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SYNOPSIS OF NORTH-AMERICAN INVERTEBRATES.

XIV. THE HYDROMEDUSÆ — PART III.

CHARLES W. HARGITT.

MEDUSÆ.

THE Medusæ (medusoids, medusiform persons, gonophores, gonozooids) of this class of *cœlenterates* may be designated as in general of the form of a more or less transparent bell, or saucer-shaped disk, varying in size from the almost microscopic to organisms of fifteen inches or more in diameter.

The comparison of the medusa with a bell is fairly good, its body being similar in form in typical cases to the body of the bell, the manubrium corresponding to the clapper. A similar comparison with an umbrella is almost equally appropriate, if not superior. In this case the body of the medusa would correspond to the extended disk of the umbrella, the manubrium to the handle, and in some respects the radial canals are comparable with the ribs of the umbrella, while the numerous tentacles of some species are somewhat comparable with the marginal fringe often seen upon a lady's parasol. In further keeping with this comparison the outer, aboral portion of the medusa bell has been designated as the *exumbrella*, the inner, concave portion of the bell as the *subumbrella*. The mouth is located at the terminal, pendent portion of the manubrium, and through the tubular canal as an *œsophagus* communicates with the gastric pouch or stomach, from which radiate the gastric or chymiferous canals, by means of which the digested food matter is distributed over the body and through the circular or circumferential canal to the marginal organs.

At first sight there might seem to be little in common between the medusa and hydranth, either as to form, structure,

habit, etc. ; but a closer scrutiny will reveal so intimate a fundamental likeness in all essentials as to demonstrate clearly the homological equivalent of every feature, some of the accessory or sensory structures alone excepted ; and since these are not constant features they may clearly be disregarded in the comparison. Differences as to form and habits may be considered as adaptations to the characteristic functions of a free and motile organism.

In keeping with the synopsis of orders already given, that of the several families and genera of *Medusæ* will be taken up in their respective order.

ANTHOMEDUSÆ.

The Anthomedusæ are generally of more or less hemispherical form or sometimes of an elongate or subconical outline. All are possessed of a definite, muscular velum ; sensory organs or ocelli borne on bulbs located at the bases of the tentacles, about which there is usually a colored pigment rendering them quite conspicuous, are usually present ; otocysts are not present. The radial canals are generally four in number, rarely six or eight ; gonads are developed and borne on the walls of the manubrium.

SYNOPSIS OF FAMILIES.

I. CODONIDÆ. Mouth-opening simple, devoid of tentacles or lobings ; gonads not radially divided, but forming a circular, continuous tissue about the manubrium ; marginal tentacles unbranched.

II. TIARIDÆ. Mouth-opening provided with simple or frilled oral lobes ; with four or eight distinct manubrial gonads ; marginal tentacles unbranched.

III. MARGELIDÆ. Mouth-opening surrounded with four or more simple or branched oral tentacles ; four or eight manubrial gonads ; marginal tentacles unbranched.

IV. CLADONEMIDÆ. Mouth-opening rarely simple, usually provided with oral lobes or tentacles ; marginal tentacles variously feathered or branched.

CLADONEMIDÆ.

A. Radial canals simple.

1. Marginal tentacles two, fringed with stalked nematocysts, bell with subconical apical projection Gemmaria
2. Tentacles as in 1, bell hemispherical, without projection Corynitis

B. Radial canals branched.

- Marginal tentacles in eight pairs Willia

Coryne mirabilis Ag. (FIG. 33).

Bell elongate hemispherical, four to six mm. in diameter; manubrium very long, protruding far beyond the velum, but highly contractile; tentacles likewise very long and filamentous, but capable of great contractility; gonads borne upon body of manubrium and at maturity filling entire bell cavity or even protruding beyond the velum. Fairly common during early spring and summer, swimming near the surface. Hydroid generation. — *Ibid.*

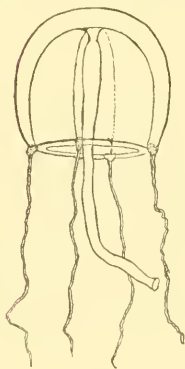


FIG. 33.

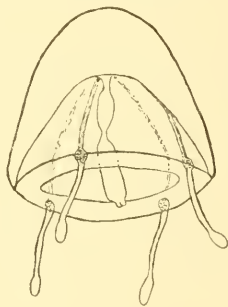
FIG. 33. — *Coryne mirabilis* Ag.

FIG. 34.

FIG. 34. — *Dipurena conica* A. Ag.

Bell conical or subhemispherical; marginal tentacles four, rather thick and with knob-like ends, and with prominent basal bulbs, each with a single ocellus; manubrium elongate, often extending beyond the velum, the basal portion constricted or narrowed, gastric cavity small, oral opening plain. Size from three to four mm. Common during midsummer. Buzzards Bay, Vineyard Sound, etc.

Dipurena conica A. Ag.
(FIG. 34).

Bell conical or subhemispherical; marginal tentacles four, rather thick and with knob-like ends, and with prominent basal bulbs, each with a single ocellus; manubrium elongate, often extending beyond the velum, the basal portion constricted or narrowed, gastric cavity small, oral opening plain. Size from three to four mm. Common during midsummer. Buzzards Bay, Vineyard Sound, etc.

McCrary (*Proc. Elliott Soc.*, Vol. I) describes from Charleston Harbor two other species of *Dipurena*, namely, *D. strangulata* and *D. cervicata*, but I find no record of them as occurring elsewhere.

Ectopleura ochracea A. Ag. (FIG. 35).

Bell elongate hemispherical, of nearly uniform thickness, except at the aboral pole, which becomes somewhat conical and correspondingly thicker. In size the medusa varies from four to six mm. Marginal tentacles four,

from the base of which lines of nematocysts extend over the bell to the apex; tentacular bulbs of purplish orange color and each with an ocellus; manubrium rather large and spindle-shaped, of yellowish color.

Hydrichthys mirus Fewkes.

Bell oval or subspherical, its outer surface dotted with nematocysts; radial canals four, wide; marginal tentacles four in mature specimens, only two in specimens at liberation; tentacular bulbs reddish in color but without ocelli. The original description was from specimens taken from a colony attached to a fish taken at Newport; other than this I find no records of it. (Cf. *Bull. Mus. Comp. Zool.*, Vol. XIII, p. 224.)

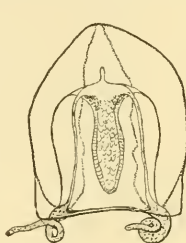


FIG. 35.

FIG. 35. — *Ectopleura ochracea* A. Ag. (After A. Agassiz.)

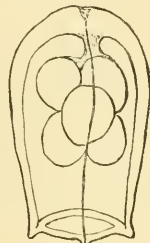


FIG. 36.

FIG. 36. — *Pennaria tiarella* McCr.

Pennaria tiarella McCr. (FIG. 36).

Bell oblong oval, of small size, about two mm. in height and half as broad; radial canals four, narrow, but rather conspicuously marked by lines of pinkish pigment; marginal tentacles very rudimentary from the four tentacular bulbs, which are devoid of ocelli; gonads borne on the walls of the manubrium, and as they approach maturity filling the entire cavity of the bell. The eggs and sperms are discharged promptly upon the medusa becoming free and even before; indeed, in many cases the medusæ are never liberated, as I have elsewhere shown. Color of a general reddish pink or rosy, manubrium a chocolate brown; ova vary in color from pale creamy white to rather bright orange.

Specimens of *P. gibbosa* from Florida and Porto Rico seem to me to be scarcely distinguishable from *P. tiarella*. Hydroid, — *Pennaria*.

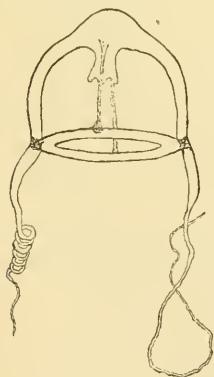


FIG. 37. — *Perigonimus jonesii*.

Perigonimus jonesii Osborn and Hargitt
(FIG. 37).

(*American Naturalist*, 1894, p. 27.)

Bell hemispherical, with slight conical apical projection; marginal tentacles two, with four marginal bulbs; tentacles highly retractile and often withdrawn and coiled within the bell cavity when the medusa is irritated. Though these medusæ were kept under observation for several weeks, no gonads were developed.

Habitat: Found upon the legs and abdominal somites of the common crab, *Labinia*, from which it was repeatedly taken during several seasons. Hydroid, — *Perigonimus*.

Euphysa virgulata A. Ag.

Bell elongate oval, or quadrangular in outline; tentacles rather heavy and unequally developed, one being much longer and heavier than the others; bases with a pinkish band extending upward along the radial canals for a short distance; manubrium cylindrical with simple oral margins and of yellowish color; gonads upon the sides of manubrium. In size the medusa is from ten to twelve mm. in diameter, of rather active habit and fairly common. Nahant, Massachusetts Bay, and southward.

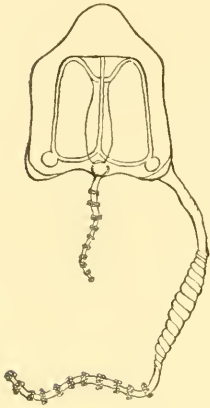


FIG. 38. — *Corymorpha pendula* Ag. (After Agassiz.)

Corymorpha pendula Ag. (FIG. 38).

Bell somewhat unsymmetrical, oblong with sub-conical apex; tentacles unequally developed, one being quite long and heavy, the others much smaller; manubrium similar to the preceding, both in form and color; bases of tentacles of pinkish color; size from five to six mm. Common along the coast, hydroids dredged from waters of Vineyard Sound, Massachusetts Bay, etc. Hydroid generation, — *Corymorpha*.

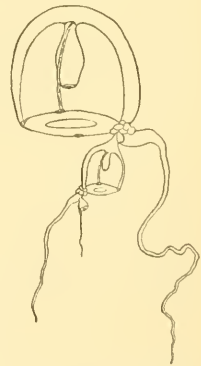


FIG. 39. — *Hybocodon prolifer* Ag.

Hybocodon prolifer Ag. (FIG. 39).

Bell similar to preceding, but with marked asymmetry; a single marginal tentacle of large size, with very thick basal portion, from which there bud prolifically secondary medusæ, which in turn similarly bud tertiary medusæ, several generations in this way being present upon the parent medusa. In other aspects very similar to the preceding. Hydroid generation, — *Hybocodon*.

Stomatoca apicata Ag. (FIG. 40).

Bell rather open and shallow, with an elongate conical projection at the apex; radial canals four; marginal tentacles two, which are long and slender and highly retractile; manubrium also retractile, with a four-lobed

oral margin. Color: manubrium, yellow or cream-color, base of tentacles purplish. Male often with green manubrium. Hydroid (?).

Stomotoca rugosa Mayer.

General form of the medusa similar to the preceding; apical projection sometimes long, sometimes short and blunt; size about five mm. in height by three mm. broad; two long marginal tentacles and fourteen rudimentary ones; radial canals four; velum well developed. Distinguished from *S. apicata* in part by the distinctively different color, which in this species is of a brick-red at tentacular bases and manubrium, while in the preceding (*S. apicata*) the manubrium is greenish or straw-colored in the male and dull ochre in the female, and the tentacle bases in male are purplish and in female ochre. Hydroid generation, — a Perigonimus.

Habitat: Common at Newport, R. I., and southward.

(Condensed from Mayer's description. *Bull. Mus. Comp. Zool.*, Vol. XXXVII, No. 1, p. 4.)

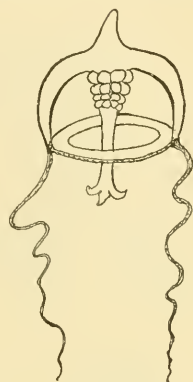


FIG. 40. — *Stomotoca apicata* Ag. (After McCrady.)

Turris vesicaria A. Ag. (FIG. 41).

Bell hemispherical, with large globular projection at its apex; marginal tentacles numerous; bases broad and with a single ocellus on each; tentacles tapering rapidly from the base and becoming delicate and filamentous; manubrium large and with four fimbriated oral lobes; gonads borne upon the base of manubrium and even extending somewhat upon the radial canals, the walls of which are notched and variously irregular, as are also the walls of the marginal canal.

(Condensed from description of A. Agassiz, *No. Am. Aculephæ*, p. 164.)

Hydroid generation, — a *Turris* (?).

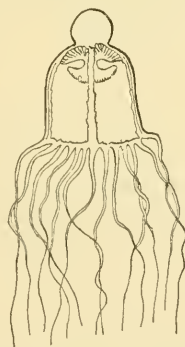


FIG. 41. — *Turris vesicaria* A. Ag. (After A. Agassiz.)

Turritopsis nutricula McCr. (FIG. 42).

Bell high-hemispherical or subspherical; radial canals four; velum broad; marginal tentacles varying from four to thirty or more, depending upon stages of maturity; a reddish ocellus at bases of tentacles; manubrium large but not



FIG. 42. — *Turritopsis nutricula* McCr. (After McCrady.)

reaching beyond the velum; gonads of reddish orange color and arranged in four masses upon the manubrium. Hydroid generation,—a Dendroclava.

Dysmorphosa fulgurans A. Ag. (FIG. 43).

Bell subhemispherical, with slight conical apical projection; radial canals four; marginal tentacles eight, symmetrically disposed; manubrium of medium size, its oral end provided with four rather prominent tentacles; from the body of the manubrium secondary medusæ bud off with great profusion, their numbers at times becoming so great as to afford a splendid phosphorescence (A. Agassiz). Hydroid (?).

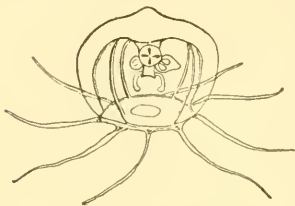


FIG. 43. — *Dysmorphosa fulgurans*
A. Ag. (After A. Agassiz.)

Podocoryne carnea Sars (FIG. 44).

Medusa oval or bell-shaped or subglobular, form variable; exumbrella surface dotted with nematocysts; size about five mm. in height by slightly more than half as broad; marginal tentacles eight, four radial, four *interradial*, instead of all *radial*, as stated in Part I in describing the gonosome of *Podocoryne*, the latter shorter; pinkish ocelli at bases of tentacles; manubrium of medium size, though extensible to velum, of quadrangular form, with four oral lobes tipped with nematocysts; gonads borne on base of manubrium.

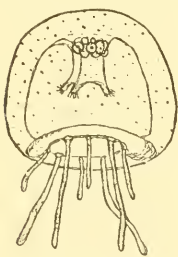


FIG. 44. — *Podocoryne carnea* Sars.

This medusa has been confused with the preceding, which has usually been designated as the product of *Podocoryne*. This is, however, a mistake. *Podocoryne*, so far as I am aware, never produces proliferous medusæ from the manubrium, as is the case with *Dysmorphosa*. I have often followed the direct liberation of the medusæ from the hydroid, and they have even at that time sex products well developed. Bunting has also noted the same thing. (Cf. *Journ. Morph.*, Vol. IX.)

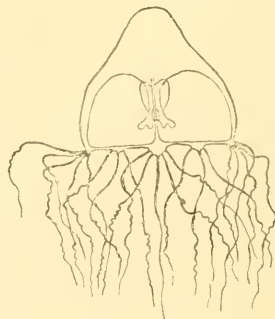


FIG. 45. — *Lizzia grata* A. Ag.
(After A. Agassiz.)

Lizzia grata A. Ag. (FIG. 45).

Bell subconical, its apex obtusely rounded; radial canals four; marginal tentacles in eight clusters, the radial groups with five each, the *interradial* groups with three, in mature specimens; young with only radial tentacles, one at each radius; there are no ocelli;

manubrium of medium size, with four prominent and branched oral tentacles ; gonads form prominent masses on body of manubrium. Hydroid (?).

Bougainvillia (Margelis) carolinensis Ag. (FIG. 46).

Bell subspherical, wall becoming very thick over the aboral part ; radial canals four, inconspicuous ; marginal tentacles in four clusters, of about ten each ; in young specimens just liberated there are but two in each group and the bell is less globular, while the oral tentacles are simple ; later these become dichotomously branched about three times ; ocelli are grouped about the base of each of the four triangular sensory bulbs. One of the commonest of our Medusæ, reaching at maturity a size of about eight mm. Color greenish or greenish-blue. Hydroid, — *Ibid*.

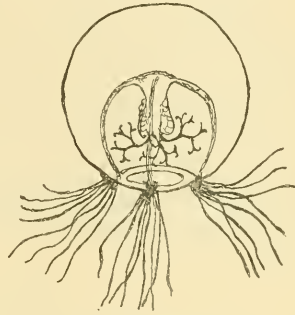


FIG. 46. — *Bougainvillia carolinensis* Ag.

Bougainvillia superciliaris Ag.

In general form and aspect very much like the preceding species, but of larger size and different shape, being somewhat obovate ; the marginal tentacles are also more numerous as well as longer, a character common also to the oral tentacles, while the manubrium is broader and shorter. Ocelli as in the former. Of yellowish color. Hydroid, — *Ibid*.

Bougainvillia gibbsii Mayer.

Very similar to the preceding, distinguished according to Mayer by the relatively greater height and smaller width, and by the short and broad manubrium, which in cross-section is cruciform. (Cf. *Bull. Mus. Comp. Zool.*, Vol. XXXVII, No. 1, p. 5.) Hydroid (?).

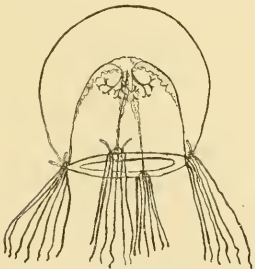


FIG. 47. — *Nemopsis bachei* Ag.

Nemopsis bachei Ag. (FIG. 47).

In general characters *Nemopsis* has many features in common with *Bougainvillia*, such as shape, mode of development, etc. The more distinctive differences are to be found in the number and character of the marginal tentacles, more particularly in the pair of erect, clavate ones which spring laterally from the tentacular bulbs, as shown in the figure. Again, the gonads present characteristic differences, arising from the basal portion of the manubrium and extending beneath the radial

canals, in some cases almost the entire length. Ocelli are present and like those in the preceding genus. In color the sensory bulbs are yellowish or orange, as are also the gonads. In size mature specimens vary from six to ten mm. Hydroid (?).

Stylactis hooperii Sigerfoos.

(*American Naturalist*, vol. xxxiii, p. 801.)

Bell globular, slightly elongate, about one mm. in long diameter; radial canals four; marginal tentacles eight, very rudimentary, symmetrically distributed about the margin; ocelli absent; manubrium large, devoid of oral tentacles or lobes; velum narrow; gonads borne in a general mass about the manubrium; genital products discharged at once on liberation of the medusa, which is quite active for a brief time following its liberation, but dies soon after discharge of eggs or sperms.

Habitat: Colony taken from shell of live snail, *Illyanassa obsoleta*. Hydroid, — *Ibid*.

Gemmaria cladophora A. Ag.

Bell hemispherical or subconical, walls rather thick, but varying in different regions, giving to the bell cavity a shape different from that of the external outline; radial canals four; marginal tentacles four, but two rudimentary, the larger abundantly provided with nematocysts, many of which are stalked; tentacular bulbs brownish, with orange pigment at bases; manubrium large, with basal conical portion separated by a sharp constriction from the oral portion, which has a flaring, quadrangular opening. Hydroid (?).

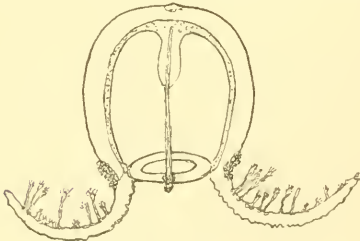


FIG. 48. — *Corynitis agassizii* McCr.
(Adapted from McCrady.)

Corynitis agassizii McCr.

(FIG. 48).

(*Gemmaria gemmosa* McCr.)

Bell elongate-hemispherical or obovate; marginal tentacles two, thick and fringed with an abundance of stalked nematocysts and batteries scattered over the tentacles from base to tip; radial canals four, with clusters of nematocysts at their marginal termini; velum well developed; manubrium of medium size, somewhat conical in shape. Mature specimens from one to two mm. in diameter.

Habitat: Taken from shells of *Mytilis*, etc. Hydroid, — *Ibid*.

Willia ornata McCr. (FIG. 49).

Body of medusa bell-shaped or conical, with blunt apical projection; marginal tentacles sixteen in mature specimens, arising from the terminals of the branched radial canals; primary canals four in young specimens, which by repeated branching become sixteen, and the development of the tentacles follow the same course of development, appearing after the several divisions of the canals; manubrium rather stout and with lobed oral margins. Intermediate between each pair of tentacles an undulating line of nematocysts, "knotted cords," passes upward on the bell. Hydroid (?).

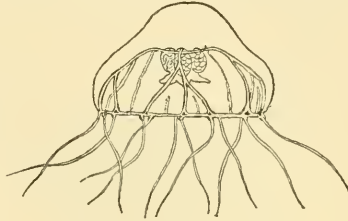


FIG. 49.—*Willia ornata* McCr.
(After A. Agassiz.)

(Adapted from McCrady's description, *Proc. Elliott Soc.*, Vol. I, p. 149.)

LEPTOMEDUSÆ.

As compared with the Anthomedusæ, the Leptomedusæ are generally flatter and more disk-like; the velum is usually smaller, and the texture of the bell is softer. Ocelli may or may not be present; otocysts may or may not be present; the gonads are borne upon the radial canals.

SYNOPSIS OF FAMILIES.

I. THAUMANTIDÆ. Ocelli present, but no otocysts; radial canals four or eight (rarely more), always simple and unbranched.

II. CANNOTIDÆ. Without either otocysts or ocelli; radial canals four or six, which are branched or pinnate.

III. EUCOPIDÆ. Otocysts always present, eight or more; ocelli usually absent; radial canals usually four, simple and unbranched.

IV. ÆQUORIDÆ. Otocysts always present; radial canals numerous, at least eight, often a hundred or more, usually simple, rarely branched.

Key to Genera.

THAUMANTIDÆ.

- A. Radial canals four; marginal tentacles numerous, and with basal cirri *Lafœa*
- B. Radial canals eight; marginal tentacles numerous, but without basal cirri *Melicertum*

CANNOTIDÆ.

Radial canals four, each with lateral, sometimes pinnate, branches which end blindly. A single genus within the range of this synopsis so far as known to the writer Ptychogena

EUCOPIDÆ.

A. Marginal tentacles four, sometimes with lateral basal cirri.

1. Manubrium very long, extending much beyond velum Eutima
2. Manubrium short, tentacles with basal cirri Eucheilota
3. Manubrium short, tentacles devoid of basal cirri Clytia (Juv.)

B. Marginal tentacles sixteen or more.

1. Manubrium long, bell hemispherical Tima
2. Manubrium short, bell disk-like, otocysts on bases of tentacles
Obelia
3. Manubrium short, mouth plain, bell hemispherical, otocysts between
bases of tentacles Clytia
4. Manubrium short and with fimbriated oral lobes Tiaropsis
(a) With 16 tentacles Epenthesis
5. Manubrium short and with oral lobes plain.
(b) With more than 16 tentacles Oceania

ÆQUORIDÆ.

A. Radial canals eight or more, often lobed or divided at their bases

Halopsis

B. Radial canals numerous, twelve to one hundred or more.

1. Manubrium very short, often indistinguishable, and with crenulated
oral margin Rhematodes
2. Manubrium well developed, oral margin lobed but plain Æquorea
3. Manubrium large and with complex and fimbriated oral lobes

Zygodactyla

Lafea calcarata A. Ag. (FIG. 50).

Bell broad, somewhat conical or dome-shaped, marginal tentacles numerous, somewhat swollen at base, long and filamentous, and interspersed with tentacular spurs, clubs, and cirri; gonads suspended in convoluted masses beneath radial canals, of milky or yellowish color; manubrium short and with convoluted oral lobes. When first liberated, the medusa is small and with only two tentacles, others appearing with growth; ocelli are located upon the bases of the tentacles. Size about 20 mm. in diameter. Hydroid, — *Ibid.*

Melicertum campanula Esch.

Medusa bell-shaped or subconical; marginal tentacles very numerous, long, and filamentous, but devoid of basal cirri; radial canals eight at maturity, four in young specimens; gonads suspended in sinuous folds beneath radial canals; manubrium much as in preceding, with oral lobes sinuously convoluted; color of bell light ochre, tentacles and gonads much darker. Reported from Greenland, Grand Manan, Nahant, etc., A. Ag. Newport Harbor, May Mayer. Hydroid (?).

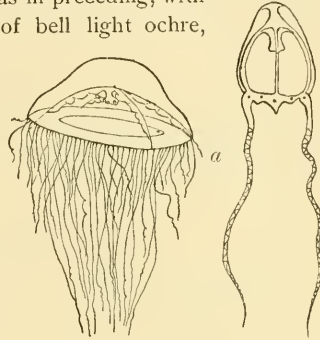


FIG 50.—*Lajea calcarata* A. Ag.
a, a young medusa of same.
(After A. Agassiz.)

Ptychogena lactea A. Ag.

Bell the small segment of a sphere, walls rather thick; radial canals four, but with sides variously notched and in the medial portions increasing to extended lateral diverticula; tentacles very numerous and filamentous; gonads variously folded and disposed beneath radial canals; devoid of either ocelli or otocysts. According to A. Agassiz (p. 137, *N. A. Acalephæ*), from whose account both this and the preceding description are condensed, this medusa lives chiefly at considerable depths, and exposure to light or increased temperature rapidly disintegrates it. Hydroid (?).

Eutima mira McCr. (FIG. 51).

Medusa broadly bell-shaped, tending to conical; marginal tentacles four, long and tapering from an enlarged base; numerous minute tentacular processes distributed about the margin; otocysts eight, symmetrically disposed; manubrium very long, extending far beyond the velum, and terminating in an everted, somewhat frilled margin; gonads disposed beneath radial canals. Hydroid (?).



FIG. 51.—*Eutima mira* McCr.
(After McCrady.)

Eutima limpida A. Ag.

Medusa much as in preceding species, but with both manubrium and tentacles shorter, the latter without the basal swellings of the former and the oral margin less frilled; broad diameter one to two inches, height much less; otocysts large and with numerous lithocysts. Hydroid (?).

Eucheilota ventricularis McCr.

Bell of medusa hemispherical; radial canals four, wide and with the gonads extending their entire length; marginal tentacles twelve to twenty in mature specimens, only four at liberation of medusa; manubrium short, tubular, of yellowish color with reddish central portion; gonads similar in color; otocysts eight, with lithocysts arranged in an arc. Hydroid (?).

Eu. duodecimalis A. Ag. (FIG. 52).

Medusa similar to preceding species, but with twelve otocysts and with only four long tentacles, each with a pair of lateral cirri at the base; gonads borne on distal half of radial canals. Hydroid (?).

Clytia bicophora Ag. (FIG. 53).

Medusa variable in appearance with age; when first liberated, the bell is rather globular, later becoming flattened and finally at maturity being hemispherical; diameter about five mm.; radial canals four, beneath which the gonads, which are dull brown in color, extend from base of the short manubrium about to their middle portion; marginal tentacles eight, with intermediate tentacular buds; otocysts eight. Hydroid, — *Ibid*.

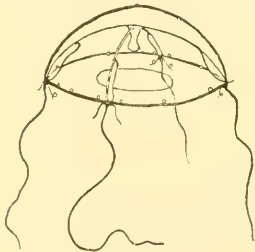


FIG. 52.

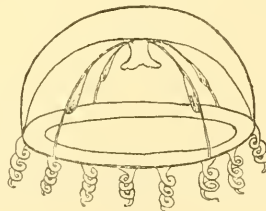


FIG. 53.

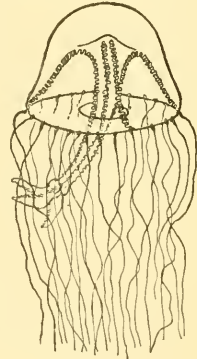


FIG. 54.

FIG. 52. — *Eucheilota duodecimalis* A. Ag. (After A. Agassiz.)

FIG. 53. — *Clytia bicophora* Ag. (After A. Agassiz.)

FIG. 54. — *Tima formosa* Ag. (After A. Agassiz.)

C. nolliformis McCr.

Medusa much as in preceding; marginal tentacles four in young specimens, increasing in number with age; otocysts eight, between bases of tentacles; manubrium short and with four oral lobes. Hydroid (?).

Tima formosa Ag. (FIG. 54).

Medusa bell-shaped or elongate hemispherical; marginal tentacles numerous, long, filamentous, and with bulbous bases; radial canals four, and with convoluted, pouch-like gonads extending their entire length;

otocysts symmetrically distributed about the margin, between the tentacular bases; manubrium large and long, extending beyond the velum, and terminating in a series of fringed, lip-like lobes. Hydroid (?).

Obelia Per. & Les.

Generic characters: Medusa flat and disk-like; marginal tentacles numerous, projecting slightly inward at the base; otocysts eight, borne on base of tentacles at the inner portion; manubrium short and somewhat quadrate. Medusæ often swimming with everted bell.

O. geniculata Linn. (FIG. 55).

Medusa flat; marginal tentacles twenty-four at liberation; gonads as oval bodies beneath middle of radial canals. Hydroid, — *Ibid.*

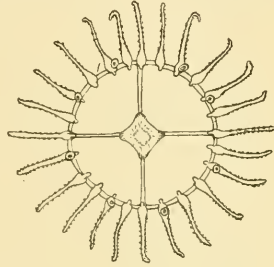


FIG. 55. — *Obelia geniculata* Linn.

O. longissima Pallas.

Very similar to preceding. Hydroid, — *Ibid.*

O. flabellata Hincks.

(*Eucope polygena* A. Ag.)

In general aspects indistinguishable from the preceding species. Hydroid, — *Ibid.*

O. gelatinosa Pallas.

(*Laomedea gigantea* A. Ag.)

In general feature similar to former, but with only sixteen tentacles at liberation. Hydroid, — *Ibid.*

O. dichotoma Linn.

Indistinguishable from *O. gelatinosa*. Hydroid, — *Ibid.*

O. commisuralis McCr.

In general features very like the preceding species, but with tentacles somewhat more slender and elongated. Hydroid, — *Ibid.*

Tiaropsis diademata Ag. (FIG. 56).

Medusa ovoid when young, becoming hemispherical at maturity; radial canals four; marginal tentacles very numerous, the larger with swollen bulbous bases; otocysts eight, situated between bases of tentacles and with otoliths in form of arc; gonads extending beneath radial canals; manubrium short, with terminal lobes complexly fimbriated. Hydroid (?).

Oceania languida A. Ag. (FIG. 57).

Medusa ovoid when set free, becoming hemispherical at maturity; radial canals four; marginal tentacles numerous in adult specimens; otocysts eight, situated near bases of tentacles in young specimens, but becoming numerous as medusæ mature, increasing in number according to A. Agassiz by subdivision of the primary otocysts; gonads of brownish or pink or green color, and borne on distal portions of canals. Hydroid (?).

Oceania carolinæ Mayer.

Bell less than a hemisphere, about 1.4 mm. in diameter; marginal tentacles sixteen, with large hollow basal bulbs, also numerous rudimentary tentacular bulbs interspersed; otocysts 64, symmetrically disposed; manubrium flask-shaped, and with four simple oral lobes; gonads borne on distal portions of radial canals; tentacular bulbs bright yellow-green. Charleston Harbor.

(Condensed from Mayer's description, *Bull. Mus. Comp. Zool.*, Vol. XXXVII, No. 1.)

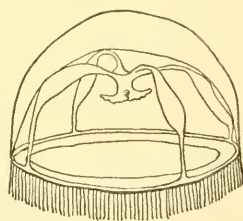
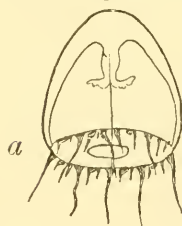


FIG. 56.

FIG. 56. — *Tiaropsis diademata* Ag. (After A. Agassiz.) a, young medusa of same.

FIG. 57. — *Oceania languida* A. Ag. (After A. Agassiz.)

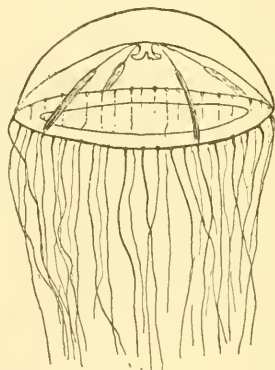


FIG. 57.

O. singularis Mayer.

Bell about two mm. in diameter, with lens-shaped apical projection; marginal tentacles 16, with hollow basal bulbs, and with 16 rudimentary tentacles symmetrically disposed; otocysts 32; gonads borne on upper portion of radial canals; colors of tentacular bulbs and radial canals in region of gonads turquoise-green. Newport Harbor, R. I.

(Condensed from Mayer's description; cf. *op. cit.*)

Epenthesis foleata McCr.

(*Oceania foleata* Ag.)

Medusa with low, subhemispherical bell, about five mm. in diameter; marginal tentacles sixteen, rather slender and with well-developed basal

bulbs; otocysts alternating with bases of tentacles; manubrium short and with four recurved oral lobes; gonads borne upon lower portions of canals. Manubrium, gonads, and sensory bulbs light greenish in color. Hydroid (?).

Halopsis ocellata A. Ag.

Bell low and flat in mature specimens, though somewhat hemispherical in young medusæ; radial canals twelve to twenty in mature specimens; marginal tentacles very numerous and highly contractile, and with interspersed cirri; otocysts numerous and with numerous otoliths arranged in double rows; manubrium short, with four recurved sinuous oral lobes. Hydroid (?).

(Condensed from description of A. Agassiz, *N. A. Acalephæ*, p. 99.)

H. cruciata A. Ag.

Under this name A. Agassiz briefly describes a medusa having but four radial canals, a hemispherical bell, comparatively few tentacles, and otherwise so unlike the preceding as to render its generic, if not family, affinities wholly distinct. Not having access to specimens, it is merely listed without further comment. Hydroid (?).

Rhegmatores tenuis A. Ag. (FIG. 58).

Bell low, with rounded aboral surface and with margins distinctly incurved; radial canals numerous, varying from twenty to forty or more in specimens examined; canals usually simple, but with many variations exhibiting connecting branches and anastomoses; marginal tentacles numerous, rather long and filiform, tapering rapidly from a somewhat broad base, above which is a tubular spur-like flap; tentacles, like the radial canals, increase with age, the larger extending from the termini of the canals, while intermediate are smaller ones with still smaller intermediate tentacular rudiments; gonads suspended in double rows along the surface of the canals; manubrium extremely short, often indistinguishable from the very shallow gastric pouch, and with its oral margin delicately crenulated; otocysts numerous.

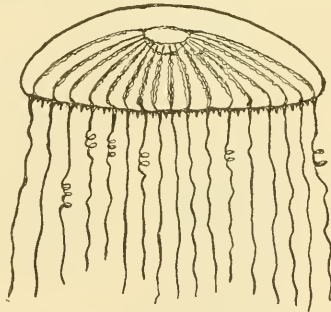


FIG. 58. — *Rhegmatores tenuis* A. Ag.

In habit these medusæ are rather sluggish, swimming or floating near the surface and rarely exerting more than two or three pulsations of the bell or small velum in succession. Hydroid (?).

R. floridanus Ag.

Very similar to the preceding, though smaller, and of southern range.

Æquorea albida A. Ag.

Bell subhemispherical, tending to conical above; radial canals very numerous, and with two or three marginal tentacles borne between each; otocysts also numerous, spherical, and containing several small otoliths; above the base of each of the larger tentacles is a tentacular spur, similar to those of *Rhegmatodes*; manubrium short and with simple oral lobes. In size mature specimens vary from one to two inches in diameter. Not uncommon in the vicinity of Buzzards Bay during later summer. Hydroid (?).

Zygodactyla grønlandica Ag.

This is one of the largest of the Hydromedusæ, sometimes measuring twelve to fifteen inches in diameter; bell rather low and flat; radial canals very numerous; marginal tentacles long and very contractile, and several between the terminals of the radial canals; above the bases of the tentacles are conical spurs quite similar to those of the two preceding genera; manubrium large and elongated, extending beyond the velum when fully expanded, and with densely frilled or fimbriated oral lobes; gonads borne along the lines of the canals as in the former genera. Habitat from Greenland, Maine, Massachusetts, southward. Hydroid (?).

TRACHOMEDUSÆ.

The synoptic characters of this order have already been given. Of representatives there are comparatively few which come within the range of the present synopsis. No details of arrangement under appropriate families will therefore be undertaken in this connection, but the genera and species will be noted so far as known, and some placed provisionally under the order, of whose exact affinities there is doubt. Hydroid generation suppressed.

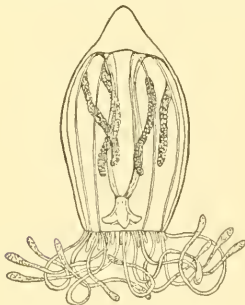


FIG. 59. — *Trachynema digitale*
A. Ag. (After A. Agassiz.)

Trachynema digitale A. Ag. (FIG. 59).

Medusa elongate bell-shaped, the apex rather sharply conical; radial canals eight, rather wide; tentacles numerous and somewhat fragile; otocysts four, rather large, and with colored otoliths; gonads eight, finger-like and suspended from the upper portions of the radial canals. Size of

mature specimens about one inch in long diameter and about half as broad. Reported from Baffins Bay, Massachusetts Bay, Nahant, A. Ag.; Newport Harbor, April, Mayer.

Gonionemus murbachii Mayer. (FIG. 60).

Medusa with low hemispherical bell when in repose, but subconical when in active motion and contraction; radial canals four, prominent and with line of brownish pigment over their course; marginal tentacles numerous, varying from sixteen to eighty or more, rather long but capable of being greatly contracted; rather prominent basal bulbs of brownish color tinged with pale green; a characteristic of the tentacles is the presence of adhesive or suctorial pads a short distance from the tips, beyond which they

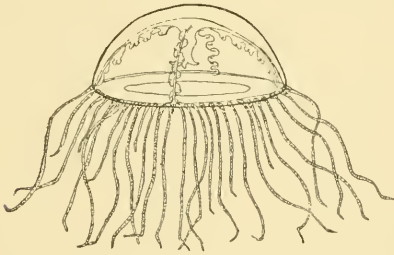


FIG. 60.

FIG. 60. — *Gonionemus murbachii* Mayer.

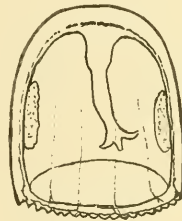


FIG. 61.

FIG. 61. — *Persa incolorata* McCr. (Modified from McCrady.)

often are bent at a sharp angle; manubrium of moderate size, quadrate in form and with prominent frilled oral lobes; gonads suspended in sinuous folds beneath the radial canals; otocysts present in variable numbers and disposed between the bases of the tentacles.

Persa incolorata McCr. (FIG. 61).

Bell thimble-shaped, walls thin, the entire medusa colorless except the pale yellowish gonads, which are oval and attached to the walls of two opposite radial canals, of which there are eight, only two of which are very definite; margin of the bell devoid of tentacles, but nodulated by the presence of batteries of nematocysts.

(Condensed from McCrady's account, *Gymn. Charl. Harb.*, p. 104.)

Liriope scutigera McCr.

Described by McCrady (*op. cit.*, p. 106) from Charleston Harbor, and noted by Mayer from Florida (*Bull. Mus. Comp. Zool.*, Vol. XXXVII, No. 2, p. 64). Also from Newport Harbor, by latter observer.

NARCOMEDUSÆ.

No representatives of this order have been taken by the present writer along our northeastern coast, and but few have been even reported from within the range of this synopsis. The following records and references may therefore suffice:

Cunoctantha octonaria McCr. Charleston Harbor. *Proc. Elliott Soc.*, Vol. I.

Cunoctantha incisa Mayer. Tortugas. *Bull. Mus. Comp. Zoöl.*, Vol. XXXVII, No. 2, p. 66.

Æginella dissonema Hæck. Tortugas. *Op. cit.*, p. 66.

SIPHONOPHORA.

Of Siphonophora recorded from northeastern Atlantic waters, by far the larger number are products of the Gulf Stream, very few, if any, being indigenous faunal elements. Those more familiar and of commoner record may be grouped under the following sections:

A. DISCONNECTÆ. Siphonophora with discoidal pneumatophore, but devoid of nectophores or bracts.

1. *Verella mutica* Bosc. Pneumatophore an elliptical or oblong disk, usually with an oblique vertical crest, and with the several zooids attached to the lower surface. Common in subtropical regions and in Gulf Stream, upon the latter of which they are occasionally borne northward to the New England coast.
2. *Porpita linncæana* Less. Pneumatophore a circular disk, but without a vertical crest. Otherwise similar to former and of similar habits and distribution.

B. CALCYONECTÆ. Siphonophora without pneumatophore, but with one or more nectophores.

1. *Diphyes pusilla* McCr. Polygastric, with two nectophores at the apex of a long tubular trunk.
2. *D. formosa* Fewk. Cf. *Report on Medusæ of Gulf Stream Region*. Commissioner of Fish and Fisheries, 1884, p. 963.
3. *D. bipartita* Costa. Reported by Mayer (*Bull. Mus. Comp. Zoöl.*, Vol. XXXVII, p. 74) from Newport, R. I.
4. *Agalmopsis carum* A. Ag.
- Nanomia cara* A. Ag. Polygastric, with long tubular trunk and with numerous siphons and bracts.
5. *Agalma okenii* Esch.
6. *Spheronectes gracilis* Hæck. Reported by Fewkes from Newport, R. I. (*Bull. Mus. Comp. Zoöl.*, Vol. VIII, p. 166.)
7. *Gleba hyppopus* Forsk. Reported by Fewkes off Marthas Vineyard. (*Rept. U. S. Comm. Fish and Fisheries*, 1884, p. 963.)

C. CYSTONECTÆ. With large vesicular pneumatophore only, no nectophores or bracts.

Physalia pelagica Bosc. Common along the coast, occasionally taken at the Bay of Fundy. The well-known Portuguese-man-of-war. One of the most conspicuous of the siphonophores, and with long graceful tentacles which are loaded with batteries of nematocysts of highly venomous character.

In the foregoing synopsis only incidental notice has been made of synonymy, any details on this line being incompatible with the purpose and limits of the paper.

It is a pleasure to acknowledge in this connection my obligations to Dr. Alfred G. Mayer, of the Brooklyn Institute, who has kindly reviewed the manuscript of Part III of this synopsis, and offered suggestions, and from whose various recent papers on Medusæ I have been able to extend the list of species in several cases.

I desire also to acknowledge the services of my son George, who has copied most of the figures and has under my direction drawn most of those made directly from nature.

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The following bibliographical references, in addition to those cited in the introductory paragraph, may also be a convenience to those concerned.

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