4 radial canals but without apical processes.

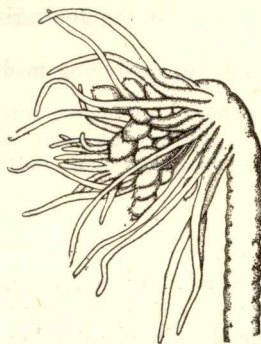


No. 23.  
*Tubularia indivisa.*

*Tubularia larynx* Ellis and Solander.

*Trophosome.* Stems clustered, often tangled at the base, height 2 cm.; perisarc extensively annulated, annulations varying from deep to shallow; proximal and distal set of tentacles each about 20.

*Gonosome.* Gonophores in denser, more compact racemes; sporosacs without radial canals; apical processes scarcely developed.

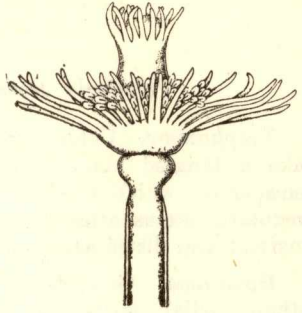


No. 24.  
*Tubularia larynx.*

*Tubularia spectabilis* (Agassiz).

*Trophosome.* Stem irregularly branched; height 10 cm.; with few or no annulations; proximal and distal set of tentacles each about 20.

*Gonosome.* Gonophores in large, loose racemes; sporosacs without radial canals but with conical apical processes.



No. 25.

*Tubularia spectabilis.**Tubularia tenella* Agassiz.

Similar to the preceding species but smaller, 2 cm. high. It is possible that it is not a distinct species.

## Sub-order CALYPTOBLASTEÆ.

## Family CAMPANULARIDÆ.

*Trophosome.* Hydrothecæ campanulate, never sessile, never adnate or immersed in the stem or branches; diaphragm always present; hydranth with trumpet-shaped proboscis.

*Gonosome.* Gonophores produce fixed sporosacs or free medusæ; the medusæ when produced usually have otocysts in the margin and have the gonads along the course of the radial canals.

## KEY TO GENERA.

- a Gonophores producing fixed sporosacs in which the planulæ are developed.
  - b Reproduction by sporosacs which remain within the gonangia during the development of the planulæ. *Campanularia.*
  - bb Reproduction by sporosacs which are extruded into a sac at the summit of the gonangium, in which sac the planulæ are developed. *Gonothyræa.*
- aa Gonophores producing medusoids without mouth or digestive cavity. *Eucopella.*
- aaa Gonophores producing free medusæ.
  - c Medusæ globular, with four tentacles at time of liberation. *Clytia.*
  - cc Medusæ flatter, with 16 or more tentacles at time of liberation. *Obelia.*

## Genus CAMPANULARIA.

*Trophosome.* Stem unbranched, regularly or irregularly branched.

*Gonosome.* Gonophores producing sporosacs, which remain within the gonangium while the planulæ develop.

## KEY TO SPECIES.

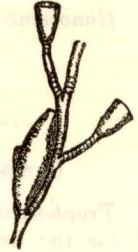
- a Stem fascicled.
  - b Hydranth pedicels appearing in whorls. *C. verticillata.*
  - bb Hydranth pedicels given off singly. *C. gelatinosa.*

- aa* Stem branched but not fasciated
- c* Hydrothecal margin entire.
    - d* Diameter of hydrotheca as great as its depth. *C. flexuosa.*
    - dd* Diameter of hydrotheca much less than its depth. *C. amphora.*
  - cc* Hydrothecal margin with teeth having two cusps. *C. neglecta.*
- aaa* Stem unbranched or but slightly branched.
- e* Hydrothecal margin entire. *C. integra.*
  - ee* Hydrothecal margin toothed.
    - f* Hydrothecæ with vertical lines.
      - g* Lines very distinct throughout the whole length.
        - h* Gonangia annulated. *C. hincksi.*
        - hh* Gonangia smooth. *C. grenlandica.*
      - gg* Lines distinct towards margin only.
        - i* Gonangia long, with bottle neck. *C. magnifica.*
        - ii* Gonangia bowl-shaped. *C. speciosa.*
    - fj* Hydrothecæ without vertical lines.
      - j* Hydrothecæ small, tubular, with blunt, shallow teeth. *C. volubilis.*
      - jj* Hydrothecæ large, broadening towards the margin, teeth blunt, deep. *C. gigantea.*

*Campanularia amphora* (Agassiz).

*Trophosome.* Colony loosely branched, height 15 cm.; annulations at the base of the branches and above the origin of the branches on the main stem; pedicels unusually annulated throughout; hydrothecæ deeper than wide; margin entire.

*Gonosome.* Female gonangia elongate-oval, about four times as long as the hydrothecæ, somewhat truncate at top, aperture small; male gonangia more slender with a slightly produced neck.

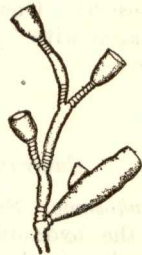


No. 26.  
*Campanularia amphora.*

*Campanularia flexuosa* (Hincks)

*Trophosome.* Stem flexuous, 3 cm. high; pinnately branched; annulated at the base and above the origin of the pedicels; pedicels annulated throughout; hydrothecæ as broad as deep, margin entire.

*Gonosome.* Gonophores axillary, on annulated pedicels; gonangia large, elongate, ovoid but truncated distally.

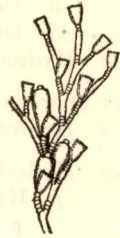


No. 27.  
*Campanularia flexuosa.*

*Campanularia gelatinosa* (Pallas).

*Trophosome.* Stem and main branches fascicled; height 25 cm.; branchlets numerous, whitish, appearing gelatinous in the water; branches annulated at the origin; pedicels vary in length, short ones annulated throughout, long ones annulated towards each end; hydrothecæ deeply campanulate, tapering gradually from margin to base; margin with about 10 teeth, each with two sharp cusps

*Gonosome.* Gonangia elongated oval, with distinct neck and tapering base; pedicels short, annulated.



No. 28.

*Campanularia gelatinosa.**Campanularia gigantea* Hincks.

*Trophosome.* Stem delicate, slightly branched, each branch forming a pedicel for a hydrotheca; pedicels annulated at the base; hydrothecæ large, much deeper than wide, the lower portion tapering gradually to the base; margin with about 10 rounded, deeply-cut teeth.

*Gonosome.* Unknown.

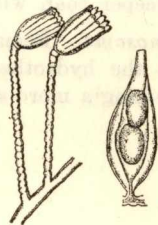


No. 29.

*Campanularia gigantea.**Campanularia grænlandica* Levinsen.

*Trophosome.* Stem unbranched, forming the pedicel for the hydranth, annulated or wavy throughout; hydrothecæ tubular, urceolate, the base hemispherical; margin with 10-12 teeth, rounded or squared at the tip; lines running down from the spaces between the teeth, the full length of the hydrotheca.

*Gonosome.* Gonangia large, with smooth surface, bottle-shaped with long neck; pedicel short.

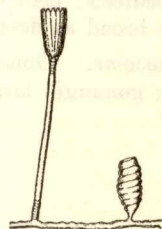


No. 30.

*Campanularia grænlandica.**Campanularia hincksi* Alder.

*Trophosome.* Stem unbranched, forming the pedicel for the hydranth, long, slender, annulated below the hydrotheca and at the base; hydrothecæ deep, nearly tubular, with lines running from the margin almost to the base; margin with square-topped teeth.

*Gonosome.* Gonangia borne on the stolon, ovoid, truncate, corrugated; pedicel short, not annulated.



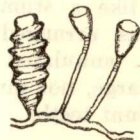
No. 31.

*Campanularia hincksi.*

*Campanularia integra* MacGillivray.

*Trophosome.* Stem unbranched, forming the pedicel for the hydranth, long and slender, varying much in the amount of the annulation but always annulated at the base and below the hydrotheca; hydrotheca small, tapering gradually from margin to base; margin entire.

*Gonosome.* Gonangium large, deeply corrugated, each corrugation with a distinct keel; pedicel short, annulated.

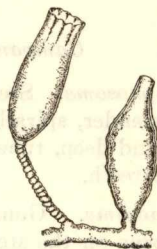


No. 32.  
*Campanularia integra.*

*Campanularia magnifica* Fraser.

*Trophosome.* Stem unbranched, growing from a stout stolon that is not annulated; hydrotheca large, slightly urceolate; margin flaring slightly, with 10-12 low, blunt teeth; lines running some distance down from the margin; pedicel annulated throughout.

*Gonosome.* Gonangium large, longer than the hydrotheca, oval, distal end drawn out into a bottle-neck, very slightly corrugated; pedicel short.

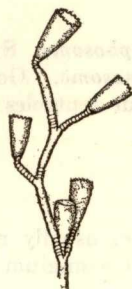


No. 33.  
*Campanularia magnifica.*

*Campanularia neglecta* (Alder).

*Trophosome.* Stem pinnately branched, annulated above the margin of each pedicel; pedicels annulated at each end or throughout; hydrothecæ narrow, deep, nearly tubular; margin toothed, each tooth provided with two sharp points.

*Gonosome.* Gonangium pyriform, axillary or on the pedicels; pedicel short, annulated.

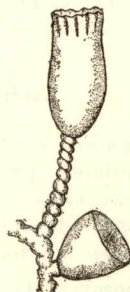


No. 34.  
*Campanularia neglecta.*

*Campanularia speciosa* Clark.

*Trophosome.* Stem unbranched from an annulated stolon; pedicels short, annulated throughout; hydrotheca large, urceolate; margin with low, rounded teeth; lines running down a short distance from the margin.

*Gonosome.* Gonangium bowl-shaped, as wide as deep; pedicel short.

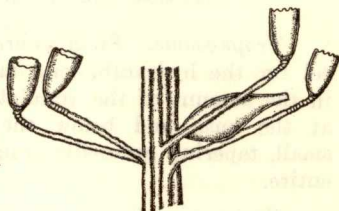


No. 35.  
*Campanularia speciosa.*

*Campanularia verticillata* (Linnæus).

*Trophosome.* Main stem fascicled throughout, ending like a stump; main branches also fascicled; hydranths arranged in irregular whorls, with long pedicels, annulated or wavy throughout, hydrotheca rather large, not much deeper than wide; margin with 12-14 blunt teeth.

*Gonosome.* Gonangia sessile on the main stem, fusiform with bottle neck; surface smooth; ova large.

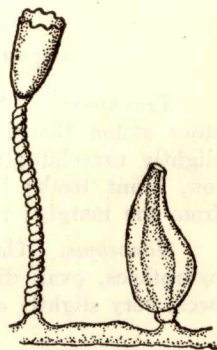


No. 36.

*Campanularia verticillata*.*Campanularia volubilis* (Linnæus).

*Trophosome.* Stem unbranched; stolon smooth or twisted; pedicel slender, spirally twisted or annulated; hydrotheca small, narrow and deep, tubular; margin with about 10 rounded, often very low teeth.

*Gonosome.* Gonangium flask-shaped, with long narrow neck, borne on the stolon; pedicel short, annulated.



No. 37.

*Campanularia volubilis*.

## Genus CLYTIA.

*Trophosome.* Stem unbranched or irregularly branched.

*Gonosome.* Gonophores producing free medusæ which are somewhat spherical, with four tentacles at the time of liberation.

## KEY TO SPECIES.

- |    |  |                        |
|----|--|------------------------|
| a  | Stem usually much branched.                      |                        |
| b  | Gonangium corrugated.                            | <i>C. edwardsi</i> .   |
| aa | Stem usually unbranched.                         |                        |
| c  | Hydrotheca cylindrical, margin with sharp teeth. | <i>C. cylindrica</i> . |
| cc | Hydrotheca campanulate, teeth blunt or rounded.  |                        |
| d  | Gonangium smooth.                                | <i>C. noliformis</i> . |
| dd | Gonangium corrugated.                            | <i>C. johnstoni</i> .  |

*Clytia cylindrica* Agassiz.

*Trophosome.* Stem unbranched; the slender pedicel annulated proximally and distally; hydrotheca cylindrical, twice as deep as wide, suddenly constricted at the base where the diaphragm appears inside; teeth 10-12, sharp pointed and deeply cut.

*Gonosome.* Gonangium from the stolon or pedicel, oblong, or obovate, smooth; pedicel short, with one or two annulations.



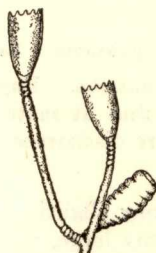
No. 38.

*Clytia cylindrica*.

*Clytia edwardsi* (Nutting).

*Trophosome.* Stem usually with few or many irregularly arranged branches, 3 cm. high; pedicels long and slender, annulated proximally and distally; hydrotheca deeply campanulate with 10-14 deeply-cut, slender teeth, rounded at the tip.

*Gonosome.* Gonangium oblong or oval, corrugated; pedicel short, annulated.

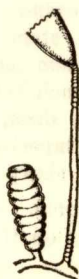


No. 39.  
*Clytia edwardsi*.

*Clytia johnstoni* (Alder).

*Trophosome.* Stem unbranched or with a single branch, annulated proximally and distally; hydrotheca broadly campanulate, depth and width nearly equal; margin with 12-16 teeth, slightly rounded or sharper.

*Gonosome.* Gonangium on the stem or stolon, oval or oblong, truncate, corrugated; pedicel short, annulated.

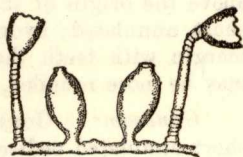


No. 40.  
*Clytia johnstoni*.

*Clytia noliformis* (McCrary).

*Trophosome.* Stem unbranched, short, stout, extensively annulated, sometimes throughout the whole length; hydrotheca broadly campanulate, as wide as or wider than deep; teeth 10-12, rounded at the tip.

*Gonosome.* Gonangium on the stolon, almost sessile, broadly oval, distal end with a short neck below the rim.



No. 41.  
*Clytia noliformis*.

## Genus EUCOPELLA.

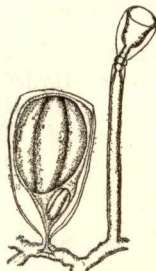
*Trophosome.* Stem unbranched; hydrotheca with very thick wall and entire margin.

*Gonosome.* Gonophores producing large medusoid structures of elongated dome-shape, without mouth or digestive cavity.

*Eucopella caliculata* (Hincks).

*Trophosome.* Stem unbranched, varying in length, slightly wavy or annulated, with a distinct double annulation below the hydrotheca; hydrotheca with very thick wall and entire margin.

*Gonosome.* Gonangium large, irregularly obovate, the distal end somewhat rounded or truncate, almost sessile on the stolon; two medusoids in the gonangium at the one time, a large one occupying the greater portion of the space and a much smaller one below; these are elongated oval in shape.



No. 42.  
*Eucopella caliculata*.

## Genus GONOTHYRÆA.

*Trophosome.* As in the family.

*Gonosome.* Reproduction by fixed medusiform sporosacs, furnished with tentacles, that at maturity become extra-capsular, remaining attached until their contents are discharged.

## KEY TO SPECIES.

- a Colony slightly and irregularly branched, margin with sharp teeth. *G. gracilis.*  
 b Colony large, more regularly branched, margin with blunt, square-topped teeth. *G. loveni.*

*Gonothyræa gracilis* (Sars).

*Trophosome.* Colony slightly and irregularly branched; stem, branches and pedicels, long and slender; stem annulated at the base and above the origin of each branch; pedicels annulated at each end; hydrotheca deep, cylindrical for the upper half and gradually tapering to the base; margin with 10-14 deeply-cut, sharp teeth.

*Gonosome.* Gonangium oblong-oval, often flaring at the rim; on the stem or stolon; pedicel annulated.



No. 43.  
*Gonothyræa gracilis.*

*Gonothyræa loveni* (Allman).

*Trophosome.* Stem branched, flexuose, annulated above the origin of the branches and pedicels; pedicels short, annulated; hydrotheca slightly deeper than wide; margin with teeth that are usually square-topped but may be more rounded.

*Gonosome.* Gonangium axillary, obconic, on a short annulated pedicel.



No. 44.  
*Gonothyræa loveni.*

## Genus OBELIA.

*Trophosome.* Stem branched, simple or fascicled.

*Gonosome.* Gonophores producing free medusæ, that are flattened dorso-ventrally and when liberated possess more than eight tentacles.

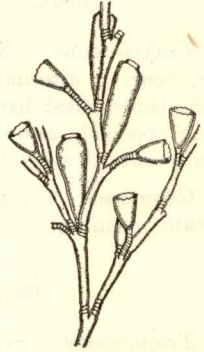
## KEY TO SPECIES.

- a Margin toothed.  
 b Gonangium much shorter than the stem internodes. *O. longissima.*  
 bb Gonangium usually longer than the stem internodes. *O. articulata.*
- aa Margin entire.  
 c Hydrotheca pedicels usually forming the only branches.  
 d Hydrotheca deeper than wide. *O. dichotoma.*  
 dd Hydrotheca as wide as deep.  
 e Hydrotheca pedicel supported on a shoulder-like process of the stem internode. *O. geniculata.*  
 ee No shoulder present on the stem internode. *O. hyalina.*
- cc Stem with other branches than those formed by the hydranth pedicels.  
 f Hydrotheca deeper than wide. *O. commissuralis.*  
 ff Hydrotheca as wide as deep. *O. flabellata.*

*Obelia articulata* (A. Agassiz).

*Trophosome.* Colony much branched, 7 cm. high; stem usually simple but in some cases slightly fascicled; main stem continuous throughout and distinctly stouter than any of the branches; stem and branches annulated above the origin of branches and pedicels; hydrotheca deeper than wide; margin with 12-14 low, rounded teeth, pedicel annulated throughout

*Gonosome.* Gonangium axillary, long, usually longer than the stem internode, a distinct collar present; pedicel annulated.

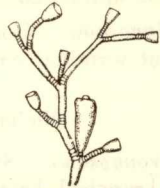


No. 45.

*Obelia articulata.**Obelia commissuralis* McCrady.

*Trophosome.* Colony large, 20 cm.; main stem geniculate; branches numerous; stem and branches annulated above the origin of the branches and pedicels; hydrotheca small, deeper than wide; margin entire; pedicels usually annulated throughout.

*Gonosome.* Gonangium axillary, obovate, smooth, with a distinct collar.

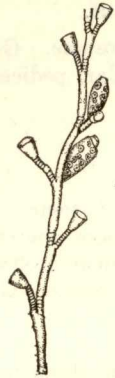


No. 46.

*Obelia commissuralis.**Obelia dichotoma* (Linnaeus).

*Trophosome.* Stem 25 mm. high, slender, erect, unbranched or slightly and irregularly branched; stem annulated above the nodes; hydrotheca funnel-shaped with polyhedral margin; pedicel usually annulated throughout.

*Gonosome.* Gonangium axillary, obovate, smooth, with tapering collar; pedicel short, annulated.

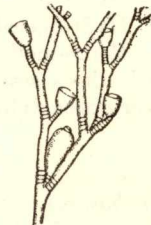


No. 47.

*Obelia dichotoma.**Obelia flabellata* (Hincks).

*Trophosome.* Colony 25 cm. high; stem and primary branches branched, spreading; stem and branches annulated above the origin of the branches and pedicels; hydrotheca as wide as deep; margin entire, pedicel annulated.

*Gonosome.* Gonangium axillary, obovate, with a terminal collar; pedicel short, annulated.



*Obelia geniculata* (Linnæus).

*Trophosome.* Stem simple, geniculate, 25 mm. high, bearing alternate pedicels on shoulder processes of the internodes; hydrotheca as wide as deep; margin entire; pedicels annulated at each end or throughout, usually curved away from the stem.

*Gonosome.* Gonangium axillary, oval or slightly obovate; terminal collar present.

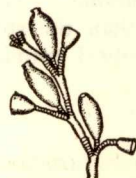


No. 49.

*Obelia geniculata.**Obelia hyalina* Clark.

*Trophosome.* Stem 20 mm. high, unbranched or occasionally branched, geniculate, with several annulations above the origin of each pedicel; hydrotheca as wide as deep; margin entire, sometimes flaring; pedicels annulated at each end or throughout.

*Gonosome.* Gonangium axillary, obovate, with or without terminal collar.



No. 50.

*Obelia hyalina.**Obelia longissima* (Pallas).

*Trophosome.* Stem filiform of great length, 60 cm., much branched, branches alternate; stem horn colour or black, annulated at base and above each node; hydrotheca deeper than wide; margin wavy or with low, rounded teeth; pedicel annulated at each end or throughout.

*Gonosome.* Gonangium axillary, oval, with a distinct collar, pedicel annulated.



No. 51.

*Obelia longissima.*

## Family CAMPANULINIDÆ.

*Trophosome.* Colonies branched or unbranched; hydrothecæ pedicellate or sessile, always operculate, the operculum formed of converging segments; hydranths with conical proboscis.

*Gonosome.* Gonophores producing fixed sporosacs or free medusæ.

## KEY TO GENERA.

- a Hydrotheca pedicellate.
  - b Hydrothecal margin distinct.
    - c Operculum of several converging segments. *Calycella.*
    - cc Operculum of four segments. *Tetrapoma.*
    - ccc Operculum shaped like an A-tent. *Stegopoma.*
  - bb Hydrothecal margin not distinct.
    - Reproduction by fixed sporosacs. *Opercularella.*
- aa Hydrotheca sessile.
  - Hydrotheca tubular, margin indistinct. *Cuspidella.*

## Genus CALYCELLA.

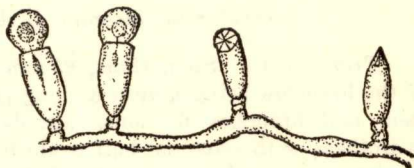
*Trophosome.* A creeping stolon gives rise to tubular hydrothecæ on annulated pedicels; margin distinct; several segments to the operculum.

*Gonosome.* Gonangia borne on the stolon; acrocysts produced.

*Calycella syringa* (Linnæus).

*Trophosome.* Stolon smooth, not reticulated; hydrotheca tubular; margin distinct; operculum of 8 or 9 converging segments; pedicel annulated.

*Gonosome.* Gonangium on the stolon, oval or obovate; sporosacs extruded into an acrocyst; pedicel short, annulated.



No. 52.  
*Calycella syringa.*

## Genus CUSPIDELLA.

*Trophosome.* Hydrotheca tubular, sessile on a creeping stolon.

*Gonosome.* Unknown.

## KEY TO SPECIES.

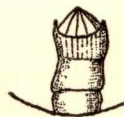
- a Gonangium obovate.  
b Hydrotheca segmented.

*O. lacerata.*  
*C. costata.*

*Cuspidella costata* Hincks.

*Trophosome.* "Hydrothecæ somewhat broadly cylindrical, encircled by two or three rather prominent ribs, or lines of growth, dividing them into segments, the uppermost or opercular segment formed of thinner material than the rest and supporting a conical, operculum, composed of very numerous convergent pieces" (Hincks)..

*Gonosome.* Unknown.

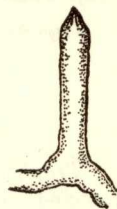


No. 53.  
*Cuspidella costata* (after Hincks).

*Cuspidella grandis* Hincks.

*Trophosome.* Sessile, tubular hydrothecæ grow from regularly creeping stolon; operculum of 8-10 segments.

*Gonosome.* Unknown.



No. 54.  
*grandis.*  
*Cuspidella*

## Genus OPERCULARELLA.

*Trophosome.* Hydrotheca elongate-oval with no distinct margin; opercular segments long and narrow.

*Gonosome.* Reproduction by sporosacs that are extruded into an acrocyst.

## KEY TO SPECIES.

- a Gonangium obovate.  
b Gonangium fusiform.

*O. lacerata.*  
*O. pumila.*

*Opercularella lacerata* (Johnston).

*Trophosome.* Stem short, 25 mm., branched, some of the branches being almost as long as the main stem; stem and branches flexuous, annulated throughout; hydrotheca with proximal half oval, distal half conical; no distinct margin; segments of the operculum long and slender.

*Gonosome.* Female gonangia obovate, sessile or on short, annulated pedicels, axillary or in place of hydrothecæ; male gonangia narrower.

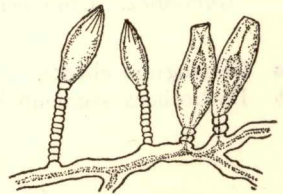


No. 55.

*Opercularella lacerata.**Opercularella pumila* Clark.

*Trophosome.* Stem erect or creeping, sparingly branched, annulated throughout; hydrothecæ similar in shape to those of *O. lacerata* but smaller.

*Gonosome.* Gonangia fusiform on short annulated pedicels on the stem or stolon.



No. 56.

*Opercularella pumila.*

## Genus STEGOPOMA.

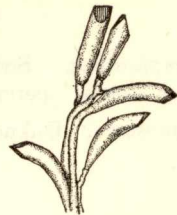
*Trophosome.* Hydrotheca with an operculum formed of two membranes folded lengthwise and which come together roof-like, with their long edges; each of these is separated from the remainder of the hydrotheca by a curved line; at each side the hydrothecal wall forms a triangular gable-like structure, between the two opercular membranes.

*Gonosome.* Gonophores producing fixed sporosacs.

*Stegopoma plicatile* (Sars).

*Trophosome.* Stem large; stem and main branches fasciated; hydrotheca long, tubular or nearly so, sessile or with a short pedicel.

*Gonosome.* Gonangium long, oval or cylindrical, adhering to the branch for a portion of the length.



No. 57.

*Stegopoma plicatile.*

## Genus TETRAPOMA.

*Trophosome.* Hydrothecæ pedicellate, with distinct four-toothed margin, operculum of four segments.

*Gonosome.* Unknown.

*Tetrapoma quadridentatum* (Hincks).

*Trophosome.* "Hydrothecæ cylindrical, usually slightly incurved on one side, the height about three times as great as the breadth, with a quadridentate margin and an operculum composed of four pieces, borne on ringed pedicels of variable lengths (3 to 7 rings) which rise at intervals from a creeping stem" (Hincks).

*Gonosome.* Unknown.



No. 58.

*Tetrapoma quadridentatum*  
(after Hincks).

## Family HALECIDÆ.

*Trophosome.* Hydrothecæ reduced to saucer-shaped hydrophores which usually pass without constriction into the large tubular pedicels; margin entire, often flaring; reduplication common; hydranths with conical proboscis.

*Gonosome.* Gonophores producing fixed sporosacs.

## Genus HALECIUM.

*Trophosome.* As in the family.

*Gonosome.* Gonangia often of different shape in the two sexes which are found on different colonies.

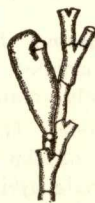
## KEY TO SPECIES.

- a Stem simple.
  - b Stem annulated or wavy throughout.
    - c Gonangium laterally compressed, small, with regular margin.
      - H. tenellum.*
      - H. minutum.*
    - cc Gonangium very large with wavy or spiny margin.
      - H. curvicaule.*
      - H. sessile.*
  - bb Stem not annulated.
    - d Colony minute, with no definite main stem.
      - H. curvicaule.*
    - dd Colony large, with main stem and branches.
      - H. sessile.*
- aa Stem fasciated.
  - e Branches not fasciated.
    - f Gonangium large, aperture lateral.
      - H. articulatum.*
    - ff Gonangium smaller, aperture terminal.
      - H. gracile.*
  - ee Stem and main branches fasciated.
    - g Gonangium spiny.
      - H. muricatum*
    - gg Gonangium smooth.
      - H. halecinum.*
      - H. beani.*
    - h Gonangium aperture terminal.
    - hh Gonangium aperture lateral.

*Halecium articulatum* Clark.

*Trophosome.* Stem coarse, fasciated; primary branches scarce but long, hence colony has a loose appearance; branches alternate, pinnate; internodes short and getting shorter towards the ends of the branches, where they may be as broad as long; hydrothecæ sessile; margin not flaring.

*Gonosome.* Female gonangia large, obovate, borne in rows on the upper side of the branches; aperture lateral but near the distal end; male gonangia oblong.



No. 59.

*Halecium articulatum.*

*Halecium beani* (Johnston).

*Trophosome.* Stem and main branches fascicled; nodes oblique; hydrophore margin flaring little.

*Gonosome.* Gonangia borne at the base of the hydrophores; male, regular oblong-oval; female, mitten-shape, aperture lateral; two small hydranths are present in the aperture.

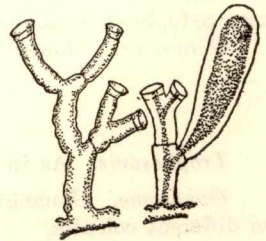


No. 60.  
*Halecium beani.*

*Halecium curvicaule* Lorenz.

*Trophosome.* Colony minute; no continuous main stem; a single pedicel grows out from the stolon, just below the hydrophore another pedicel is given off, or one on each side; these bend upward almost at the base; each of them may give rise to others in the same way until there may be four or five sets of them; each pedicel has an annulation at its base or occasionally more than one; margin of hydrophore flaring but little.

*Gonosome.* Male gonangium cylindrical; female pyriform, with terminal aperture from which two hydranths appear, both almost sessile, borne on the pedicel just below the hydrophore.

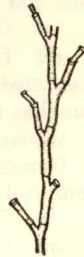


No. 61.  
*Halecium curvicaule.*

*Halecium gracile* Verrill.

*Trophosome.* Stem fascicled, much branched; branches long and slender; internodes long and slender; margin of hydrophore flaring but little.

*Gonosome.* Male gonangia oblong-ovate; female pyriform, emarginate; aperture terminal.

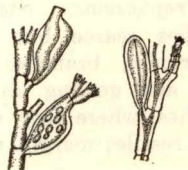


No. 62.  
*Halecium gracile.*

*Halecium halecinum* (Linnæus).

*Trophosome.* Stem fascicled, erect, rigid; primary branches fascicled, few; secondary branches and pedicels pinnately arranged; hydrophore margin not flaring.

*Gonosome.* Gonangia arranged in rows on the upper side of the branches; male gonangia obovate-oblong; female pyriform; aperture elevated on a collar; two hydranths in the aperture.

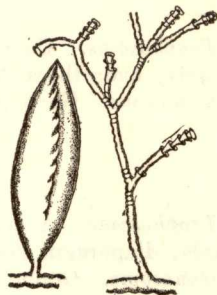


No. 63.  
*Halecium halecinum.*

*Halecium minutum* Broch.

*Trophosome.* Stem simple, slender, irregularly branched, wavy or annulated throughout; hydrophores with flaring margin, often much reduplicated.

*Gonosome.* Gonangia very large, 3 mm. in diameter, cockle-shaped, with the margin wavy below and spiny above.

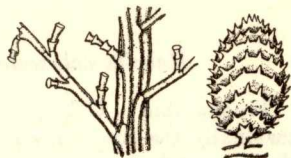


No. 64.

*Halecium minutum.**Halecium muricatum* (Ellis and Solander).

*Trophosome.* Stem fascicled, stout, rigid, irregularly and densely branched; primary branches fascicled; ultimate branches and pedicels pinnately arranged; hydrophores with margin flaring.

*Gonosome.* Gonangia crowded on the branches, ovate, much greater in the one diameter than the other; numerous prickles on the surface, arranged in raised rows.



No. 65.

*Halecium muricatum.**Halecium sessile* (Hincks).

*Trophosome.* "Stem slender, irregularly branched, branches not in the same plane; branches jointed, the joints consisting of a single stricture; hydrothecæ alternate, very short, and perfectly sessile, not rising at all separately from the lateral stem processes of which they are mere openings, without being raised into a tube" (Hincks).

*Gonosome.* Unknown.

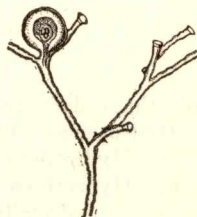


No. 66.

*Halecium sessile* (after Hincks).*Halecium tenellum* Hincks.

*Trophosome.* Colony small, 15 mm. high; stem delicate, annulated or wavy, irregularly branches, sometimes dichotomously; margin of hydrophore strongly flaring.

*Gonosome.* Gonangia oval or ovate, broader in one diameter than in the other, smooth, axillary or on the branch below the hydrophore.



No. 67.

*Halecium tenellum.*

## Family HEBELLIDÆ.

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

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

## Genus HEBELLA.

*Trophosome.* A creeping stem gives rise to single hydranths, attached by short pedicels; diaphragm present in the hydrothecæ.

*Gonosome.* Gonophores producing free medusæ.

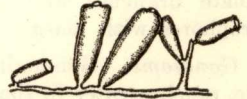
## KEY TO SPECIES.

- a Hydrotheca tubular, pedicel very short. *H. calcarata.*  
 b Hydrotheca urceolate, pedicel longer, annulated. *H. pocillum.*

*Hebella calcarata* (A. Agassiz).

*Trophosome.* Colony creeping over hydroids or occasionally the stem may be free for a short distance; hydrothecæ tubular, coming off singly or in pairs from the stolon, almost sessile.

*Gonosome.* Gonangia large, oblong-ovovate, smooth, almost sessile; aperture terminal, small.

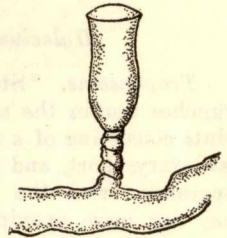


No. 68.  
*Hebella calcarata.*

*Hebella pocillum* (Hincks).

*Trophosome.* Stem creeping, hydrothecæ urceolate, on relatively long, annulated pedicels.

*Gonosome.* Unknown.



No. 69.  
*Hebella pocillum.*

## Family LAFCEIDÆ.

*Trophosome.* Hydrothecæ tubular; margin entire; no operculum; hydranth with conical proboscis; no diaphragm in any of the genera here included.

*Gonosome.* Gonangia closely crowded to form a coppinia mass.

## KEY TO GENERA.

- a Hydrothecæ directly attached to a reticular stolon. *Filillum.*  
 b Hydrothecæ attached to a fascicled stem.  
 c Hydrothecæ free or very slightly adherent. *Lafœa.*  
 cc Hydrothecæ partly immersed in the main portion of the stem but not distally. *Cryptolaria.*  
 ccc Hydrothecæ partly immersed in the stem throughout its whole length. *Grammaria.*

## Genus CRYPTOLARIA.

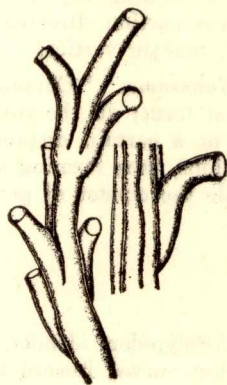
*Trophosome.* Stem strongly fascicled; portion of branches simple; hydrothecæ on the stem more or less immersed, everywhere partly adherent.

*Gonosome.* A coppinia mass.

*Cryptolaria triserialis* Fraser.

*Trophosome.* Stem fascicled, very coarse; hydrothecæ on the stem few in number, appearing singly or in opposite or sub-opposite pairs, the distal half free, curves outward; on the simple portion of the branches the hydrothecæ are arranged in three series.

*Gonosome.* Unknown.



No. 70.

*Cryptolaria triserialis.*

## Genus FILELLUM.

*Trophosome.* A creeping stem gives rise to partly adherent hydrothecæ, the free portion curved upward.

*Gonosome.* A coppinia mass.

*Filellum serpens* (Hassell).

*Trophosome.* Stolon reticular; hydrothecæ adherent from one-half to two-thirds of their length, nearly the same size throughout, not annulated but sometimes transversely striated.

*Gonosome.* Coppinia mass compact; gonangia not so closely placed as in some other species; hydrothecal tubes long and slender.



No. 71.

*Filellum serpens.*

## Genus GRAMMARIA.

*Trophosome.* Stem fascicled, consisting of a hydrothecate axial tube surrounded by a number of peripheral non-hydrothecate tubes; hydrothecæ partly adherent.

*Gonosome.* A coppinia mass.

## KEY TO SPECIES.

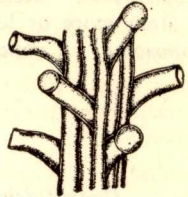
- a* Portion of hydrotheca not immersed, curved outward.  
*b* Portion of hydrotheca not immersed, curved inward.

*G. abietina.*  
*G. gracilis.*

*Grammaria abietina* (Sars).

*Trophosome.* Stem stout, irregularly branched; branches constricted at the base, resembling the main stem in all particulars; a large portion of the hydrotheca extending beyond the outer tubes of the stem, the free portion directed outwards; orifice nearly circular; margin vertical.

*Gonosome.* "Coppinia generally of an irregular or oval form; all the tubes extending radially from it bend at a certain distance from the surface in all directions, thus forming a network, lying like a capsule outside the cluster of gonangia" (Bonnievie).



No. 72.  
*Grammaria abietina.*

*Grammaria gracilis* Stimpson.

"Polypidom slender, with a polished appearance; cells small, elongated, projecting, but curved inward at the extremities, and distant from each other in the very irregular rows; colour dark brown, sometimes black" (Stimpson).

## Genus LAFCEA.

*Trophosome.* Mature stems strongly fascicled and erect; young stems may be simple and creeping; hydrothecæ nearly always entirely free from the stem, never immersed.

*Gonosome.* A coppinia mass.

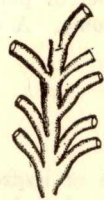
## KEY TO SPECIES.

- |           |   |                       |
|-----------|---|-----------------------|
| <i>a</i>  | No erect or fascicled stem.   | <i>L. pygmæa.</i>     |
| <i>aa</i> | Stem when mature, erect, fascicled.   |                       |
|           | <i>b</i> Hydrothecæ sessile, sometimes slightly adherent at the base.   | <i>L. dumosa.</i>     |
|           | <i>bb</i> Hydrothecæ pedicellate.   |                       |
|           | <i>c</i> Hydrothecæ convex, convex side uppermost.  |                       |
|           | <i>d</i> Hydrothecæ making an angle of less than 45° with the stem or branch, stem not distinguishable from branches. | <i>L. gracillima.</i> |
|           | <i>dd</i> Hydrothecæ making an angle of 45° to 60° with the stem, main stem distinct.                                 | <i>L. fruticosa.</i>  |
| <i>cc</i> | Hydrothecæ symmetrical.   | <i>L. symmetrica.</i> |

*Lafcea dumosa* (Fleming).

*Trophosome.* Mature stem strongly fascicled, erect, coarse, much branched; young stem either erect or creeping over other L. droids; hydrothecæ sessile, usually free from the stem but occasionally those on the distal part of the stem are slightly adherent.

*Gonosome.* The gonangia of the coppinia mass, as seen from the surface, are hexagonal, containing the orifice at the centre; they are closely set out and the elongated hydrothecæ come out at intervals among them.



No. 73.  
*Lafcea dumosa.*

*Lafæa fruticosa* Sars.

*Trophosome.* Stem fascicled, with many large branches regularly arranged; pedicels long with three or four twists, passing out at an angle of  $45^{\circ}$  to  $60^{\circ}$  from the stem; hydrothecæ slightly convex with the lower wall more nearly in line with the pedicel than the upper.

*Gonosome.* Coppinia with long hydrothecæ curved spirally.

*Lafæa gracillima* (Alder).

*Trophosome.* Stem fascicled, very much branched but the main stem is indistinguishable from the branches; hydrothecæ long, tubular, convex, coming off from the stem at an angle of less than  $45^{\circ}$ ; pedicels with one or two twists.

*Gonosome.* Coppinia similar to that of *L. dumosa* but the gonangia as viewed from the surface are more nearly circular than hexagonal.

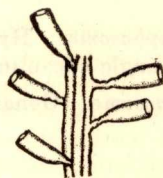
*Lafæa pygmæa* Hincks.

*Trophosome.* Stem creeping; hydrothecæ small, almost symmetrical; pedicels with two or three twists.

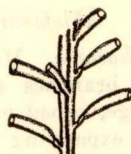
*Gonosome.* Coppinia oval, tubes long, stout, strongly bent, forming a complete network around the gonangia. (According to Broch.)

*Trophosome.* Stem erect, fascicled, irregularly branched hydrothecæ symmetrical, coming off from the stem nearly at right angles; pedicels longer than in other species, with five or six annulations or twists.

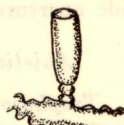
*Gonosome.* "Coppinia with regular hexagonal facets in the middle of which is a tubular opening; the tubes are comparatively few in number, very thick and strong, quite irregularly curved" (Bonnievie).



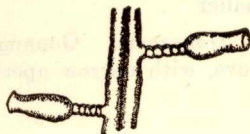
No. 74.  
*Lafæa fruticosa*.



No. 75.  
*Lafæa gracillima*.



No. 76.  
*Lafæa pygmæa*.



No. 77.  
*Lafæa symmetrica*.

## Family SERTULARIDÆ.

*Trophosome.* Hydrothecæ sessile, usually arranged on both sides of the stem or branches and more or less adnate to them.

*Gonosome.* Gonophores producing fixed sporosacs.

## KEY TO GENERA.

- a Hydrothecæ all on one side of the branches, their distal ends alternating right and left. *Hydrallmania*.
- aa Hydrothecæ arranged in two longitudinal rows.
- b Hydrothecæ in opposite pairs. *Sertularia*.
- bb Hydrothecæ alternate.
- c Operculum of one adcauline flap.
- d Hydrothecal aperture small, body flask-shaped. *Abietinaria*.
- dd Hydrothecal aperture large, body not flask-shaped. *Diphasia*.
- cc Operculum abcauline or with more than one flap.
- e Operculum of three or four pieces. *Sertularella*.
- ee Operculum of one or two pieces. *Thuiaria*.
- aaa Hydrothecæ arranged on all sides of the branches. *Selaquinopsis*.

## Genus ABIETINARIA.

*Trophosome.* Hydrothecæ alternate, flask-shaped, aperture small; operculum with a single adcauline flap.

*Gonosome.* Gonangia without spines or internal marsupium.

## KEY TO SPECIES.

- a Much more than one-third of the hydrothecæ free.  
 b Stem stout.  
 bb Stem slender.

*A. abietina.*  
*A. filicula.*

*Abietinaria abietina* (Linnæus).

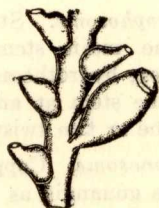
*Trophosome.* Main stem stout, straight or slightly flexuous; branches stout, pinnately arranged; hydrothecæ large, broad at the base, tapering to a distinct neck and expanding again slightly to the round, entire margin; much of the hydrotheca, often more than one-half, free from the stem.

*Gonosome.* Gonangia oval, with a short collar and wide aperture; surface smooth or slightly annulated.

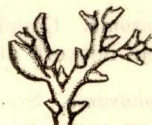
*Abietinaria filicula* (Ellis and Solander).

*Trophosome.* Stem slender, straight proximally, flexuous in the branched portion; branches regularly pinnate, often branched again and sometimes the secondary branches are branched; hydrothecæ sub-opposite, shaped like those of *A. abietina* but much smaller.

*Gonosome.* Gonangia oval, tapering to a neck above, with narrow aperture; surface smooth.



No. 78.

*Abietinaria abietina.*

No. 79.

*Abietinaria filicula.*

## Genus DIPHASIA.

*Trophosome.* Hydrothecæ in two rows on the stem and branches; operculum of a single adcauline flap.

*Gonosome.* Gonangia provided with spines or lobes; an internal marsupium usually present in the female.

## KEY TO SPECIES.

- a Less than one-third of the hydrothecæ free.  
 b More than one-third of the hydrothecæ free.  
 c Hydrothecal margin sinuous not toothed.  
 cc Hydrothecal margin with three prominences; hydrothecæ and gonangia very large.

*D. fallax.**D. rosacea.**D. tamarisca.**Diphasia fallax* (Johnston).

*Trophosome.* Stem erect; branching irregular; branches often terminating in long hooked tendrils; hydrothecæ almost opposite, short, stout, only a small distal portion free; margin sinuous.

*Gonosome.* Gonangia borne in rows on front of branches; male obovate with distal portion quadrangular, constricted to a tubular process for the aperture; female gonangia larger, terminating in four, long-pointed lobes; an internal marsupium present.



No. 80.

*Diphasia fallax.*

*Diphasia rosacea* (Linnæus).

*Trophosome.* Colony delicate; branching irregular; hydrothecæ opposite, long and slender, with at least the distal third free; margin sinuous.

*Gonosome.* Male gonangium long and slender, with tubular neck; female gonangium larger, pyriform, distally terminating in two long and six shorter, pointed lobes, the shorter ones curved to the centre; an internal marsupium present.



No. 81.

*Diphasia rosacea.**Diphasia tamarisca* (Linnæus).

*Trophosome.* Stem, branches and hydrothecæ very stout; hydrothecæ sub-opposite, nearly one-half free; three low elevations are present on the margin.

*Gonosome.* Gonangia both male and female with one diameter greater than the other, obovate, spiny, the female with lobes forming coarse serrations as well, the two distal lobes much elongated.



No. 82.

*Diphasia tamarisca.*

## Genus HYDRALLMANIA.

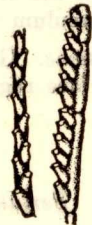
*Trophosome.* Hydrothecæ in groups on the side of the branches, their bases in line but the distal ends curved alternately to right and left; operculum of one adcauline flap.

*Gonosome.* Gonangia without spines or internal marsupium.

*Hydrallmania falcata* (Linnæus).

*Trophosome.* Colony long and slender; main branches spirally arranged and of much the same length; hydrothecæ tubular or very slightly urceolate, arranged in a row on one side of the branch, bases in line, distal portions turned alternately to right and left, five or six to an internode.

*Gonosome.* Gonangium oval, with tubular neck, smooth or with indistinct longitudinal lines.



No. 83.

*Hydrallmania falcata.*

## Genus SELAGINOPSIS.

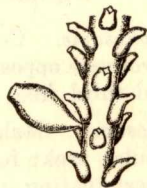
*Trophosome.* Hydrothecæ arranged in more than two longitudinal rows, at least on the branches.

*Gonosome.* Gonangia oval or obovate, smooth or nearly so.

*Selaginopsis mirabilis* (Verrill).

*Trophosome.* Stem stout; branches regularly alternate; hydrothecæ tubular, distal portion free and turned out from the stem, in two rows on the stem and six rows on the branches; margin oval, with two lateral teeth; operculum of two flaps.

*Gonosome.* Gonangia oval, not constricted to form a neck; aperture large, circular; surface smooth.



No. 84.  
*Selaginopsis mirabilis.*

## Genus SERTULARELLA.

*Trophosome.* Hydrothecæ in two rows, alternate, usually with three or four teeth and an operculum of three or four flaps.

*Gonosome.* Gonangia usually supplied with ridges or corrugations.

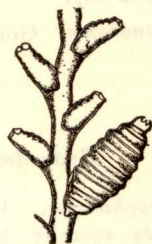
## KEY TO SPECIES.

- |    |   |                         |
|----|---|-------------------------|
| a  | Hydrotheca with four teeth.                               |                         |
|    | b Stem more or less regularly annulated.                  | <i>S. fusiformis.</i>   |
|    | bb Stem not regularly annulated.                          |                         |
|    | c Hydrothecæ annulated or rugose.                         |                         |
|    | d Hydrothecæ decidedly rugose.                            | <i>S. rugosa.</i>       |
|    | dd Hydrothecæ with complete or incomplete annulations.    | <i>S. conica.</i>       |
|    | cc Hydrothecæ smooth.                                     | <i>S. polyzonias.</i>   |
| aa | Hydrothecæ with three teeth, stem lax, hydrothecæ smooth. | <i>S. tricuspidata.</i> |

*Sertularella conica* Allman.

*Trophosome.* Colony small, either unbranched or with a few small branches like the main stem; hydrothecæ nearly tubular, rather distant; annulations complete or on the adcauline side only; margin with four teeth; operculum with four flaps.

*Gonosome.* Gonangia oval; margin with four stout teeth; surface rugose with distinct crests on the rugosities.

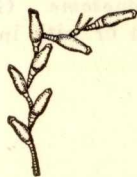


No. 85.  
*Sertularella conica.*

*Sertularella fusiformis* Hincks.

*Trophosome.* "Stem slender, slightly zigzag, generally simple, annulated at the base and below each calycle; hydrothecæ bent in opposite directions, elongate, somewhat flask-shaped, smooth, one to each internode; aperture quadridentate; operculum composed of four pieces, each internode, with its calycle, of a fusiform figure" (Hincks).

*Gonosome.* "Gonothecæ elongate, ovate, slender, ribbed across, produced at the upper extremity into a short neck and toothed" (Hincks).

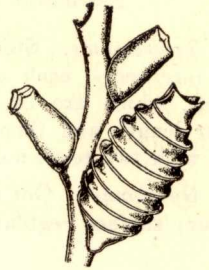


No. 86.  
*Sertularella fusiformis*  
(after Hincks).

*Sertularella polyzonias* (Linnæus).

*Trophosome.* Stem slender; branching irregularly alternate; hydrothecæ alternate, rather distinct, large, tapering but slightly, the distal half or more, free; margin with four teeth; operculum of four flaps.

*Gonosome.* Gonangia large, oval; margin with four stout spines or teeth; surface strongly and regularly rugose.

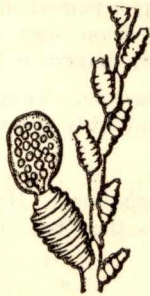


No. 87.  
*Sertularella polyzonias.*

*Sertularella rugosa* (Linnæus).

*Trophosome.* Colony small, stem usually unbranched, constricted at regular intervals; hydrothecæ alternate, rather distinct, fusiform, distinctly rugose; margin with four tentacles; operculum with four flaps.

*Gonosome.* Gonangia oval, rugose; margin with four teeth.



No. 88.  
*Sertularella rugosa.*

*Sertularella tricuspidata* (Alder).

*Trophosome.* Stem slender, lax, branching irregularly alternate or dichotomous; hydrothecæ alternate, very slightly immersed, tubular, sometimes curved; margin with three teeth; operculum with three flaps.

*Gonosome.* Gonangia oval, with strongly crested rugosities; a small, smooth tubular neck bears the aperture.



No. 89.  
*Sertularella tricuspidata.*

## Genus SERTULARIA.

*Trophosome.* Hydrothecæ in two rows, occurring in pairs, which are strictly opposite throughout, or at least on the distal portion of the branches.

*Gonosome.* Gonangia oval or ovate.

## KEY TO SPECIES.

a Stem with opposite branches, the two hydrothecæ of a pair not in contact.

*S. pumila.*

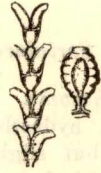
♂ Stem unbranched, the two hydrothecæ of a pair in contact.

*S. cornicina.*

*Sertularia cornicina* (McCrary).

*Trophosome.* Stem unbranched, divided into regular internodes, each of which bears a pair of hydrothecæ, which are in contact for about two-thirds of their length and then turned abruptly outward; margin with two teeth and a two-parted operculum.

*Gonosome.* Gonangia oval, with distinct, short collar; surface regularly annulated.

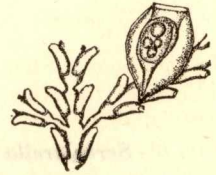


No. 90.

*Sertularia cornicina.**Sertularia pumila* Linnæus.

*Trophosome.* Stem unbranched or with opposite branches; a pair of hydrothecæ to each internode, tubular, free from each other, curved outward, the distal half free; margin with two teeth.

*Gonosome.* Gonangium obovate, with a narrow collar and wide aperture.



No. 91.

*Sertularia pumila.*

## Genus THUIARIA.

*Trophosome.* Hydrothecæ in two rows on stem and branches; hydrothecæ with not more than two teeth; operculum of one abcauline flap or two flaps.

## KEY TO SPECIES.

- a Branches only on two sides of the stem.
  - b Stem long and slender, primary branches much branched. *T. cupressina.*
  - bb Stems shorter and more rigid; branches relatively longer.
    - c Hydrothecæ sub-opposite. *T. similis.*
    - cc Hydrothecæ strictly alternate.
      - d Branches stout and rigid. *T. lonchitis.*
      - dd Branches slender. *T. latiuscula.*
- aa Branches on all sides of the stem.
  - e Distal branches forming a dense tuft.
    - f Hydrothecæ sub-opposite. *T. fabricii.*
    - ff Hydrothecæ definitely alternate.
      - g Primary branches branched dichotomously, all branches short and stiff. *T. thuja.*
      - gg Branches long and less rigid. *T. robusta.*
  - ee Branches on the distal portion of the stem loosely arranged.
    - h Hydrothecæ almost wholly immersed. *T. immersa.*
    - hh Hydrothecæ less than half free. *T. argentea.*
    - hhh Hydrothecæ more than half free. *T. tenera.*

*Thuiaria argentea* (Linnæus).

*Trophosome.* Colonies often growing in clusters, stem slender; branches rise from all sides of the stem but irregularly, these branch dichotomously; hydrothecæ usually definitely alternate but occasionally sub-opposite, rather distant, curved gradually outward, nearly one-third free; margin with two teeth, one often larger than the other; operculum with two flaps.

*Gonosome.* Gonangia long-obovate, usually with two shoulder spines; collar short.



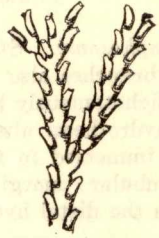
No. 92.

*Thuiaria argentea.*

*Thuiaria cupressina* (Linnæus).

*Trophosome.* Colonies clustered; stem long, flexuous; branching alternate but not always exactly in the same plane; branches branch dichotomously and these branches again do so; hydrothecæ alternate, short, the free portion, about one-third, divergent, narrowed towards the margin; margin bi-labiate; operculum with two flaps.

*Gonosome.* Gonangia obovate or triangular, with two shoulder spines; collar short.



No. 93.

*Thuiaria cupressina.**Thuiaria fabricii* (Levinsen).

*Trophosome.* Stem erect, rather rigid, branches on all sides of the stem, distally forming a dense tuft; repeated dichotomous branching; hydrothecæ sub-opposite, narrowing slightly from base to margin, about one-third free; margin with two teeth; operculum with two flaps.

*Gonosome.* Gonangia borne in two rows on the branches, oblong or obovate, with circular aperture and two shoulder spines.

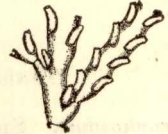


No. 94.

*Thuiaria fabricii.**Thuiaria immersa* Nutting.

*Trophosome.* Stem long, flexuous, branches coming out on all sides in a loose spiral arrangement; main branches sparingly dichotomously branched; hydrothecæ alternate, almost entirely immersed, tapering from base to margin.

*Gonosome.* Unknown.

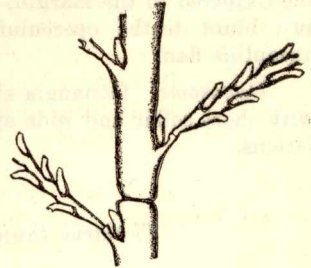


No. 95.

*Thuiaria immersa.**Thuiaria latiuscula* (Stimpson).

*Trophosome.* Main stem stout, rigid, much larger than the slender, alternate branches, that are not again branched; hydrothecæ slender, tubular, tapering to the margin, about one-fourth free.

*Gonosome.* Unknown.

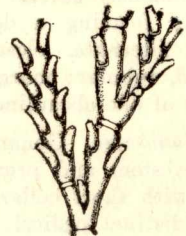


No. 96.

*Thuiaria latiuscula.**Thuiaria lonchitis* (Ellis and Solander).

*Trophosome.* Main stem stout, rigid; branching pinnate; branches stout, stiff, white, not again branched; hydrothecæ alternate, tubular, but little tapered, about one-fourth free.

*Gonosome.* "Gonangia borne on upper side of branches, long, slender, with a round aperture, narrow collar and operculum" (Nutting).



No. 97.

*Thuiaria lonchitis.*

*Thuiaria robusta* Clark.

*Trophosome.* Stem stout, with deeply cut internodes; branches also stout, rising from all sides of the stem, dichotomously branched, distally forming a dense tuft; hydrothecæ alternate, not closely placed, almost wholly immersed in the proximal portions, less so distally, tubular; margin bi-labiate; operculum with two flaps on the distal hydrothecæ and one on the proximal.

*Gonosomè* "Gonangia borne in rows on the terminal branchlets, slender, with a terminal collar and aperture and two long curved spines rising from the antero-lateral corners of the shoulders" (Nutting).

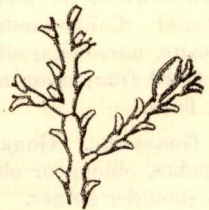


No. 98.

*Thuiaria robusta.**Thuiaria similis* (Clark).

*Trophosome.* Colony bilateral, with the stem very distinct and much stouter than the branches; hydrothecæ sub-opposite, slender, tubular, tapering very little, distal portion free and turned well outward; margin with two distinct teeth; operculum with two flaps.

*Gonosome.* Gonangia fusiform, short collar, circular aperture; no spines or annulations.



No. 99.

*Thuiaria similis.**Thuiaria tenera* (Sars).

*Trophosome.* Stem slender; branching loose from all sides of the stem; branches dichotomously branched; hydrothecæ alternate, distant, enlarged above the base, then tapered to the margin, one-half free; margin with two blunt teeth; operculum with two flaps or one abcauline flap.

*Gonosome.* Gonangia single on the branches, oval, with short collar and wide aperture; no spines or annulations.

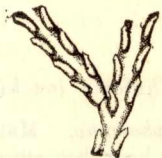


No. 100.

*Thuiaria tenera.**Thuiaria thuja* (Linnæus).

*Trophosome.* Main stem rigid, not very stout, branches from all sides of the stem, stiff, branching dichotomously several times; ultimate branches rigid, distally forming a dense tuft (bottle brush); hydrothecæ alternate, closely placed, almost wholly immersed, tubular; margin without distinct teeth; operculum of one abcauline flap.

*Gonosome.* Gonangia in rows that may be crowded on the stem and proximal portions of the branches, oval, with short collar and large terminal aperture; a short distinct pedicel; surface without annulations or spines.



No. 101.

*Thuiaria thuja.*

## Family PLUMULARIDÆ.

*Trophosome.* Hydrothecæ growing only on one side of the branches (hydrocladia), sessile, more or less adnate; nematophores always present.

*Gonosome.* Gonophores producing fixed sporosacs, which are often protected by special modifications of the branches.

## KEY TO GENERA.

- A. Statoplean forms, i.e., those with fixed nematophores that are usually monothalamic.
- a Gonangia protected by branchlets, each of which is an appendage of a hydrocladium (phylactogonium).
  - b Cauline nematophores not crenulated, phylactogonia not jointed. *Cladocarpus.*
  - bb Cauline nematophores crenulated, phylactogonia jointed. *Aglaophenopsis.*
  - aa Gonangia protected by corbulæ, each of which is a modified hydrocladium. A hydrotheca at the base of each gonangial leaf. *Thecocarpus.*
- B. Eleutheroplean forms, i.e., those with movable nematophores that are usually bithalamic.
- c Gonangia not specially protected.
  - d Hydrocladia pinnately arranged. *Plumularia.*
  - dd Hydrocladia in whorls or scattered over the stem. *Antennularia.*
  - cc Gonangia protected by phylactogonia, hydrocladia branched. *Schizotricha.*

## Genus AGLAOPHENOPSIS.

*Trophosome.* "Stem usually fascicled; hydrocladia with numerous internal septal ridges; hydrocladium margin toothed; nematophores with crenulated margin" (Nutting).

*Gonosome.* "Gonangia protected by special appendages, growing from the proximal joint of the hydrocladia and apparently of the nature of greatly modified mesial nematophores of the proximal hydrothecæ" (Nutting).

*Aglaophenopsis cornuta* (Verrill).

*Trophosome.* Colony branched repeatedly, each branch and hydrocladium at right angles to that from which it springs; stem fascicled; hydrocladia growing on an anterior tube; internodes with about six strong septal ridges and an external longitudinal ridge; hydrothecæ obconical, with a large anterior wing-like keel; margin with five small teeth on each side; intrathecal ridge small, oblique; supracalcine nematophores long, tubular, with crenulated margin; mesial nematophore nearly straight, spur-like, margin crenulated; three cauline nematophores to each node. (From Nutting's description.)

*Gonosome.* "Gonangia borne on the terminal branchlets, oblong-oval, with latero-terminal apertures; protective appendage unbranched or bifurcated, borne at the side of the proximal hydrotheca on each hydrocladium, having a hydrotheca at its distal end, and two when it is forked; there is an axial cavity divided by numerous septal ridges" (Nutting).



No. 102.  
*Aglaophenopsis cornuta*  
(after Nutting).

## Genus ANTENNULARIA.

*Trophosome.* Hydrocladia arranged in whorls or scattered over the stem.

*Gonosome.* Gonangia unprotected.

## KEY TO SPECIES.

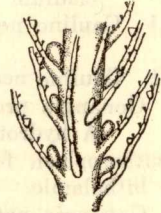
- a Proximal hydrothecæ not divided from stem by nodes.  
 b Proximal hydrothecæ divided from stem by two nodes.

*A. americana*  
*A. antennina*

*Antennularia americana* Nutting.

*Trophosome.* Stem slender, hydrocladia usually in whorls of four; proximal hydrothecæ on a long process from the stem, one or two intermediate internodes; between each two succeeding hydrothecate internodes; hydrothecæ cup-shaped; two nematophores above the hydrotheca, one below, two on the intermediate internodes, two on the shoulder that supports the hydrocladium, cauline nematophores scattered.

*Gonosome.* Gonangia borne at the base of the hydrocladia, oblong-oval, aperture latero-terminal.

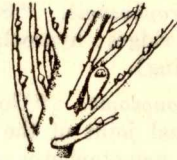


No. 103.  
*Antennularia americana.*

*Antennularia antennina* (Linnæus).

*Trophosome.* Stems clustered, slender; hydrocladia whorled, short, incurved; internodes alternating with and without hydrothecæ, the former nearest the stem; hydrothecæ cup-shaped; nematophores similarly placed to those in *A. americana*.

*Gonosome.* Gonangia produced singly, in the axils of the hydrocladia, obovate, with latero-terminal aperture.



No. 104.  
*Antennularia antennina.*

## Genus CLADOCARPUS.

*Trophosome.* Hydrothecæ deep with the margin smooth or with low, blunt teeth; mesial nematophores short.

*Gonosome.* Gonangia borne on the stem, at the base of the hydrocladia, protected by processes (phylactogonia) springing from the base of the hydrocladia; these have nematophores but no hydrothecæ.

## KEY TO SPECIES.

- a Hydrothecæ without teeth.  
 b Hydrothecæ with two large, rounded, anterior teeth and shallow lateral teeth.

*C. pourtalesi.*  
*C. speciosus.*

*Cladocarpus pourtalesi* Verrill.

*Trophosome.* Stem fascicled, irregularly branched, the anterior tube bearing the hydrocladia; hydrocladia closely approximated, alternate, divided into regular, short internodes, each with three or four septal ridges; hydrothecæ closely approximated, broader towards margin; margin entire; intrathecal ridge short, curved sharply upward; supracalyceine and mesial nematophores stout, cauline nematophores numerous. (From Nutting's description.)

*Gonosome.* "Gonangia oblong-ovate, with lunate, sub-terminal aperture, borne on an unbranched phylactogonium springing from the side of the base of the proximal hydrotheca of the hydrocladium; there are from one to five gonangia to each phylactogonium" (Nutting).



No. 105.

*Cladocarpus pourtalesi*  
(after Nutting).*Cladocarpus speciosus* Verrill.

*Trophosome.* Stem fascicled, distal portion simple, divided into long internodes, each with a hydrocladium from near the middle; hydrocladial internodes with seven septal ridges; hydrothecæ short, widening from base to margin; margin with two rounded anterior teeth and four or five shallow teeth on each side; intrathecal ridge low, straight, horizontal; supracalyceine nematophores and mesial, with crenulated margin, cauline nematophores four to each internode. (From Nutting's description.)

*Gonosome.* "Gonangia not known, phylactogonia branched, arising from the side of the proximal hydrothecæ and not morphologically a modified mesial nematophore, the latter being present" (Nutting).



No. 106.

*Cladocarpus speciosus*  
(after Nutting).

## Genus PLUMULARIA.

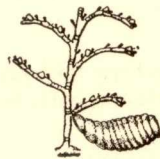
*Trophosome.* Hydrocladia unbranched, pinnately arranged, each having more than one hydrotheca; hydrothecæ with entire margin; all nematophores movable.

*Gonosome.* Gonangia without extra protection.

*Plumularia setaceoides* Bale.

*Trophosome.* Stem simple, unbranched, divided into regular internodes, each of which gives off a hydrocladium distally; two to four annulations above each node; hydrocladia slender, recurved; non-hydrothecate and hydrothecate internodes alternating, each with two or three internal ridges; hydrothecæ cup-shaped, about one-third free; supracalyceine nematophores present, one nematophore below the hydrotheca, one on each intermediate internode, one in the axil of each hydrocladium and one on each cauline internode.

*Gonosome.* Gonangia very large, on the face of the stem at the base of the hydrocladium, obovate, curved, truncate, several distinct, though not deep corrugations.



No. 107.

*Plumularia setaceoides*.

## Genus SCHIZOTRICHA.

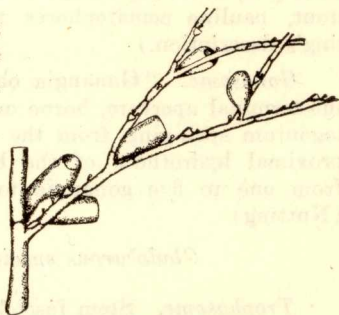
*Trophosome.* Colony simple, branched, with hydrocladia pinnately arranged.

*Gonosome.* Gonangia springing from the stem, branch or hydrocladium, not directly protected.

*Schizotricha gracillima* (G. O. Sars).

*Trophosome.* Stem fascicled, sparingly branched; branches fascicled proximally; each hydrocladium, one to an internode, usually branched dichotomously, one, two or three times; few intermediate internodes; hydrothecæ small, cup-shaped, about as wide as deep; nematophores large, a supracalcine pair, three or four mesial on each internode, one in the axil of each hydrocladium and others scattered over the stem. (From Nutting's description.)

*Gonosome.* "Gonangia borne in pairs on the stem near the axils of the hydrocladia, and also at the forkings of the latter; they are cylindrical in shape, tapering at the proximal end and almost sessile, the pedicel being much reduced" (Nutting).



No. 108.  
*Schizotricha gracillima*  
(after Nutting).

## Genus THECOCARPUS.

*Trophosome.* Stem fascicled; hydrothecæ with one or two large, anterior teeth, the others small.

*Gonosome.* Corbulæ composed of widely separate leaves, each bearing a hydrotheca near its base.

*Thecocarpus myriophyllum* (Linnæus).

*Trophosome.* Stem fascicled, swollen at intervals, but slightly branched; hydrocladia alternate, closely approximated; hydrothecæ deep, cylindrical, with one large anterior tooth; supracalcine and mesial nematophores small; cauline nematophores numerous but small.

*Gonosome.* Corbulæ open, some distance from the stem, each with a hydrotheca near its base and a row of nematophores along its distal leaflet.



No. 109.  
*Thecocarpus myriophyllum.*