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SYNOPSES OF NORTH-AMERICAN INVERTEBRATES.

XIV. The Hydromedusæ — Part II.

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The Campanulariæ (Calyptoblastea).

The Campanulariæ are distinctively colonial Hydromedusæ, many of them most exquisitely beautiful and graceful forms. In size they vary from very minute forms barely visible to the unaided eye, to forms like Halecium, measuring from twelve to twenty inches or more in height. The hydranths are provided with specialized receptacles, hydrothecæ, into which they are capable of more or less complete retraction. Gonophores are produced by budding, and are provided with specialized receptacles, gonangia, similar in morphological features to the hydrothecæ. The gonophores may be liberated as free medusæ, or may remain fixed as medusoids, the sexual products maturing within the gonangium and later escaping as free larvæ or planulæ. When free, the medusæ are known as Leptomedusæ, characterized generally by a low, flat bell, marginal sense organs usually of the vesiculate type, with the gonads usually borne along the underside of the radial canals.

A classification of the Campanularidæ is almost, if not quite, impossible without the presence of the gonosome, which in many genera is the most distinctive differentiating feature. In the following synopsis this feature will be in constant requisition, and where it is absent in specimens the student is admonished as to the doubtful character of purely morphological determinations.

SYNOPSIS OF FAMILIES.

CAMPANULARIDÆ. Hydrothecæ campanulate, terminal, borne on distinct pedicels ; gonophores fixed or free-swimming. Hydranths with large and somewhat trumpet-shaped hypostome.

LAFŒIDÆ. Hydrothecæ deep tubular, sessile or pedicellate ; hydranths with conical hypostome.

HALECIDÆ. Hydrothecæ usually reduced to shallow, disk-like receptacles (hydrophores). Hydranths with conical hypostome. Gonophores as imperfectly developed medusoids.

SERTULARIDÆ. Hydrothecæ borne in double rows, adnate to hydrocaulus. Gonophores sessile.

PLUMULARIDÆ. Hydrothecæ arranged in single row only on side of hydrocaulus.

CAMPANULARIDÆ.

Synopsis of the Genera.

CLYTIA. Stems simple or rarely branched. Hydrothecæ deeply bell-shaped, with toothed margins, borne on long pedicels. Gonangia producing free medusæ having four marginal tentacles.

OBELIA. Stems regularly branched, hydrothecæ bell-shaped, with entire margins. Gonangia borne on stems and branches and producing free medusæ having numerous marginal tentacles.

CAMPANULARIA. Stems simple or branched. Hydrothecæ campanulate, with margins entire or variously toothed. Gonangia, medusæ as mere sporosacs, within which the sexual products develop and escape as free planulæ.

GONOTHYRÆA. Stems branching ; hydrothecæ campanulate and with toothed margins. Gonangia producing well-developed medusoids, which, while often furnished with tentacles and capable of protruding beyond the orifice of the gonangium, never become free, thus exhibiting an interesting intermediate stage between the first two genera and Campanularia.

Clytia Lamx. (in part).

Generic characters : Stem usually simple, attached by creeping hydrorhiza. Hydrothecæ devoid of operculum. Gonangia produced from stem or hydrorhiza and borne on pedicels which are usually beautifully annulated. Gonosome. Medusæ deeply bell-shaped and with four marginal tentacles when first liberated. Otocysts eight, two in each interradius. Both these and the tentacles increase in number with the age of the medusa.

1, *C. bicophora* Ag. (Fig. 16).

Trophosome : Colony rarely attaining a height of more than an inch, composed of simple or sparingly branched stems. Hydrothecæ deeply bell-shaped and numerously and sharply toothed, borne on elongate pedicels which have terminal annulations.

Gonosome : Gonangia symmetrically annulated and usually arising from the hydrorhiza. Medusæ when first liberated of hemispherical shape and with four tentacles and eight otocysts.

Habitat : Usually on fucus, occasionally on shells or other hydroids.

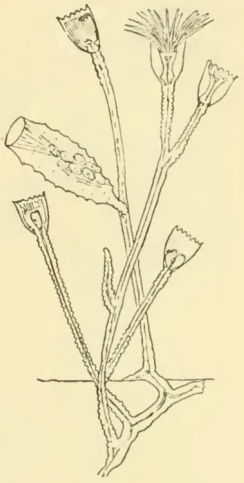

Fig. 16. — *Clytia bicophora* Ag. (After Agassiz.)

2, *C. cylindrica* Ag.

(*Cont. Nat. Hist. U. S.*, vol. iv.)

Trophosome : Stems simple, hydrothecæ tubular, small, deep, with sharply pointed teeth. Pedicels short, with proximal and distal annulations.

Gonosome : Gonangia oblong, somewhat flattened, devoid of annulation, producing free medusæ.

Habitat : Similar to last species.

3, *C. grayi* Nutting.[1]

Trophosome : Stem simple or irregularly branched, strongly annulated except in middle branch. Hydrothecæ very large, cylindrical. Numerous marginal teeth, rounded and not deeply cut. Hydranth with about twenty tentacles.

Gonosome : Gonangia oblong, conspicuously and regularly annulated, attached to creeping rootstocks.

Habitat : Growing on living worm tubes, composed of sand. Dredged from depth of 31 fathoms. The largest Clytia yet found in American waters.

Obelia Peron and Leseur.

Generic characters : Colony often plant-like, of whitish color, attached by creeping hydrorhiza ; hydrothecæ campanulate and devoid of operculum. Gonangia borne on stems and branches, producing free medusæ characterized by numerous marginal tentacles, four radial canals, and eight otocysts symmetrically disposed on the inner margin of each interradial quadrant.

[1] Condensed from Professor Nutting's original description.

1, *O. commisuralis* McCr. (FIG. 17).

Trophosome: Colony long, slender, profusely branching, branches spreading in graceful curves on each side of the main stem, which may attain a height of six to eight inches.

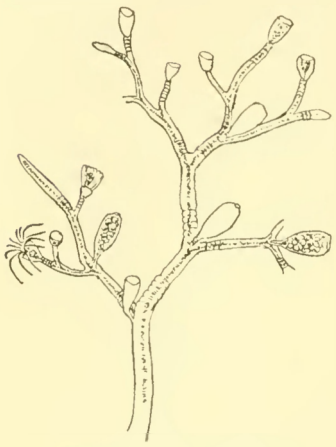

FIG. 17.—*Obelia commisuralis* McCr. (After Agassiz.)

Gonosome: Gonangia elongate, slender, obconical, opening by terminal, circular orifice arising from the base of the cone on a short conical neck. Medusæ when first liberated have sixteen marginal tentacles, four radial canals, beneath which later the gonads develop.

2, *O. dichotoma* Linn.

Trophosome: Colony rather small, stem slender, irregularly branched, annulated just distal to origin of branches, the latter annulated at irregular intervals. Hydrothecæ large, deeply campanulate, borne on annulated pedicels.

Gonosome: Gonangia axillary, slender and smooth, somewhat obconical, and similar to those of former species. Medusæ with sixteen tentacles, manubrium somewhat trumpet-shaped.

3, *O. flabellata* Hincks.

Trophosome: Stem filiform, alternately branching, giving the stem a somewhat zigzag character. Both stem and branches variously annulated. Hydrothecæ alternate, short, widely open and with entire margins, borne on tapering annulated pedicels.

Gonosome: Gonangia axillary, obovate, with tubular orifice. Medusæ?

4, *O. geniculata* Linn. (FIG. 18).

Trophosome: Colony inconspicuous, rarely attaining a height of more than an inch. Stem somewhat zigzag in form as in former species, but apparently jointed at each bend. Hydrothecæ obconical, rather short, with plain orifice, borne on short annulated pedicels.

Gonosome: Gonangia axillary, urceolate, borne on short pedicels. Medusæ discoid, with twenty-four tentacles when liberated, greatly increasing in number with age.

Habitat: Common along Massachusetts and north Atlantic coast, on Fucus and Laminaria.

5, *O. gelatinosa* Pallas.

Trophosome: Stems fascicled, rising from a fibrous hydrorhiza to a height of eight to ten inches. Branches opposite in pairs, which alternate with each other in vertical arrangement, presenting a verticillate appearance. Hydrothecæ small, borne on long slender, ringed pedicels, and having notched margins of a somewhat castellated form.

Gonosome: Gonangia axillary, ovate, flattened at distal end and provided with raised orifice. Medusæ with sixteen tentacles when liberated from gonangium.

6, *O. longissima.*

7, *O. bicuspidata.*

8, *O. bidentata.*

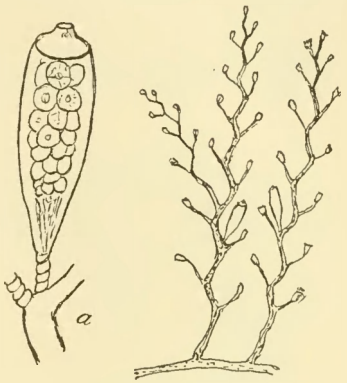

FIG. 18.—*Obelia geniculata* Linn. *a*, gonangium of same enlarged.

Species 6, 7, 8 are listed from Professor Nutting's records, but have not been taken by the present writer.

Campanularia Lamx. (in part).

The generic characters are fairly explicit under the synopsis of genera.

1, *C. caliculata* Hincks.

(Clytia poterium Ag.)

Trophosome: Stem simple, of variable length, bearing a single hydrotheca which is campanulate, with entire margin, and with a thick wall forming a sort of diaphragm within the lower part, thus giving the appearance of a double-walled cup.

Gonosome: Gonangia irregular, oval in shape, with undulating outline and with wide circular aperture. Medusoids extremely degenerate. Larvæ escaping as free-swimming planulæ.

Habitat: Massachusetts Bay, Nahant, Nova Scotia, on seaweed, etc.

2, *C. hincksii* Alder.

Trophosome: Stems rather long, mostly simple; hydrothecæ large, deep, almost tubular, the margins scalloped with castellated teeth.

Gonosome: Gonangia ovate, elongate, somewhat narrowed toward extremity, irregularly annulated throughout, borne on short, smooth pedicels. Medusoids degenerate; ova forming a central mass within the capsule.

3, *C. volubilis* Linn.

Trophosome: Stems usually simple, long and somewhat twisted. Hydrothecæ deep and sub-tubular, margins with shallow undulations.

Gonosome: Gonangia flask-shaped, smooth, with an elongate neck borne on short pedicels.

Habitat: Frequently found growing upon other hydroids, usually in deep water. Gulf of St. Lawrence, Massachusetts coast, etc.

4, *C. neglecta* Alder.

Trophosome: Stems regularly branched, delicate, filiform, branches pinnate, both stem and branches more or less annulated. Hydrothecæ narrow, deep, borne on annulated pedicels and with marginal teeth bimucronate.

Gonosome: Gonangia axillary or on short pedicels which are annulated, pear-shaped.

The colony is very minute and inconspicuous.

5, *C. verticillata* Linn.

Trophosome: Colony composed of erect, fascicled stems, irregularly branched. Hydrothecæ bell-shaped, rather large, deep, with from ten to twelve teeth about the margins, borne on annulated pedicels.

Gonosome: Gonangia flask-shaped, smooth, borne on short pedicels and terminating in narrow orifice.

FIG. 19.—*Campanularia amphora* Ag. (After Agassiz.)

6, *C. amphora* Ag. (FIG. 19).

Trophosome: Colony resembling in general aspects that of *Obelia commisuralis*, attaining in some cases a height of four to six inches. Hydrothecæ campanulate, with entire margins, borne on annulated pedicels.

Gonosome: Female gonangia elongate, somewhat obconical, borne on short annulated pedicels and opening by a terminal aperture. Male gonangia elongate, oval or spindle-shaped. Medusoids more or less degenerate, never becoming free; the male, according to Agassiz, attaining a higher stage of development than the female. The embryo escapes from the gonangium as a free-swimming planula.

7, *C. angulata* Hincks (Fig. 20).

Trophosome: Stems slender, slightly branched, strongly geniculate or undulate in habit. Hydrothecæ alternate, campanulate, with entire margins, borne on long slender pedicels which arise at each flexure of the stem or branch.

Gonosome: Gonangia somewhat ovate, obscurely wrinkled, and terminated by a broad aperture. Colony small, varying from ½ to ¾ inch.

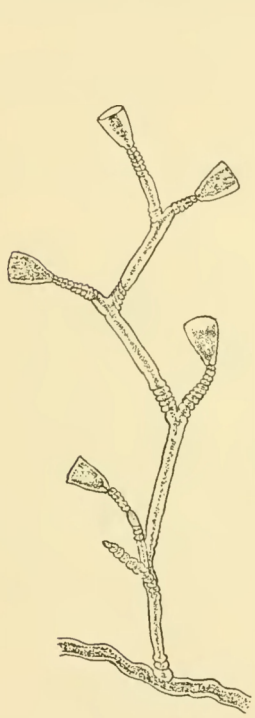

Fig. 20.

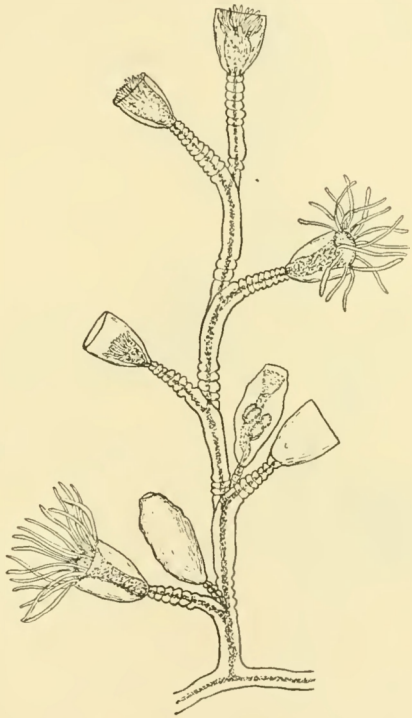

Fig. 21.

Fig. 20. — *Campanularia angulata* Hincks. (After Hincks.)
Fig. 21. — *Campanularia flexuosa* Hincks. (After Hincks.)

8, *C. flexuosa* Hincks (Fig. 21).

Trophosome: Stem flexuous, irregularly branched, annulated near the base and above the origin of branches. Hydrothecæ large, subcampanulate with plain margins, borne on long annulated pedicels.

Gonosome: Gonangia axillary, large, elongate, smooth, and borne on short annulated pedicels. Male gonangia sensibly smaller.

Professor Nutting has recorded the following species of which I have no data, and which therefore are merely noted.

C. minuta; *C. Edwardsii* Nutting; *C. calceolifera.*

Gonothyræa Allman.

1, *G. lovéni* Allman (FIG. 22).

Trophosome: Stems erect, somewhat flexuous, irregularly branched, and with annulations above each branch. Hydrothecæ deeply bell-shaped and with toothed margins, borne on short annulated pedicels.

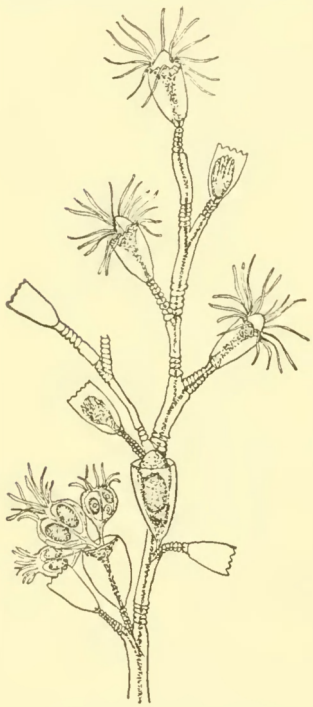

FIG. 22. — *Gonothyræa loveni* Allman. (After Hincks.)

Gonosome: Gonangia borne on short annulated pedicels, axillary, broadly obconical in outline.

Habitat: On fucus and other algæ, rocks, etc. Cold Spring Harbor, Woods Holl, etc.

2, *G. hyalina* Hincks.

Trophosome: Colony elongate, clustered, profusely branched, with flexuous stems giving off branches at each bend, "Branches erect, very tender and hyaline, sometimes of great length and much ramified." Hydrothecæ elongate, of delicate texture, with numerous marginal teeth and borne on annulated pedicels.

Gonosome: Gonangia oval, axillary, borne on annulated pedicels.

Habitat: On various hydroids, Tubularia, Halecium, etc. (Hincks).

3, *G. tenuis* Clark.

Noted from Nutting's list.

LAFŒIDÆ.

This family has been variously modified of late and by some replaced entirely. In the present synopsis I have chosen to follow in general the classification of Hincks, though recognizing its doubtful reliability in some respects.

Lafœa Lamx.

Stems simple or fascicled, attached by filiform hydrorhiza. Hydrothecæ tubular, with or without operculum. Gonangia oblong, often forming encrusting masses about the stem.

1, *L. dumosa* Flem. (Fig. 23).

Trophosome: Stem creeping, sometimes erect and fascicled; hydrothecæ tubular, margins devoid of teeth or operculum, usually sessile.

Gonosome: (?)

2, *L. calcarata* A. Ag. (Fig. 24).

Trophosome: Stems creeping, simple; hydrothecæ tubular, sessile.

Gonosome: Gonangia large, elongate, obovate or oblong, somewhat resembling those of certain campanularians. Medusæ large, transparent, with

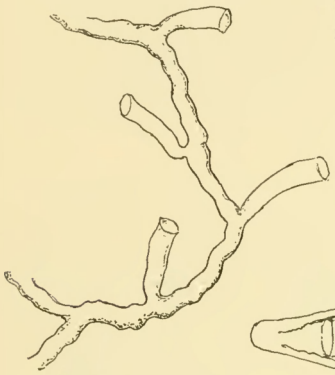

Fig. 23.

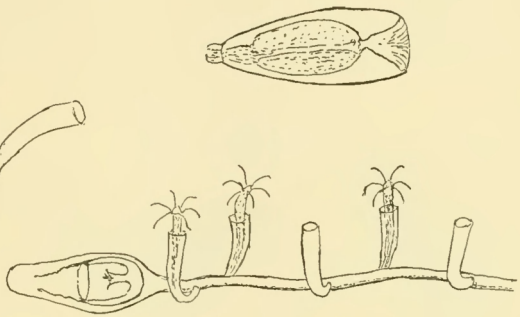

Fig. 24.

Fig. 23.—*Lafœa dumosa* Flem. (After Hincks.)
Fig. 24.—*Lafœa calcarata* A. Ag. (Adapted from A. Agassiz.)

gonads suspended in folds beneath the radial canals; marginal tentacles numerous in mature specimens, only two when first set free.

Habitat: Usually parasitic upon sertularian hydroids.

3, *L. pygmæa* Alder.

Trophosome: Stem creeping; hydrothecæ minute, tubular, elongate, borne on very short annulated pedicels.

Gonosome: (?)

Habitat: Parasitic on various hydroids.

Halecidæ.

Of this family a single genus comes within the range of this synopsis: namely, the type genus, Halecium (Oken), the characters of which may be summarized as follows:

Trophosome: Colony more or less branched, attached by a creeping hydrorhiza. Hydrothecæ often shallow and disk-like, or funnel-shaped (hydrophores). In many species with double or triple margins due to

subsequent secretions as the hydranth grows, leaving the old hydrophore. In many cases the everted rim has on its inner margin a circle of small bright dots which are rather characteristic of the genus. Hydranths imperfectly retractile, elongate, and with conical hypostome.

Gonosome: Gonangia of varying aspects, showing distinctive differences between male and female and affording easy means of distinguishing the sexes. Medusoids imperfectly developed, never free.

1, *H. halecinum* Linn. (FIG. 25).

Trophosome: Colony erect, rather rigid, subflabellate in form. Hydrothecæ alternate, somewhat tubular in form, and with everted rims.

Gonosome: Gonangia borne in a series on the upper side of the branches; those of the male elongate, slender, somewhat spindle-shaped, tapering below

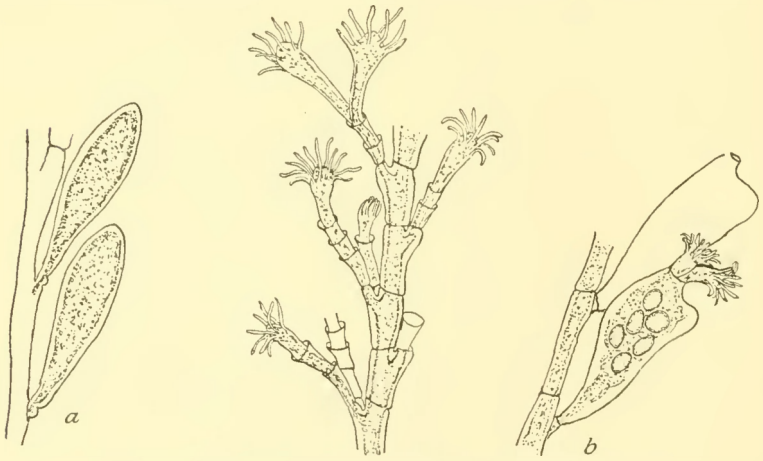

FIG. 25.—*Halecium halecinum* Linn. *a*, male; *b*, female gonangia of same (enlarged). (After Hincks.)

to their attachment by very short, slightly ringed pedicels. Female gonangia somewhat oblong, broader toward the distal end, and with tubular aperture nearer one margin.

2, *H. beanii* Johnston.

Trophosome: Colony of delicate, graceful form, somewhat dendritic, attaining a height of about two inches. Hydrothecæ with everted rims.

Gonosome: Gonangia arising from near the base of hydrothecæ; male, elongate oval; female, somewhat curved, with the aperture situated near the middle of the upper side.

3, *H. tenellum* Hincks.

Trophosome: Colony minute, extremely delicate; stems slender, often strongly annulated, branching irregularly. Hydrothecæ funnel-shaped and with everted margins.

Gonosome: Gonangia ovate, pedicellate.

4, *H. muricatum* Ell. and Sol.

Trophosome: Colony stout, dendritic, profusely branched, and with joint-like divisions, alternately from below which the hydrothecæ arise.

Gonosome: Gonangia ovate, borne on short pedicels, roughly marked with linear ridges of spinous processes.

Eastport, Me. (Verrill).

SERTULARIDÆ.

Synopsis of Genera.

SERTULARIA. Colony plant-like, stems more or less branching, jointed, attached by creeping hydrorhiza. Hydrothecæ in double rows, strictly opposite, usually devoid of operculum. Gonangia with plain margins.

SERTULARELLA. Colony resembling somewhat the former. Hydrothecæ in double rows, but distinctly alternate, with toothed margins and with an operculum composed of several pieces. Gonangia strongly annulated throughout, slightly dissimilar in the two sexes.

DIPHASIA. Colony more or less branching, stem jointed, hydrothecæ opposite, a pair to each internode and often with a valve-like operculum. Gonangia scattered, differing in shape in the two sexes, those of female large, often divided into segments above, male smaller and with central tubular aperture.

THUIARIA. Stem somewhat plant-like, jointed; hydrothecæ in double series sub-opposite, but deeply immersed in the substance of stem and branches.

HYDRALLMANIA. Stems flexuous or somewhat spirally inclined. Hydrothecæ alternate, placed on front of branches, and curved alternately to right and left.

Sertularia Linn.

Generic characters given above.

1, *S. pumila* Linn. (FIG. 26).

Trophosome: Stems straight or slightly curved, simple or branched; branches opposite; both stem and branches divided into short internodes, each bearing a pair of hydrothecæ, the latter opposite, tubular, and somewhat contracted toward the aperture, which faces outward and is more or less cleft or notched.

Gonosome : Gonangia more or less oval, sessile, with marginal rim. Male gonangia somewhat more slender, and regular in outline.

Habitat : One of our commonest sertularians, found attached to fucus, etc., between tide marks and in tide pools.

2, *S. cornicina* McCr.

Trophosome : Colony very small, composed chiefly of unbranched stems, which rarely attain a height of more than ½ inch. Hydrothecæ appearing as lateral emarginations with slightly divergent apertures. Hydranths slender, with about sixteen tentacles.

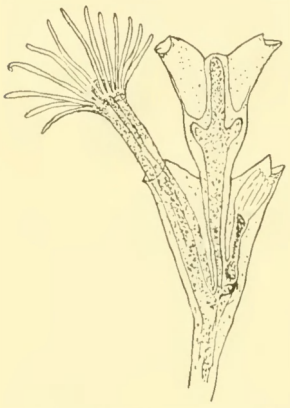

FIG. 26. — *Sertularia pumila* Linn. (After Agassiz.)

Gonosome : Gonangia ?

The above description is condensed and modified from that of McCrady (*Proc. Elliott Soc.*, Vol. I, p. 204).

3, *S. argentea* Ell. and Sol.

Trophosome : Colony of bushy and slightly wavy stems, perisarc dark and horny; branching, alternate, and somewhat dichotomous. Hydrothecæ short, urn-shaped, tapering toward the free and divergent aperture, which is small and oblique.

Gonosome : Gonangia broad, obovate, tapering toward the base ; aperture circular, and usually with two divergent spines.

Habitat : Usually from deeper waters, growing on shells, stones, etc., sometimes found near tide marks. Recorded from various points along the New England coast.

4, *S. cupressina* Linn.

Trophosome : Colony slender, elongated. Stems rather stout and straight, alternately branched and dichotomously sub-branching. Hydrothecæ tubular, transparent, somewhat alternate, and adherent throughout most of their length, slightly divergent toward the aperture, which is wide and bilabiate.

Gonosome : Gonangia elongate, tapering toward base, and with prominent spine at each side of the aperture, which is slightly raised and central.

Habitat : Less abundant than the former species, though with similar distribution.

Sertularella Gray.

Generic characters given in above synopsis.

1, *S. rugosa* Linn.

Trophosome : Colony small, simple, or sparingly and irregularly branched ; stems annulated. Hydrothecæ crowded, strongly annulated transversely, and with four marginal teeth.

Gonosome : Gonangia large, ovate, strongly annulated, and with a four-toothed aperture.

2, *S. gayi* Lamx.

Trophosome : Stems erect, with alternate branches, somewhat obliquely jointed. Hydrothecæ somewhat urn-shaped, one to each internode, usually wrinkled, and with narrower, divergent, four-toothed aperture.

Gonosome : Gonangia elongate, ovate, tapering toward the small, two-toothed aperture. Usually strongly annulated in upper portion, the lower smooth.

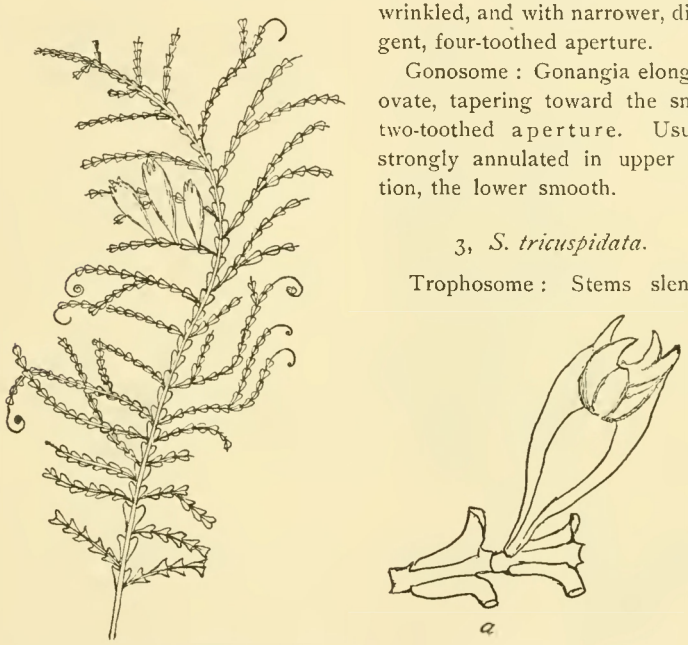

FIG. 27.—*Diphasia fallax* Johnst. (After Hincks.) *a*, ♀ gonangium of same (enlarged).

3, *S. tricuspidata.*

Trophosome : Stems slender, alternately branched, often bipinnate near the ends. Hydrothecæ cylindrical, smooth, slightly everted, with a three-toothed orifice.

Gonosome : Gonangia large, with strongly transverse ridges and with a plain, funnel-shaped opening.

Diphasia Ag.

1, *D. fallax* Johnston (FIG. 27).

Trophosome : Stems thick, sparingly branched, branches alternate, often terminating in tendril-like bodies. Hydrothecæ short, tubular, with upper part slightly divergent, and with wide, smooth orifice.

Gonosome : Gonangia differ in the two sexes. Male elongate, slender, tapering toward base and expanding toward orifice, which bears four stout spines. Female gonangium oval, deeply cleft above into four leaf-like segments, larger than male.

2, *D. rosacea* Linn.

Trophosome : Stems slender and delicate, branches alternate and with internodes constricted at the base. Hydrothecæ long, tubular, with upper portion free and divergent toward the aperture, which is oblique and entire.

FIG. 28. — *Hydrallmania falcata* Linn. (After Hincks.)

Gonosome : Gonangia slightly different in the sexes ; female pear-shaped, elongate, borne on short pedicels and marked with eight longitudinal ridges, each terminating above in a spinous process. Male somewhat curved toward base, with similar longitudinal ridges terminating in spinous teeth about the slender tubular orifice.

Thuiaria Flem.

A single species of this genus comes within the present synopsis.

Thuiaria thuja Flem.

Trophosome : Stem and branches rather rigid, somewhat zigzag in shape, and annulated near the base. Perisarc black or very dark in color. Hydrothecæ smooth, ovate at base and tapering toward the distal end.

Gonosome : Gonangia smooth, pyriform, and with circular slightly emarginate aperture.

Hydrallmania Hincks.

Hydrallmania falcata Linn. (FIGS. 28, 29).

(Sertularia falcata.)

Trophosome : Stems flexuous, slender, sometimes spirally inclined. Branches alternate, regularly pinnate and plume-like, arising just above

each joint. Hydrothecæ tubular, closely appressed, arranged in rows along the pinnæ, and with plain oblique aperture.

Gonosome: Gonangia ovate, tapering toward the base, and with a tubular orifice.

Habitat: Shells, stones, etc., generally distributed from Grand Manan, Massachusetts Bay, and southward.

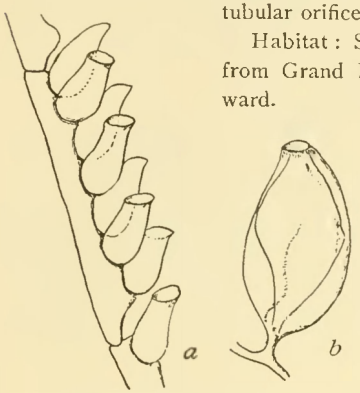

FIG. 29.—*Hydrallmania falcata* Linn. *a*, hydrothecæ; *b*, gonangium.

PLUMULARIDÆ.

Synopsis of genera. Modified and condensed from Nutting's Monograph of the Plumularidæ.

ANTENNULARIA. Colony more or less arbuscular, stem simple or branching, jointed, attached by massive hydrorhiza. Branching somewhat verticillate or scattered; hydrothecæ cup-shaped; nematophores trumpet-shaped. Gonangia borne in axils of branches, unilateral.

MONASTÆCHAS. Colony dichotomously branched, stem not fascicled, hydrocladia arising from upper sides of branches, otherwise resembling Plumularia, from which it differs in the entire absence of cauline hydrothecæ. Gonangia oval in shape and with terminal aperture.

SCHIZOTRICHA. Colony branching, branches pinnately arranged, hydrocladia often forked. Gonangia borne on stem or hydrocladia.

CLADOCARPUS. Stem simple or fascicled. Nematophores not trumpet-shaped, definitely fixed to hydrothecæ or branches. Gonangia borne on stem or hydrocladia.

Antennularia Linn.

1, *Antennularia antennina* Linn. (FIG. 30).

Trophosome: Colony growing in dense clusters of upright stems, often eight to ten inches high, stems simple or sparingly branched, obscurely jointed, each internode bearing a cluster of hydrocladia. Hydrothecæ small, cup-shaped, and with slightly everted margins.

Gonosome: Gonangia ovate, borne singly in axils of hydrocladia. Aperture subterminal.

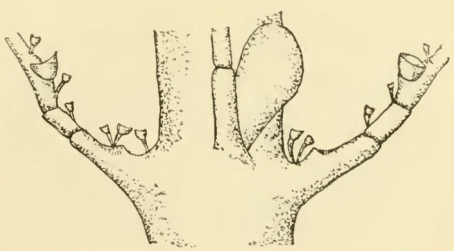

FIG. 30.—*Antennularia antennina* Linn. Portion of stem and hydrocladia (enlarged). (After Nutting.)

2, *A. americana* Nutting.

Similar to former, but usually from deeper water and apparently of exceedingly variable character.

3, *A. rugosa* Nutting.

Trophosome: Colony unbranched, attaining a height of six inches. Hydrocladia in verticils of six or eight, borne on stout processes of the stem and with proximal ends reinforced on the lower sides by a thickening of the perisarc. Internodes long and irregular, further subdivided by numerous irregularly disposed septal thickenings, which resemble joints, giving the appearance of many internodes, where in reality there is but one. Hydrothecæ small, short, cylindrical, and supported below by a thickening of the internode.

Monastæchas quadridens McCr.

Trophosome: Colony subflabellate in form, dichotomously branched, attaining a height of about six inches. Stem not fascicled, with indistinct internodes and branching at irregular intervals, those bearing hydrocladia being divided into long internodes, each of which bears a hydrocladium at its distal upper side. Hydrothecæ large, campanulate.

Gonosome: Gonangia sac-like, borne on short processes below hydrothecæ, and each protected by a pair of nematophores.

Habitat: Various stations along the North Atlantic coast, and from Marthas Vineyard southward.

Schizotricha Allman.

Hydrocladia pinnately disposed, often branching once or more. Two species come within the range of this synopsis.

1, *S. tenella* Verrill.

Trophosome: Colony branched dichotomously, attaining a height of about two inches. Stems clustered or fascicled, divided into alternately longer and shorter internodes, the latter bearing each a hydrotheca and a hydrocladium. Hydrocladium slender, often branched, proximal internodes short, and without hydrothecæ, which are subcylindrical.

Gonosome: Gonangia of curved shape, tapering at base and gradually enlarged toward the distal end, somewhat resembling cornucopiæ.

Habitat: Gay Head, Vineyard Sound, New Haven, Greenport, R. I., Woods Holl, Vineyard Haven.

2, *S. gracillama* Sars. (Fig. 31).

Trophosome : Stem sparingly branched, having a height of about two inches and somewhat fascicled. Branches divided into regular internodes, each of which bears a hydrocladium on a short, stout process near its distal end. Hydrocladia alternate, branching dichotomously twice or more beyond its proximal internode. Hydrothecæ small, cup-shaped.

Fig. 31.

Fig. 32.

Fig. 31. — *Schizotricha gracillima* Sars. Branched hydrocladium (enlarged). (After Nutting.)

Fig. 32. — *Cladocarpus flexilis* Verrill. Portion of hydrocladium (enlarged). (After Nutting.)

Gonosome : Gonangia borne in pairs on the stems in the axils of the hydrocladia, and also at the forks of the latter, cylindrical in shape, tapering at proximal ends, sessile.

Habitat : Shallower waters, New England coast.

Cladocarpus Allman.

Stem simple or fascicled. Hydrothecæ deep and with smooth margins or with lateral sinuations, and with one or two anterior teeth. A single species comes within the range of this synopsis.

C. flexilis Verrill (Fig. 32).

Trophosome : Colony long, slender, sparsely branching, stem not fascicled, attaining a height of about nine inches. Hydrocladia distinct, slightly sinuous, divided into rather slender internodes, each with a number of septal ridges back of hydrothecæ, which are deep, tubular, nearly straight, and with a single anterior tooth at the aperture.

Gonosome : Gonangia numerous, borne on stem and bases of hydrocladia, oblong-ovate, with latero-terminal orifice.