CONTRIBUTIONS

TO

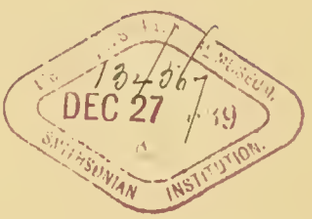
THE NATURAL HISTORY

OF THE

UNITED STATES OF AMERICA.

BY

LOUIS AGASSIZ.



SECOND MONOGRAPH.

IN FIVE PARTS.—I. ACALEPHS IN GENERAL.—II. CTENOPHORÆ.—III. DISCOPHORÆ.—IV. HYDROIDÆ.
—V. HOMOLOGIES OF THE RADIATA; WITH FORTY-SIX PLATES.

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CHAPTER EIGHTH.

SIPHONOPHORÆ.

SECTION I.

SIPHONOPHORÆ IN GENERAL.

Modern zoölogists generally consider the Siphonophoræ as one natural group of Acalephs, which they have subdivided in various ways, into families or tribes. When closely compared, it appears, however, that they differ widely, in a morphological point of view; while the characteristics by which they are held together, are of the most trifling nature, consisting chiefly in the fact that they are free, moving animals, and not attached to the ground. Kölliker has, nevertheless, insisted upon that feature as essential, and on that account called them Polypi nectalei. In attempting to classify them, I have kept in view the prominent difference pervading the whole class of Acalephs, in which individuals assume either the characteristics of attached Hydroids or of free Medusæ, with every degree of approximation to one or the other of these extreme forms. In Siphonophoræ the hydroid type is prevalent, but already raised above the ordinary condition of Hydroids, in being free; and the medusoid element is lowered, in so far as most Medusæ, budding from the colonies, are deprived of some of the characteristics of the higher Acalephs. Moreover, hydroids and medusæ, budding from one another, invariably form polymorphous communities, from which various parts are cast off to continue a short, precarious existence, as independent beings. The connection of all these isolated members of the Siphonophoræ, has only recently been traced in a satisfactory manner. Upon the prevalence of the hydroid or medusoid elements, and their various combinations among these Acalephs, aided by what is already known of their development, I venture to subdivide the Siphonophoræ into four sub-orders: the Porpitæ of Goldfuss, or Chondrophoræ of Chamisso and

Eysenhardt; the Physaliæ, as limited by Lesson;[1] the Physophoræ of Goldfuss, excluding Physalia (Arethusa); and the Diphyæ of Cuvier. These sub-orders may be characterized as follows: —

1. Porpitæ *Goldf.* — The community of these Acalephs buds from a primary hydra, which is provided with many tentacles, and retains its individuality. The secondary hydræ arise between the tentacles of the primary hydra and its proboscis; they are small, club-shaped, and without tentacles. From these small hydræ arise medusæ-buds, which are cast off and become free sexual Medusæ, long known under the name of Linuche, and recently described anew as Chrysomitra.

2. Physaliæ *Less.*[1] — Physalia starts from a primitive hydra, which attains gigantic dimensions, and, losing its individuality, becomes a floating apparatus for the whole community. The secondary hydræ all arise from one and the same side of the primitive hydra, in bunches; they vary in size and development from one another, some being closed at the actinal end, while others have a gaping mouth; some have one long, lateral tentacle, starting from their base, and attached to their side, and others none. By the side of these arise large bunches of small, fertile medusæ-buds, with four radiating chymiferous tubes and a circular tube, but without tentacles. These Medusæ wither upon the stock from which they arise. The mode of combination of the hydræ and medusæ, in different species of this type, may afford generic characters to subdivide them.

3. Physophoræ *Goldf.*[2] — Community budding around a slender tentaculated hydra, the abactinal end of which terminates in an air cyst. From the abactinal sides of this primary, egg-born hydra, arise sterile sessile medusæ, without tentacles and proboscis, arranged in two or more vertical rows; and from the actinal side, one or two kinds of secondary hydræ, with or without compound or simple tentacles. Between the secondary hydræ, small sessile male and female Medusæ bud

[1] Lesson is the first author who has isolated the Physaliæ, as a separate group, from all other Acalephs. He considers them only as a family, but they really constitute a distinct sub-order. Leuckart, Quatrefages, and Huxley, have published the most recent accounts upon this type. See their papers, quoted above. The way in which McCrady has divided the Siphonophoræ, and his attempt to incorporate them in one and the same sub-order with the Tubularians, does not seem to me to be justifiable. In the first place, the mode of growth of his Endostomata and Exostomata is not so characteristic as he supposes, as a comparison of the medusæ-buds of Coryne and Obelia, described above, pp. 192 and 318, may show. In the second place, the Diphyidæ arise in a totally different manner from the other Siphonophoræ, as the observations of Gegenbaur upon the reproduction of Diphyes have shown. Their community is not built up from a hydra, but from a medusa. Again, the primitive hydra of the Siphonophoræ is never pedunculated; that of the Tubularians always is.

[2] For this type, see the papers and works of Kölliker, Leuckart, Vogt, Gegenbaur, and Huxley, quoted above, Vol. III. p. 27; also Chapter II. Vol. III. p. 73.

forth, with a proboscis, four radiating chymiferous tubes, and a circular tube. These fertile Medusæ are either scattered between the secondary hydræ, or gathered in bunches.

4. Diphyæ *Cuv.* — Compound community of combined twins, arising from an egg-born Medusa. The community consists of twin sterile Medusæ, without tentacles or proboscis (Ersæa or Aglaisma, when young), from which arise a string of compound, heteromorphous twins, one of which is a hydra, the other a fertile medusa, either male or female, without tentacles but with proboscis, becoming free together (Eudoxia or Cuboides).

SECTION II.

THE GENUS PHYSALIA, AND OUR PHYSALIA ARETHUSA.

Although for many years past I have had ample opportunities of investigating the North American Siphonophoræ, this volume has already attained dimensions, which forbid that I should dwell upon them for the present. I will, therefore, limit myself to a few remarks upon one of their most remarkable representatives, from which the mode of combination of the heterogeneous individuals, forming this kind of communities, may best be appreciated. By far the most prominent part of the compound body is a large, oblong, pear-shaped bag, full of air, of a bright, bluish tint, varying to rose-color, floating lightly upon the surface of the ocean, so that it is altogether raised above the level of the water. An elegant, comb-like, crenulated crest, edged with a rose-colored rim, and traversed by similar bands, forms a sort of sail above the float, from the lower surface of which hangs a most extraordinary variety of appendages, appearing, at first sight, like bunches of varied tentacles. These appendages are all clustered upon one and the same side of the air-bag, and crowded toward its broader end, while the tapering end has none of them. A more careful inspection readily discloses the heterogeneous nature of these appendages, some of which are simple, elongated hydræ, with or without tentacles, and others medusæ-buds. Unless we compare these hydræ among themselves, and ascertain their mode of combination, we can have only a very imperfect idea of their extraordinary diversity. In the first place, it should be noticed that the largest hydræ are all arranged along the windward side of the animal, and that they are provided with the longest and most complicated tentacles. (Pl. XXXV. *Fig.* 1.) As I have seen these Physalia by thousands, in every kind of weather, I have noticed that they always present the same side to the wind, that is, the one from which hang the longest tentacles; and when the

breeze is fresh and the animal is driven before the wind, these tentacles are stretched to a most extraordinary length, varying, according to circumstance, from twenty to thirty, forty, and even fifty feet, and forming as many anchors upon which it rides, without being cast adrift. I have observed them in stormy weather struggling in that way against the elements, in order to avoid being thrown ashore. It is curious to see how, under these circumstances, they change their position, by raising the pointed end of their air-bag and throwing themselves suddenly upon the opposite side; but I have never seen them emptying their bag and sinking under the surface of the water. These large hydræ form small bunches of two, three, or four, budding from a common hollow stem, which communicates with the chymiferous cavity extending between the inner and outer wall of the air-bag. (Pl. XXV. *Fig.* 3.) Bunches of similar hydræ in larger numbers, but of a uniformly smaller size, alternate with these and occupy a position on their lee. All these hydræ have nothing to do with nourishing the colony, and their actinal end is closed; they are, evidently, simply locomotive individuals. When the whole colony is at rest, they hang down loosely.

The feeding hydræ are also of two kinds, large and small ones, and, like the locomotive hydræ, their difference of size seems to be primitive, and not the consequence of a more or less advanced development. These individuals never have tentacles; but they are clustered in bunches, budding in greater or smaller numbers from a common hollow stem, and, like the preceding, communicate with the chymiferous cavity. All these bunches of feeding hydræ are scattered along the lee-side of the floating bag. (Pl. XXV. *Fig.* 2.) I have seen them gorged with food almost to bursting, but I have never seen undigested food in any other kind of individuals. Neither the locomotive, nor the feeding hydræ, ever produce medusæ-buds. These always arise from a third class of very small hydræ, forming very large clusters, suspended between the clusters of feeding hydræ. These prolific hydræ resemble the locomotive hydræ most in general form, but, like the nutritive hydræ, they are destitute of tentacles. The medusæ-buds themselves, of which there are males and females, arise singly, either from the base of the prolific hydræ or from the stems and branches which unite the latter. These medusæ-buds are very similar to those of Tubularia proper, and wither without dropping from their parent stock. As soon as it is understood that the Physaliæ are compound communities, and not single individuals with very diversified organs, the idea is at once suggested that the floating air-bag must be a large primary hydra, assuming the special function of a floating apparatus, and the observations of Huxley upon very young Physaliæ fully supports this view. I must abstain from further details, from want of room, but shall resume my communications, upon this subject, on another occasion.

CHAPTER NINTH.

CLASSIFICATION OF THE HYDROIDÆ.

SECTION I.

TABULAR VIEW OF THE WHOLE ORDER OF HYDROIDÆ.

In order not to introduce questionable information in this synopsis, I have only quoted such references as relate to the most trustworthy accounts now at hand upon this type, and condensed these to the utmost, sometimes to the mere names of the genera and species, as the special papers on this subject, already enumerated in preceding sections, must necessarily be consulted by all those who propose to investigate the Hydroids and their alternate generations.

Order of HYDROIDÆ *Johnst.* (So extended as to include the majority of the naked-eyed Medusæ and all the Siphonophoræ.) — Lithophyta and Zoophyta (pro parte) *Lin.* — Zoophyta (p. p.) *Pallas*, *Ellis* and *Sol.*, *Flem.*, *Dana.* — Polypi (p. p.) *Cuv.*, *Lamx.*, *Lmk.*, *Milne-Edw.* — Anthozoa (p. p.) *Ehrenb.* — Radiaires anomales and médusaires (p. p.) *Lmk.* — Medusæ (p. p.) *Pér.* and *LeS.* — Siphonophoræ *LeS.* — Acalèphes libres (p. p.) and Ac. hydrostatiques *Cuv.* — Æquoreæ, Physophoræ, and Porpitæ *Goldf.* — Vesiculares, Medusæ (p. p.), Chondrophoræ, and Anomalæ *Cham.* and *Eysenh.* — Papyracea, Hydrostatica, and Cyclomorpha (p. p.) *Latr.* — Discophoræ cryptocarpæ (p. p.) and Siphonophoræ *Esch.* — Polypiaria (p. p.), Physograda, Pulmograda (p. p.), and Cirrhograda, *DeBl.* — Siphonophoræ and Discophoræ (p. p.) *Oken.* — Discophoræ (p. p.) and Siphonophoræ *Brandt.* — Medusæ (p. p.) and Diphyidæ, Polytomæ, Physophoræ, Physaliæ, Velellæ, and Porpitæ *Less.* — Gymnophthalmata *Forbes.* — Hydroidæ *Agass.* — Coralliaria Tabulata and Rugosa, and Hydraria *Milne-Edw.* and *Haime.* — Hydromedusæ (p. p.) and Siphonophoræ *Vogt.* — Hydroidea and Hydromedusida *Köll.* — Hydroidea, Medusida Craspedota (p. p.) and Siphonophora *Gegenb.* — Hydroidæ *McCr.* (exclud. Æginidæ). — Hydrozoa *Huxl.*

1st Sub-order. RUGOSÆ. — Coralliaria Rugosa *Milne-Edw.* and *Haime*; with four families: Stauridæ, Cyathaxonidæ, Cyathophyllidæ, and Cystiphyllidæ; all extinct, and mostly belonging to the earliest geological periods, for the enumeration of which I refer to the elaborate works of Milne-Edwards and Haime. Evidently the Hydroid elements prevailed in the structure of these animals, and they probably never produced Medusoid buds. How far the living types of Hydra and Lucernaria may be related to them still remains to be ascertained.

2d Sub-order. TABULATÆ. — Coralliaria Tabulata *Milne-Edw.* and *Haime*; with four families: Milleporidæ, Seriatoporidæ,[1] Favositidæ, and Thecidæ, for the characteristics of which I refer to the papers of Milne-Edwards and Haime. The Tubulosa *Milne-Edw.* and *Haime*, seem to me to be low forms of Tabulata. Should Millepora prove to produce medusæ-buds, I would not hesitate to unite this sub-order with the following.

3d Sub-order. TUBULARIÆ.[2] Alternate generations. Hydra always pedunculated, and mostly attached, head more or less club-shaped, without distinct horny bell; Medusa, either free or sessile, deep bell-shaped, with few hollow tentacles, all, or at least the most prominent of which, are in the prolongation of the radiating chymiferous tubes; eyes never independent of the tentacles. Reproductive organs always connected with the proboscis, and never limited to the radiating chymiferous tubes.

1st Family. CLAVIDÆ *McCrady*.[3]

Clava *Gmel.* — See p. 218.

C. multicornis *Johnst.* — Clava parasitica *Gmel.* — Coryne squamata *Lmk., VanBen.* — *Mediterranean* (Forskål); *British Channel* (Pallas).

C. leptostyla *Ag.*, Pl. 21. — *Massachusetts Bay* (Agassiz).

[1] I have shown, p. 296, that in Seriatopora the same tendency to a quadripartite division of the cells prevails, as among the Rugosa, which indicates a closer relation between the Tabulata and Rugosa than Milne-Edwards seems to admit.

[2] Lamouroux, ignorant of the mode of growth and reproduction of these animals, included only Hydroids in this group, to which many free Medusæ are now also referred. It is highly important to notice the close affinities which bind together the Medusæ of this sub-order, and the Hydroids from which they arise. We shall see that these relations are most intimate in all the minor natural groups of these Acalephs, the Medusa and Hydra of which are equally well known.

[3] The simple, uniform tentacles, scattered upon a club-shaped head, and the sessile medusæ-buds, characterize this family. The extraordinary changes which the proboscis assumes (Pl. XXI.), show that the peculiar arrangement of the tentacles, in the Tubularidæ, belongs to the same series. The Tubularians present, in fact, a beautiful gradation of forms, indicating a large number of distinct families. In Clavidæ, the head of the Hydræ is simply club-shaped, and all the Hydræ of a community are alike, and so are they in Sarsiadæ;

Syncoryna *Ehr.* (restricted).[1] — Cordylomorpha *Allm.*

S. parasitica *Ehrenb.* — *Mediterranean* (Cavolini).

S. lacustris *Ag.* — Cordylomorpha lacustris *Allm.*, Phil. Trans. R. S., 1853, Pl. 25, fig. 1. — *Dublin, Ireland* (Allman). — Professor Leidy has discovered another species in *Newport Harbor, R. I.*

2nd Family. HYDRACTINIDÆ *Ag.*[2]

Hydractinia *VanBened.* See p. 227.

H. echinata *Johnst.* — Hydr. rosea and H. lactea *VanBen.* — *Scotland* (Fleming); *British Coast* (Johnston); *German Ocean* (VanBen.).

H. polyclina *Ag.* — *North America, Atlantic coast* (Agassiz).

3d Family. SARSIADÆ *Forbes* (restricted).[3] See pp. 184 and 217.

Coryne *Gärt.* — Hydra: Coryne *Gärt.*, Syncoryne *Ehr.*, Stipula *Sars*, Hermia *Johnst.* — Medusa: Sarsia *Less.*, Sthenyo *Dujar.*[4]

but in the former the tentacles are simple, and only sessile medusæ-buds are produced, while the latter produce free medusæ, and have knobbed tentacles. In Cladonemidæ the clavate tentacles are arranged in worls and cross-wise. In Hydractinidæ there are two kinds of Hydræ, each kind with different tentacles. In Bougainvillidæ and Eudendroidæ the tentacles encircle a well-defined crown, and the apex of the Hydra assumes, in the latter, the form of a distinct proboscis. In Tubularidæ proper the proboscis has tentacles also, but of the same kind as the crown, while in Pennaridæ the coronal tentacles are simple, and those of the proboscis clavate. In Nemopsidæ the Hydroid community is free and locomotive, and in Nucleiferæ the medusæ-buds arise from a creeping stolon, and not from the pedicel, nor from the head of the Hydra, as in the other families.

[1] Syncoryna, *Ehrenberg*, Corallenthiere, Vert. Akad. Wiss., Berlin, 1834, p. 70. "Huc *Sertulariam parasiticam* Cavolini referrem: *Syncoryna* parasitica." The three other species belong to the genus Coryne *Gaert.*

Cordylophora, Allman, Proc. Brit. Assoc., 1843.
" Allman, Annals and Mag. Nat. Hist., May, 1844, XIII., p. 328.
" Allman, Philos. Trans. Roy. Soc., 1853, p. 367.
Corydendrium, VanBeneden, Bullet. Acad. Roy., Bruxelles, p. 313, Nov. 1844.
" Dana, Zoöphytes, 1846.
" Dana, Synopsis Zoöph., 1859, p. 148.
Sertularia (*parasitica*), Cavolini Mem. Polypi Marini, 1785, Pl. VI. *Figs.* 8–13, and Sprengel's transl., 1813, p. 83.

[2] This family is very peculiar and distinct from all other Tubularians. The communities consist of two kinds of Hydræ, equally developed, the ones sterile with simple tentacles, the others fertile with knobbed tentacles. Medusæ sessile, the males and the females budding from different colonies. McCrady is mistaken in stating that the medusæ-bearing Hydræ are not tentaculated.

[3] Forbes refers, also, the genera Bougainvillia, Lizzia, Modeeria, Euphysa, and Steenstrupia, to this type; but they belong to different families. As here restricted, the Sarsiadæ embrace only those Acalephs the hydræ of which are Coryne-like, and the medusæ deep bell-shaped, with four long tentacles in the prolongation of the four chymiferous tubes, and a long simple proboscis, upon which the eggs are developed.

[4] It is to be hoped that henceforth zoölogists will refrain from giving names to Hydroids, the development of which they have not traced, since this genus shows to what complication of the nomenclature the prevalent practice has led. A true

C. pusilla *Gärt.*, *Johnst.*, Pl. 2. — Oceania tubulosa *Sars.* — Sarsia tubulosa *Less.*, *Forbes*, Nak. Med., Pl. 6, fig. 2. — Comp. p. 201, note.[1] — Sthenyo *Duj.*, An. Sc. Nat., 1845, Vol. IV. Pls. 14 and 15, B. — *British Channel* (Gärtner); *Coast of Norway* (Sars); *Zetland Islands* (Forbes).

C. mirabilis *Ag.*, Vol. III. Pls. 17 and 18. — Sarsia mirabilis *Ag.*, Mem. Am. Ac., IV. Pls. 4 and 5. — *Boston Bay* (Agassiz).

C. Rosaria *A. Ag.* — *Gulf of Georgia* (A. Agassiz).[2]

Sarsia macrorhynchos *Busch*, Pl. 3, fig. 7, from Falmouth, belongs certainly to this genus, and, may be, to Coryne pusilla.

Syndictyon *A. Ag.* — Hydra: Coryne-like.

S. reticulatum *A. Ag.* — *Nahant* (A. Agassiz).[3]

S. thelostylum *Ag.* — Oceania thelostyla *Gegenb.*, Pl. 8, fig. 9. — *Messina* (Gegenbaur).

Sarsia ocellata *Busch*, Pl. 2, fig. 1, from Triest, probably belongs to this genus.

Corynitis *McCr.* — Hydra: Halocharis *Ag.*,[4] Vol. IV. p. 239, Pl. 20, fig. 10.

C. Agassizii *McCr.*, Pl. 9, fig. 2. — *Charleston Harbor, South Carolina* (McCrady).

Candelabrum *DeBl.* — Myriothela *Sars.* — Spadix *Gosse.*

regard for science ought to lead us all to imitate the entomologists, who raise the larvæ of Insects before naming them.

[1] The European zoölogists have described many species belonging to this genus, but it now remains to be seen how far they are distinct, since I have shown how greatly one of the American species varies at different seasons.

[2] C. Rosaria *A. Ag.*; resembles the English C. pusilla very closely; it has a long, light-brown proboscis, hanging below the level of the veil, with a marked constriction at the point of attachment. Tentacular bulb small; eye-speck very minute; tentacles moderately long, expanding about twice the length of the spherosome. Height of the bell half an inch, length of the proboscis three quarters of an inch, diameter across the circular tube one quarter of an inch. — *Straits of Rosario, Washington Territory* (A. Agassiz).

[3] Syndictyon *A. Ag.* Spherosome goblet-shaped; digestive trunk shorter than in Sarsia proper; tentacular bulb large, with large eye-speck; tentacles hollow, short, the surface crowded with clusters of large lasso-cells; whole surface of spherosome covered with a net-work of clusters of lasso-cells.

S. reticulatum *A. Ag.* Thickness of bell uniform, from abactinal pole to circular tube; digestive cavity with a constriction near the base, and another near the actinal end; clusters of lasso-cells increasing in size towards the end of the tentacles; lasso-cells of surface of bell arranged in concentric lines made up of clusters of small cells parallel to the circular tube, with clusters of larger lasso-cells scattered irregularly; height one eighth of an inch; of a light metallic-blue color. — *Nahant, near Boston, July* (A. Agassiz).

[4] This is the Stauridioid genus to which McCrady makes a reference in his paper, p. 46

C. phrygium *DeBl.* — Lucernaria phrygia *Fabr.*[1] — *Greenland* (Fabricius); *Grand Manan, Bay of Fundy* (W. Stimpson).

C. arcticum *Ag.* — Myriothela arctica *Sars.* — Spadix purpurea *Gosse*, Ann. and Mag. Nat. Hist., 1855, p. 125; Mar. Zool., p. 19, fig. 25. — *Norway* (Sars); *English Coast* (Gosse).

Dipurena *McCr.*[2]

D. strangulata *McCr.*, Pl. 9, fig. 1. — *Charleston Harbor* (McCrady).

D. cervicata *McCr.* — *Charleston Harbor* (McCrady).

D. conica *A. Ag.* — *Naushon, Buzzard's Bay* (A. Agassiz).[3]

Slabberia *Forbes.*

S. halterata *Forbes*, Nak. Med., Pl. 6, fig. 1. — *Cornwall* (Forbes).

4th Family. Cytæidæ *Agass.*[4]

Cytæis *Esch.* (not Sars).

C. tetrastyla *Esch.*, Pl. 8, fig. 2; *Eyd.* and *Soul.*, Bonite, Zooph., Pl. 2, figs. 4–15. — *Atlantic Ocean, Equator* (Eschscholtz).

C. pusilla *Gegenb.*, Pl. 8, fig. 8. — ? Bougainvillia mediterranea *Busch.* — *Messina* (Gegenbaur).

5th Family. Cladonemidæ *Gegenb.*, Zeit. w. Zool., 1856.

Cladonema *Duj.* — Medusa: Stauridia *Wright.* — Hydra: Stauridia *Duj.*

C. radiatum *Duj.*, Ann. sc. nat., 1845, Pls. 14 and 15, C. — *British Channel* or *Mediterranean* (Dujardin).

Eleutheria *Quatr.* — Hydra: Clavatella *Hincks*, Ann. and Mag., 1861, Vol. VII. Pl. 7.

E. dichotoma *Quatr.*, Ann. sc. nat., 1842, Pl. 8. — *Isles Chausey* (Quatrefages).

[1] Mr. W. Stimpson has called my attention to the generic identity of Lucernaria phrygia *Fabr.* and Sars' Myriothela, which is unquestionable. I have compared a specimen collected by Mr. Stimpson at Grand Manan with the descriptions of the European species, and find that they agree in their generic characters. The name first proposed by DeBlainville for this genus must, therefore, be retained. The medusa is not yet known.

[2] According to Forbes' statement, the ovaries of Slabberia are upon the radiating tubes: in Dipurena they are upon the proboscis. This seems to indicate either an incorrect observation or different affinities.

[3] Dipurena conica *A. Ag.* Spherosome conical; thickness of disk tapering rapidly from abactinal pole to circular tube; digestive trunk elongated, with a slight constriction at the base and another near the middle, tapering towards extremity, does not quite extend to the level of the veil; the four marginal tentacles with large bulbs at the base, and very marked eye-specks, surrounded by reddish pigment-cells; terminal bulb of tentacles about twice the diameter of the tentacle itself; height of spherosome and diameter across the circular tube one eighth of an inch. — *Naushon, Buzzard's Bay, September* (A. Agassiz).

[4] This family differs, chiefly, from the Sarsiadæ, by the presence of tentacles at the end of the proboscis. The species referred to Cytæis by Sars, belong to the family of Bougainvillidæ.

6th Family. EUDENDROIDÆ *Ag.* See p. 282. No free Medusæ.

Eudendrium *Ehrenb.* — Calamella *Oken.* — Thoa *Lamx.*

E. ramosum *Ehrenb.* — Tubularia ramea *Dalyell*, Pl. 6. — *Northern Europe* (Linnæus).

E. dispar *Ag.* — Thoa dispar *Ag.*, Vol. 4, Pl. 27, figs. 10–26. — *Massachusetts Bay* (Agassiz).

7th Family. TUBULARIDÆ *Johnst.* (restricted).[1]

Tubularia *Linn.* (restricted).

T. indivisa *Linn.*, *Dalyell*, Pls. 1–4; *Johnst.*, Zoöph., Pl. 3, fig. 1. See p. 241. — *Northern Europe* (Linnæus).

T. Couthouyi *Ag.*, p. 266, Pl. 24. — *Massachusetts Bay* (Agassiz).

Thamnocnidia *Ag.*

T. coronata *Ag.* See p. 242. — Tubularia coronata *Abild.* — *Northern Europe* (Abildgaard and VanBeneden).

T. calamaris *Ag.* See p. 242. — Tubularia calamaris *VanBen.* — Tubularia gracilis *Johnst.* — *German Ocean* (VanBeneden).

T. spectabilis *Ag.*, p. 271, Pl. 22, figs. 1–20. — *Boston Bay*, *Nahant* (Agassiz).

T. tenella *Ag.*, p. 275, Pl. 22, figs. 21–30. — *Nahant* (Agassiz).

Parypha *Ag.* — Pyxidium *Leuck.*?

P. cristata *Ag.* — Tubularia cristata *McCr.* — *Charleston* (McCrady).

P. crocea *Ag.*, p. 249, Pl. 23. — *Boston Bay* (Agassiz).

Pyxidium truncatum *Leuck.*, Arch. Nat., 1856, Pl. 2, fig. 7. — *Nice* (Leuckart).[2]

Ectopleura *Ag.*[3]

E. Dumortieri *Ag.* See p. 242. — Tubularia Dumortieri *VanBen.* — *German Ocean* (VanBeneden).

[1] As here limited, the Tubularidæ embrace only those Hydroids the head of which has a wreath of simple coronal tentacles, and a proboscis with simple tentacles around the mouth; producing either sessile or free medusæ, more or less one-sided, budding from the floor between the coronal tentacles and the proboscis.

[2] Kölliker has described a Tubularia which belongs to the genus Parypha (see p. 242), and may be the parent of Leuckart's Pyxidium. The eminent anatomist uses expressions in this description, which require our special attention. What he calls sexual organs are unquestionably medusæ-buds, and the hollow cone of these organs is the proboscis of the medusa. The parts of these so-called sexual capsules are, in fact, homologous to the parts of the free medusæ, in all their details; and this shows them to be distinct individuals, for an organ homologous to a whole animal, in all its parts, would be a singular anomaly.

[3] Ectopleura *Ag.* In this genus are included those species formerly referred to Sarsia, having a short digestive trunk, not provided with movable lips; and in which the pigment cells of the sen-

E. pulchella *Ag.* — Sarsia pulchella *Forbes*, Nak. Med., Pl. 6, fig. 3. — *British Seas* (Forbes).

E. turricula *Ag.* — Sarsia turricula *McCr.*, Pl. 8, figs. 6–8. — *Charleston, South Carolina* (McCrady).

E. nodosa *Ag.* — Sarsia nodosa *Busch.*, Pl. 2, fig. 6. — *Cornwall* (Busch).

E. ochracea *A. Ag.* — *Naushon, Buzzard's Bay* (A. Agassiz).[1]

Corymorpha *Sars.* — Ellisia *Forbes.*

C. nutans *Sars.* See p. 242. — *German Ocean* (Sars); *British Seas, Orkney Islands* (Forbes).

C. pendula *Ag.*, p. 276, Pl. 26, figs. 7–17. — *Bay of Massachusetts. Nahant* (Agassiz).

Steenstrupia *Forbes.* See p. 242.[2]

S. fritillaria *Ag.* — Coryne fritillaria *Steenst.*, Generationsw., Tab. I. — *Iceland* (Steenstrup).

S. rubra *Forbes*, Nak. Med., Pl. 13, fig. 1. — *British Seas* (Forbes). — S. flaveola *Forbes*, Nak. Med., Pl. 13, fig. 2, is, perhaps, only another state of S. rubra.

S. lineata *Leuck.*, Arch. Nat., 1856, Pl. 2, fig. 6. — *Nice* (Leuckart).

Euphysa *Forbes.*

E. aurata *Forbes*, Nak. Med., Pl. 13, fig. 3. — *British Seas* (Forbes).

Hybocodon *Ag.*

H. prolifer *Ag.*, p. 243, Pl. 25. — *Massachusetts Bay* (Agassiz).

Sarsia gemmifera *Forbes*, Nak. Med., Pl. 7, fig. 2, and Sarsia prolifera *Forbes*, Nak. Med., Pl. 7, fig. 3, may also belong to this genus, or form another distinct group.

sitive bulb are not concentrated in one mass, but scattered through the whole swelling at the base of the tentacles. There are also two rows of lasso-cells on the surface of the spherosome, commencing at the base of the chymiferous tubes, and running, one each side of it, towards the abactinal pole.

[1] Ectopleura ochracea *A. Ag.* Spherosome of uniform thickness from the circular tube to the base of the digestive trunk. From this point the outline tapers very gradually towards the abactinal pole, giving a great thickness to this part of the spherosome. The tentacles are short, carried tightly curled, lasso-cells very numerous, and scattered irregularly over their surface. There is an accumulation of light-yellow pigment-cells near the base of the digestive trunk, which is itself of a delicate pink color. The pigment-cells of the sensitive bulb are of a purplish-orange upon a yellow ground. Height one quarter of an inch. — *Naushon, Buzzard's Bay, September* (A. Agassiz).

[2] By misprint the genus Steenstrupia bears the authority of Sars. on p. 242. when it should be Forbes. I suspect a mistake on the part of Steenstrup in referring the free Medusa, represented in the "Generationswechsel," Pl. I. figs. 43, 44, and 45, to the Hydroid represented fig. 41. His free Medusa has the closest affinity with Hybocodon prolifer, which truly belongs to the Tubularidæ, while his Hydroid cannot be referred to this family, as it has no coronal tentacles.

8th Family. PENNARIDÆ *McCr.*[1] (restricted).

Pennaria *Goldf.* (non *Oken*). See p. 278.

P. distycha *Goldf.* — Sertularia pennaria *Cav.*, Pl. 5, figs. 1–6. — *Mediterranean* (Cavolini).

P. gibbosa *Ag.*, Vol. III. Pl. 15, figs. 1 and 2. — *Florida* (Agassiz).

Euphysa globator *Leuck.*, Wiegm. Arch., 1856, Pl. 2, fig. 4, is probably a Pennaria.

Globiceps *Ayres.* — Eucoryne *Leidy.* Both names preoccupied.

G. tiarella Ayres. — Eucoryne elegans *Leidy.* — Pennaria tiarella *McCr.* — *Massachusetts: Buzzard's Bay* (Ayres); *N. Jersey* (Leidy); *Charleston, South Carolina* (McCrady).

Zanclea *Gegenb.* — Microstoma *Less.* (preoccupied).

Z. costata *Gegenb.*, Pl. 8, figs. 4–7. — *Messina* (Gegenbaur).

Z. ambigua *Ag.* — Microstoma ambiguum *Less.* — *Waigiou* (Lesson).

Z. gemmosa *McCr.*, Pl. 8, fig. 4. — Gemmaria *McCr.* — *Charleston, South Carolina* (McCrady).

9th Family. BOUGAINVILLIDÆ *Lütk., Gegenb.* — Hippocrenidæ *McCr.*

Bougainvillia *Less.* — Hippocrene *Mert.* — Hydra: Eudendrium-like, with short proboscis. — See p. 283.

B. macloviana *Less.* — Cyanea Bougainvillii *Less.*, Coq. Zooph, Pl. 14, fig. 3. — *Falkland Islands* (Lesson).

B. Mertensii *Ag.* — Hippocrene Bougainvillei *Br.*, Pl. 20. — *Behring Straits* (Brandt); *Gulf of Georgia* (A. Agassiz).

B. superciliaris *Ag.*, Mem. Am. Ac., IV. Pl. 1; see also this volume, p. 283. — *Bay of Boston, Nahant* (Agassiz).

Margelis *Steenst.* — Medusa: Bougainvillia *Forb.*, Hippocrene *McCr.* — Hydra: Eudendrium-like, with short proboscis.

M. principis *Steenst.* — *Faröe Isl.* (Steenstrup).

M. carolinensis *Ag.* — Hippocrene carolinensis *McCr.*, Pl. 10, figs. 8–10. — *Charleston Harbor* (McCrady); *Naushon* (A. Agassiz).

M. ramosa *Ag.* — Tubularia ramosa *Dalyell*, and Medusa ocilia *Dalyell*, Pl. XI. — Bougainvillia britannica *Forbes*, Nak. Med., Pl. 12, fig. 1. — *Zetland Islands* (Forbes).

[1] McCrady refers also Willia and Cladonema to this family, but the hydræ of Cladonema and Eleutheria, which are closely allied, differ as much from those of the true Pennaridæ, as their free medusæ. The Pennaridæ differ from the Tubularidæ by the mode of branching of the Hydroid, and by the structure of the proboscidal tentacles, which are clavate, while the coronal tentacles are simple. The Cladonemidæ have only one kind of tentacles, arranged in worls, and they are clavate.

M. nigritella *Ag.*—Bougainvillia nigritella *Forbes*, Nak. Med., Pl. 12, fig. 2.—*Zetland Islands* (Forbes).

Lizzia *Forbes*. See p. 284.

L. octopunctata *Forbes*, Nak. Med., Pl. 12, fig. 3.—Cytæis octopunctata *Sars.*—*Norway* (Sars); *Zetland Islands* (Forbes).

L. blondina *Forbes*, Nak. Med., Pl. 12, fig. 4.—*Zetland Islands* (Forbes).

Rathkia *Br.* Ac. St. Pet., 1838, p. 353, note.

R. Blumenbachii *Br.*—Oceania Blumenbachii *Rathke*, Ac. St. Pet., 1835, Pl. (no number).—*Crimea* (Rathke).

Köllikeria *Agass.* Differs by its eight bunches of tentacles.

K. fasciculata *Ag.*[1]—Melicerta fasciculata *Pér.* and *LeS.*—Lizzia Köllikeri *Gegenb.*, Pl. 7, fig. 5; *Leuck.*, Arch., 1856, Pl. 2, fig. 2.—Bougainvillia diplocanos *Busch*, Pl. 2, fig. 9, may be the young.—*Nice* (Péron and LeSueur); *Messina* (Gegenbaur).

10th Family. Nemopsidæ *Agass.*[2]

Nemopsis *Ag.* The Hydra has been described by McCrady.

N. Bachei *Ag.*—Nemopsis Gibbesi *McCr.*, Pl. 10, figs. 1–7.—*Vineyard Sound* (Agassiz); *Naushon* (A. Agassiz); *Charleston Harbor, South Carolina* (McCrady).

Acaulis *Stimp.* The free medusa is not known.

A. primarius *Stimp.*, Pl. 1, fig. 1.—*Grand Manan, Bay of Fundy* (Stimpson).

11th Family. Berenicidæ *Esch.*—Willsiadæ *Forbes.*[3]

Berenix *Pér.* and *LeS.*—Berenice *Cuv.*

B. euchroma *Pér.* and *LeS.*; *Cuv.*, Règn. An., Ill. ed., Pl. 53, fig. 2.—*Equatorial Atlantic Ocean* (Péron and LeSueur).

B. Thalassina *Pér.* and *LeS.*—*West Coast of New-Holland* (Péron and LeSueur.

Cuvieria *Pér.* and *LeS.*

C. carisochroma *Pér.* and *LeS.*; *Cuv.*, Règn. An., Ill. ed., Pl. 53, fig. 1.—*New-Holland* (Péron and LeSueur).

[1] There can be no doubt that Lizzia Köllikeri *Gegenb.* is identical with Melicerta fasciculata, *Pér.* and *LeS.* The description agrees fully, and the origin is the same. Is not Lizzia dibalia *Busch* also a Köllikeria or a Rathkia?

[2] This family differs from the Bougainvillidæ, by the peculiar prolongation of the genital apparatus of the free Medusa, which extends from the proboscis to the radiating tubes, along which it projects, like curtains, into the cavity of the bell.

[3] I see no reason why the Willsiadæ of Forbes should be separated from the Berenicidæ of Eschscholtz, founded upon the species drawn by LeSueur, and described by Péron and LeSueur. The genus Eudora is evidently drawn from imperfect Acalephs.

Eudora *Pér.* and *LeS.* (not Lesson).

E. undulosa *Pér.* and *LeS.*; *Cuv.*, Règn. An., Ill. ed., Pl. 54, fig. 5. — *De Witt's Land* (Péron and LeSueur).

Proboscidactyla *Br.* — P. flavicirrhata *Br.*, Pl. 19. — *Petropolawsky* (Mertens); *Gulf of Georgia* (A. Agassiz).

Willia *Forbes.*[1] (Spelled Willsia by Forbes.)

W. stellata *Forbes*, Nak. Med., Pl. 1, fig. 1; Gosse, Devon., Pl. 20, figs. 1–5. — *Bay of Oban and Penzance* (Forbes).

W. ornata *McCr.*, Pl. 9, figs. 9–11. — *Charleston Harbor, South Carolina* (McCrady); *Naushon, Massachusetts* (A. Agassiz).

12th Family. NUCLEIFERÆ *Less.* — Oceanidæ *Esch.* (p. p.), *Gegenb.*, *McCr.*

Conis *Br.* — C. mitrata *Br.*, Mém. Acad. St. Petersb., 1838, Pl. 2. — *Bonin Islands* (Mertens).

Turris *Less.* — Oceania (Auct. p. p.).[2] — Hydra: Clavula *Wright.*

T. papua *Less.*; *Eyd.* and *Soul.*, Bonite, Zooph., Pl. 2, figs. 1–3. — *Waigiou* (Lesson).

T. digitalis *Forbes*, Nak. Med., Pl. 3, fig. 1. — Medusa digitalis *O. F. Müll.* — Melicerta digitalis *Pér.* and *LeS.* — Eirene digitalis *Esch.* — Turris borealis *Less.* — *German Ocean* (O. F. Müller); *British Seas* (Forbes).

T. neglecta *Less.*; *Forbes*, Nak. Med., Pl. 3, fig. 2. — Clavula Gossii *Wright*, Edinb. Phil. Journ., 1859, Vol. X. p. 105; *Gosse*, Devon., Pl. 13, figs. 6–10. — *British Seas* (Forbes).

[1] Dedicated to Dr. Will, by Prof. Forbes, and should, therefore, be written Willia, and not Willsia.

[2] As characterized by the French naturalists, the genus Oceania does not at all correspond to the genus Oceania of Forbes and the modern German zoölogists. Eschscholtz does not seem to have observed a single species himself, and adopts nearly the same limits for it as Péron and LeSueur. So does also DeBlainville. Moreover, Péron and LeSueur unite the Oceaniæ of modern writers with the species which Lesson has retained in this genus, after restricting it so as to exclude the Forskalian species. The result of all this is, that the Lessonian Oceaniæ are united with some of the Æquoridæ of Eschscholtz, even though Eschscholtz had already proposed the name Oceanidæ for a family which is entirely different from the Æquoridæ. As there are types of several distinct families united at the outset under the name Oceania, by Péron and LeSueur, the question now is, for which that name ought to be retained, if retained at all. Lesson perceived the confusion, and took the first steps towards remedying it; but he did it very imperfectly. I see, however, no reason why the name Nucleiferæ, which he proposed for the old Forskalian type, should not be retained for this family, and the name Oceania and Oceanidæ applied specially, as Lesson has done, to Oceania phosphorica, which Péron and LeSueur place in the first section of the genus. This section corresponds to the genus Thaumantias of modern writers. The second section answers to the genus Oceania, as limited by Forbes; but since Lesson had previously divided the genus in a different way, Forbes' arrangement cannot be adopted. The third section corresponds to Geryonopsis.

Tiara *Less.* — Oceania *Forbes.* — Pandea *Less.* (p. p.).

T. pileata *Ag.* — Medusa pileata *Forsk.* — Oceania pileata *Pér.* and *LeS.*; *Leuck.*, Arch. Nat., 1856, Pl. 2, fig. 1. — Tiara papalis *Less.* — Oceania coccinea *Leuck.* (male). — *Mediterranean* (Péron and LeSueur); *Nice* (Leuckart).

T. conica *Ag.* — Dianæa conica *Q.* and *G.* — Oceania conica *Esch.*, *Gegenb.*, Pl. 7, fig. 1. — Pandea conica *Less.* — Oceania sedecimcostata *Köll.* — *Mediterranean* (Guoy and Gaimard).

T. octona *Ag.* — Oceania octona *Forbes*, Nak. Med., Pl. 2, fig. 1. — Oceania saltatoria *Sars*, O. turrita and O. episcopalis *Forbes*, Nak. Med., Pl. 2, figs. 2 and 3, are probably different stages of growth of the same species. — *British Seas* (Forbes).

Pandea *Less.* (restricted).

P. flavidula *Ag.* — Oceania flavidula *Pér.* and *LeS.*; *Gegenb.*, Pl. 7, fig. 4. — Oceania rotunda *Q.* and *G.* — Oceania armata *Köll.* — *Nice* (Péron and LeSueur).

P. globulosa *Ag.* — Oceania globulosa *Forbes*, Nak. Med., Pl. 3, fig. 3. — *British Seas* (Forbes).

Turritopsis *McCr.*

T. nutricola *McCr.*, Pls. 4 and 5, and Pl. 8, fig. 1. — *Charleston, South Carolina* (McCrady); *Naushon* (A. Agassiz).

Modeeria *Forbes.*

M. formosa *Forbes*, Nak. Med., Pl. 7, fig. 1. — *Hebrides* (Forbes).

Stomotoca *Ag.* — Saphenia *Forbes* (not *Esch.*).[1]

St. dinema *Ag.* — Saphenia dinema *Forbes*, Nak. Med., Pl. 2, fig. 4, (not *Esch.*). — Saphenia Titania *Gosse*, Devon., Pl. 26, figs. 7–9. — *British Channel* (Forbes). — Syncoryna Cleodoræ *Gegenb.*, Generat., Pl. 1, fig. 3, appears to be the Hydra of a Stomotoca.

St. apicata *Ag.* — Saphenia apicata *McCr.*, Pl. 8, figs. 2 and 3. — *Charleston* (McCrady).

St. atra *A. Ag.* — *Gulf of Georgia, W. T.* (A. Agassiz).[2]

Rhizogeton *Ag.* See p. 224.

R. fusiformis *Ag.*, Pl. 20, figs. 17–23. — *Nahant* (Agassiz).

[1] This name must be changed, since the genus Saphenia *Esch.* is well founded, but embraces entirely different species from those referred to it by Forbes, and belonging to a different family, the Geryonopsidæ. I propose to call it Stomotoca.

[2] Stomotoca atra *A. Ag.* Spherosome rounded at abactinal pole. Pedunele long, ovaries of dark brown color, occupying the lower half of it, and extending to the level of the veil; digestive cavity terminating in four simple folds, hanging below the

4th Sub-order. SERTULARIÆ.[1] Alternate generations or direct development.[2] Hydra always pedunculated and attached, protected by a horny sheath, forming a distinct cup around the head. Medusa either free or sessile, mostly flat, sometimes, however, deep bell-shaped, with numerous tentacles, not more prominent in the prolongation of the radiating chymiferous tubes, than in the intervals between them, along the circular tube;[3] with or without independent eyes and marginal cirrhi. Reproductive organs always along the radiating chymiferous tubes, and never upon the proboscis.

1st Family. AGLAURIDÆ *Ag.* See note 2, p. 352.

Aglaura *Pér.* and *LeS.*, *Esch.*, *DeBl.*, *Less.*, *Gegenb.* (non *Oken*).

A. hemistoma *Pér.* and *LeS.* — Aglaura Peronii *Leuck.*, Arch. Nat., 1856, Pl. 1, fig. 5; *Gegenb.*, Pl. 8, fig. 3. — *Nice* (Péron and LeSueur); *Messina* (Gegenbaur).[4]

Lessonia *Eyd. et Soul.*

L. radiata *Eyd. et Soul.*, Bonite, Zooph., Pl. 2, fig. 16. — *South Sea* (Eydoux et Souleyet).

2d Family. CIRCEIDÆ *Forbes.* See note 2, p. 352.

Circe *Mert.*, in Brandt's paper, Mém. Ac. St. Petersb., 1838.

C. camtschatica *Br.*, Pl. 1. — *Coast of Kamtschatka* (Mertens).

level of the circular tube. About eighty rudimentary tentacles between the two large ones. Spherosome of a light blue color; folds of actinostome, dirty yellow; tentacles, light brown. Height, three quarters of an inch. — *Gulf of Georgia, Washington Territory* (A. Agassiz).

[1] This sub-order corresponds to the groups of Hydroids generally designated under the names of Sertularians and Campanularians, but, since many of them are now known to produce free Medusæ, it is evident that all the naked-eyed Medusæ which have the same structure as these, must be associated with them, even though the origin of a majority of them remains at present unknown.

[2] It remains doubtful whether some naked-eyed Medusæ, such as the Trachynemidæ *Gegenb.*, which are known to undergo a direct development from eggs, should remain in this sub-order. But when I consider the difference in the development of Pelagia and Cyanea, notwithstanding their close affinity, I am inclined to believe that a regular succession of generations, without the interposition of an hydroid form, is no objection to the association of these naked-eyed Medusæ with those, the eggs of which produce Hydræ from which free Medusæ arise.

[3] When young, some of these Medusæ have four tentacles, and for some time, while still growing, the tentacles in the prolongation of the chymiferous tubes are larger than those placed in the intervals: but in course of time this difference gradually vanishes.

[4] The Aglaura penicillata *DeBl.*, Pl. 33, fig. 4, belongs to the genus Polyorchis; it is figured twice, and appears under two different names in the Manuel d'Actinologie. It is the Melicertum penicillatum *Esch.*, and is also figured under that name by DeBlainville on Pl. 38. See Polyorchis, p. 349.

C. impatiens *A. Ag.*—*Gulf of Georgia* (A. Agassiz).

C. Anais *Less.*, Pl. 5, fig. 1.—Circe elongata *Less.*, Pl. 5, fig. 2 (the same contracted).—*Seas of Africa* (Rang).

C. rosea *Forbes*, Nak. Med., Pl. 1, fig. 1.—*British Seas* (Forbes).

Persa *McCr.*

P. incolorata *McCr.*, Pl. 12, fig. 3.—*Charleston* (McCrady).

Mitra *Less.*

M. Rangii *Less.*, Pl. 6, fig. 5.—*Seas of Africa* (Rang). The long tentacles indicate an affinity with Tiara *Less.*

3d Family. POLYORCHIDÆ *A. Ag.* See note 2, p. 352.

Polyorchis *A. Ag.*[1]—Melicertum *Esch.* (p. p.).—Aglaura *DeBl.* (p. p.).

P. penicillata *A. Ag.*—Melicertum penicillatum *Esch.*, Pl. 8, fig. 4.—Aglaura penicillata *DeBl.*—*California* (Eschscholtz).—*Gulf of Georgia and San Francisco* (A. Agassiz).

4th Family. MELICERTIDÆ *Ag.* See note 2, p. 352.

Melicertum *Oken.*—Melicerta *Pér.* and *LeS.* (p. p.).—Campanella *Less.* (non *Bl.*).

M. campanula *Pér.* and *LeS.*—Medusa campanula *Fab.*—Campanella Fabricii *Less.*—*Greenland* (Fabricius); *Massachusetts Bay* (Agassiz).

M. pusillum *Esch.*—Actinia pusilla *Swartz*—Melicertum campanulatum *Ehrenb.*, Pl. 8, fig. 7 (non *Cham.* and *Eysenh.*).—Stomobrachium octocostatum *Forbes*, Nak. Med., Pl. 4, fig. 1.—Oceania octocostata *Sars.*—Æquorea octocostata *Less.*—Thaumantias Milleri *Landsb.*—*German Ocean* (Swartz); *England* (Forbes).

M. campanulatum *Esch.* (non *Ehrenb.*).—Medusa campanulata *Cham.* and *Eysenh.*, Act. Nov., X. Pl. 30, fig. 1.—Campanella Chamissonis *Less.*—*South Sea* (Chamisso and Eysenhardt).

M. georgicum *A. Ag.*[2]—*Gulf of Georgia* (A. Agassiz).

[1] Polyorchis *A. Ag.* Spherosome bell-shaped. Ovaries suspended as independent pouches near the base of the digestive cavity; digestive cavity cylindrical, very flexible, terminating in simple lips. Chymiferous tubes sending off numerous branches at right angles with the main stems; tentacles forming a knee upon themselves, and having the tentacular bulb at a distance from the circular tube. No ocelli or sensitive capsules.

[2] Melicertum georgicum *A. Ag.* Spherosome somewhat pointed towards abactinal region; tentacles much fewer in number than in the species of the New England coast, with large tentacular bulbs; digestive cavity longer, terminating in four lips. Ovaries not extending to the base of the chymiferous tubes. Digestive cavity, ovaries, and tentacular bulbs of a yellowish-brown color.—*Gulf of Georgia, Washington Territory, July* (A. Agassiz).

Gonionemus *A. Ag.*[1]

G. vertens *A. Ag.*[2]—*Gulf of Georgia, Washington Territory* (A. Agassiz).

5th Family. Laodiceidæ *Ag.* — Thaumantiadæ *Gegenb.*[3]

Laodicea *Less.*[4] — Cosmetira *Forbes.* — Thaumantias *Gegenb.* (non *Esch.*).

L. cruciata *Ag.* — L. crucigera *Less.* — Medusa cruciata *Forsk.*, Pl. 33, fig. A. — Oceania cruciata, in Wagner's Icones Zoot., Pl. 33, fig. 2. — Oceania cacuminata *Esch.* — Thaumantias Mediterranea *Gegenb.*, Pl. 8, figs. 1–3. — Thaumantias corollata *Leuck.*, Pl. 1, fig. 11. — *Mediterranean* (Forskål).

L. stauroglypha *Ag.* — Æquorea stauroglypha *Pér.* and *LeS.* — Thaumantias (Cosmetira) pilosella *Forbes*, Pl. 8, fig. 1. — *British Channel* (Péron and LeSueur).

L. cellularia *A. Ag.*[5]—*Gulf of Georgia, W. T.* (A. Agassiz).

L. calcarata *A. Ag.*[6]—*Naushon, Buzzard's Bay* (A. Agassiz).

[1] Gonionemus *A. Ag.* Spherosome conical, ovaries in alternate folds along the chymiferous tubes. Digestive cavity flexible; tentacles attached to the circular tube by a peduncle, not numerous.

[2] Gonionemus vertens *A. Ag.* Spherosome rather conical, with rounded apex, chymiferous tubes making a sharp bend above the commencement of the ovaries, which are dark violet, as well as the tentacular bulb, and a spot of the same color near the extremity of the tentacles; the tentacles themselves are reddish brown, short, sickle-shaped (when the Medusa is in motion), with a bulb which is not immediately at the base of the tentacle: they can expand to twice the diameter of the Medusa. There are fifteen between every two chymiferous tubes, and one opposite each. The lasso-cells are arranged in rings around the tentacles. The digestive cavity, hanging like a long bag, with four-lobed lips round the actinostome. Vertical diameter nine tenths of an inch, actinal diameter eight tenths of an inch. — *Gulf of Georgia* (A. Agassiz).

[3] As the genus Thaumantias *Gegenb.* does not correspond to that of Eschscholtz, while it is synonymous with Laodicea *Less.*, this name cannot be retained for the family.

[4] By a strange mistake the name of Laodicea is introduced among the synonyms of Aurelia, p. 159. It was copied from a memorandum made to compare Medusa cruciata *Forsk.*, which is a Laomedea, with Medusa cruciata *Bast.*, which is an Aurelia.

[5] Laodicea cellularia *A. Ag.* Digestive cavity very short; lips of actinostome narrow, with frilled edges, at least five times as long as the diameter of the digestive cavity. Ovaries extending the whole length of the chymiferous tubes, with a slightly lobed outline. Tentacles very contractile, with a large swelling at the base. Ovaries and digestive cavity of a light violet color; the tentacular bulb of a darker shade; the whole spherosome with a light violet tinge. Diameter, across the circular tube, one and one fifth of an inch. Height, three quarters of an inch. Surface of spherosome covered with large, polygonal epithelial cells. — *Gulf of Georgia, Washington Territory, July to September* (A. Agassiz).

[6] Laodicea calcarata *A. Ag.* Spherosome perfectly transparent; ovaries hanging in folds from the base of the digestive cavity to a short distance from the circular tube. Digestive cavity short, with four thin, wavy lips, equalling in length the diameter of the digestive cavity. The tentacles are exceedingly numerous, and placed close together; from the narrow intervals between them protrude small, solid, club-shaped tentacles, and thread-like cirrhi. The large tentacles have a conical spur, equalling in length the diameter of the tentacular bulb, which is of a dirty yellow color, with a dark

Staurophora *Br.*

St. Mertensii *Br.*, Pls. 24 and 25. — *Norfolk Sound* (Mertens).

St. laciniata *Ag.*, Mem. Amer. Acad., IV. Pl. 7. — *Massachusetts Bay* (Agassiz).

Laphœa *Lamx.* — Atractylis *Wr.* (p. p.). — Campanulina *VanBened.*

L. cornuta *Lamx.*[1] — *Newfoundland* (Lamouroux). — *Naushon, Buzzard's Bay* (A. Agassiz).

L. dumosa *Ag.* — Campanularia dumosa *Flem., Johnst.*, Zoöph., p. 114, fig. 20. — Atractylis repens *Wr.*, Edinb. Phil. Journ., 1859, Pl. 1, fig. 5. — Campanulina tenuis *VanBened.*, Bull. Ac. Belg., 1847. — *British Seas* (Fleming); *Ostende* (VanBeneden).

Trichydra *Wright.*

T. pudica *Wright*, Ed. Phil. Journ., 1858, Vol. VII., Pl. 3, fig. 1.

6th Family. Eucopidæ *Gegenb.* (restricted). See note 2, p. 352.

Obelia *Pér.* and *LeS.* — Hydra: a branching Campanularia.

O. sphaerulina *Pér.* and *LeS.*; *DeBl.*, Actin., Pl. 41, fig. 3. — Campanularia geniculata *Van-Ben.*, Pl. 3, figs. 1–6. — *Holland* (Péron and LeSueur); *Ostende* (VanBeneden).

O. leucostyla *Ag.* — Thaumantias leucostyla *Will.* — Pl. 2, fig. 16. — *Trieste* (Will).

O. commissuralis *McCr.* — *Charleston* (McCrady); *Naushon* (A. Agassiz); *Massachusetts Bay* and *Grand Manan* (Agassiz).

Eucope *Gegenb.* — Hydra: a branching Campanularia.

E. polystyla *Gegenb.*, Pl. 8, fig. 18. — *Messina* (Gegenbaur).

E. plana *Ag.* — Thaumantias plana *Sars*, Beskr., Pl. 5, fig. 13. — *Norway* (Sars).

E. lucifera *Ag.* — Thaumantias lucifera *Forbes*, Pl. 10, fig. 2, under the name of Th. lucida. — *Zetland* (Forbes). — Laomedea geniculata *Gosse*, Devon., Pl. 4, and Campanularia gelatinosa *Van-Ben.*, Pls. 1 and 2, may be the young of this species.

violet pigment spot. The ovaries and digestive cavity are of the same color as the tentacular bulb. Diameter across the circular tube one inch, height, half an inch. — *Naushon, Buzzard's Bay* (A. Agassiz).

[1] Laphœa cornuta *Lamx.* The free Medusa resembles that of Atractylis repens of Wright. Tentacles shorter, lasso-cells arranged in spirals along the two long tentacles. Large white pigment-cells at the base of the tentacles and at the base of the digestive cavity. Hydræ creeping upon stems of Dynamena. Sterile hydræ alternating upon the stem, moderately close together; calyx curved at the base. Reproductive calycle very large, egg-shaped, smooth, containing, in an advanced state of development, one Medusa only. Height of the Medusa, one sixteenth of an inch. — *Naushon, Buzzard's Bay, September* (A. Agassiz). The knowledge of this Medusa gives a clue to the position of Trichydra.

E. diaphana *Ag.*, p. 322, Pl. 34, figs. 1–9.—Thaumantias diaphana *Ag.*, Mem. Amer. Acad., IV. p. 300, figs. 1 and 2.—*Nahant* (Agassiz); *Naushon* (A. Agassiz).

Laomedea *Lamx.*[1]—Campanularia *Lmk.* (p. p.).

L. amphora *Ag.*, p. 311, Pl. 30.—*Massachusetts Bay* (Agassiz).

7th Family. Oceanidæ *Esch.*[2] (So restricted as to exclude the Nucleiferæ *Less.*, and the Geryonopsidæ *Ag.*).—Eucopidæ *Gegenb.* (p. p.).

Oceania *Pér.* and *LeS.* (restricted).—Thaumantias *Esch.*—Callichroma *Dujard.*—Epenthesis *McCr.*—Phialidium *Leuck.*

O. phosphorica *Pér.* and *LeS.*—Thaumantias cymbaloides *Esch.*—T. hemisphærica *Esch.*, *Forbes*, Nak. Med., Pl. 8, fig. 2.—*English Channel* (Péron and LeSueur).—Thaumantias insconspicua *Forbes*, Pl. 8, fig. 3, *Hebrides*,—T. punctata *Forbes*, Pl. 10, fig. 1, *Isle of Man*,—T. lineata *Forbes*, Pl. 11, fig. 1, *Zetland*,—T. pileata *Forbes*, Pl. 11, fig. 2, *North Ireland*,—T. sarnica *Forbes*, Pl. 11, fig. 4, *Guernsey*,—are probably different stages of growth only of T. hemisphærica.—Oceania ampullacea *Sars*, belongs also to this series.

[1] Without a renewed comparison, it is impossible for me to refer to their proper genus, the many species of Campanularia and Laomedea already described, since it is known that among them there are types of different genera; belonging even to different families.

[2] Compare note 2, p. 346. It is far more difficult to define correctly the families of this sub-order, than those of the Tubularians, for the simple reason that comparatively few free Medusæ of this type can be referred with certainty to the Hydroids from which they arise, and the medusæ-buds of a large number of the Hydroids, have not been observed at all. Under these circumstances, the attempt at a classification, here presented, should be considered as containing hints, rather than mature results. Starting, however, from principles which have proved a safe guide, whenever the data on hand were sufficient, I have considered as belonging to distinct families all those free Medusæ and Hydroids which have distinct patterns. Thus, the Aglauridæ are separated on account of the flat-topped bell, and the position of their reproductive organs, even though their mode of reproduction is unknown. To the characters assigned to the Circeidæ by Forbes, I would add their elongated, cylindrical form. The Polyorchidæ are quite remarkable for their branching, chymiferous tubes, and their pendent, reproductive organs; the Melicertidæ for their eight radiating tubes, their lobed, reproductive organs, and their wide and short actinostome; the Laodiceidæ for their flat form, the extensive lobes of their actinostome, and their peculiar marginal appendages. The free medusa of Lafœa cornuta *Lamx.*, lately observed, and the peculiarities of this Hydroid, show that this family cannot be united with the Oceanidæ proper, and still less with the Geryonidæ with which Forbes associates them. Gegenbauer has appreciated their difference correctly; but he has given them a name which cannot be retained. All these families are destitute of eyes, and have only an accumulation of pigment upon the base of the tentacles, or cirrhi alternating with them. The Eucopidæ and Oceanidæ, on the contrary, have distinct eyes; but in the Eucopidæ they are at-

Oceania folleata *Ag.* — Epenthesis folleata *McCr.* — *Charleston, South Carolina* (McCrady).

O. languida[1] *A. Ag.* — *Nahant* and *Naushon* (A. Agassiz).

O. gregaria[2] *A. Ag.* — *Gulf of Georgia, W. T.* (A. Agassiz).

Phialidium viridiscens *Leuck.*, Arch. Nat., 1856, from *Nice*, belongs to this genus.

Thaumantias convexa *Forbes*, Pl. 11, fig. 6, *Zelland*, may also be a distinct species. — T. Thompsoni *Forbes*, Pl. 11, fig. 5, seems to be the adult of Obelia sphærulina. See p. 351.

Thaumantias gibbosa *Forbes*, Nak. Med., Pl. 11, fig. 3, *Hebrides*, constitutes, probably, a distinct genus.

Eucheilota *McCr.*

E. ventricularis *McCr.*, Pl. 11, figs. 1–3, and Pl. 1, fig. 12. — *Charleston* (McCrady); *Naushon* (A. Agassiz).

E. duodecimalis *A. Ag.*[3] — *Naushon, Buzzard's Bay* (A. Agassiz).

tached to the base of the tentacles, while in the Oceanidæ they are free, and occupy, along the circular tube, a position which seems independent of the arrangement of the tentacles. As I now know the young Medusa of four genera of this family, I am able to add to the family character that, in their early stages of growth, these Medusæ have only four tentacles, one in the prolongation of each of the four radiating tubes, and two eyes in each interval; while the Eucopidæ are hatched with at least sixteen or twenty-four tentacles, with eyes attached to two of the tentacles in each quarter segment. The Laodiceidæ are born with two or four tentacles only, placed, like those of the Oceanidæ, in the prolongation of the radiating tubes, but they have no eyes at all. As many of these Medusæ have a large number of tentacles in their adult condition, it follows that the specific distinctions which have been based upon the relative number of tentacles are not trustworthy; and yet the reduction of the species hinted at above, should merely be looked upon as approximative, since I had no means of tracing the transformations of the European species, and could only infer their specific identity from what I have observed in the American species.

[1] Oceania languida *A. Ag.* Spherosome a segment of a sphere, somewhat less than a hemisphere. Tentacles thirty-two in number, with large swelling at the base. Two or three sensitive capsules, with one granule in each, between every two tentacles; digestive cavity with short lips; ovaries linear, light brown, extending from the circular tube nearly to the base of the digestive cavity. One inch in diameter, half an inch high. — *Nahant and Naushon* (A. Agassiz).

[2] Oceania gregaria *A. Ag.* Four pale-yellow, linear ovaries, extending from the circular tube along one half the length of the chymiferous tubes. Thirty-six short tentacles, not capable of great expansion. Lips of actinostome very thin, convoluted. Three quarters of an inch in diameter. — *Gulf of Georgia, from May to September* (A. Agassiz).

[3] Eucheilota duodecimalis *A. Ag.* Spherosome thin, of uniform thickness; ovaries short, elliptical, commencing from the circular tube; four tentacles, with lateral cirrhi, one opposite each chymiferous tube. Twelve sensitive capsules, one in the middle of the space between two tubes, and one on each side of the four tentacles. Digestive cavity short, bottle-shaped, colorless; one quarter of an inch in diameter. — *Naushon, September* (A. Agassiz).

Clytia *Lamx.* — Calicella *Hincks.* — Trochopyxis *Ag.* — Hydra: a Campanularia of the type of C. volubilis.

C. volubilis *Lamx.* See p. 297. — *Northern Europe* (Lamouroux).

C. bicophora *Ag.* See p. 304. — *Massachusetts Bay* (Agassiz).

Campanularia noliformis *McCr.*, Pl. 11, fig. 4, from *Charleston, South Carolina*, — Campanularia Gegenbauri *Sars; Gegenb.*, Generat., Pl. 1, fig. 1, from *Messina*, — and Campanularia Johnstoni *Hincks; Wright*, Ed. Phil. Journ., 1858, Vol. VII. Pl. 7, fig. 3, from the *British shores*, belong also to this genus.

Platypyxis *Ag.* See p. 306.

Pl. cylindrica *Ag.*, Pl. 27, figs. 8 and 9. — *Massachusetts Bay, Nahant* (Agassiz); *Buzzard's Bay, Naushon* (A. Agassiz).

Thaumantias octona *Forbes*, Pl. 9, fig. 2, *Tarbet, Scotland*, — T. quadrata *Forbes*, Pl. 9, fig. 2, *Tarbet*, — T. aeronautica *Forbes*, Pl. 9, fig. 3, *Brassay, Zetland*, — T. maculata *Forbes*, Pl. 9, fig. 4, *Zetland*, — T. globosa *Forbes*, Pl. 10, fig. 4, *Zetland*, — T. melanops *Forbes*, Pl. 10, fig. 3, *Zetland*, — and Eucope thaumantoides *Gegenb.*, Pl. 9, fig. 9, *Messina*; E. campanulata *Gegenb.*, Pl. 9, fig. 8, *Messina*; E. affinis *Gegenb.*, Pl. 9, fig. 12, *Messina*, which are, probably, the males and females of the same species, at different stages of growth, belong either to this genus or to the preceding and following genera.

Geryonia planata *Will*, Pl. 2, figs. 13 and 14, *Trieste* (Will), belongs also to this family, and may be the type of a distinct genus, if its eyes really alternate with the tentacles, as Will's figure and description indicate.

Wrightia *Ag.*[1] — Hydra: a Campanularia of the type of C. Syringa.

W. Syringa *Ag.* — Sertularia Syringa *Lin.* — *Northern Europe* (Linnæus). To this genus belong also the Laomedea acuminata *Alder; Wright*, Ed. Phil. Jour., 1858, Vol. VII. Pl. 1, and the Laomedea lacerata *Wright*, Ed. Phil. Jour., 1859, Vol. IX. Pl. 3. Some of Forbes' species of Medusæ, quoted above, may, perhaps, belong to this genus rather than to Platypyxis.

[1] The genus Wrightia differs from Clytia proper in having the eyes near the tentacles, instead of occupying the middle of the space between them. We have an undescribed species upon the shores of Massachusetts, and another genus closely allied to this, the Hydra of which has only ten tentacles. Campanulata verticillata and Hincksii belong also to distinct genera, for the first of which the name Campanularia may be retained. I shall describe their American representatives on another occasion.

Tiaropsis *Agass.*

T. diademata *Ag.* See p. 308. — *Nahant, Massachusetts Bay* (Agassiz).

T. multicirrhata *Ag.* — Thaumantias multicirrhata *Sars*, Beskr., Pl. 5, fig. 12. — *Norway* (Sars).

Orthopyxis *Ag.* — Clytia *Lamx.*, see p. 297. — Silicularia *Meyen*?

O. poterium *Ag.*, Pl. 28. — *Massachusetts Bay* (Agassiz).

Campanularia volubiliformis, *Sars; Gegenb.*, Generat., Pl. 1, fig. 8, and Laomedea integra *Johnst.*, Pl. 28, fig. 2, belong also to this genus.

Hincksia *Ag.*[1] — Campanularia *Hincks.*

H. tincta *Ag.* — Campanularia tincta *Hincks*, Ann. and Mag. Nat. Hist., 1861, Vol. VII. Pl. 12. — *Australia* (Hincks).

8th Family. Sertularidæ[2] *Johnst.*

Dynamena *Lamx.*[3] (restricted). — Sertularia *Lin., Lmk.*

D. pumila *Lamx.* See p. 326. — *On the European and American shores of the Atlantic* (Ellis, Agassiz).

Diphasia *Ag.*[4] — Dynamena *Lamx.* (p. p.). — Sertularia *Lmk.* (p. p.).

D. rosacea *Ag.* — Sertularia rosacea *Lin., Johnst.* — *Europe* (Ellis).

Sertularia fallax *Johnst.*; S. tamarisca *Lin.*; S. pinaster *Ellis* and *Sol.*; S. margareta *Hass.*; S. pinnata *Pall.*; S. nigra *Pall.*; S. fusca *Johnst.*; belong also to this genus.

Amphisbetia *Ag.* — Dynamena *Lamx.* (p. p.). — Sertularia *Lmk.* (p. p.).

A. operculata *Ag.* — Sertularia operculata *Lin.* — *Europe* (Ellis).

[1] The genus Hincksia is characterized by its one-sided, ringled, fertile hydra. Bimeria vestita *Wright* = Manicella fusca *Allm.*, seems to belong to this family; while Reticularia immersa *Thomps.* (Campanularia serpens *Hassall* = Thalia prætenuis *Allm.*), and Coppinia arcta *Hassall*, appear more closely related to Trichydra, p. 351, and through this to Lafœa. Campanularia fruticosa is unquestionably closely allied to Lafœa. Thus all the known types of Campanularians are now referred to known types of Medusæ; they prove to belong to three different families of Medusæ, and they represent three different types of Hydroids. See p. 307.

[2] Hydræ in two rows, on opposite sides of the main stem and branches; calycles always sessile, more or less flask-shaped or tubular, with a tendency to a bilabiated aperture. It is superfluous to fill the references to the works of Ellis and Johnston, which must be in everybody's hands who would study this family.

[3] See p. 326. As here limited, the genus Dynamena embraces those species the sterile hydræ of which are opposite one another, in successive pairs, with distinctly bilabiate calycle, and the fertile hydræ fusiform, with simple aperture. In the genus Diphasia the fertile hydræ are deeply dentated; in Amphisbetia the sterile hydræ are slender, the outer edge extending to a prominent point, and the fertile hydræ fusiform, with simple aperture.

[4] The American representatives of this and the following genera, which are about as numerous as the European ones, will be described on another occasion.

Sertularia *Lin.*[1] (restricted).

S. cupressina *Lin., Lmk., Johnst., VanBen.* — *Europe* (Ellis).[2]

S. argentea *Ellis* and *Sol.*, belongs also to this genus, and, probably, also S. abietina *Lin.*, S. filicula *Ellis* and *Sol.*, and Plumularia falcata *Lmk.*

Amphitrocha *Ag.* — Sertularia *Lmk.* (p. p.).

A. rugosa *Ag.* — Sertularia rugosa *Lin.* — *Europe* (Ellis).

A. picta *Ag.* — Sertularia picta *Meyen.* — *Terra del Fuego* (Meyen).

A. cincta *Ag.* — *Massachusetts Bay* (Agassiz).

Cotulina *Ag.*[3] — Sertularia *Lin.* (p. p.).

C. polyzonias *Ag.* — Sertularia polyzonias *Lin.* — *Europe* (Ellis). — Also S. Ellisii *Milne-Edw.*

Lineolaria *Hincks.*[4]

L. spinulosa *Hincks*, An. and Mag. Nat. Hist., 1861, Vol. VII. Pl. 13. — *Australia* (Hincks).

[1] Sertularia *Lin., Lamx.*

Sertularia, Linné, Systema Naturæ, 1767, p. 1306.
" Linné, Fauna Suecica, 1761, p. 540.
" Fabricius, Fauna Grœnland., 1780, p. 442.
" Ellis and Solander, Zoöph., 1786, p. 32.
" Gmelin, Linn. Systema Nat., 1788, p. 3844.
" Turton, British Fauna, 1807, p. 212.
" Lamouroux, Bull. Soc. Phil., Paris, 1812, p. 184.
" Lamouroux, Hist. Polyp. Flex., 1816, p. 182.
" Lamouroux, Expos. Méthodique, 1821, p. 12.
" Schweigger, Handbuch der Naturg., 1820, p. 426.
" Goldfuss, Handbuch der Zool., 1820, p. 88.
" Fleming, Brit. Animals, 1828, p. 542.
" Blainville, Dict. Sc. Nat., 1830, LX. p. 444.
" Blainville, Manuel d'Actinologie, 1834–1836, p. 480.
" Bosc, Hist. des Vers, 1830, p. 94.
Sertularia, Johnston, Brit. Zoöph., 1838, p. 121.
" Johnston, Brit. Zoöph., 1847, 2d ed., p. 61.
" Alder, Catal. Zoöph., Northumb., &c., 1857, p. 21.
" Hincks, An. Mag. Nat. Hist., 1861, VIII. p. 252.

[2] As here limited, the genus Sertularia embraces those species the sterile hydræ of which alternate on opposite sides of the stem, with a tendency to a combination in pairs; fertile hydræ two-horned. This peculiarity has an important morphological meaning, and seems to indicate that the calyx consists of two connate hydræ, homologous to an undeveloped pair of hydræ, as observed in Dynamena. In Amphitrocha the sterile hydræ are more loosely scattered on opposite sides, and the fertile hydræ flask-shaped, the calycles of both being ringled.

[3] This genus differs from the other Sertularidæ in having the alternate calycles of the sterile hydræ dentate; the fertile ones are ventricose and slightly ringled, with contracted aperture.

[4] The sessile hydræ show this genus to belong to the Sertularidæ, and not to the Campanularidæ, to which Hincks refers it.

Thuiaria *Flem.*[1] — Sertularia *Lin.* (p. p.).

Th. Thuia *Flem.* — Sertularia Thuia *Lin.* — *Europe* (Ellis). — Also Th. articulata *Flem.*

Halecium *Oken.*[2] — Thoa *Lamx.* — Sertularia *Lin.* (p. p.).

H. halecinum *Oken.*[3] — Thoa halecina *Lamx.* — Sertularia halecina *Lin.* — *Europe* (Ellis).

Grammaria *Stimp.* and Cryptolaria *Busk*, appear to be related to Halecium.

[1] Thuiaria *Fleming*, 1828.

Thuiaria, Fleming, British Animals, 1828, p. 545.
" Johnston, Brit. Zoöph., 1838, p. 137.
" Johnston, Brit. Zoöph., 1847, 2d ed., p. 83.
" Alder, Catalogue Zoöph. Northumb., &c., 1857, p. 27.
" Hincks, An. Mag. Nat. Hist., 1861, VIII. p. 255.

Biseriaria, Blainville, Dict. Sc. Nat., 1830, LX. p. 446.
" Blainville, Manuel d'Actinologie, 1834–1836, p. 482.

Cellaria (*C. thuia*), Lamarck, An. sans Vert., 1816, p. 139.

Sertularia, Linnæus, Systema Naturæ, 1767, 12th ed., p. 1308.
" Fabricius, Fauna Grœnland., 1780, p. 444.
" Solander and Ellis, 1786, p. 41.

Corallina vesiculata, caule angulato rigido, ramis dense stipitatis et bifurcatis, terminantibus denticulis cauli appressis. Ellis, Corallines, 1755, p. 10, Pl. 5, fig. *b*, B.

[2] Halecium *Oken*, 1815. The short, simple, symmetrical calycles of the sterile hydræ, which are too small to allow the animal to retreat in them, and the one-sided fertile calycles, seem to indicate a distinct family.

Halecium, Oken, Lehrbuch, 1815, III. p. 91.
" Schweigger, Handbuch, 1820, p. 426.
" Johnston, Brit. Zoöph., 1847, 2d ed., p. 58.
" Alder, Catal. Zoöph. Northumb., &c., 1857, p. 20.

Halecium, Alder, An. Mag. Nat. Hist., 1859, III. p. 354.
" Hincks, An. Mag. Nat. Hist., 1861, VIII. p. 251.
" Hincks, Proc. British Association, 1858, p. 128.

Thoa, Lamouroux, Hist. Polyp. Flexibles, 1816, p. 210.
" Lamouroux, Exposition Méthodique, 1821, p. 14.
" Johnston, British Zoöph., 1828, 1st ed., p. 119.
" Blainville, Dict. Sc. Nat., 1830, LX. p. 452.
" Blainville, Manuel d'Actinologie, 1834–1836, p. 488.
" Milne-Edwards, in Lamk. An. sans Vert., 1836, 2d ed., p. 147.

Sertularia (*halecina*), Linnæus, Fauna Suecica, 1761, p. 540.
" " Linnæus, Syst. Nat., 1767, 12th ed., p. 1308.
" " Solander and Ellis, Zoöphytes, 1786, p. 46.

Corallina erecta, tubulosa, pennata, halecis spinæ facie. Ellis, Corallines, 1755, p. 17, Pl. 10.

[3] Halecium Beanii *Johnst.*, and H. muricatum *Johnst.*, seem to me to be generically distinct from H. halecinum, but I have not the means of ascertaining their true characters. If they constitute distinct genera, the characters now assigned to the genus will require modifications. VanBeneden has figured the animal of H. halecinum, Bull. Acc. Belg., 1847, Vol. XIV. p. 462. The fertile hydra is double-headed and tentaculated.

9th Family. PLUMULARIDÆ *Ag.*[1] — Sertularidæ *Johnst.* (p. p.).

Aglaophenia *Lamx.*,[2] as restricted by McCrady. — Plumularia *Lmk.* (p. p.). — Sertularia *Lin.* (p. p.).

A. Pluma *Lamx.* — Sertularia Pluma *Lin.* — Plumularia cristata *Lmk.* — *Europe* (Ellis).

A. trifida *Ag.* — A. cristata *McCr.* (non *Lmk.*). — *Charleston, South Carolina* (McCrady and Agassiz).

A. pennatula *Lamx.*, A. myriophyllum *Lamx.*, A. tricuspis *McCr.*, and A. arcuata *Lamx.*, belong also to this genus.

Plumularia *Lmk.*, as restricted by McCrady.

Pl. quadridens *McCr.* — *Charleston* (McCrady).

Pl. setacea *Lmk.* — *Europe* (Ellis).

Pl. pinnata *Lmk.*, Pl. frutescens *Lmk.*, Pl. Catharina *Johnst.*, belong to this genus, and probably also Laomedea obliqua *Sanders.*

Nemertesia *Lamx.*[3] — Antennularia *Lmk.*

N. antennina *Lamx.* — Antennularia antennina *Lmk.* — *Europe* (Ellis). Also N. ramosa *Lamx.*

[1] Hydræ sessile, on one side of the stem. Two kinds of sterile hydræ, large ones and small ones, the small ones either in the intervals between the large ones or clustered around them; besides these, fertile calycles, either simple or compound. The tentacles of the hydræ assume a more or less bilateral symmetry. McCrady has already hinted at the propriety of separating this family from the Sertularidæ. Having observed several of these Hydroids alive, I feel justified in carrying out this suggestion.

[2] AGLAOPHENIA *Lamx.*, 1812.

Aglaophenia, Lamouroux (*Sertularia pluma* Linn.), Bull. Soc. Phil., Paris, 1812, p. 184.
" Lamouroux, Hist. Polyp. Flex., 1816, p. 164.
" Lamouroux, Exposition Méthodique, 1821, p. 11.
Plumularia, Lamarck, Animaux sans Vert., 1816, II. p. 123.
" Fleming, Brit. Animals, 1828, p. 546.
" Blainville, Dict. Sciences Nat., 1830, LX. p. 441.
Plumularia, Blainville, Manuel d'Actinologie, 1834–1836, p. 477.
" Milne-Edwards, in Lmk. An. sans Vert., 2d ed., 1836, p. 158.
" Johnston, Brit. Zoöph., 1838, p. 140.
" Johnston, Brit. Zoöph., 2d ed., 1847, p. 89.
" Sars, Nyt Mag., 1856, p. 163.
" Alder, Catal. Zoöph. North., 1857, p. 28.
Sertularia, Linnæus, Fauna Suecica, 1761, ed. altera, p. 540.
" Linnæus, Syst. Nat., 1767, p. 1306.
" Pallas, Elenchus, 1766.

[3] NEMERTESIA *Lamx.*, 1812.

Nemertesia, Lamouroux (*Sertularia antennina* Ell.), Bulletin Soc. Phil., Paris, 1812, p. 184.
" Lamouroux, Hist. Polyp. Flexibles, 1816, p. 161.
" Lamouroux, Exposition Méthodique, 1821, p. 10.
Antennularia, Lamarck, An. sans Vert., 1816, p. 122.
" Milne-Edwards, in Lmk., An. sans Vert., 1836, 2d ed., p. 155.

10th Family. Æquoridæ *Esch.* (restricted).

Æquorea *Pér.* and *LeS.*

Æ. Forskålea *Pér.* and *LeS.* — Medusa Æquorea *Forsk.*, Pl. 32. — Æquorea Forskålina *Esch.* — *Mediterranean* (Forskål).

Æ. ciliata *Esch.*, Pl. 9, fig. 1. — *North-west Coast of N. America, Lat.* 41°–51° *N.* (Eschscholtz).

Æ. violacea *M.-Edw.*, in *Cuv.* Règne An. Zooph., Pl. 42, and Ann. Sc. Nat., 2d ser., Vol. XVI. — *Cette* (Milne-Edwards).

Æ. cyanea *Pér.* and *LeS.*; *DeBl.*, Actin., Pl. 32, fig. 2. — *New Holland, Arnheim* (Péron and LeSueur).

Æ. albida *A. Ag.* — *Naushon* (A. Agassiz).[1]

Æ. eurodina *Pér.* and *LeS.* — *Strait of Bass* (Péron and LeSueur).

Æ. allantophora *Pér.* and *LeS.* — *English Channel.*

Æ. atlantica *Pér.* and *LeS.* — Medusa Æquorea *Lin.* — *Atlantic* (Löfling).

Æ. danica *Pér.* and *LeS.* — Medusa Æquorea *Müll.* — *German Ocean* (O. F. Müller).

Æ. amphicurta *Pér.* and *LeS.* — *New Holland, De Witt's Land* (Péron and LeSueur).

Æ. bunogaster *Pér.* and *LeS.* — *New Holland, Arnheim* (Péron and LeSueur).

Antennularia, Goldfuss, Handbuch der Zoöl., 1820, p. 89.
" Schweigger, Handbuch der Naturg., 1820, p. 427.
" Fleming, British Animals, 1828, p. 546.
" Blainville, Dict. Sc. Nat., 1830, LX. p. 450.
" Blainville, Manuel d'Actinologie, 1834–1836, p. 486.
" Johnston, British Zoöphytes, 1838, p. 139.
" Johnston, British Zoöphytes, 1847, p. 85.
" Alder, Catalogue Zoöph. Northumb., &c., 1857, p. 27.

Sertularia, Linnæus, Fauna Suecica, 1761, editio altera, p. 540.
" Linnæus, Syst. Nat., 1767, XII. p. 1306.
" Ellis and Solander, Zoöph., 1786, p. 45.

Corallina astaci corniculorum æmula, Ellis, Corallines, 1755, p. 15, Pl. 9, fig. A, *a*.

[1] Æquorea albida *A. Ag.* Spherosome slightly concave near the abactinal pole, diminishing very gradually in thickness towards the circular tube. Chymiferous tubes exceedingly numerous, extending in a regular curve from the circular tube to the digestive cavity, the diameter of which is about one third the diameter of the disk. Narrow linear ovaries extending along the whole length of the tubes. Marginal tentacles numerous, three to four between every two chymiferous tubes. No prominent swelling at the base of the tentacles, which taper gradually from the circular tube to their extremity; large patches of lasso-cells scattered irregularly over the surface; two marginal capsules for every large tentacle, with from three to four granules clustered in the centre of each. The spurs are placed at the base of the large tentacles. Ratio of actinal to polar diameter as two to one and one half. Actinal diameter two and one half inches. — *Naushon, Buzzard's Bay* (A. Agassiz).

Æ. purpurea *Pér.* and *LeS.*; *M.-Edw.*, in *Cuv.* Règn. An. Zooph., Pl. 43, fig. 3. — Polyxenia purpurea *Esch.* — *New-Holland, Endraeht* (Péron and LeSueur).[1]

Crematostoma *A. Ag.*[2]

C. flava *A. Ag.*[3] — *Gulf of Georgia, W. T.* (A. Agassiz).

Mesonema pileus *Less.*, Pl. 6, fig. 1, belongs to this genus.

Melicerta *Less.*[4]

M. morchella *Less.*, Pl. 6, fig. 4. — Geryonie morille, Pl. 6, fig. 4. Origin unknown.

Mesonema *Esch.*

M. Coelum pensile *Esch.* — M. coerulescens *Köll.* — Medusa *Forsk.*, Tab. 28, B. — Æquorea mesonema. *Pér.* and *LeS.* — Æquorea Rissoana *Delle Ch.*, Pl. 73, figs. 1 and 2. — *Mediterranean* (Forskål).

M. macrodactylum *Br.*, Pl. 4. — *Pacific, Equator* (Mertens).

M. abbreviata *Esch.*, Pl. 11, fig. 3. — *Sunda* (Eschscholtz).

Zygodactyla *Br.* — Rhacostoma *Agass.*

Z. coerulescens *Br.* — Mesonema coerulescens *Br.*, Pl. 5. — *Pacific Ocean, Lat.* 35° *N., Long.* 144° *W.* (Mertens).

Z. dubia *Ag.* — Mesonema dubium *Br.*, Pl. 26. — *Conception Bay and Coast of Chili* (Mertens).

Z. groenlandica *Ag.* — Æquorea groenlandica *Pér.* and *LeS.* — Medusa Æquorea *Fab.* — Medusa globularis *Mod.* — Rhacostoma atlanticum *Ag.* — *Greenland* (Fabricius); *Coast of Maine, Bay of Fundy*, and *Massachusetts Bay* (Agassiz).

[1] Judging from the figure of LeSueur, published by Milne-Edwards, this species belongs to a different genus.

[2] Crematostoma *A. Ag.* Digestive cavity hanging down below the level of the circular tube; lips of actinostome large, lanceolate, fimbriated, and as numerous as the chymiferous tubes, of which there are from sixty to eighty. One large marginal tentacle opposite the base of each of the chymiferous tubes, without intermediate ones.

[3] Crematostoma flava *A. Ag.* Spherosome very heavy, of a slight blueish tinge. Chymiferous tubes broad, extending down the projection of the disk into the cavity of the bell. Tentacles with a broad base, dark yellow, as well as the chymiferous tubes; the ovaries extend from the circular tube to the base of the digestive cavity. The digestive cavity is almost colorless, but the lips of the actinostome are of the same color as the base of the tentacles. Ratio of actinal to polar diameter as three to one and three quarters; from three to four inches in diameter. — *Gulf of Georgia, Washington Territory* (A. Agassiz).

[4] The name Melicerta or Melicertum has been applied to two very different genera, among Acalephs. It is to be retained for the type to which Medusa campanula *Fabr.* belongs, and for which Lesson proposed the name Campanella, unfortunately already preoccupied; see p. 349. Melicerta *Less.* must be changed, but I forbear to do it, as this Medusa is little known. Melicerta Perla *Pér.* and *LeS.* seems to be a young Pelagia.

Z. cyanea *Ag.*[1] — *Florida: Key West* (Agassiz).

Z. vitrina *Ag.* — Æquorea vitrina *Gosse*, Devon., Pl. 23. — *Devonshire* (Gosse).

Rhegmatodes *A. Ag.*[2]

R. tenuis *A. Ag.*[3] — *Buzzard's Bay: Naushon* (A. Agassiz).

R. floridanus *Ag.*[4] — *Florida: Key West* (Agassiz).

R. Forbesianus *Ag.* — Æquorea Forbesiana *Gosse*, Devon., Pl. 24. — *Devonshire* (Gosse).

R. globosa *Ag.* — Æquorea globosa *Esch.*, Pl. 10, fig. 2. — *Pacific Ocean, near the Equator* (Eschscholtz).

Stomobrachium mirabile *Köll.* — *Messina* (Kölliker), belongs to this genus.

Stomobrachium *Br.*[5] (non *Forbes*).

St. lenticulare *Br.*, Pl. 3, fig. 7. — *Falkland Islands* (Mertens).

St. tentaculatum *Ag.*[6] — *Massachusetts Bay, Nahant* (Agassiz).

[1] Zygodactyla cyanea *Ag.* Spherosome of a light blue color; this species can at once be distinguished from the Z. grœnlandica by the greater thickness of the spherosome, the shorter digestive cavity, with a large actinostome surrounded by innumerable small fimbriated lips, and the greater radius of the digestive cavity, which is more than half that of the spherosome itself. Actinal diameter three inches, polar diameter two inches. — *Key West, Florida* (Agassiz).

[2] Rhegmatodes *A. Ag.* Spherosome flat; chymiferous tubes numerous; digestive cavity short, of small diameter compared to that of the spherosome; lips of actinostome scarcely fimbriated. Large tentacles, twice as numerous as the chymiferous tubes, and not always placed opposite them; rudimentary tentacles between the larger ones.

[3] Rhegmatodes tenuis *A. Ag.* Specimens measuring between three and four inches have been found at Naushon. Ratio of actinal to polar diameter as one to three and a half; in young specimens as one to one and a half; in large specimens there were thirty chymiferous tubes, extending along the bulging of the disk into the cavity of the bell. Digestive cavity very short, lips of actinostome resembling a piece of catgut tied near the end. The ovaries do not extend to the circular tube, but hang down in two pouches from the chymiferous tubes. Spur placed opposite the base of the large tentacles. Two marginal capsules for each large tentacle, two granules in each marginal capsule, placed opposite one another, near the circumference. Disk colorless. — *Naushon, Buzzard's Bay* (A. Agassiz).

[4] Rhegmatodes floridanus *Ag.* resembles the young of Rhegmatodes tenuis at the time when it has from sixteen to twenty-four chymiferous tubes. This species has three large tentacles between every two chymiferous tubes, and one opposite each. Ovaries extending only along the middle portion of the chymiferous tubes; from three to five marginal capsules between the large tentacles, with two, or even three granules in each.

[5] This genus differs chiefly from the other Æquoridæ, by the structure of its actinostome, which is distinctly divided into four lobes.

[6] Stomobrachium tentaculatum *Ag.* The tentacles between every two chymiferous tubes are from thirty to forty in number. The ovaries extend along the greater part of the chymiferous tubes, except a small portion of the actinal and abactinal ends. The lobes of the actinostome are only four in number. The disk is colorless. — *Massachusetts Bay, Nahant* (Agassiz).

11th Family. Geryonopsidæ *Agass.* — Geryonidæ *Esch.* (p. p.).

Eirene *Esch.*[1] — Geryonopsis *Forbes.* — Phortis *McCr.*?

E. viridula *Esch.* — Oceania viridula *Pér.* and *LeS.* — Geryonopsis delicatula *Forbes.* — Thaumantias cymbaloidea *Forbes* (on Pl. 9, fig. 1). — *British Channel* (Péron and LeSueur); *Coasts of Dorset and Devon* (Forbes).

E. coerulea *Ag.*[2] — *Florida: Key West* (Agassiz).

Phortis gibbosa *McCr.* — *Charleston, South Carolina* (McCrady) — belongs either to this or the following genus.

Tima *Esch.* — Eirene *Esch.* (p. p.). — Dianæa *Delle Ch.*

T. flavilabris *Esch.*, Pl. 8, fig. 3. — *Atlantic Ocean: Azores* (Eschscholtz).

T. gibbosa *Ag.*[3] — Oceania gibbosa *Pér.* and *LeS.* — Eirene gibbosa *Esch.* — Dianæa lucullana *Delle-Ch.*, Pl. 74, fig. 1. — Geryonia pellucida *Will.*, Pl. 2, fig. 8. — Geryonopsis pellucida *Forbes.* — Tima pellucida *Gegenb.* — *Nice* (Péron and LeSueur); *Naples* (Delle-Chiaje); *Messina* (Gegenbaur).

T. Bairdii *Forbes*, Pl. 5, fig. 1. — *St. Andrews, Scotland* (Forbes).

T. formosa *Ag.*[4] — *Massachusetts Bay* (Agassiz).

[1] The genus Eirene, as characterized by Eschscholtz, contains species of three distinct genera; all of which, however, belong to the same family. Instead of rejecting it altogether, as most writers have done, I have here limited it to the type first described by Péron and LeSueur.

[2] Eirene coerulea *Ag.* Spherosome hemispherical; proboscis tapering rapidly, not extending to the level of the veil. Lips of actinostome short; ovaries commencing some way from the circular tube, and extending to the digestive cavity. From thirty to thirty-five short tentacles between every two chymiferous tubes. Diameter across the circular tube one and a quarter inches, height of spherosome one inch, base of proboscis half an inch above the veil. Of a light steel-blue color. — *Key West, Florida, April* (Agassiz).

[3] We have here a species, accurately described by the first naturalists who have most extensively known the Acalephs, redescribed twice, as new, by later observers, and referred to not less than six genera. This does not speak well for the criticism bestowed upon the nomenclature of these animals. Eschscholtz, himself, has overlooked its generic identity with Tima, though he himself first characterized the latter genus.

[4] Tima formosa *Ag.* Spherosome greater than a hemisphere, with actinal edges slightly receding from the axis near the circular tube. Proboscis broad, tapering very gradually, and reaching slightly beyond the level of the veil; ovaries convoluted, extending from the circular tube along the whole length of the chymiferous tubes nearly to the digestive cavity, which is short. Actinostome surrounded by four long, lanceolatel ips, with exceedingly fine frills, colorless. Veil heavy, with small opening. Diameter across the circular tube two and a half inches; height of spherosome two inches; distance from circular tube to base of proboscis, one inch and a quarter. In specimens of this size there are seven large tentacles between every two chymiferous tubes, and one opposite; between every two large tentacles, five small rudimentary tentacles, and from four to six marginal corpuscles, with eight to nine granules arranged in a circle in each. — *Massachusetts Bay, March to May* (Agassiz).

Eutima *McCr.*

E. mira *McCr.*, Pl. 11, fig. 8. — *Charleston, South Carolina* (McCrady).

E. variabilis *McCr.* — *Charleston, South Carolina* (McCrady).

E. limpida *A. Ag.*[1] — *Buzzard's Bay: Naushon* (A. Agassiz).

E. pyramidalis *Ag.*[2] — *Florida: Key West* (Agassiz).

Orythia *Pér.* and *LeS.*;[3] DeBlainv. (p. p.). — Phorcynia *Pér.* and *LeS.*[4] — Eirene *Esch.* (p. p.).

O. viridis *Pér.* and *LeS.*; *DeBl.*, Pl. 34, fig. 1. — Dianæa endrachtensis *Q.* and *G.*; *DeBl.*, Pl. 34, fig. 2. — Eirene endrachtensis *Esch.* — *New Holland* (Péron and LeSueur).

Saphenia *Esch.* (not *Forbes*). — Dianæa *Q.* and *G.*[5] — Plancia *Forbes.* — Goodsirea *Wright.* — Geryonia *Pér.* and *LeS.* (p. p.).

S. balearica *Esch.* — Dianæa balearica *Q.* and *G.*, Zool. Uran., Pl. 84, fig. 3. — Dianæa bitentaculata *Q.* and *G.*, Ann. Sc. Nat., Vol. X. Pl. 6, fig. 9. — Saphenia bitentaculata *Esch.* — *Coast of Valencia* and *Gibraltar* (Quoy and Gaimard).

S. dinema *Esch.* (non *Forbes*). — Geryonia dinema *Pér.* and *LeS.*; *Milne-Edw.*, in *Cuv.* Règn. An. Zooph., Pl. 54, fig. 1. — Goodsirea mirabilis *Wr.*, Ed. Phil. Journ., 1859, Vol. X. Pl. 9, fig. 1. — *British Channel* (Péron and LeSueur).

[1] Eutima limpida *A. Ag.* Gelatinous proboscis not projecting more than the length of the diameter of the bell below the level of the veil. Digestive cavity long, terminating in a quadrangular flat disk, which may be folded into four simple lips. Genital organs narrow, extending one third of their length along the proboscis, and the remaining two thirds along the chymiferous tubes towards the circular tube, which they do not reach. Two marginal capsules between every two chymiferous tubes, and from twelve to thirteen granules, arranged in a semicircle, in each. Walls of the four large tentacles tapering gradually from circular tube; lateral cirrhi small, one on each side of the large tentacles; rudimentary tentacles numerous. Tentacles, digestive cavity, and ovaries perfectly colorless. Polar diameter half an inch; actinal diameter one and one eighth of an inch; length of proboscis two inches. — *Naushon, Buzzard's Bay* (A. Agassiz).

[2] Eutima pyramidalis *Ag.* Spherosome hemispherical; base of the gelatinous proboscis very broad, tapering rapidly; the digestive cavity is short, terminating with four rounded leaflets with scalloped edges. The four larger tentacles are short, colorless. Polar diameter half an inch; actinal diameter seven eighths of an inch. — *Key West, Florida* (Agassiz).

[3] The genus Orythia is only known from the description of Péron and LeSueur, and the later figure of Quoy and Gaimard, in the Voyage of the Uranie, who represent the same species, with its tentacles. Both are reproduced in DeBlainville's Actinologie.

[4] The genus Phorcynia is founded upon decayed specimens, probably belonging to this genus.

[5] The genus Dianæa *Lmk.* is worthless. It embraces Medusæ of at least eight different families, most of which had already been referred to separate genera by Péron and LeSueur, before Lamarck named it, and no one of which could be considered as the type of a new genus. Later authors, who have adopted the genus, have only made matters worse by adding other heterogeneous species.

12th Family. GERYONIDÆ *Esch.* (restricted).

Geryonia *Pér.* and *LeS.* (non *Less.*), restricted. — Liriope *Less.* (non *Gegenb.*).

G. proboscidalis *Esch.* — Medusa proboscidalis *Forsk.*; *M.-Edw.*, in *Cuv.* Règn. An., Pl. 52, fig. 3. — Geryonia hexaphylla *Pér.* and *LeS.* (non *Br.*). — *Mediterranean* (Forskål).

G. hexaphylla *Br.*, Pl. 18 (non *Pér.* and *LeS.*). — *Bonin Islands* (Mertens).

13th Family. LEUCKARTIDÆ *Agass.*[1] — Geryonidæ *Esch.* (p. p.).

Leuckartia *Ag.* — Geryonia *Leuck.* (non *Auct.*).

L. proboscidalis *Ag.* — Geryonia proboscidalis *Leuck.* (non *Auct.*), Arch. Nat., 1856, Pl. 1, fig. 1. — *Nice* (Leuckart).

[1] After having satisfied myself that the bitentaculated Medusæ thus far referred to the genus Saphenia belong to two different families, Saphenia *Forbes* to the Nucleiferæ, and Saphenia *Esch.* to the Geryonopsidæ, it occurred to me that, among the proboscidal Geryonidæ, there might also be representatives of different families. I was led to this supposition by the great diversity of types included in that family by earlier naturalists, and even by Forbes. The result of my comparisons are here submitted to the criticisms of those who may have an opportunity of testing the value of my suggestions. That the Geryonopsidæ differ from the Leuckartidæ I have no doubt, having had an opportunity of examining several representatives of the two families. But there does not occur, along the American coast, a representative of the Geryonia proboscidalis of Europe, so that my inference upon this type are solely based upon a careful comparison of the descriptions and figures of Forskål, Mertens, Milne-Edwards, Gegenbaur, and Leuckart. On comparing the figures of this species published by Forskål and Milne-Edwards, it may at once be noticed, that, while they agree in every prominent feature, they differ strangely from that of Leuckart. Gegenbaur's minute description of the same type differs equally from the description given by Leuckart. Gegenbaur says distinctly, "the proboscis is characterized by the absence of distinct canals," "its interior forms a large cavity," and "from the circular tube arise centripetal, cæcal appendages." In Leuckart's Geryonia proboscidalis there are no "centripetal appendages;" moreover, it appears to agree in every respect with the other species described by him under the name of Geryonia exigua, of which he says, that the "stomach is small, about a line long." He says distinctly, that above the stomach there is "no funnel-shaped cavity," and that "the radiating canals arise immediately from it." We have thus Geryonidæ, with flat, heart-shaped dilatations of the radiating tubes, as genital organs, which agree with the Geryonopsidæ in the structure of their chymiferous system and its ramification, and others which do not. The latter are Gegenbaur's type, long known from Forskål's description and figure, and for which the name of Geryonidæ must be retained; for the other, first accurately described by Leuckart, I propose the name of Leuckartidæ, and to the latter family the genus Liriope *Gegenb.* (not *Less.*) also belongs. It will be noticed that the form of the genital organs of the Leuckartidæ is the reverse of that of the Geryonidæ; the heart-shaped genital organs of the genuine Geryonidæ pointing toward the circular tube, and those of the Leuckartidæ toward the stomach, while in Geryonopsidæ they extend evenly along the chymiferous tubes, as in the Oceanidæ. If I am not mistaken, the true Geryonidæ should be referred to the Discophoræ haplostomeæ, while the Leuckartidæ are genuine Hydroids.

Liriope *Gegenb.* (non *Less.*). — Geryonia *Less.*; *Esch.* (p. p.) (non *Pér.* and *LeS.*). — Dianæa *Q.* and *G.* — Eurybia *Esch.* (see p. 169), and Eurybiopsis *Gegenb.*, are only the young of this genus.

L. exigua *Gegenb.* — Dianæa exigua *Q.* and *G.* — Geryonia exigua *Leuck.*, Arch. Nat., 1856, Pl. 1, fig. 1. — Liriope mucronata *Gegenb.* — Eurybiopsis anisostyla *Gegenb.*, Pl. 8, fig. 12. — *Gibraltar* (Quoy and Gaimard); *Messina* (Gegenbaur); *Nice* (Leuckart).

L. appendiculata *Gegenb.* — Geryonia appendiculata *Forbes*, Nak. Med., Pl. 5, fig. 2. — *British Seas* (Forbes).

L. catharinensis *F. Müll.*,[1] Wiegm. Archiv, 1859, Pl. 11. — *Brazil* (Fritz Müller).

L. scutigera *McCr.* — *Charleston, South Carolina* (McCrady).

L. tenuirostris *Ag.*[2] — *Key West, Florida* (Agassiz).

L. rosacea *Gegenb.* — Geryonia rosacea *Esch.*, Pl. 11, fig. 2. — *South Sea, under the Equator* (Eschscholtz).

Xanthea *Less.*, are eight-tentaculated Liriope.

X. agaricina *Less.*, Pl. 6, fig. 3. — Origin unknown.

X. tetraphylla *Ag.* — Geryonia tetraphylla *Cham.* and *Eysenh.*, Pl. 27, fig. 2. — *Sunda Straits* (Chamisso and Eysenhardt).

14th Family. Trachynemidæ *Gegenb.*

Trachynema *Gegenb.* — Its embryology in *Gegenb.*, Generations-Wech., p. 50, Pl. 2, figs. 17–23.

T. ciliatum *Gegenb.*, Pl. 9, fig. 6. — *Messina* (Gegenbaur).

Tholus *Less.* — Sminthea *Gegenb.* (p. p.).

T. funerarius *Less.* — Dianæa funeraria *Q.* and *G.*, Ann. Sc. Nat., Vol. X., Pl. 6, figs. 10–15. — Sminthea eurygaster *Gegenb.*, Pl. 9, fig. 14. — Sminthea leptogaster *Gegenb.*, Pl. 9, fig. 11. — *Straits of Gibraltar* (Quoy and Gaimard); *Messina* (Gegenbaur).

Sminthea *Gegenb.* (restricted).

S. globosa *Gegenb.*, Pl. 9, fig. 1. — *Messina* (Gegenbaur).

S. tympanum *Gegenb.*, Pl. 9, fig. 18. — *Messina* (Gegenbaur).

[1] The elaborate paper of F. Müller upon this Medusa, recently published in the Archiv für Naturgeschichte, is one of the most important modern contributions to the Natural History of Acalephs. It appears from Müller's observations, that the genus Eurybia *Esch.*, and Eurybiopsis *Gegenb.*, were established upon the young of Liriope. Liriope catharinensis, however, may be the Geryonia bicolor *Esch.*, Pl. 11, fig. 1, in which case the name of Liriope catharinensis should be changed to L. bicolor.

[2] The great length and narrowness of the proboscis at once distinguish this species from any other of the genus. Actinal and polar diameters half an inch, length of the proboscis two and a half inches. — *Key West, Florida* (Agassiz).

Rhopalonema *Gegenb.* — Calyptra *Leuck.* (preoccupied among Mollusca).

R. velatum *Gegenb.*, Pl. 9, figs. 1–5. — Calyptra umbilicata *Leuck.*, Pl. 1, figs. 9 and 10. — *Nice* (Leuckart); *Messina* (Gegenbaur).

Hypsonema *Ag.* — Cytæis *Will.*

H. polystyla *Ag.* — Cytæis polystyla *Will.*, Pl. 2, fig. 5. — *Adriatic: Trieste* (Will).

Gossea *Ag.* — Thaumantias *Gosse* (p. p.).

G. Corynetes *Ag.* — Thaumantias Corynetes *Gosse*, Devon., Pl. 21; fig. 1, Pl. 22, may be the young. — *Devonshire Coast* (Gosse).

5th Sub-order. PORPITÆ *Goldf.*[1] — Chondrophoræ *Cham.* and *Eysenh.*

1st Family. Velellidæ *Esch.* (restricted). This family is readily distinguished by its oblong form and crested disk.

Velella *Lmk.* — Holothuria *Forsk.* — Phyllodoce *Br.* — Armenistarium *Costa.* — Rataria *Esch.* (young). — The free Medusæ: Chrysomitra *Gegenb.*, and Linuche *Esch.* — For the development of the Hydra, see Huxley, p. 114, and Pl. 11.

V. spirans *Esch.* — Holothuria spirans *Forsk.*; *Köll.*, Pl. 11; *Vogt*, Pl. 1 & 2; *Leuck.*, Pl. 13, fig. 22. — *Mediterranean* (Forskål).

V. mutica *Bosc; Ag.*, pp. 83 and 110. — *Gulf of Mexico* (Brown, Bosc); *Coast of Florida* (Agassiz).

2d Family. Porpitidæ *Guild.* — Velellidæ *Esch.*, (p. p.). — Form circular, no crest.

Porpita *Lmk.* — Holothuria *Forsk.* — Polybrachionia *L. Guild.* — Ratis *Less.* — Acies *Less.*

P. mediterranea *Esch.*; *Köll.*, Pl. 12. — Holothuria denudata *Forsk.* — *Mediterranean* (Forskål).

P. linnæana *Less.* — Polybrachionia linnæana *L. Guild.* — *Antilles* (Guilding); *Florida* (Agassiz); *Charleston* (McCrady).

6th Sub-order. PHYSALIÆ *Less.* — Thus far only one family, Physalidæ *Br.*, with a single genus:

Physalia *Lmk.* — Holothuria *L.* — Salacia *L.* — Arethusa *Br.* — Thalia *Brug.* — Cystisoma *Less.* — Young Hydra in *Huxl.*, Pl. 10.

[1] In characterizing this and the following sub-orders, p. 334, I have purposely avoided the special nomenclature, devised by the German naturalists to describe the Siphonophoræ, and reproduced in an hellenic garb by Huxley, in order the more directly to show the close affinity of these animals with the Hydroids. It is a fact constantly recurring in our science, that special names are required to designate the parts of animals, the homologies of which are not fully ascertained; but as soon as their structural identity ceases to be doubtful, it seems to me best to discard such technicalities, and I believe the time has come when the Siphonophoræ may be described in the same words as other Acalephs.

Ph. Arethusa *Til.*;[1] *Ag.*, Pl. 35. — Ph. aurigera *McCr.* — *Gulf of Mexico* (Brown, Sloane); *Charleston, South Carolina* (McCrady).

7th Sub-order. PHYSOPHORÆ, *Goldf.*[2] — Phosophoridæ *Esch.* (p. p.).

1st Family. Pethosomeæ *Less.* (p. p.). — Hippopodidæ *Köll.*

Gleba *Forsk.*, *Otto.* — Hippopodius *Q.* and *G.* — Protomedea *DeBl.* — Stephanomia *Q.* and *G.* — Elephantopus *Less.*

Gl. Hippopus *Forsk.*;[3] *Leuck.*, Arch. Nat., 1854, Pl. 12, figs. 1–5. — Hippopodius lutens *Q.* and *G.*, Ann. Sc. Nat., Vol. X. Pl. 4, Zool. Astr., Pl. 2, figs. 13–21; *Vogt*, Pl. 13. — H. neapolitanus *Köll.*, Pl. 6, figs. 1–5. — *Mediterranean* (Forskål).

Vogtia *Köll.*

V. pentacantha *Köll.*, Pl. 8. — *Messina* (Kölliker).

2d Family. Physophoridæ *Esch.* (restricted), *Huxl.* — Physophoræ *Less.* — Discolabæ *Less.* — Angelæ *Less.*?

Physophora *Forsk.*[4] — Cupulita *Q.* and *G.*

Ph. hydrostatica *Forsk.*, Pl. 33, fig. *E*; *Vogt*, Pls. 3–6; *Gegenb.* Neue Beitr., Pl. 31. — Physophora Philippii *Köll.*, Pl. 5. — *Mediterranean* (Forskål).

[1] The species of this and the preceding sub-orders, thus far described, are most fully enumerated by Lesson; but it remains to be seen which are truly distinct.

[2] Instead of discarding altogether the species described by Quoy and Gaimard, in the Zoölogy of the Astrolabe, most of which are figured from imperfect specimens, I have here attempted to classify them according to the method so successfully applied in the study of fossil remains, comparing the parts preserved and illustrated by the French zoölogists, with corresponding parts of the European species, now fully known by the extensive researches of Milne-Edwards, Kölliker, Leuckart, Vogt, Gegenbaur, and Huxley. From the observations of these naturalists, it is now evident that all the representatives of this sub-order arise, like Physalia, from a primary hydra. But there is this essential difference between the Physaliæ and the Physophoræ, that in the first, the primary hydra produces no secondary sterile medusæ, and that the fertile medusæ arise from secondary hydræ; while in Physophoræ, the abactinal sides of the primary hydra produce more or less numerous sterile medusæ, and the fertile medusæ arise directly from the primary hydra. Again, the primary hydra of the Physophoræ is reduced to the function of an axis, around which the two kinds of secondary medusæ and the secondary hydræ arise; while in Physaliæ, the primary hydra remains the most prominent individual of the community, even though it is not the most highly organized. The Rhizophysidæ seem to be the only family in which there appear no secondary sterile medusæ. Whether Discolabe Stephanospira has any or not remains doubtful.

[3] While Kölliker, Leuckart, and Vogt's figures and descriptions of this type agree fully with one another, and with Forskål's, those of Quoy and Gaimard's differ so strikingly, that I am strongly inclined to believe in the existence of two closely-allied genera observed by different authors, and more or less mixed up by Delle-Chiaje and Lesson; but I have no means of settling the difficulty. Leuckart has at one time considered them as distinct, and afterwards again identified them.

[4] The European species alone is satisfactorily described; those from other parts are very imperfectly known.

Haplorhiza *Ag.* — Physophora *Q.* and *G.*

H. alba *Ag.* — Physophora alba *Q.* and *G.*, Zool. Astr., Pl. 1, figs. 1–9. — *Southern Atlantic* (Quoy and Gaimard).

Discolabe *Esch.* — Stephanospira *Gegenb.* — Rhizophysa *Q.* and *G.* — Rhodophysa *DeBl.*

D. mediterranea *Esch.* — Rhizophysa discoidea *Q.* and *G.*; Ann. Sc. Nat., Vol. X. Pl. 5; Zool. Astrol., Pl. 1, figs. 22–24. — Rhodophysa discoidea *DeBl.* — Stephanospira insignis *Gegenb.*, Neue Beitr., Pl. 33. — *Mediterranean* (Quoy and Gaimard).

Angela *Less.*

A. cytherea *Less.*, Acal., Pl. 9, fig. 1. — *Senegal* (Rang).?

3d Family. AGALMIDÆ *Br.*[1] — Agalmæ *Less.* — Stephanomiæ *Less.* — Stephanomidæ *Leuck.*, *Huxl.*

Agalma *Esch.* (non *Köll.*, *Leuck.*, *Vogt*). — Pontocardia *Less.*?

A. Okenii *Esch.*, Acal., Pl. 13, fig. 1. — *North Pacific* (Eschscholtz).

Crystallomia *Dana.*

Cr. polygonata *Dana*, Mem. Amer. Acad., Vol. VI. p. 459, Pl. 1. — *Pacific Ocean*, 30° *N. Lat., and* 179° *E. Long.* (Dana).

Temnophysa *Ag.* — Stephanomia *Q.* and *G.*

T. alveolata *Ag.* — Stephanomia alveolata *Q.* and *G.*, Zool. Astr., Pl. 3, figs. 19–23. — *Off Cape Verd* (Quoy and Gaimard).

Sphyrophysa *Ag.* — Physophora *Q.* and *G.* — Agalma *Huxl.* (p. p.).

Sph. intermedia *Ag.* — Physophora intermedia *Q.* and *G.*, Astr., Pl. 1, figs. 10–18. — *Atlantic Ocean*, 7° *N. Lat.* (Quoy and Gaimard).

Sph. brevis *Ag.* — Agalma breve *Huxl.*, Pl. 7. — Origin not stated.

Stephanomia *Pér.* and *LeS.*; *Huxl.* (non *Milne-Edw.*).

St. amphitritis *Pér.* and *LeS.*, Voy. Terres Austr., Pl. 29, fig. 5; *Huxl.*, Pl. 6. — *Australia, Pacific* (Péron and LeSueur).

[1] Upon a closer comparison of the genera referred to this family, it will appear that the true Agalmidæ, of which the genus Agalma *Esch.* is the type, may form a distinct family, including also the genera Chrystallomia and Temnophysa, characterized by the wedge-shaped secondary actinal Hydræ; while the Stephenomiadæ, including Stephenomia, Agalmopsis, and Forskâlia, may be separated on the ground of the thin, flat, secondary actinal Hydræ; and the Chamissonidæ *Ag.*, restricted to the type of Cuneolaria, the sterile abactinal Medusæ of which, resemble the actinal ones of the true Agalmidæ. It should not be overlooked in this connection, that Agalma *Esch.* is not generically identical with the European species generally referred to this genus, while Chrystallomia *Dana*, and Temnophysa *Ag.*, are closely related to it. Again, Quoy and Gaimard have figured several Cuneolariæ, under the names of Stephanomia triangularis, etc., which exhibit a totally different combination of their sterile Medusæ. Phyllophysa may belong to the true Stephenomiæ, or form another family by itself. The decision of this question must depend upon the structure of the secondary Hydra which are not satisfactorily represented.

Forskalia *Köll.* — Stephanomia *Milne-Edw.* — Apolemia *Vogt* (non *Esch.*). — *Less.* (p. p.).

F. contorta *Leuck.* — Stephanomia contorta *Milne-Edw.*, Ann. Sc. Nat., 1841, Vol. XVI. Pls. 7 and 8. — Apolemia contorta *Vogt.* Pl. 13. — *Mediterranean* (Milne-Edwards).

F. Edwardsii *Köll.*, Pl. 1. — *Messina* (Kölliker).

F. ophiura *Leuck.*, Arch. Nat., 1854, Pl. 13, fig. 18. — Stephanomia ophiura *Delle-Ch.*, Pl. 50, fig. 7. — *Naples* (Delle-Chiaje); *Nice* (Leuckart).

Agalmopsis *Sars* (non *Leuck.*). — Agalma *Köll., Leuck.* (non *Esch.*).

A. elegans *Sars.* — Fauna littor. Norv., Pls. 5 and 6. — *Coast of Norway, Floröe Islands* (Sars).

A. Sarsii *Köll.*, Pl. 3.; *Leuck.*, Arch. Nat., 1854, Pl. 12, figs. 21–27. — *Messina* (Kölliker); *Nice* (Leuckart).

A. clavatum *Leuck.*, Arch. Nat., 1854, Pl. 13, figs. 2–7. — *Nice* (Leuckart).

Halistemma *Huxl.* — Agalma *Vogt* (non *Esch.*). — Agalmopsis *Köll., Leuck.*

H. rubrum *Huxl.* — Agalma rubra *Vogt*, Pls. 8–11. — Agalmopsis rubra *Leuck.*, Arch. Nat., 1854, Pl. 12, figs. 12–20. — *Nice* (Vogt).

H. punctatum *Ag.* — Agalmopsis punctata *Köll.*, Pl. 4. — *Messina* (Kölliker).

Phyllophysa *Ag.* — Stephanomia *Q.* and *G.* — Sarcoconus *Less.*

Ph. foliacea *Ag.* — Stephanomia foliacea *Q.* and *G.*, Zool. Astr., Pl. 3, figs. 8–12. — *New-Guinea* (Quoy and Gaimard).

Cuneolaria *Eysenh.* — Sarcoconus *Less.* — Stephanomia *Q.* and *G.*

C. incisa *Eysenh.*, Act. Nov. Acad. Nat. Cur., Vol. X. Pl. 32, fig. 5. — Saroceonus Eysenhardtii *Less.* — *Sandwich Islands* (Chamisso).

C. triangularis *Ag.* — Stephanomia triangularis *Q.* and *G.*, Zool. Astr., Pl. 3, figs. 1–7. — *Off Cape Verd* (Quoy and Gaimard).

C. heptacantha *Ag.* — Stephanomia heptacantha *Q.* and *G.*, Zool. Astr., Pl. 3, figs. 16–18. — *Molucca Islands* (Quoy and Gaimard).

C. imbricata *Ag.* — Stephanomia imbricata *Q.* and *G.*, Zool. Astr., Pl. 3, figs. 13–16. — *New-Zealand* (Quoy and Gaimard.)

4th Family. Apolemiæ *Less.* — Apolemiadæ *Huxl.* — Stephanomidæ *Leuck.* (p. p.).

Apolemia *Esch.* — Stephanomia *LeS.* — Agalma *Vogt* (non *Esch.*).

A. Uvaria *Esch.*; *Gegenb.*, Zeitsch. w. Zool., 1854, Pl. 18, fig. 1; *Leuck.*, Arch. Nat., 1854, Pl. 12, figs. 8–11; *Köll.*, Pl. 6, figs. 6–9. — Agalma punctata *Vogt*, Pl. 12. — *Mediterranean* (LeSueur).

5th Family. Anthophysidæ *Br.* — Athorybiæ *Less.* — Athorybides *Vogt.* — Athorybiadæ *Huxl.*

Athorybia *Esch.* — Physophora *Forsk.* (p. p.). — Rhizophysa *Q.* and *G.* (p. p.). — Anthophysa *Br.* — Rhodophysa *DeBl.*

Ath. rosacea. — *Esch.*; *Köll.*, Pl. 7; *Huxl.*, Pl. 9. — Physophora rosacea *Forsk.*, Tab. 43, Fig. B. — *Mediterranean* (Forskål).

Ath. melo. *Esch.* — Rhizophysa melo *Q.* and *G.*, Ann. Sc. Nat., Vol. X. Pl. 5, C. — Stephanomia melo *Q.* and *G.*, Zool. Astr., Pl. 2, figs. 7–12. — *Mediterranean* (Quoy and Gaimard).

Ath. helianthea *Esch.* — Rhizophysa Helianthus *Q.* and *G.*, Ann. Sc. Nat., Vol. X. Pl. 5, A. — Stephanomia Helianthus *Q.* and *G.*, Zool. Astr., Pl. 2, figs. 1–6. — *Mediterranean* (Quoy and Gaimard).

6th Family. Rhizophysidæ *Br.*, *Leuck.*, *Huxl.* — Rhizophysæ *Less.*

Rhizophysa *Pér.* and *LeS.* — Physophora *Forsk.* (p. p.). — Epibulia *Esch.*

Rh. filiformis *Lamk.*; *Gegenb.*, Zeitsch. w. Zool., 1854, Pl. 18, fig. 5; *Huxl.*, Pl. 8, figs. 13–20. — *Mediterranean* (Forskål).

8th Sub-order. Diphyæ *Cuv.* — Calycosphoridæ *Leuck.* (p. p.).

1st Family. Prayidæ *Köll.* (restricted so as to exclude Galeolaria). — Sphæronectidæ *Huxl.*[1]

Praia *Q.* and *G.*, *DeBl.*, *Less.* — Prayia *Köll.*, *Leuck.*, *Gegenb.*, *Vogt.* — Rosacea *Q.* and *G.* — Cucuballus *Q.* and *G.* — Rhizophysa *Vogt.* — Diplophysa *Gegenb.*

P. dubia *Q.* and *G.*, in *DeBl.* Act., Pl. 3, figs. 34–36. — *Australia, off Kangaroo Islands* (Quoy and Gaimard).

P. Diphyes *Less.* (non *Köll.*, *Gegenb.*, *Vogt*). — Diphyes prayensis *Q.* and *G.*, Vol. Astr., Pl. 3, figs. 37 and 38. — *Cape Verd Islands* (Quoy and Gaimard).

P. Köllikeri *Ag.* — Praya Diphyes *Köll.*, Pl. 9; *Gegenb.* (non *Less.*, *Vogt*). — *Messina* (Kölliker).

P. cymbiformis *Leuck.*, Zool. Unt., Pl. 1; Arch. Nat., 1854, Pl. 11, figs. 19–24. — P. maxima *Gegenb.*, Zeitsch. w. Zool., 1854, Pl. 17, figs. 1–4. — P. Diphyes *Vogt.*, Pls. 16 and 17 (non *Less.*, *Köll.*, *Gegenb.*). — *Messina* (Gegenbaur); *Nice* (Vogt, Leuckart).

[1] Huxley's Sphæronectidæ seem hardly distinct from the Prayidæ. Praya dubia is closely allied to it, more so than to the other species of the genus thus far described; it may, however, constitute a distinct genus, judging from the drawings of Quoy and Gaimard, or rather, it is the type of the genus Praya, and if generically distinct from the others, these will require a new generic name.

Sphæronectes *Huxl.*

Sph. Köllikeri *Huxl.*, p. 30, Pl. 3, fig. 4. — *Indian Ocean, East Coast of Australia and Torres Straits* (Huxley).

2d Family. Diphyidæ *Esch.*[1] (restricted).

Diphyes *Cuv., Esch.* — Endoxia *Esch.* — Ersæa *Esch.* — Cucullus *Q.* and *G.* — Eudoxoides *Huxl.*

D. dispar *Cham.* and *Eysenh.*; *Huxl.*, Pl. 1, fig. 1. — *Pacific Ocean* (Chamisso and Eysenhardt).[2]

Muggiæa *Busch* (extended; see note 3, below). — Ersæa *Will.*[3]

M. pyramidalis *Busch*, Beob., p. 48, Pl. 4, fig. 6. — Diphyes Kochii *Will*, Hor. Terg., Pl. 2, figs. 22 and 23. — *Adriatic: Trieste* (Will).

Huxleyia *Ag.* — Diphyes *Auct.* (See note 3, below.)

H. biloba *Ag.* — Diphyes biloba *Sars*, Faun. litt. Norv., Pl. 7, figs. 16–21. — *Coast of Norway: Floröe Islands* (Sars).

Galeolaria *DeBl., LeS.* — Sulculeolaria *DeBl., LeS.* — Physophora *Delle-Ch.* — Beroides *Q.* and *G.* — Epibulia *Vogt.* — Diphyes *Gegenb.*

G. filiformis *Leuck.*, Arch. Nat., 1854, Pl. 11, figs. 14–16. — Physophora filiformis *Delle-Ch.* — Sulculeolaria quadrivalvis *LeS.* — Epibulia aurantiaca *Vogt.* — Galeolaria aurantiaca *Vogt.*, Pls. 18 and 19. — Diphyes quadrivalvis *Gegenb.*, Zeit. w. Zool., Pl. 16, figs. 8–11. — *Naples* (Delle-Chiaje); *Nice* (Vogt, Leuckart); *Messina* (Gegenbaur).

[1] For this type see the papers and works, quoted above, of Kölliker, Gegenbaur, Leuckart, and Huxley. For the embryology, especially the paper of Gegenbaur on Diphyes turgida, Zeits. w. Zool., 1854, p. 332, and for the budding, the work of Huxley, especially Pl. 5. The Calycophoridæ *Leuck.* do not constitute a natural division, since the communities of the Hippopodidæ have not the same organic complication as the Diphyidæ, while the Prayidæ have. The Abylidæ differ from the two latter families, by the great inequality, angular form, and position of the twin sterile Medusæ.

[2] To this genus belong also D. Boryi *Q.* and *G.* — D. campanulifera *Esch.*; *Gegenb.*, Neue Beitr., Pl. 30, figs. 23–26. — D. angustata *Esch.*, Ac., Pl. 12, fig. 6. — D. regularis *Meyen*, and D. Steenstrupii *Gegenb.*, Neue Beitr., Pl. 29, figs. 27–29.

[3] It is my impression that D. appendiculata, *Esch.*, Ac., Pl. 12, fig. 8; *Huxl.*, Pl. 1, fig. 2. — D. Sieboldii *Köll.*, Pl. 11, figs. 1–8 (with which D. gracilis *Gegenb.*, Zeit. w. Zool., Pl. 16, figs. 5–7, and D. acuminata *Leuck.*, Zool. Unters., Pl. 3, figs. 11–19, are synonymous), and D. Kochii *Will*, belong to another genus for which the name Muggiæa *Busch* may be retained. D. biloba *Sars;* D. Sarsii *Gegenb.*, Neue Beitr., Pl. 30, figs. 30 and 31; D. turgida *Gegenb.*, Zeitsch. w. Zool., 1854, Pl. 23, formerly D. Sieboldii *Gegenb.*, and D. truncata *Sars*, Faun. litt. Norv., Pl. 7, figs. 1–15, form a third genus, for which I propose the name of *Huxleyia*. The generic relations of the many species of this family have not yet been sufficiently considered, nor is it easy, when the young and adult and the secondary buds differ so widely.

3d Family. Abylidæ *Ag.* — Diphyidæ *Auct.*

Abyla *Q.* and *G.*, *Esch.* (p. p.). — Amphirhoa *LeS.* — Cymba *Q.* and *G.* — Enneagonum *Q.* and *G.* — Microdiphyes *Less.* (p. p.). — Heterodiphyes *Less.* (p. p.).

A. trigona *Q.* and *G.*, Ann. Sc. Nat., Vol. X. Pl. 2, B; Vogt. Pl. 20, figs. 4–7; *Gegenb.*, Neue Beitr., Pls. 27 and 28, figs. 9–12. — Diphyes Abyla *Q.* and *G.*, Zool. Astr., Pl. 4, figs. 12–17. — Salpa polymorpha *Q.* and *G.*, Zool. Uran., Pl. 73, figs. 4 and 5. — *Mediterranean* (Quoy and Gaimard).

Calpe *Q.* and *G.* — Abyla *Esch.* (p. p.). — Eudoxia *Esch.* (p. p.). — Cuboides *Q.* and *G.* — Aglaisma *Esch.* — Aglaismoides *Huxl.* — Tetragonum *Q.* and *G.* — Pyramis *Otto.*

C. pentagona *Q.* and *G.* — Abyla pentagona *Esch.*; *Leuck.*, Zool. Unters., Pl. 3, figs. 1–10, Arch. Nat., 1854, Pl. 11, 1–10; *Köll.*, Pl. 10; *Gegenb.*, Neue Beitr., Pl. 29, figs. 17 and 18; *Huxl.*, Pl. 2, fig. 2. — *Mediterranean* (Quoy and Gaimard).

Bassia *Q.* and *G.* — Calpe *Less.* (p. p.). — Sphenia *Huxl.* — Sphenoides *Huxl.*

B. quadrilatera *Q.* and *G.*, in *DeBl.* Actin. — Diphyes bassensis *Q.* and *G.*, Zool. Astr., Pl. 4, figs. 18–20; *Huxl.*, Pl. 2, fig. 1. — *Bass Straits* (Quoy and Gaimard.)

B. perforata *Ag.* — Abyla perforata *Gegenb.*, Neue Beitr., Pl. 31, figs. 20 and 21 — *Coast of Guinea* (Gegenbaur).

SECTION II.

GEOGRAPHICAL DISTRIBUTION OF THE HYDROIDÆ.

Our knowledge of these Acalephs is limited to those of so small areas of the surface of our globe, that it is impossible to characterize the faunæ into which they may be divided; nevertheless, from the fragmentary information on hand, it already appears that these Hydroids are localized within narrow boundaries, with as much precision as the higher orders of the class. The Diphyidæ alone seem to make an exception; but I suspect that in this family, closely allied representative species have been mistaken as identical. There are in the Museum of Comparative Zoölogy at Cambridge, a great many undescribed Hydroids from various parts of the world, which, when published, may lead to some general results respecting the mode of association of these animals with the higher Acalephs, and the representatives of other classes in their respective zoölogical provinces.

EXPLANATION OF THE PLATES.

PLATE XX.

CORYNE MIRABILIS, HALOCHARIS SPIRALIS, CLAVA LEPTOSTYLA, RHIZOGETON FUSIFORMIS.

[Figs. 11 to 16a, drawn from nature by A. Sonrel; the others by H. J. Clark.]

Figs. 1 to 9. Coryne mirabilis *Ag.*

Fig. 1. The end of a hydra stem rejuvenating. *a* the horn-like sheath; *b* the stem of the hydra; b^1 the expanded end of *b*, attached to *a*. 200 diameters.

Fig. 2. The stem of a hydra one half of an inch below the tentacles, to show the numerous lasso-cells in the outer wall (*a*), where they cannot possibly perform any prehensile function, as they are covered by the thick, horn-like sheath (*c*). *b* the inner wall; *d* chymiferous canal. 400 diameters.

Fig. 3. Two young hydræ budding from opposite sides of the stem. *a* outer, and *b* inner wall of the bud; a^1 outer, and b^1 inner wall of the parent stem; *c* the horn-like sheath, which, at c^1, covers the buds; *d* the chymiferous canal. 200 diameters.

Fig. 4. A young hydra, with two incipient tentacles (*t*), budding from an old hydra stem (*d*). *c* horn-like sheath of *d*; d^1 mouth of the young hydra. 100 diams.

Fig. 5. A young hydra with four tentacles (*t*). Letters as in fig. 4. 100 diameters.

Fig. 6. A young hydra with eight tentacles, strongly contracted. *a* outer, and *b* inner wall of the head; a^1 outer, and b^1 inner wall of the stem; *c* horn-like sheath, which, at c^1, covers the head; *d* digestive cavity; *t* tentacles. 300 diameters.

Fig. 7. Proboscis of a young medusa, not long free, to show the replication of the walls. *a* the inner wall folded outward; *b* the outer wall of the second plication; *c* base of the proboscis. 400 diameters.

Fig. 8. A papilliform tentacle of the medusa of fig. 13, Pl. XVII. a^1 the outer wall of large hyaline cells; b^1 inner wall; d^1 chymiferous cavity. 500 diameters.

Fig. 9. End of the tentacle of a young medusa not long free. *a* papillate bodies on the surface; *b* groups of lasso-cells; *c* outer wall. 400 diameters.

Fig. 10. The hydra of Halocharis spiralis *Ag.*, with its Corynoid tentacles (*t*) developed from base to apex. *a* outer, and *b* inner wall. 100 diameters.

Fig. 10^a. The same as fig. 10, strongly contracted. 100 diameters.

Fig. 10^b. The upper part of fig. 10, more highly magnified. *a* outer, and *b* inner wall of the body; a^1 outer, and b^1 inner wall of the tentacle; *d* digestive cavity; d^1 mouth. 200 diameters.

Fig. 10^c. A tentacle of fig. 10^b, with the same letters. 200 diameters.

Figs. 11 to 15. From a bunch of female medusæ of Clava leptostyla *Ag.* All magnified 200 diameters.

Fig. 11. A medusa containing two eggs. *a* outer, and *b* inner wall of the pedicel; a^1 outer and only wall of the disk; b^3 eggs; b^4 Purkinjean vesicle; b^5 end of the inner wall; *d* the proboscis; *e* cavity of *d*.

Fig. 12. A medusa containing a segmenting, mulberry-like mass (b^3).

Fig. 13. Medusa similar to that of fig. 12, but the segmenting mass, b^3, more minutely divided.

Fig. 14. A medusa containing two or more very young, irregularly spherical planulæ or young hydræ (b^3). *d* the proboscis.

Fig. 15. A medusa whose planulæ (b^3) are elongate pyriform, and about to escape. e^1 chymiferous canal of the pedicel; the other letters as in fig. 11.

Fig. 16. A group of male medusæ of Clava leptostyla *Ag.* A A have discharged their spermatic particles; B a half-grown medusa; the other two full-grown. *a* wall of the medusa; b^2 spermatic mass; *d* the proboscis. 200 diameters.

Fig. 16^a. Spermatic particles from fig. 16. 800 diameters.

Figs. 17 to 23. Rhizogeton fusiformis *Ag.*; the male; all but fig. 23 magnified 100 diameters. All the figures have corresponding letters. *a* and a^1 the outer wall

of either hydra or medusa; a^2 the thickened oral end of the disk; b and b^1 inner wall of the same; b^2 the spermatic mass; c^2 and c^1 the horn-like sheath; d proboscis of the medusa; e and e^1 chymiferous canal or cavity; f stolon; m mouth of the hydra; t tentacles.

Fig. 17. A hydra (B) and a young medusa (A) arising from the same stolon.

Fig. 18. A very young medusa, with a large proboscis.

Fig. 19. A half ripe medusa, with the proboscis expanded.

Fig. 20. A ripe medusa, with a shrivelled proboscis.

Fig. 21. A medusa which has discharged its spermatic particles.

Fig. 22. A medusa metamorphozing into a hydra.

Fig. 23. Spermatic particle of the medusa of fig. 20. A is magnified 500 diameters; B is exaggerated, to show the form.

PLATE XXI.

Clava leptostyla *Ag.*

[Figs. 1, D, and fig. 3, from nature, by H. J. Clark; the others by A. Sonrel.]

All the figures are lettered correspondingly. a the tentacles; b the medusæ: c the head of the hydra; d the slender base of the hydra; e the stolon; f the outer, and f^1 the inner wall; g the digestive cavity or chymiferous canal: g^1 the mouth: n the pedicel of the bunch of medusæ: p the proboscis of the medusæ.

Fig. 1. A hydromedusarium attached to a sea-weed. Natural size.

Fig. 2. A hydromedusarium, magnified to show the various forms and attitudes of the individual hydræ, A to H. 25 diameters.

Fig. 3. A young hydra, just commencing to bud. 60 diameters.

Fig. 4. A young hydra, with very few tentacles. 60 diams.

Fig. 5. A young hydra, transversely wrinkled by contraction. 60 diameters.

Fig. 6. A young hydra, having nine or ten tentacles, with the month wide open. 60 diameters.

Fig. 7. A young hydra, with no more tentacles than that of fig. 6, but much larger. 60 diameters.

Fig. 7a. View of fig. 7 from above, the mouth wide open. 60 diameters.

Fig. 8. Mouth and upper tentacles of a full-grown hydra, showing the proboscis reverted. 80 diameters.

Fig. 8a. A single bunch of medusæ from fig. 8. 80 diameters.

Fig. 9. The same as fig. 8, but strongly contracted. 200 diameters.

Figs. 10 and 10a. The young hydra or planula, just escaped from the medusa, and swimming about by means of vibratile cilia. 200 diameters.

PLATE XXII.

Figs. 1–20, Thamnocnidia spectabilis *Ag.*; Figs. 21–30, T. tenella *Ag.*

[Figs. 1–15 and 17, drawn by H. J. Clark; the others by A. Sonrel.]

In figs. 1 to 14, a outer wall of the medusa; a^1 outer wall of the pedicel of the medusa; b inner wall of the medusa; b^1 inner wall of the pedicel; c chymiferous cavity; d proboscis; d^1 proboscis seen through the young hydroid; e germ basis; e^1 young hydroids; e^2 cavity of the disk; f tentacles; st basal end of the hydroid; p proboscis of the hydroid; te tentacles of the hydroid.

These figures (1–15) represent the origin and mode of growth of the medusa and the hydroids which it contains. Figs. 1, 4, 6, 6a, 7, 8, 9, 10, 11, 12, 13, and 14, are magnified 100 diameters; figs. 2, 3, and 5, 300 diameters; figs. 4a and 8a, 200 diameters; fig. 15. 60 diameters. August, 1851.

In figures 15 to 30, excepting when stated otherwise, a is the base of the proboscis; b the oral end of the proboscis; b^1 the top of the stem; c the inner margin of the open mouth; d the medusæ; d^1 young medusæ-buds; e medusiferous branches; p proboscis; p^1 decurrent bases of proboscidal tentacles; t coronal tentacles; t^2 proboscidal tentacles; t^3 branching coronal tentacle; t^4 aperture of proboscis.

Fig. 15. A young hydroid just set free. 60 diameters.

Fig. 16. Hydromedusarium of T. spectabilis. Natural size.

Fig. 17. A bunch of female medusæ, in different stages of growth. 25 diameters.

Fig. 18. End view of the proboscis.

Fig. 18a. Profile view of fig. 18.

Fig. 19. Birds-eye view, showing the gaping mouth and the constricted proboscis.

Fig. 20. The proboscis enormously distended.

Fig. 21. Hydromedusarium of T. tenella. Natural size. a the new branches; b the stems of the individual hydroids.

Figs. 22 to 30. Magnified 25 diameters.

Fig. 22. Shows the coronal tentacles, contracted so as to appear globose at the tip.

Fig. 23. Birds-eye view, to show the circle of medusiferous branches around the proboscis.

Fig. 24. A young hydromedusarium.

Fig. 25. Birds-eye view, showing the interior of the broadly expanded mouth.

Fig. 26. The buccal tentacles, so laid together as to resemble a solid ribbed mass.

Fig. 27. The medusiferous branches turned toward the mouth, so as to show their basal connection with the disk of the hydra.

Fig. 28. The buccal tentacles retracted, and the mouth wide open.

Fig. 29. A young hydroid, partially contracted.

Fig. 30. A young hydroid, contracted as in fig. 22.

PLATE XXIII.

Parypha crocea *Ag.*

[Figs. 1, 1b, and 1c, drawn by A. Sonrel; the others by H. J. Clark.]

Figures 2^a, 3, 4^a, 5, 7, 8, 9, 10, 11, 12, 12c, 13, 14, 15, 21, 22, and 23, are magnified 100 diameters; figs. 1^c, 9^a, and 14^a, 200 diameters; figs. 3^a, 4, 5^a, 7^a, 18, 18^a, and 19, 300 diameters; figs. 6, 12^a, 12^b, 19^a, 21^a, 22^a, 23^a, and 24, 400 diameters; figs. 9_b, 15^a, 16^B, 17, 17^a, 25, 26, 26^a, and 26^b, 500 diameters.

Fig. 1. A group of immature hydroids. *a* a^1 a^2 a^3 branches and stolons; *b c d e f g* the heads in different stages of growth.

Fig. 1^a. A full-grown hydromedusarium. *a b* the stem; a^1 the stolon; *c* the medusæ bunches; *d* base of the head; *e* proboscidal tentacles.

Fig. 1^b. The head and top of the stem of a hydromedusarium, from fig. 1. *a b c* c^1 the medusæ; *d* the stem; d^1 top of *d*; *e* e^1 branchlets of the medusiferous branch; *p* the proboscis; *t* buccal tentacles; t^1 coronal tentacles. 25 diameters.

Fig. 1^c. The proboscis of fig. 1^b opened longitudinally. *m* mouth; *p* the walls; p^1 p^2 internal folds; *t* buccal tentacles; t^1 decurrent base of buccal tentacles; t^2 centripetal bases of buccal tentacles.

Fig. 1^d. The chitinous sheath. 3 diameters.

Fig. 1^e. The end of a buccal tentacle. *a* outer, and *b* inner wall; *c* dense accumulation of lasso-cells. 200 diameters.

Fig. 2. A bunch of male medusæ, *a b*; *c* the branch from which they arise. 25 diameters.

Fig. 2^a. A male medusa. *a* pedicel; *b* disk; *c* spermatic mass; *d* proboscis.

Figs. 3 to 26^b represent the development of the medusa and its young.

Figs. 3 to 7 are lettered alike. *a* outer wall of the medusa; a^1 outer wall of the branch or pedicel; *b* inner wall of the medusa; b^1 inner wall of the branch or pedicel; b^2 edge of the inner wall; *c* c^1 chymiferous cavity; *d* d^1 proboscis; *e* germ-basis.

Fig. 8. A male medusa. *a* inner wall of pedicel; *b* outer wall of disk; *c* inner wall of disk; *d* proboscis; *e* edge of inner wall; *f* spermatic mass.

Fig. 9. A partially developed female medusa. *a* disk; a^1 outer, and b^1 inner wall of pedicel; *c* chymiferous cavity; *d* proboscis; d^1 tip of *d*; *e* germ-basis; *f* tentacles beginning to bud.

Fig. 9^a. A portion (*b*) of the germ-basis. *a* walls of the disk.

Fig. 9^b. Cellules of fig. 9^a, *b*, isolated. *a* wall of the cell; *b* contents.

Fig. 10. A female medusa. *a* disk; a^1 outer wall of pedicel; *b* inner wall of pedicel; *c* chymiferous cavity; *d* proboscis; d^1 tip of *d*; *e* germ-basis; *f* tentacles.

Fig. 11. A female medusa. *a* a^1 *b c d* as in fig. 10; *e* a young hydroid; *f* the cavity of the disk; *g* the germ-basis.

Fig. 12. *a* a^2 *b c d* d^1 *f* as in fig. 10; *e* e^1 e^2 e^3 young hydroids.

Fig. 12^a. One of the tentacles of fig. 12, seen in profile. a^1 the disk; *b* b^1 b^2 the entrance to the cavity of the tentacle; *d* outer wall; *e* inner wall.

Fig. 12^b. Edgewise view of fig. 12^a, looking along the line *a . . . . c*. *a* the disk; *b* cavity of the tentacle; *e* corresponds to *e* in fig. 12^a.

Fig. 12^c. The edge of the disk of a female medusa with ten tentacles *c* c^1. *a* walls of the disk; *b* aperture of the disk.

Fig. 13. The lettering as in fig. 12, excepting e^2, the digestive cavity of a young hydroid, and e^3, tentacles.

Fig. 14. A medusa upon the point of discharging a young hydroid. *a* disk; a^1 outer, and b^1 inner wall of pedicel; *c* proboscis of the hydroid; c^1 stem of of the hydroid; *d* proboscis of the medusa; d^1 chymiferous cavity; *e* tentacles of the hydroid; *f* f^1 tentacles of the medusa; *g* globose tips of *e*.

Fig. 14^a. The stem of the hydra of fig. 14, to show the horny sheath, *c* c^1 c^2. *a* outer, and *b* inner wall; *d* chymiferous cavity.

Fig. 15. A male medusa. Letters as in fig. 2^a, and *e* aperture of the disk; d^1 proboscis projecting through *e*.

Fig. 15^a. A portion (*b*) of the spermatic mass of fig. 15. *a* the walls of the disk.

Fig. 16. Spermatic particle from a mature medusa. *A*, diagrammic, to show its form; B as seen with 500 diams.

Fig. 17. The proboscis of fig. 12. *a* remains of the germ-basis; *b* wall of the proboscis; *c* chymiferous cavity.

Fig. 17ª. The same as fig. 17, contracted, and the germ-basis wrinkled and having the appearance of an outer wall.

Fig. 18. A portion of a medusiferous branch, partially contracted. *a* outer, and *b* inner wall; *c* chymiferous channel.

Fig. 18ª. The same as fig. 18, but uncontracted.

Fig. 19. The same as fig. 18, in a sectional view.

Fig. 19ª. The same as fig. 19, contracted.

By mistake there is no figure 20.

Fig. 21. A young hydroid, just beginning to develop its tentacles, *b*. *a* the inner mass or wall; *c* outer wall.

Fig. 21ª. A portion of fig. 21. *a* inner wall; a^1 inner wall of the tentacle; *b* an incipient tentacle; *c* outer wall.

Fig. 22. A young hydroid with quite prominent tentacles (*b*). *a* inner, and *c* outer wall.

Fig. 22ª. A portion of fig. 22. Letters as in fig. 21ª.

Fig. 23. A young hydroid with tentacles already flexible. *a* inner wall; a^1 *b* tentacles.

Fig. 23ª. A portion of fig. 23. Lettered as in fig. 22ª. a^1 and a^2 axial cells of the tentacle.

Fig. 24. A portion of the young hydroid in fig. 11, *c*. *a* inner wall; *c* outer wall.

Fig. 25. A portion of fig. 21ª, more highly magnified.

Fig. 26. The end of the tentacle of a hydroid, just issuing from the parent; lateral view. *a* outer wall; a^1 a^2 lasso-cells in *a*; *b* b^1 inner wall; *c* globular tip, crowded with lasso-cells.

Fig. 26ª. The same as fig. 26, but more extended; seen from the actinal side.

Fig. 26ᵇ. The same as fig. 26ª, but the lasso-cells more prominent.

PLATE XXXIIIª.

Figs. 1–7, Parypha crocea *Ag.*; Figs. 8 and 9, Tubularia Couthouyi *Ag.*; Figs. 10 and 11, Hybocodon prolifer *Ag.*; Fig. 12, Coryne mirabilis *Ag.*

[Drawn from nature by H. J. Clark.]

Figs. 1, 1ª, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, magnified 500 diameters; Fig. 8 magnified 40 diameters.

Fig. 1. A lateral view of a coronal tentacle in a highly extended state. *a* a^1 a^2 cells of the outer wall, in profile; *b* b^1 b^2 b^3 b^4 general view of the cells of the outer wall, in outline; *c* c^1 c^2 c^3 superficial view of the outer wall, c^3 lasso-cells; *d* cells of the inner wall or axis, seen through the outer wall; *e* the same as *d*, seen isolately.

Fig. 1ª. Cells from the disintegrated outer wall. *a–d* lasso-cells; *e* granular contents.

Fig. 2. View from below at the surface of the axis of a coronal tentacle. *a* a^1 a^2 as in fig. 1; a^3 lasso-cells; *e* the two rows of cells nearest the eye, which meet along the line e^1.

Fig. 3. Transversely sectional view of fig. 1. *a* cells of the actinal side; a^1 cells of abactinal side; a^2 corresponds to a^2 in fig. 1; b^1 b^3 correspond to b^1 b^3 in fig. 1; *c* e^1 same as in fig. 2.

Fig. 4. A combined profile and general view of a portion of the stem, just below the head. *a* the horny sheath; *b c* outer wall, in profile; b^1 lasso-cells; *d e* inner wall, in profile; *f* f^1 f^2 f^3 f^4 inner wall in profile, seen through the cells nearest the eye (*g*); g^1 g^2 end view of the cells of the inner wall, seen through those of the outer wall (*i*); *h i* i^2 i^3 general view of the outer wall.

Fig. 5. The stem of a young hydra, at the upper third, stretched longitudinally. The lettering as in fig. 4; in addition, g^3 cells of the semi-partition, corresponding to g^3 g^4 in fig. 7.

Fig. 6. A cell of the outer wall of fig. 4. *a* lasso-cell; *b c* wall of the cell; *d* cavity of the cell.

Fig. 7. Transverse section of the stem, a little below the head. The lettering as in fig. 5; in addition, *j* is the loose pigment layer.

Fig. 8. A transverse section of the stem of Tubularia Couthouyi *Ag.* *a* horny sheath; *b* outer wall; *d* inner wall; g^3 g^4 the solid cellular mass which fills the axis of the stem; *j* the longitudinal channels; j^1 the primary channel.

Fig. 9. A portion of fig. 8, more highly magnified. *a* lamellate sheath; *b* outer wall; *d* d^1 inner wall; *g* cells of the solid central mass; g^1 mesoblast of the cells (*g*); g^2 outline of cells like *g*, but in the distance; g^3 mesoblast in profile.

Fig. 10. A portion of the transverse section of the stem of Hybocodon prolifer *Ag.* *a* the lamellate sheath; *b bb* outer wall; *d* inner wall; *dd* pigment cells; g^3 g^4 the semi-partition.

Fig. 11. Inner face of a semi-partition of fig. 10, with the same letters, and g^1 a mesoblast.

Fig. 12. A transverse section of the stem of Coryne mirabilis *Ag.* *a* the horny sheath; *b c* cells of the outer wall; b^1 a mesoblast; *d e* cells of the inner wall; *dd* pigment cells.

PLATE XXIV.

Tubularia Couthouyi *Ag.*

[Figs. 1–5, drawn by A. Sonrel; the others by H. J. Clark.]

Figs. 6–13 magnified 200 diameters; figs. 14–18 and 24–26, 100 diameters; fig. 19, 60 diameters; figs. 20–23, 40 diameters.

Fig. 1. A group of female hydroids, natural size. *a* the stem; *b* the medusæ; *p* the proboscis; *t* the coronal tentacles.

Fig. 1, B. A lateral view of the head of a hydromedusarium, magnified 5 diameters. *a* the stem; a^1 the largest tubule; *b* the terminal expansion of the stem; *c* the base of the head; *d* d^1 the medusæ; *e* the medusiferous branches; *t* coronal tentacles.

Fig. 1, C. The same as fig. 1, B, seen from the under side.

Fig. 2. A male hydroid, with the proboscis (*p*) spread wide open. The letters as in fig. 1.

Fig. 3. Another male hydroid, the head hanging downward. Letters as before.

Fig. 4. The proboscis of a male hydra. *a* the base; *t* t^1 t^2 t^3 the tentacles. 5 diameters.

Fig. 5. The broadly-expanded proboscis and a medusiferous branch of a male hydromedusarium (*d e*). *a* the base of the proboscis; *b* the decurrent bases of the tentacles (*t* t^1); *d* the oldest, *e* the youngest medusæ. 5 diameters.

Fig. 6. A medusa-bud, just beginning to form. *a* outer, and *b* inner wall; *d* chymiferous cavity.

Fig. 7. A, a double-walled hernia-like medusa. a^1 outer, and b^1 inner wall; *d* chymiferous cavity. B, a far advanced bud. a^1 outer wall; *c* ends of the radiating tubes; *d* the proboscis; *e* base of the radiating tubes; *f* germ-basis.

Fig. 8. A little younger than fig. 7, B. The letters the same.

Fig. 9. An exterior view, a little younger than fig. 7, B. The letters the same.

Fig. 10. An interior view, showing three of the radiating tubes (*c* c^1). The letters as in fig. 7, B.

Fig. 11. A little older than fig. 7, B, and with the same letters.

Fig. 12. The circular tube is formed. *a b c* as before; a^1 outer wall of the disk; b^1 inner wall containing the radiating tubes; *d* base of the radiating tubes and proboscis (d^1).

Fig. 13. A male medusa, a little older than the last, with corresponding letters, and also c^1, junction of radiating and circular tubes, seen in the distance, and *g*, spermatic mass.

Fig. 14. A nearly mature female medusa. *c* remains of the circular tube; *d* proboscis; *e* radiating tube; *f* germ-basis.

Fig. 15. The chymiferous tubes obliterated, and the germ-basis (*f* f^1) beginning to divide. *a* a^1 *b* b^1 *d* as in fig. 12; b^2 the base of the proboscis. Drawn as a sectional view.

Fig. 16. The germ-basis, still further divided. *a b f* f^1 as in fig. 15; *c* as in fig. 14.

Fig. 17. A sectional view of a medusa of the same age as that of fig. 16. The letters as in fig. 15, and *c* as in fig. 14.

Fig. 18. The germ-basis nearly all divided off into hydræ (f^1 f^2). *a* outer, and *b* inner walls of the pedicel; *c* junction of circular and radiating (*e*) tubes; *d* proboscis.

Fig. 19. Similar to fig. 18, but not so far advanced. *f* germ-basis.

Figs. 20, 21, 22, and 23. Similar to figs. 18 and 19, with the same letters.

Fig. 24. The hydroids have escaped, but more of the germ-basis remains. Letters as in figs. 18 and 19: also a^1 the wrinkled disk.

Figs. 25 and 25^a. Lateral and end view of an empty medusa. Letters as in fig. 24.

Fig. 26. A male medusa. *a* outer, and *b* inner wall of the pedicel; *c* as in fig. 14; *f* spermatic mass; *g* disk cavity.

PLATE XXV.

Hybocodon prolifer *Ag.*

[Figs. 1, 2, 15, 15a, and 15b, drawn by A. Sonrel; the others by H. J. Clark.]

Fig. 1 natural size; figs. 2 and 3 magnified 10 diameters; figs. 2^a, 14, 14^a, 15, 15^a, and 15^b, 40 diameters; figs. 4, 5, 6, 7, 8, 9, 200 diameters; figs. 10, 11, 12, 13, 100 diameters.

Fig. 1. A single hydra. *a* the stem; *t* the coronal tentacles.

Fig. 2. A profile view of the upper part of an individual, loaded with medusæ-buds. *a* the stem; a^1 the horny sheath; *b* the top of the stem; *c* the base of the head; *d* d^1 d^2 *e* medusæ; *t* coronal tentacles; t^1 t^2 proboscidal tentacles.

Fig. 2^a. The proboscis of fig. 2. *p* the mouth; p^1 the intervals of the exterior row (t^2) of tentacles; p^2 the decurrent bases of t^2; t^1 inner row of tentacles.

Fig. 3. A much older head than fig. 2, with the coronal tentacles (*t*) cut off near the base. *a* the stem; a^1

the horny sheath; a^2 the expansion of the sheath at the base of the head; d d^1 the medusæ; t^1 t^2 the inner and outer rows of proboscidal tentacles.

Fig. 4. A young medusa-bud, just rising from the disk of the hydra. a outer, and b inner wall; d chymiferous cavity.

Fig. 5. A medusa-bud from the hydra disk. a outer, and b inner wall; c c^1 radiating tubes; d digestive cavity.

Fig. 6. A medusa-bud from the hydra disk, already one-sided. a b c c^1 d as in fig. 5; c^2 the incipient tentacle.

Fig. 7. A little older than fig. 6, but from the base of the tentacle of figs. 14 and 14ª. a b c c^1 c^2 as in fig. 6; b^1 inner wall of c^2.

Fig. 8. A little older than fig. 7. From the hydra. The letters the same; b^2 an incipient primary medusa.

Fig. 9. Considerably older than fig. 8. From the hydra. a b b^2 c c^1 c^2 d as before; a^1 horny sheath; b^3 a secondary medusa-bud; d^1 chymiferous cavity.

Fig. 10. A medusa with four medusa-buds, a^1 b b^1 b^2. c the tentacle. From the hydra.

Fig. 11. A medusa in which the circular tube (b^2) is already developed. From the hydra. a outer, and b inner wall; b^1 the radiating tubes; b^2 circular tube; c the incipient bud of a secondary medusa; c^2 the tentacle of c; d outer, and d^1 inner wall of the proboscis; d^2 digestive cavity; e disk cavity; f f^1 secondary medusæ; g tentacle of the primary medusa.

Fig. 12. A medusa nearly ready to break loose from the hydra. a outer, and b inner wall; b junction of radiating (b^3 b^5 b^6) and circular (b^2) canals; b^4 hollow base of the tentacle (g^2); c a primary medusa; c^1 a secondary, and c^2 a tertiary medusa; d digestive cavity; d^1 proboscis; e disk cavity; f an incipient group of medusæ; g g^1 tentacle of c; g^2 tentacle of the parent medusa.

Fig. 13. A medusa a little older than fig. 12: looking toward the inner face of the tentacle. The letters as in the last: also f^1 f^2 h the same as f in fig. 12; i a primary medusa, a little younger than c; i^1 i^2 secondary and tertiary medusæ of i; g^3 tentacle of i.

Fig. 14. A medusa just set free, seen with the tentacle in profile. b the radiating canal; b^2 circular canal; b^4 the hollow base of g; b^5 the canal opposite the tentacle (g); d^1 the proboscis; d^2 the remains of the pedicellar attachment; f^2 medusæ-buds; g the tentacle; l aperture of the veil (l^1); n the prolonged edge of the disk.

Fig. 14ª. View of fig. 14, from the side opposite to the tentacle, and obliquely from below. Letters as in fig. 14; also d, the digestive cavity.

Fig. 15. A medusa, drawn about twenty-four hours after it dropped from the hydra: the tentacle next the observer. The letters as in figs. 14 and 14ª: also g^1 the solid part of the tentacle; k the pair of pigment bands on each side of the odd radiating canal; k^1 base of k; k^2 base of the other bands (k^3).

Fig. 15ª. View from above of fig. 15, with the same letters. Also k^4, the ends of the pair of pigment-bands.

Fig. 15ᵇ. The proboscis of fig. 15, elongated. a outer, and b inner wall; c mouth; d the base.

PLATE XXVI.

Figs. 1–6, Tubularia Couthouyi *Ag.*; Figs. 7–17, Corymorpha pendula *Ag.*; Fig. 18, Hydractinia polyclina *Ag.*

[Figs. 1–5 and 18, drawn by H. J. Clark; fig. 6 by J. H. Richard; figs. 7–17 by Wm. Tappan.]

Fig. 1. A hydra just escaped from the parent. a the stem; b the coronal tentacles; c the buccal tentacles; d the base of b. 100 diameters.

Fig. 2. The same as fig. 1, in an expanded state, with the same letters.

Fig. 3. The medusa with the hydra of fig. 1, before it escaped. a outer, and b inner wall of the pedicel; c point of junction of the circular and radiating (e e^1) tubes; d the proboscis of the medusa, seen through the hydra (f^1); e^2 base of e and e^1; f^2 tentacles of f. 100 diameters.

Fig. 4. A branch of withering medusæ. a the branch; b c d e the medusæ in various stages of decadence. 100 diameters.

Fig. 5. A part of a medusiferous branch, to show the relations of its walls to those of the medusa. a the outer, and b the inner wall of the branch; a^1 the outer, and b^1 the inner wall of the branchlet; c c^1 the chymiferous cavity; d the radiating tubes of the medusa; e the proboscis. 60 diameters.

Fig. 6. The hydræ a short time after birth, attached to the stem of the parent (T). p the proboscis; s the stem; s^1 the base of s; t coronal tentacles. 40 diameters.

Figs. 7 and 9–17. Hydromedusarium of Corymorpha, in various attitudes. a the proboscis; d the medusæ. Natural size.

Fig. 8. A hydra, with the upper third of the stem very much extended, and pendulous. a the proboscis; b^1 the base of the head; b^3 the stem; b^4 the horn-like

sheath; b^5 the terminal expansion of b^4; *d* the medusæ; *r* the branching base of the stem; *t* the coronal tentacles; t^1 t^2 the buccal tentacles. 8 diameters.

Fig. 8ª. View of the abactinal side of the head of a hydra. b^1 b^3 *d* as in fig. 8; *t* t^3 t^4 t^5 coronal tentacles in various stages of growth. 8 diameters.

Fig. 18. The retiform stolonic basis of the hydra of Hydractinia polyclina. *a* the outer wall at the edge of the depressions (*d*); *b* inner wall; b^1 granules circulating in the channels; *c* cells of *a*, in profile; *d* depressions in the outer wall, which sometimes appear to be open spaces. 400 diameters.

PLATE XXVII.

Figs. 1–7, Bougainvillia superciliaris *Ag.*; Figs. 8 and 9, Clytia cylindrica *Ag.*; Figs. 10–26, Thoa (Eudendrium) dispar *Ag.*

[Figs. 1, 8, 9, 10, 11, 12, 13, 22, 23, 24, 25, 26, drawn by A. Sonrel; the others by H. J. Clark.]

Fig. 1. A hydromedusarium. Natural size.

Fig. 2. A portion of fig. 1. *a–d* rings of the stem; A B medusa-buds. 25 diameters.

Fig. 3. The head of a hydra and the upper part of a branch of fig. 1. *a* outer, and *b* inner wall of the head; a^1 outer, and b^1 inner wall of the proboscis; a^2 outer, and b^2 inner wall of the tentacles; *c* the horn-like sheath; c^1 the termination of *c*; *d* digestive cavity; *m* mouth; *t* t^1 tentacles. 200 diameters.

Fig. 4. A young head of a hydra, almost ready to burst its envelope. *a* outer, and *b* inner wall; a^1 outer, and b^1 inner wall of the proboscis; a^2 outer, and b^2 inner wall of the tentacles; *c* c^1 the horn-like sheath; *d* digestive cavity. 300 diameters.

Fig. 5. A medusa-bud and the pedicel. *a* outer, and *b* inner wall of the pedicel; *c* inner wall of the medusa, containing the radiating tubes; *i* the horn-like sheath. 300 diameters.

Fig. 6. A bud considerably older than fig. 5. *c* c^1 horn-like sheath; *l* base of *c*. 300 diameters.

Fig. 7. A medusa-bud in which the circular tube (*l*) is nearly complete. *a b c* d^1 *i* as above; *l* circular tube; *n* the proboscis. 300 diameters.

Fig. 8. The medusa of Clytia cylindrica, seen from below. *a* the edge of the opening in the veil; *b* the circular tube; *c* the tentacles; c^1 the tentacles budding; c^2 the base of *c*; *d* the proboscis; *e* the radiating tubes; e^1 the genital organs; *f* ocular organs. 40 diameters.

Fig. 9. The same as fig. 8, seen obliquely from below. *g* the disk.

Fig. 10. A branch of Thoa dispar: the male. A A young head; B heads destitute of medusoids; C medusiferous heads. 25 diameters.

Fig. 11. A head from fig. 10. *p* the proboscis. 25 diams.

Fig. 12. A head from fig. 10, bearing young medusæ. *md* medusæ; *p* the proboscis; *t* the tentacles. 40 diams.

Fig. 13. Similar to fig. 10, C. *d* base of the medusa pedicel; d^1 the digestive cavity; *md* medusæ; *p* the proboscis. 40 diameters.

Fig. 14. An incipient medusa-bud from fig. 10. *a* outer, and *b* inner wall; *c* chymiferous cavity. 300 diameters.

Fig. 15. A little older than fig. 14, with the same letters. 300 diameters.

Fig. 16. From fig. 10: the primary medusa. *a* outer, and *b* inner wall of the pedicel; a^1 disk; *ca* disk cavity; *p* proboscis. 300 diameters.

Fig. 17. A medusa much older than fig. 16. Letters as in fig. 16, and *l* lasso-cells. 300 diameters.

Fig. 18. The primary (A) and secondary (B) medusa, far advanced, the tertiary medusa (C) just forming. *a* outer, and *b* inner wall; c^1 the inner, or axial wall; *ca* disk cavity containing the spermatic mass; *e* constriction between A and B; e^1 constriction between B and C; *p* proboscis; p^2 the homologue of *p*. 300 diameters.

Fig. 19. An exterior view: the primary medusa (A) nearly mature, the secondary (B) and tertiary (C) far advanced. The letters as in fig. 18. 300 diams.

Fig. 20. A, an immature spermatic particle from fig. 19, A: 500 diameters. B, diagrammic, to show the form.

Fig. 21. A, a mature spermatic particle: 500 diameters. B, a diagrammic figure, to show the form.

Fig. 22. A head and branch of a female hydromedusarium. *a b* the young medusæ; *md* md^1 nearly mature medusæ; *p* the proboscis; *t* coronal tentacles. 25 diameters.

Figs. 23, 24, and 25. The same as fig. 22, with corresponding letters. 40 diameters.

Fig. 26. A view from above of fig. 22. *dc* the disk; *m* the mouth; *p* proboscis; *t* coronal tentacles. 60 diameters.

PLATE XXVIII.

Clytia poterium *Ag.*

[Figs. 1 and 2, drawn by A. Sonrel; the others by H. J. Clark.]

Figs. 3, 4, 5, 6, 7, 8, 9, 10, 13, 13ª, 15, and 19, are magnified 100 diameters; figs. 11, 12, and 14, 200 diameters; fig. 16, 60 diameters; figs. 17, 17ª, 18, and 20, B C, 500 diameters; fig. 20, A, diagrammic.

Fig. 1. A male hydromedusarium attached to a sea-weed. Natural size.

Fig. 2. A portion of fig. 1. *a* the pedicels of the hydræ; *b* the reproductive calycles; *c* c^1 the young hydra-buds; *d* the stolon. 15 diameters.

Fig. 3. A sectional view of a hydra pedicel (c^2) and head. *a* outer, and *b* inner wall of the head; *c* the semi-partition; c^1 cavity of the calycle; c^2 pedicel; c^3 top of c^2; c^4 the stolon; *g* digestive cavity; *t* two opposite tentacles.

Figs. 4, 5, 6, 7, 8, 9. Progressive stages in the development of the hydra. *a* the outer, and *b* the inner wall of the head; a^1 outer, and b^1 inner wall of the pedicel; *ab* the tentacular region; *c* the semi-partition; c^1 cavity of the calycle; c^2 chitinous sheath; *d* the opercle; *e* point where the walls adhere to the calycle; *g* digestive cavity.

Fig. 10. A hydra just emerging from its embryonic state. *d* the opercle; *t* the tentacles.

Fig. 11. The bud of a fertile male hydra. β outer, and γ the inner wall; *b* chymiferous cavity; *d* the growing terminus; *i* a medusa-bud; *k* the calycle.

Fig. 12. The same as fig. 11, but much further advanced. The letters the same: also *a*, the chymiferous cavity.

Fig. 13. A male reproductive hydra. *a* the single chymiferous channel; *c* c^1 c^2 the multiple chymiferous channels; *d* the common terminal cavity; *f* radiating tubes of the medusa; *i* the spermatic mass.

Fig. 13a. The hydromedusa of fig. 13, taken from its calycle, and allowed to expand so as to show the point of connection (c^1) of the medusa to one channel of the multiple axis.

Fig. 14. A two thirds grown hydromedusa, removed from its calycle. *a* base of the channel of *c*; *b* junction of the medusa with *a*; *c* channel of the axis; *d* expanded terminus of *c*; *f* radiating canals; *i* spermatic mass.

Fig. 15. A female hydromedusa. *a* the main channel; *b* neck of the medusa; *c* c^1 c^2 c^3 c^4 the multiple channels arising from *a*; *d* common cavity into which *c*–c^4 empty; *e* e^1 *f* f^1 radiating tubes of the medusa; *h* actinal side of the medusa; *i* i^1 the planulæ; *k* k^1 the calycle.

Fig. 16. A mature female hydromedusa. *a b c* c^1 c^2 *d e* e^1 *f i* i^1 *k* k^1 as in fig. 15; e^3 radiating tube; *h* a portion of the medusa protruded from the calycle; h^1 neck of *h*; i^2 planulæ.

Figs. 17 and 17a. A lateral and end view of a planuloid hydra from fig. 15.

Fig. 18. A the outer cells of fig. 17; B the interior cells of the same.

Fig. 19. A male hydromedusa, two thirds grown. *a b c* c^1 *d e* e^1 e^2 *f* f^1 *k* as in fig. 15; also *i*, the spermatic mass.

Fig. 20. B, spermatic particles; A, a diagrammic figure of A; C, immature spermatic particle.

PLATE XXIX.

Figs. 1–5, CLYTIA POTERIUM *Ag.*; figs. 6–9 C. BICOPHORA *Ag.*; Figs. 10 and 11, C. INTERMEDIA *Ag.*

[Drawn by H. J. Clark.]

Fig. 1. A hydra which has developed from the head of another hydra. *a* the base of (a^1) the pedicel of the upper hydra; a^2 the semi-partition; *b* the terminal ring of the lower pedicel; b^2 terminal ring of the upper pedicel. 100 diameters.

Fig. 2. A male hydromedusa. *a* main chymiferous channel; *b* base of the multiple channels (c^1 c^2 c^3); c^4 c^5 outer wall of the hydra; *d* common chymiferous cavity; *e* e^1 e^2 radiating tubes of the medusa; *f* branches of *e*; *g* g^1 furrow in the spermatic mass. 150 diameters.

Fig. 3. A mature male hydromedusa. Letters as in fig. 2; also *i*, the spermatic mass. 100 diameters.

Fig. 4. Similar to fig. 3, and with the same letters.

Fig. 5. A mature male hydromedusa, discharging its spermatic particles, the multiple axis partially retracted. *a* main channel; *b* base of the multiple channels (*c* c^1 c^2); *d* end of the axis; *h* the medusa; *i* i^1 the current of spermatic particles; *k* the calycle; k^1 the mouth of *k*. 100 diameters.

Fig. 6. A hydromedusarium of Clytia bicophora. A–G the hydra; *a b c f* the base of the branch of a hydra; *d e* the reproductive hydra; *g* the stolonic sheath; *h* the channel of the stolon. 40 diameters.

Fig. 7. A hydra from fig. 6. *c* the semi-partition; c^2 the terminal ring of the pedicel; c^6 the teeth; c^7 the sinuses between c^6. 100 diameters.

Fig. 7a. End view of fig. 7, with the same letters.

Fig. 7b. A portion of the calycle of fig. 7, with the same letters. 100 diameters.

Fig. 8. The calycle of an immature hydra. *b* the terminal ring of the stem; *c* the semi-partition; *d* the filmy opercule. 200 diameters.

Fig. 9. The margin of the calycle of a mature hydra just before it emerges. c^3 c^4 c^6 the teeth; c^5 the decurrent angles of the intervals (c^7) of the teeth c^6); *d* the opercule; d^1 line which divides the smooth from

the scalloped part of the opercle; d^2 d^3 the puffs of d. 470 diameters.

Fig. 10. The hydra of Clytia intermedia. g the stolon. 40 diameters.

Fig. 11. A single hydra of fig. 10. c the semi-partition; c^2 the top ring of the stem; c^3 the calycle; c^6 the teeth; t the tentacles. 100 diameters.

PLATE XXX.

Laomedea amphora *Ag.*

[Figs. 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, drawn by A. Sonrel; the others by H. J. Clark.]

Fig. 1. A group of young hydra, attached to a sea-weed. Natural size.

Fig. 2. A full-grown bunch of hydræ. Natural size.

Fig. 3. A portion of a branch of a hydromedusarium. 8 diameters.

Fig. 4. A hydra, seen from above. A B the tentacles alternately elevated and depressed. 40 diameters.

Fig. 5. A hydra in profile. A B as in fig. 4; c^1 the calycle; c^2 the rings of the pedicel; g the intra-calycine axis; pr proboscis. 100 diameters.

Fig. 6. A hydra calycle. a the border, and b the aperture of the semi-partition. 100 diameters.

Fig. 6a. End view of fig. 6.

Fig. 6b. The papillate margin of the semi-partition of fig. 6. 400 diameters.

Fig. 7. The base of a hydra calycle. a the papillæ along the margin of c; b aperture of c; c the semi-partition; c^1 actinal prolongation of c; c^2 abactinal prolongation of c. 300 diameters.

Fig. 8. The terminal development of a branch. a b the youngest portion; c^1 the horn-like sheath; g the chymiferous channel. 100 diameters.

Fig. 9. A partially-developed hydra. ab the head; g^1 the axis of the pedicel; g^2 processes from the outer wall of g. 100 diameters.

Fig. 10. A nearly mature hydra. a outer, and b inner wall of the head; c^2 rings of the pedicel; g digestive cavity. 100 diameters.

Fig. 11. A hydra a little older than fig. 10. c^2 c^3 c^4 the pedicel and branchlet; d the calyx; g^1 the axis. 100 diameters.

Fig. 12. A hydra a little older than the last. a outer, and b inner wall; c^1 the calycle; c^2 the terminal ring of the pedicel; g the digestive cavity. 100 diams.

Fig. 13. Similar to fig. 12, but the head is retracted. 100 diameters.

Fig. 14. The pedicel of a hydra, to show the very prominent rings (c^2). 100 diameters.

Fig. 15. A female hydromedusa. β outer, and γ inner wall of the axis; ae the egg; d the end of the axis; h^1 the medusæ; k the calycle; k^1 rings of the pedicel. 100 diameters.

Fig. 16. A medusa from fig. 15. ae the egg; h the discoid termination of the inner wall; h^1 the disk; h^2 the pedicel; h^4 the chymiferous cavity. 300 diams.

Fig. 17. The inferior end of the axis of a male hydromedusa. A–D the medusæ; β the outer, and γ the inner wall of the axis; ae the spermatic mass; h^1 the disk of the medusa; h^5 the proboscis of the medusa. 300 diameters.

Fig. 18. A male reproductive calycle. A B, the medusæ emerging in one mass; k the wall of the calycle. 60 diameters.

PLATE XXXI.

Figs. 1–8, Laomedea amphora *Ag.*; Figs. 9–15. Tiaropsis diademata *Ag.*

[Drawn by H. J. Clark.]

Fig. 1, A. A spermatic particle, from fig. 18, Pl. 30. 500 diameters. B a diagrammic figure.

Fig. 2. A medusa from a mature hydromedusa. ae the egg; af outline of the egg, next the inner wall; h the discoid termination of the inner wall (h^3); h^1 the disk; h^2 outer wall; h^3 inner wall; h^4 digestive cavity; p the Purkinjean vesicle. 400 diameters.

Fig. 2a. The Purkinjean vesicle of fig. 2. 500 diameters.

Fig. 3, 3a. Views from two opposite sides of a segmenting egg. a a^1 a^2 the dividing furrow; b e the two halves of the segmenting mass. 300 diameters.

Fig. 3b. An end view of fig. 3a.

Fig. 4. A quadrated mass. a a^1 as in fig. 3; b c d e the four segments; f g the secondary furrow.

Fig. 5, 5a. An unequally quadrated mass; letters as in figs. 2 and 4.

Fig. 6. A surface view of a mass, divided into eight segments. b b^1 c c^1 the four segments nearest the eye; h h^1 h^2 as before.

Fig. 6a. The same as fig. 6, by transmitted light. b b^1 c c^1 correspond to those in fig. 6; d d^1 e e^1 the four segments in the distance; h h^1 h^2 as before.

Fig. 7. A mass divided into thirty-two segments (a af ag). h h^1 h^2 as before.

Fig. 7a. One of the segments of fig. 7, isolated.

Fig. 8. A minutely divided mass (*ae*). *h* h^1 as before.

Fig. 9. An ovary of Tiaropsis diademata, seen obliquely from above. *a* a^1 a^2 a^3 the median wall of the medusa; *b* b^1 the innermost wall. 100 diameters.

Fig. 9ª. A transverse, sectional view of fig. 9. The letters as above.

Fig. 10. An incipient tentacle. *a* outer, and *b* inner wall of the bud; a^1 outer, and b^1 median wall of the disk; *c* circular canal. 400 diameters.

Fig. 11. A young tentacle. *a* outer, and *b* inner wall; b^1 the base. 400 diameters.

Fig. 12. An ocular coronet, seen obliquely from above. *a* outer, and *b* median wall of the edge of the disk; a^1 outer wall of the tentacle; a^2 outer wall of the coronet; b^1 inner wall of the coronet; *c* the semicircle of refractive bodies; *d* the boss-like edge of the disk; *e* the pigment spot; *f* circular canal. 400 diameters.

Fig. 13. The same as fig. 12, but seen strictly from above, so that the disk (*h*) partly overshadows it; the same letters; also *g* the innermost wall of the disk.

Fig. 14. The same as fig. 12, seen from below, with similar letters.

Fig. 15. An edgewise view of fig. 12, with similar letters.

PLATE XXXII.

Dynamena pumila-*Lamx.*

[Figs. 1, 4, and 4a, drawn by A. Sonrel; the rest by H. J. Clark.]

Fig. 1. A hydrarium creeping over a sea-weed. Natural size.

Fig. 2. Two pairs of hydra calycles; the hydræ of the upper ones are omitted. *a* outer, and *b* inner wall; a^1 outer wall of the upper pair; *c* c^1 base of the hydra where it passes through the semi-partition (*d*); *m* aperture of the calycle; *op* operculum of an immature hydra calycle; *p* the proboscis; *t* tentacles. 100 diameters.

Fig. 3. A pair of hydræ, and the bases of two branches, seen from the convex side. *i* the branch; *k* a calycle of the branch; *op* as in fig. 2. 100 diameters.

Fig. 4. A hydra emerging for the first time from its calycle (*b*). Letters as in fig. 2. 100 diameters.

Fig. 4ª. The same as fig. 4, just before emerging.

Fig. 5. An oblique end-view of a young, reproductive hydra. 125 diameters.

Fig. 5ª. The same as fig. 5, in profile. *a*, a^1 the outer wall; *d e* the inner wall; *c* the calycle. 300 diameters.

Fig. 6. A pair of young hydræ. *a* a^1 a^2 the outer wall; *b* the fold of the horn-like sheath, at the base of the calycles; b^1 the sheath in process of formation; *c* the exterior portion of the sheath; *d* the inner wall of the matured stem; *e* e^1 e^3 inner wall of the young hydra; e^2 inner wall of the growing stem; *f* f^1 f^2 the three divisions of the triple bud. 300 diameters.

Fig. 6ª. The top of the branch from which figure 6 was taken. 40 diameters.

Fig. 7. A female hydromedusa. *a* the axis; *g* the growing portion of the axis; *h* ramifications of the axis; *ov* the eggs. 60 diameters.

Fig. 8. A mature male hydromedusa; a^1 the outer, and *e* the inner wall of the axis; *b* the outer, and b^1 the inner wall of the medusa; *c* the calycle; *g* the terminal expansion of the axis; *l* the proboscis of the medusa; l^1 the base of *l*; *sp* the spermatic mass. 100 diameters.

Fig. 9. A mature female hydromedusa. Letters as in fig. 8; also *ov* the eggs. 100 diameters.

Fig. 10. A young hydromedusa. A the main stem; a^1 *e b* b^1 *c g h* as in figs. 7, 8, and 9. 80 diams.

Fig. 10ª. A group of hydromedusæ. A the main stem; B C D the three calycles; *h* the branches decurrent from the axial, chymiferous canal; *i* point of junction of C and D; *j* the axis. 60 diameters.

Fig. 11, *a*. A spermatic particle from fig. 8. 500 diameters. *b c* diagrammic figures of *a*.

Fig. 12. A sectional view of a pair of hydræ, and the terminal development of the main stem. *a* outer, and *b* the inner wall of the stem and the hydra; a^1 the the processes from *a*; *c* the aperture of the semi-partition (*d*); *g* the chymiferous channel; *h* the flat end of the stem. 100 diameters.

Fig. 13, *a e*. Cells from the outer wall of fig. 14ª. 500 diams. *b c d f g h i* diagrammic figures of *a e*.

Fig. 14. Profile view of figs. 5 and 5ª. *a* the hydromedusa; *m* the mouth of a hydra-calycle; A the stem. 125 diameters.

Fig. 14ª. A pair of hydræ, just beginning to bud from the main stem. *a* the outer, and *d* the inner wall; *c* the horn-like sheath; e^2 the end of the inner wall of the stem; *e* e^3 the inner wall of the hydræ. 300 diams.

Fig. 15. A hydra just before the tentacles develop. The letters as in fig. 12; also *m* the chitinous sheath, between the hydra and the main stem; *l* the roof-like end of the calycle. 300 diameters.

Fig. 16. An egg removed from the medusa, like that in fig. 9. A the yolk, 500 diameters; B the egg,

of which *p* is the Purkinjean vesicle; *w* the Wagnerian vesicle; *y* the yolk; *v* the vitelline sac, 400 diameters; C the Purkinjean vesicle (*p*), seen isolately; *w* Wagnerian vesicle. 500 diameters.

Fig. 17. A pair of young hydræ, a little younger than fig. 6, with the same lettering. 300 diameters.

Fig. 18. The horn-like sheath of fig. 6. *a b c* the partition between the hydræ and the main stem. 150 diams.

PLATE XXXIII.

Obelia commissuralis *McCr.*

[Figs. 1 and 2, drawn by A. Sonrel; the others by H. J. Clark.]

Fig. 1. A hydrarium, full grown, and natural size.

Fig. 2. A hydromedusarium, attached to a sea-weed. Natural size.

Fig. 3. A growing branch and pedicel. α the outer, and β the inner wall of the branch; γ the processes from the outer wall; ε the rings of the horn-like sheath; a^1 the outer, and b^1 the inner walls of the young pedicel; c^2 the horn-like film over a^1; g^1 the end of the chymiferous channel. 500 diameters.

Fig. 3ª. The main stem, from which a branch is beginning to bud. α β γ as in fig. 3; δ the upper edge of the bud, overlapping the outer wall (ε) of the stem; a^1 outer, and b^1 inner wall of the bud; c^2 the old horn-like sheath, thrown off by the expanding bud; c^3 the new sheath of the bud. 500 diameters.

Fig. 4. A half-developed hydra. *a* outer, and *b* inner wall of the head; a^1 outer, and b^1 inner wall of the pedicel; c^1 cavity of the calycle; c^2 uppermost ring of the pedicel; c^3 the calycle; *g* the digestive cavity. 500 diameters.

Fig. 4ª. An end view of the polygonal cells of the outer wall (*a*) of fig. 4. 500 diameters.

Fig. 5. A sectional view of an adult hydra. *a* outer, and *b* inner wall of the head; a^1 outer and b^1 inner wall of the pedicel; a^2 outer, and b^2 inner wall of the tentacles; a^3 outer, and b^3 inner wall of the proboscis; c^1 cavity of the calycle (c^3); c^2 rings of the pedicel; *g* the digestive cavity; g^1 cavity of the proboscis (*pr*); *t* tentacles. 200 diameters.

Fig. 5ª. Looking into the mouth (*m*) of the proboscis of fig. 5.

Fig. 5ᵇ. A tentacle of fig. 5. a^2 and b^2 as before; *l* lasso-cells; *a* an infusorium, encircled by lasso-threads. 500 diameters.

Fig. 6. A portion of the branch of a hydromedusarium. β the branch; γ the top of β; δ the branchlet; ε rings of the horn-like sheath; ζ rings of the pedicel of B; B the hydromedusa; C C^1 hydræ; C^2 the rings of the pedicel of C. 60 diameters.

Fig. 7. A hydra, with budding tentacles. Letters as in fig. 5; also *c* the point of attachment to the semi-partition. 60 diameters.

Fig. 7ª. The end of a tentacle of fig. 7. 500 diams.

Fig. 8. A young hydra, just upon the point of emerging from the calycle. *c* the attachment to the semi-partition; c^6 the sides, and c^7 the angles of the polyhedral aperture of the calycle; *d* the opercle; d^1 the inflected edge of *d*; *t* tentacles. 125 diams.

Fig. 9. A hydra a little older than fig. 7. 125 diams.

Fig. 10. A hydra similar to fig. 8. *d* the opercle depressed. 125 diameters.

Fig. 11. A branch of a hydromedusarium. A B the reproductive hydræ; C the hydræ. 11 diameters.

Fig. 12. The calycle of a hydra in profile. *c* the semi-partition; c^1 the cavity of the calycle (*c*); c^2 the pedicel; c^6 the sides, and c^7 the corners of the polyhedral aperture. 300 diameters.

Fig. 12ª. The same as fig. 12, looking into it; *c* c^1 c^6 c^7 as before.

Fig. 13. A portion of the pedicel of a hydra, beset with lasso-cells (a^1); c^2 the concentric layers of the horn-like pedicellar sheath. 500 diameters.

Fig. 14. A portion of the main stem in a state of decomposition. a^1 inner, and b^1 outer wall; c^2 the lamellated, horn-like sheath. 500 diameters.

PLATE XXXIV.

Figs. 1–9ª, Eucope diaphana *Ag.*; Figs. 10-21, Obelia commissuralis *McCr.*

[Figs. 4 and 9, drawn by A. Sonrel; the others by H. J. Clark.]

Fig. 1. A portion of the stem of a hydrarium. *a* a^1 a^2 a profile of the concentric laminæ; *b* the inner face exposed; *c* loosened filaments or shreds. 400 diameters.

Fig. 2. The calycle and its pedicel, obliquely in profile. *a* a^1 the thick wall of the calycle; *e* e^1 the thickness of the stem; *f* the basal attachment of the joint above; *g–h* one joint of the stem; *k* the semi-partition. 100 diameters.

Fig. 3. A hydra with partially contracted tentacles (*b* b^1). *a* the calycle; *d* the proboscis. 125 diameters.

Fig. 4. A birds-eye view of a hydra; *b d* as in fig. 3.

Fig. 5. A calycle, pedicel, and a joint of the stem, in sectional profile. a a^1 the thickness of the calycle walls (a is one third too thick); e e^1 the thickness of the sheath; f–g upper and lower ends of the joint of the stem; h the base of the pedicel; k the semi-partition; m the deflected edge of k. The arrows are explained in figs. 5[a] and 6. 100 diameters.

Fig. 5[a]. An end view of fig. 5, seen as if along the arrow 2, a little oblique to the axis. a the edge; c corresponds to a in fig. 5; b the tentacles; d the outskirts of the proboscis.

Fig. 6. A view of a terminal hydra, its pedicel and the last joint of the stem, seen as if along the arrow 3 of fig. 5. a the calycle; b cavity of a; d the proboscis; e the horn-like sheath of the stem; g the base of the joint; h the next joint below g; i outer wall of the stem; k semi-partition.

Fig. 7. The base of a calycle. k l m n various parts of the semi-partition. 500 diameters.

Fig. 8. A stem viewed so that the hydræ (A–F) project toward, and directly from, the eye. 40 diameters.

Fig. 9. A hydrarium creeping over a sea-weed. Natural size.

Fig. 9[a]. A view of one quarter of the medusa. a the eyes; β the base of the tentacles; γ the lateral swellings of the tentacles; f the circular canal; f^1 the genital organ; h^4 the base of the proboscis (p); t tentacles; v the veil. 200 diameters.

Fig. 10. The terminal half of an immature hydromedusa. β outer, and γ inner wall of the axis; A A^1 the medusæ; c the chymiferous channel; d the undeveloped end of the axis; k the calycle; k^1 the opercle; k^3 the edge of k^1; m mouth of A; t tentacles of A. 400 diameters.

Fig. 11. A mature hydromedusa. β outer, and γ inner wall of the axis; β' β''' processes from β; β'' outer, and γ' inner wall of the young medusa (G); A–G the medusæ; a the axis; d^1 the chymiferous channel; k the calycle; k^1 the aperture of the calycle; k^2 the depressed base of the neck; k^3 the edge of the depression (k^2); p the proboscis of the medusa; t the tentacles of the medusa. 400 diameters.

Fig. 12. A quarter of a medusa, at the time of birth. a the eyes; β base of the tentacles; γ lateral swellings of t; a outer, and b middle wall of the disk; a^1 outer, and b^1 inner wall of the tentacles; f circular tube; f^1 radiating tube; g^2 wall of f^1; h^4 mouth of the proboscis (p); t t^1 the tentacles; v the veil. 400 diameters.

Fig. 13. A young medusa-bud in profile; h the radiating tubes, or inner wall; h^1 the disk. 300 diameters.

Fig. 13[a]. An end view of fig. 13. h as before.

Fig. 14, 14[a]. Cells from the outer wall of p, fig. 12. 500 diameters.

Fig. 15. Cells from the lower surface of fig. 12. 500 diameters.

Fig. 16. Two medusæ (A B) from fig. 11. h h^1 as in fig. 13; h^2 outer, and h^3 inner wall of the pedicel. 400 diameters.

Fig. 17. A medusa from fig. 11, in profile; h h^1 h^2 h^3 as in fig. 16; h^4 chymiferous cavity. 300 diameters.

Fig. 18. A medusa just escaped from the calycle; seen from above. Letters as in fig. 12. 300 diameters.

Fig. 18[a]. A tentacle of fig 18, a in profile, to show the prominence of the eye (a).

Fig. 19. The natural size of fig. 18.

Fig. 20. A tentacle from fig. 18, seen from above. a outer wall of the disk; b^1 axial or inner wall of the tentacle; f circular tube; f^1 radiating tube; g g^1 innermost wall of the disk; l lasso-cells; β centripetal projection of the axial wall of the tentacle; γ lateral swelling of the base of the tentacle. 500 diams.

Fig. 21. An oculiferous tentacle, from fig. 18, seen from below. a b^1 g^1 f γ as in fig. 20; a the eye; a' the lenticular body of a; v the veil.

Fig. 21[a]. The lateral swelling, γ, fig. 21, seen isolately.

PLATE XXXV.

Physalia arethusa *Til.*

[Drawn from nature by A. Agassiz and A. Sonrel.]

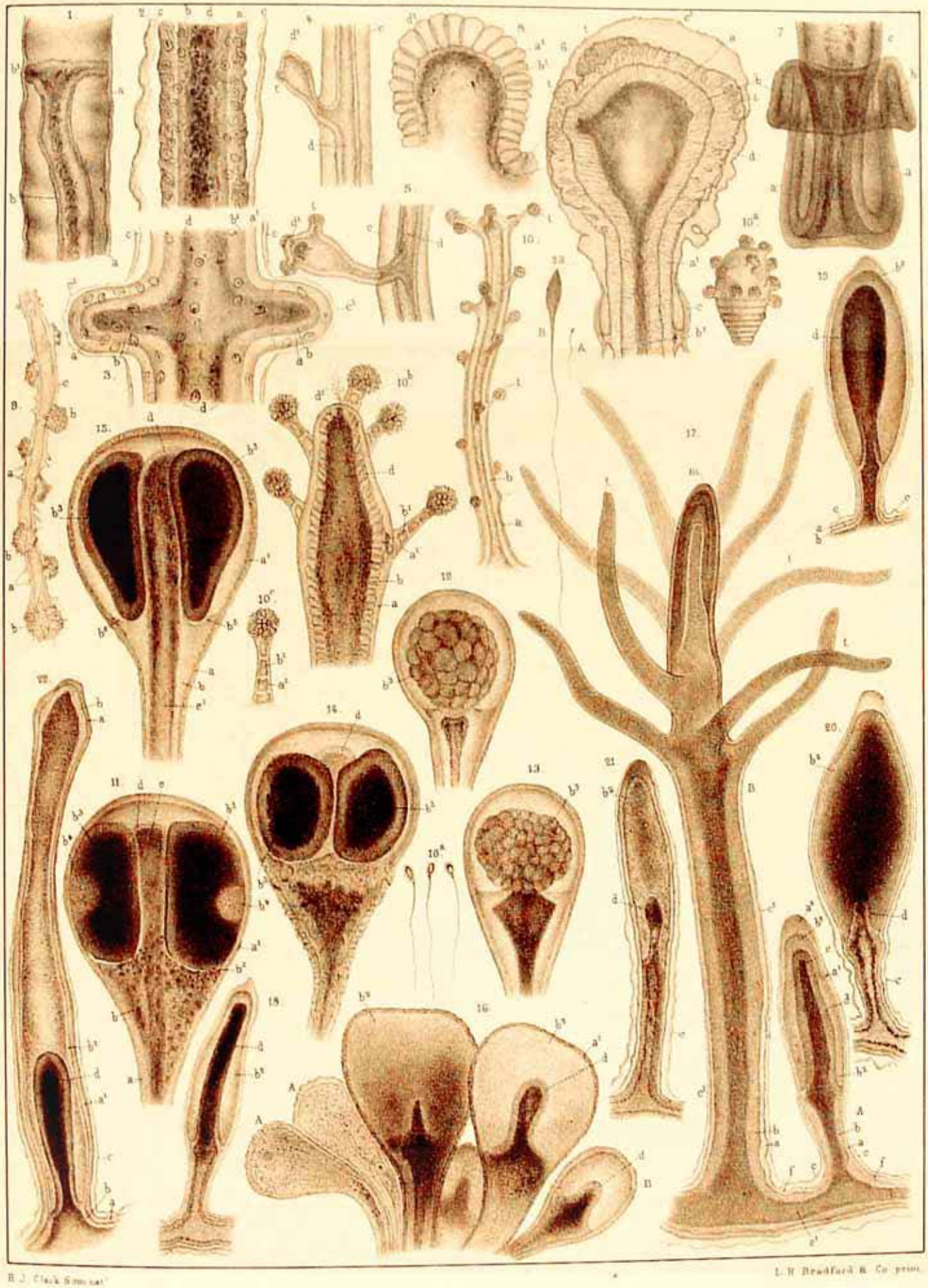
Fig. 1. Specimen floating quietly upon the surface of the water, with tentacles drooping loosely, seen from the windward side.

Fig. 2. The same specimen from the opposite side.

Fig. 3. Transverse section of the floating hydra, to show the relations of the secondary hydræ and clusters of hydræ and medusæ.

Obliged, on account of my eyes, to depend, in a great measure, upon others for the revision of my proofs, I request the reader to excuse the mistakes that may have been allowed to pass unnoticed in this volume.

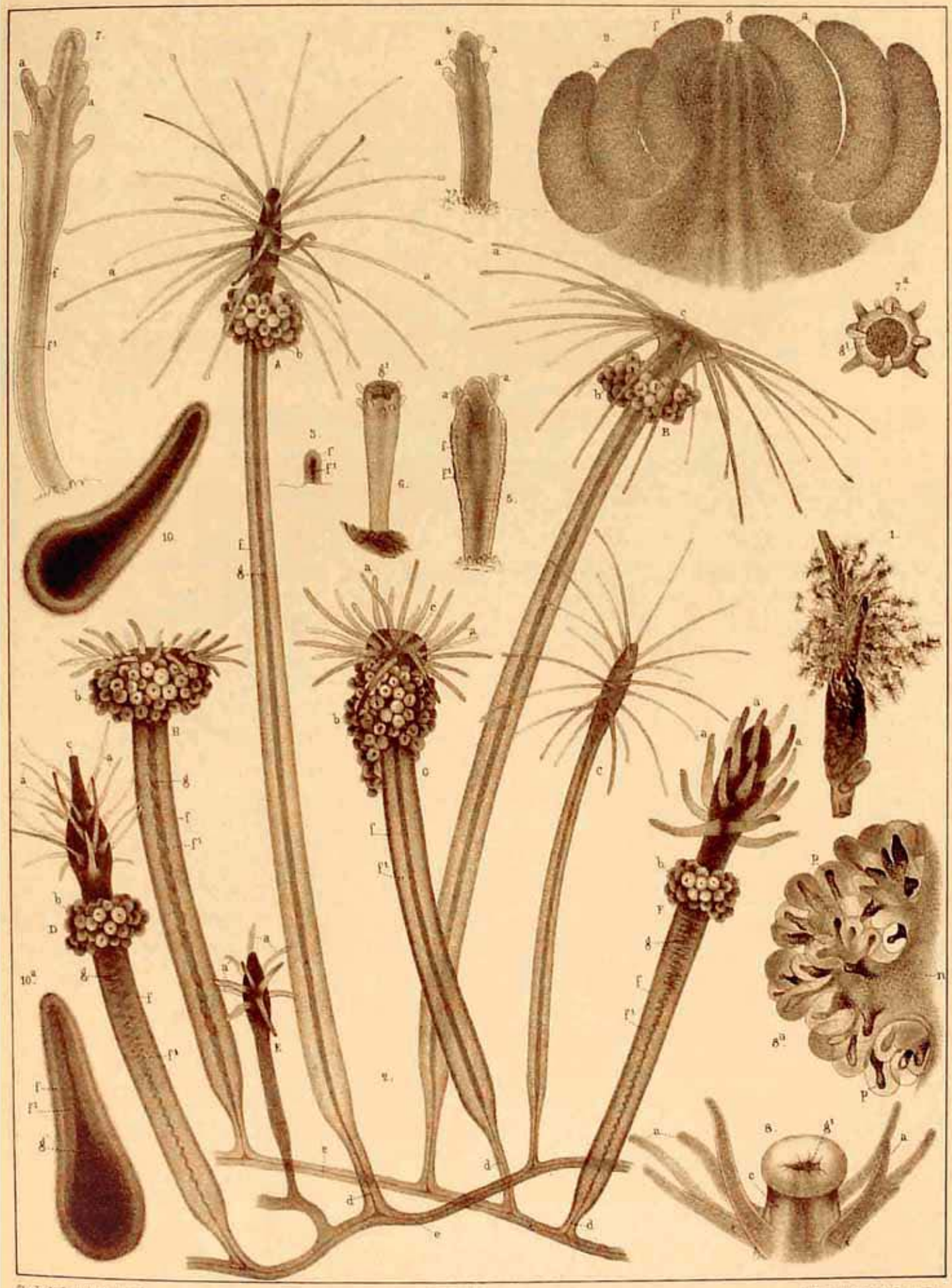
Cambridge, May 1, 1862.



B. J. Clark Sculpt.

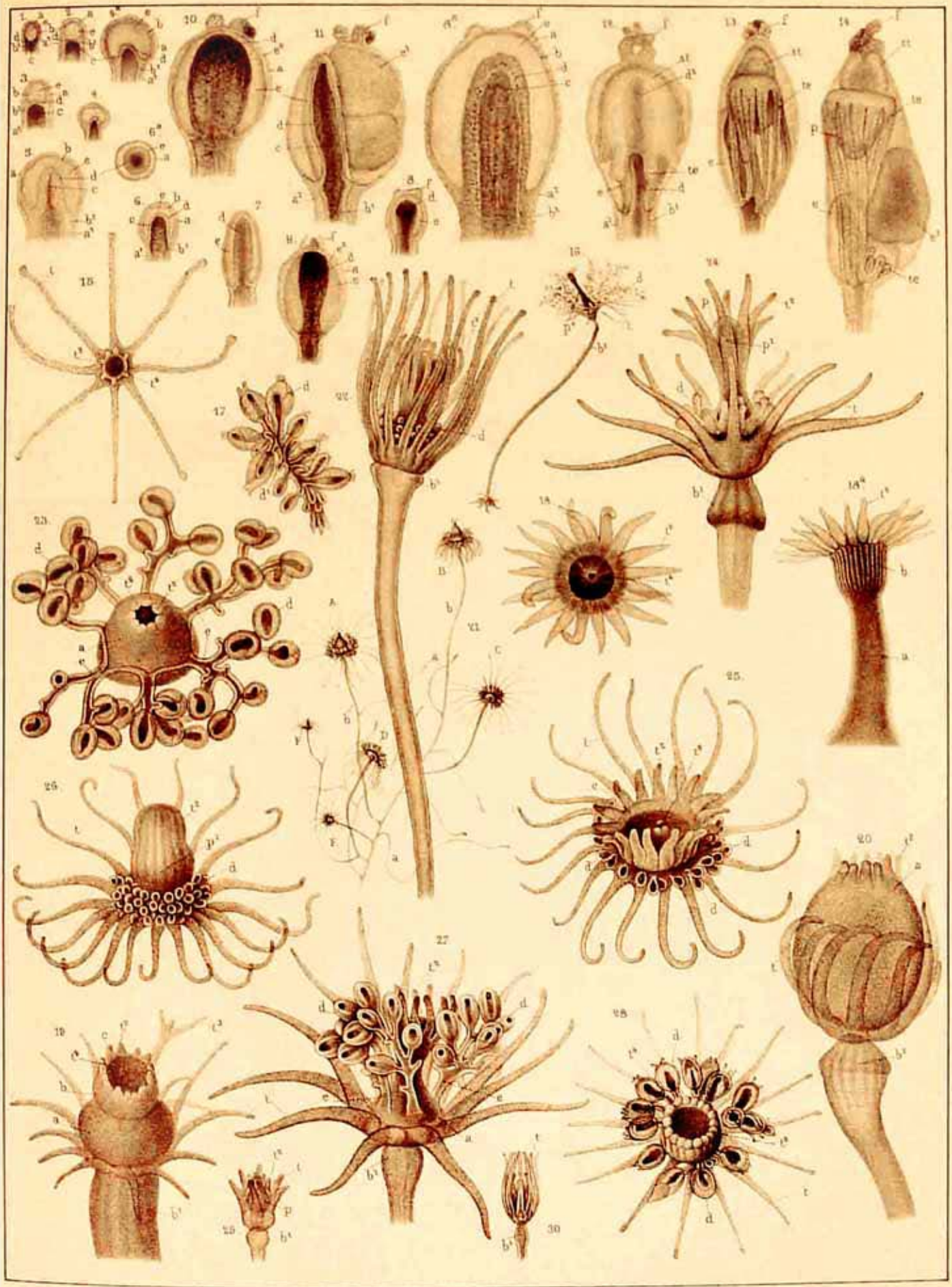
L. H. Bradford & Co. print.

1-9. CORYNE MIRABILIS Ag. — 10-10c HALOCHARIS SPIRALIS Ag. — 11-16c CLAVA LEPTOSTYLA Ag.
17-23. RHIZOGETON FUSIFORMIS Ag.



Clark & Sinnel from nat.r E. Burrill on stone L.H. Bradford & Co. print.

CLAVA LEPTOSTYLA Ag.



Clark & Sentzel from nat. Norrill on stone. T. H. Bradford & Co. print.

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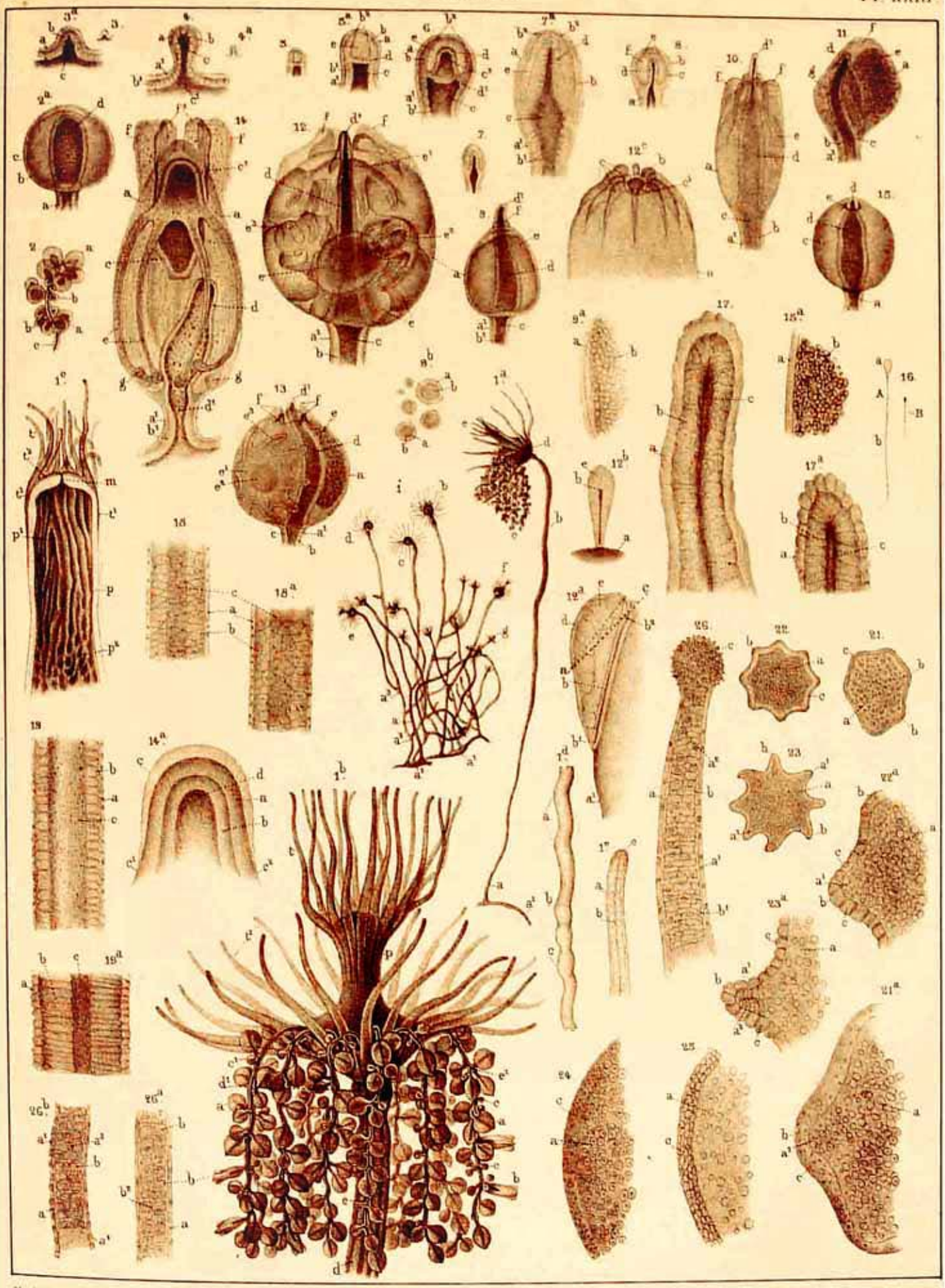
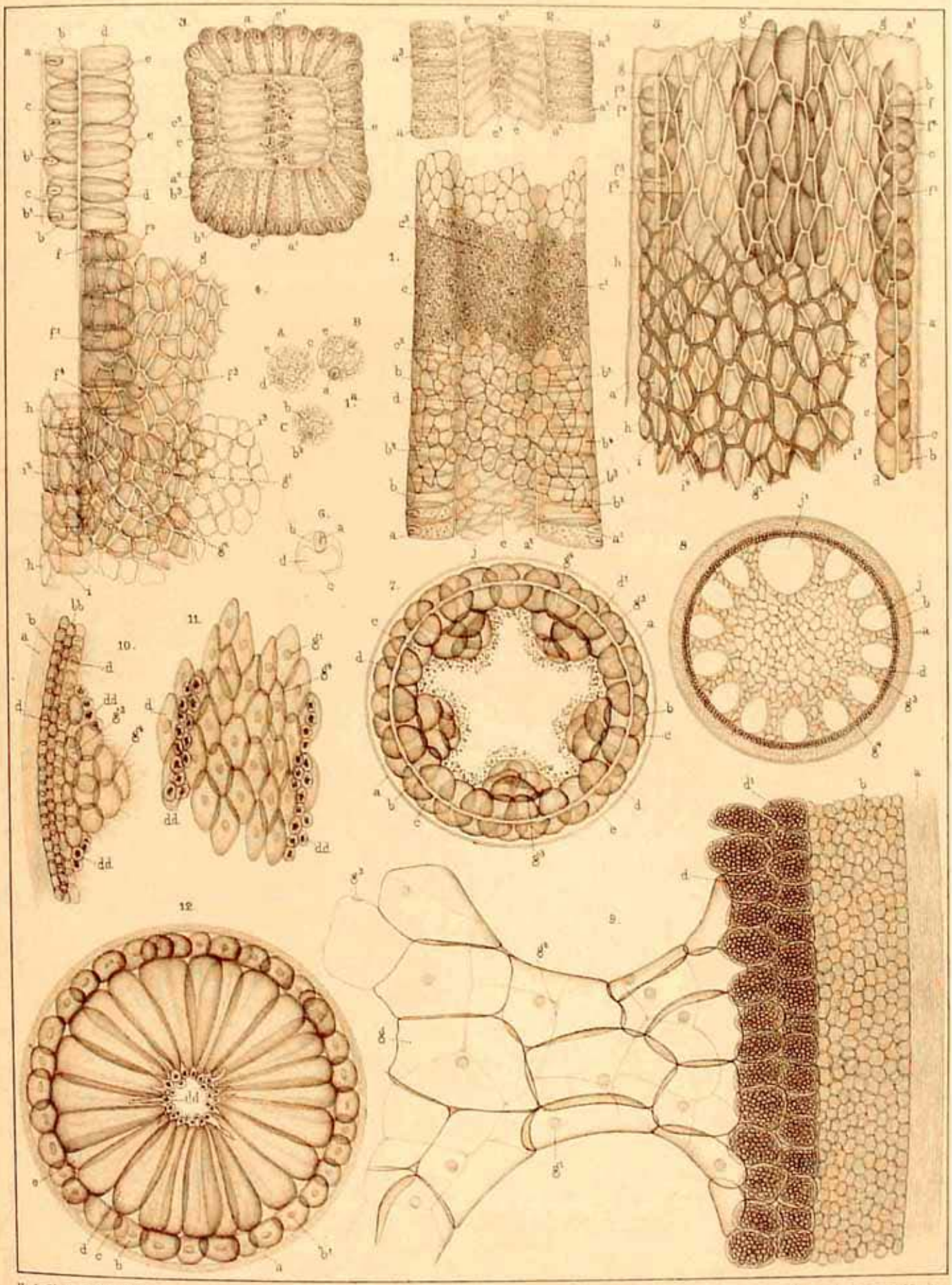


Clark & Conrad Hist. Nat. Co.

Borrell on stone

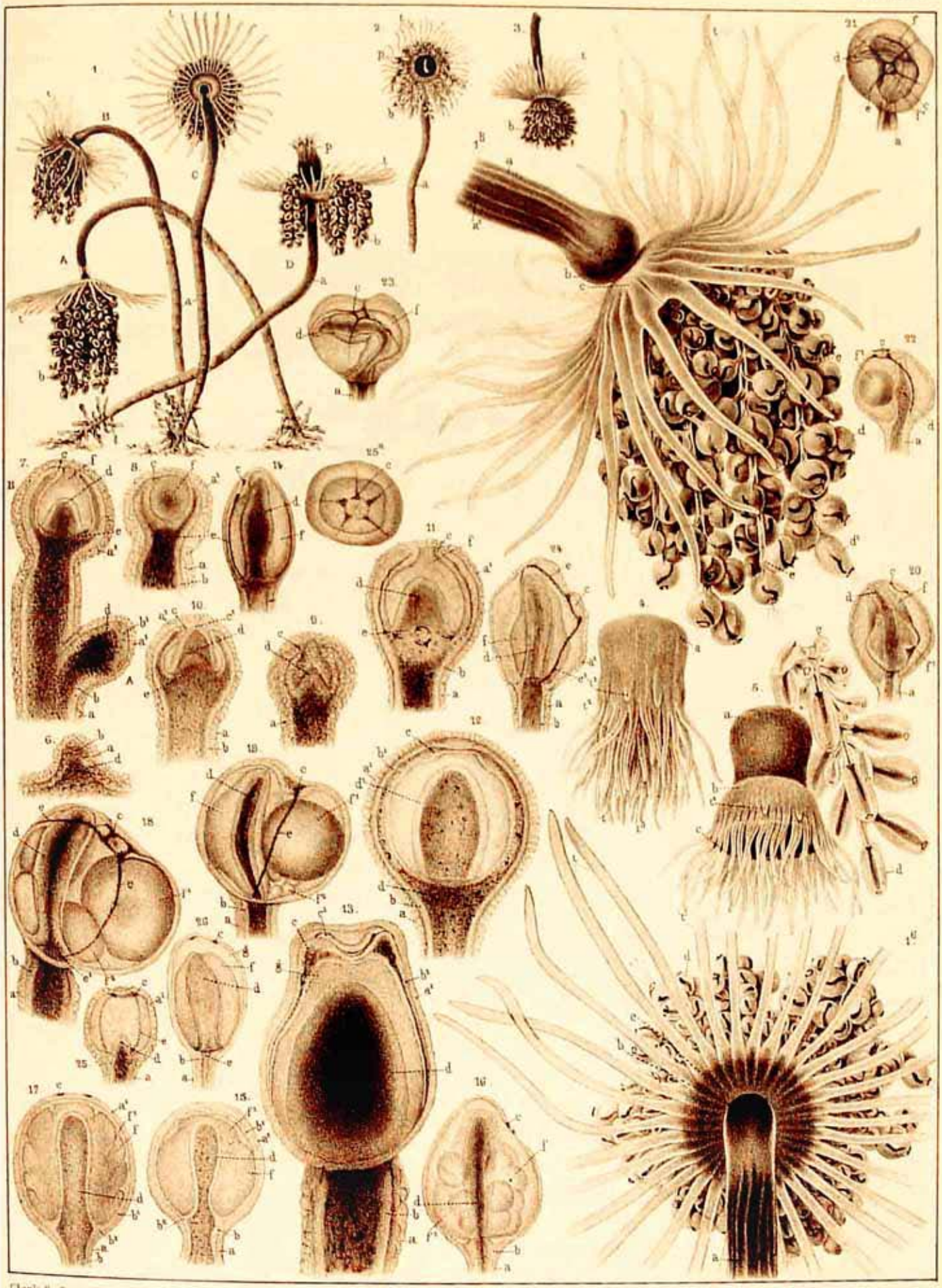
L.H. Bradford & Co. print

PARYPHA CROCEA Ag.



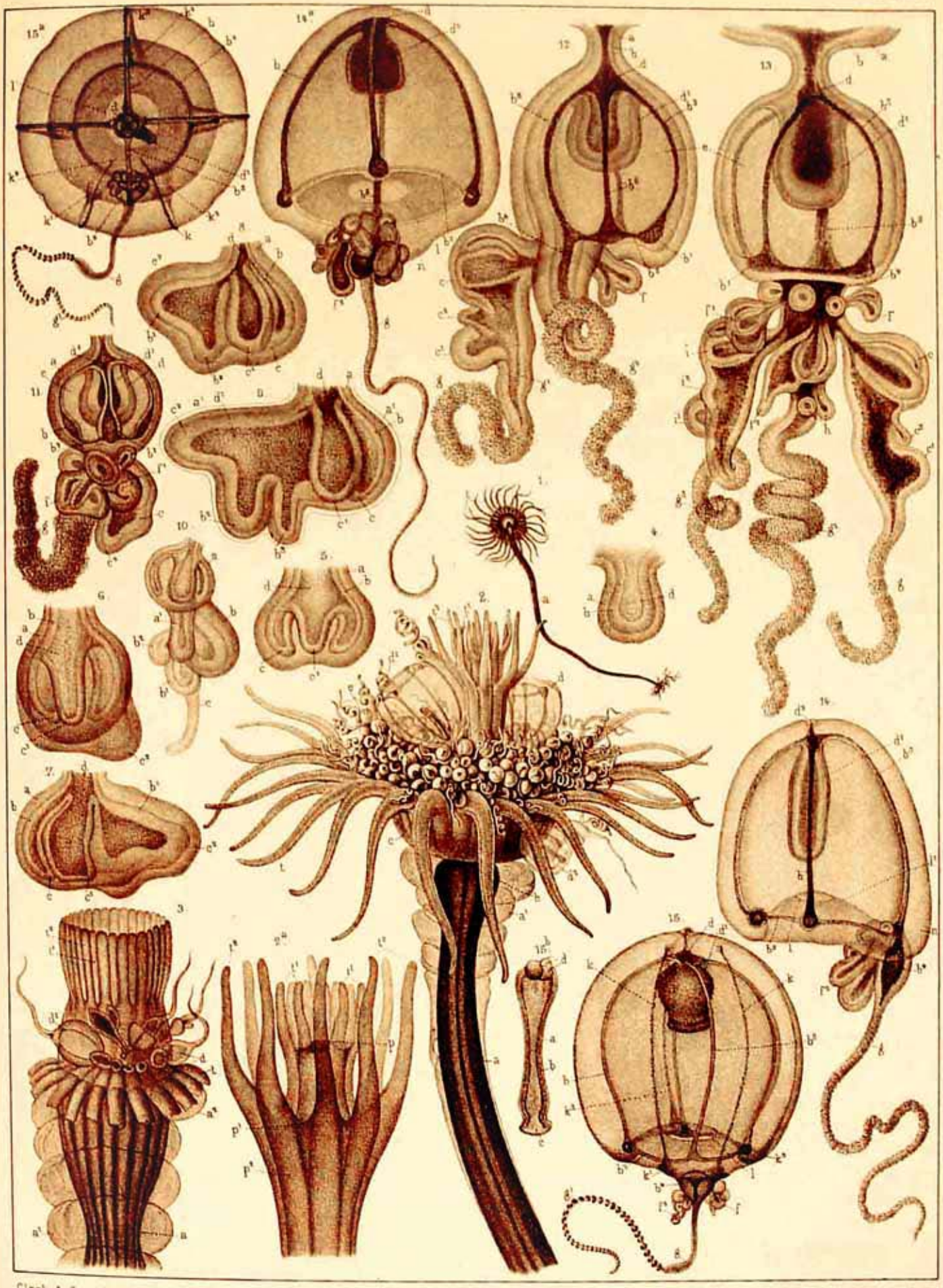
B. J. Clark from nat.r Printed at J. H. Bufford's

1-7 PARYPHA CROCEA Ag.r — 8,9. TUBULARIA COUTHOUYI Ag.r — 10,11 HYBOCODON PROLIFER Ag.r
12 CORYNE MIRABILIS Ag.r



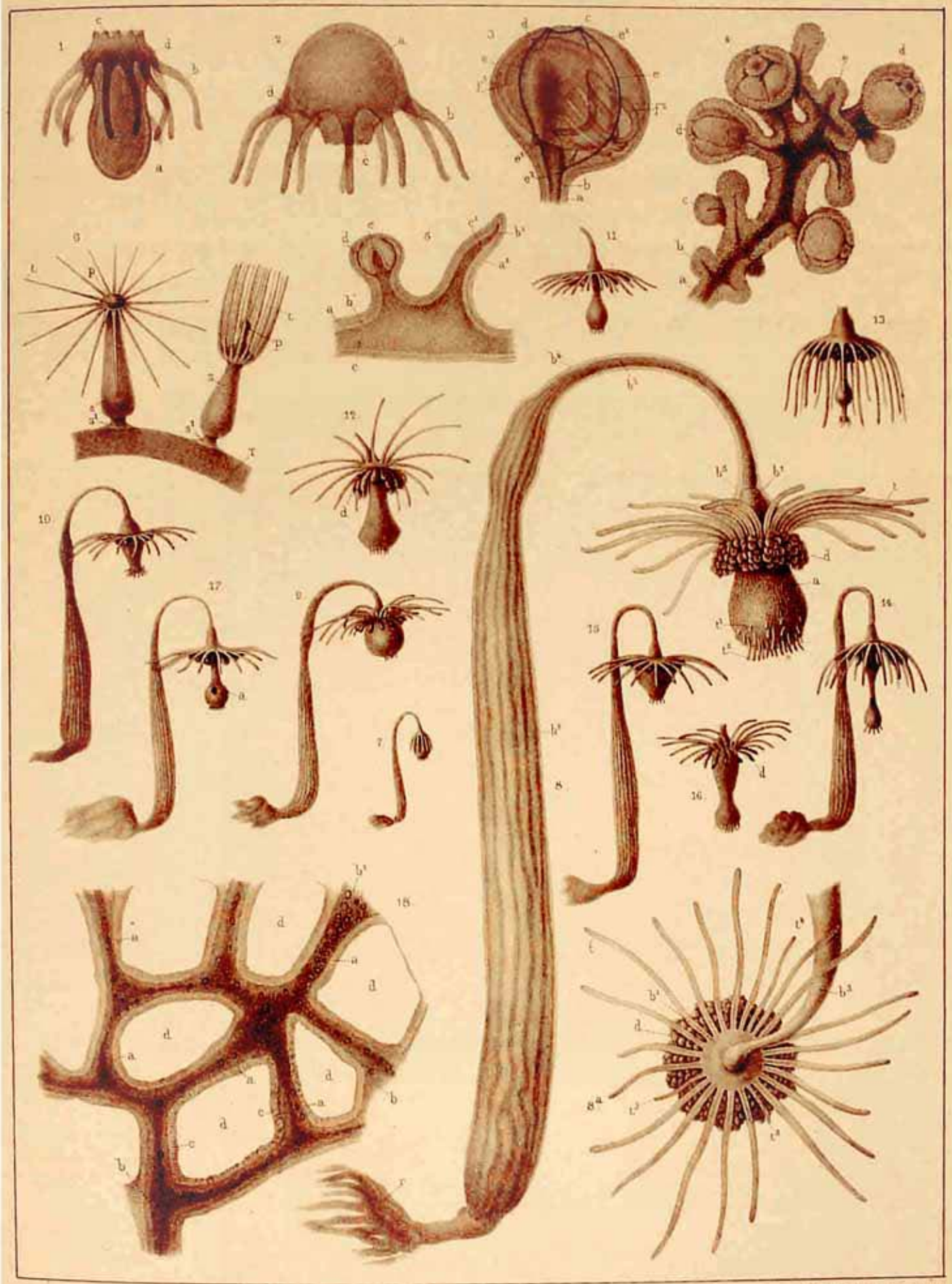
Clark & Sonrel from nat. F. Burrill on stone L.H. Bradford & Co. print.

TUBULARIA COUTHOUYI Ag.



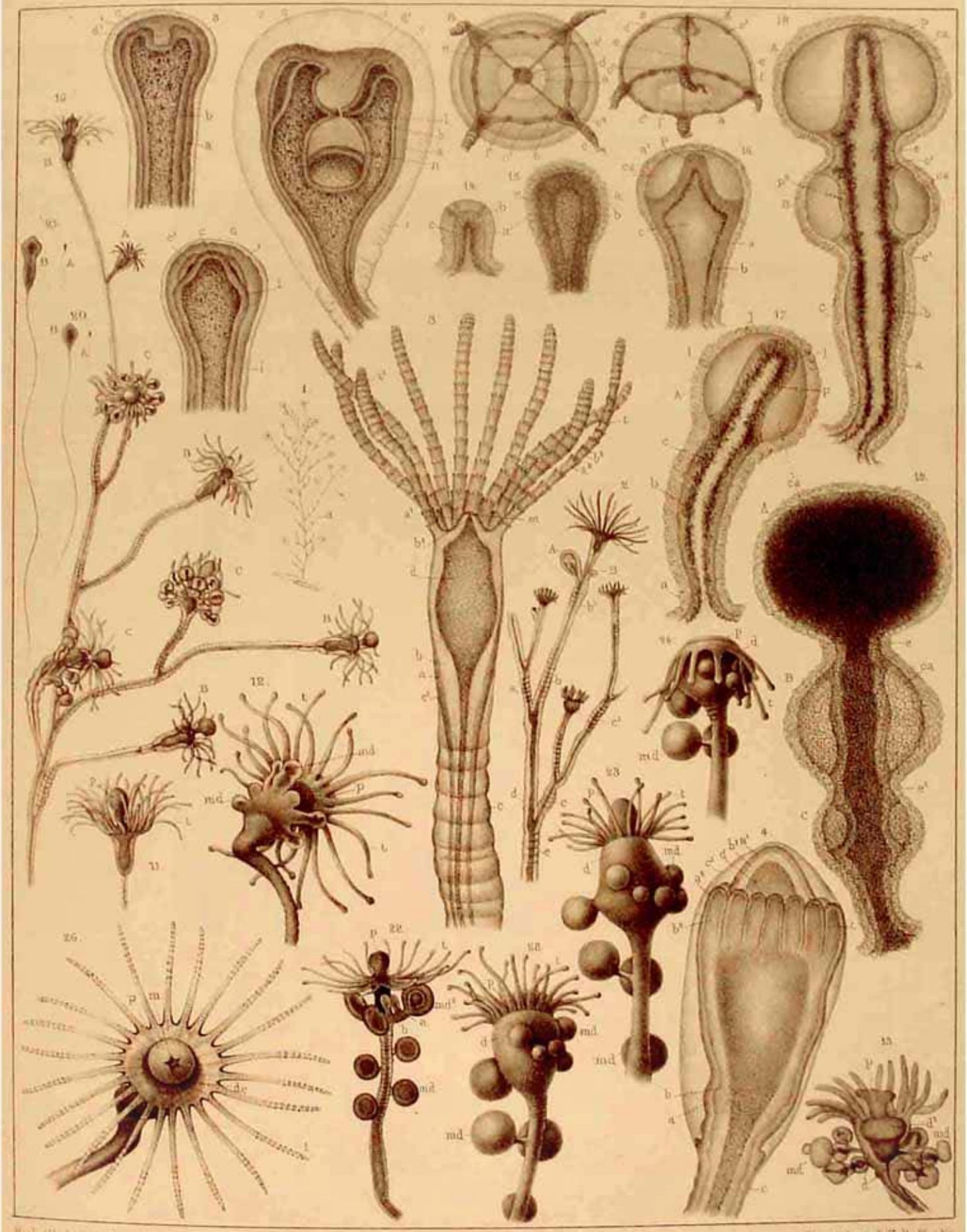
Clark & Sonrel from nat. E. Burrill on stone. L.H. Bradford & Co. print.

HYBOCODON PROLIFER A.Ag.



Tappan & Clark from nat. Burrill on stone L.H. Bradford & Co. print.

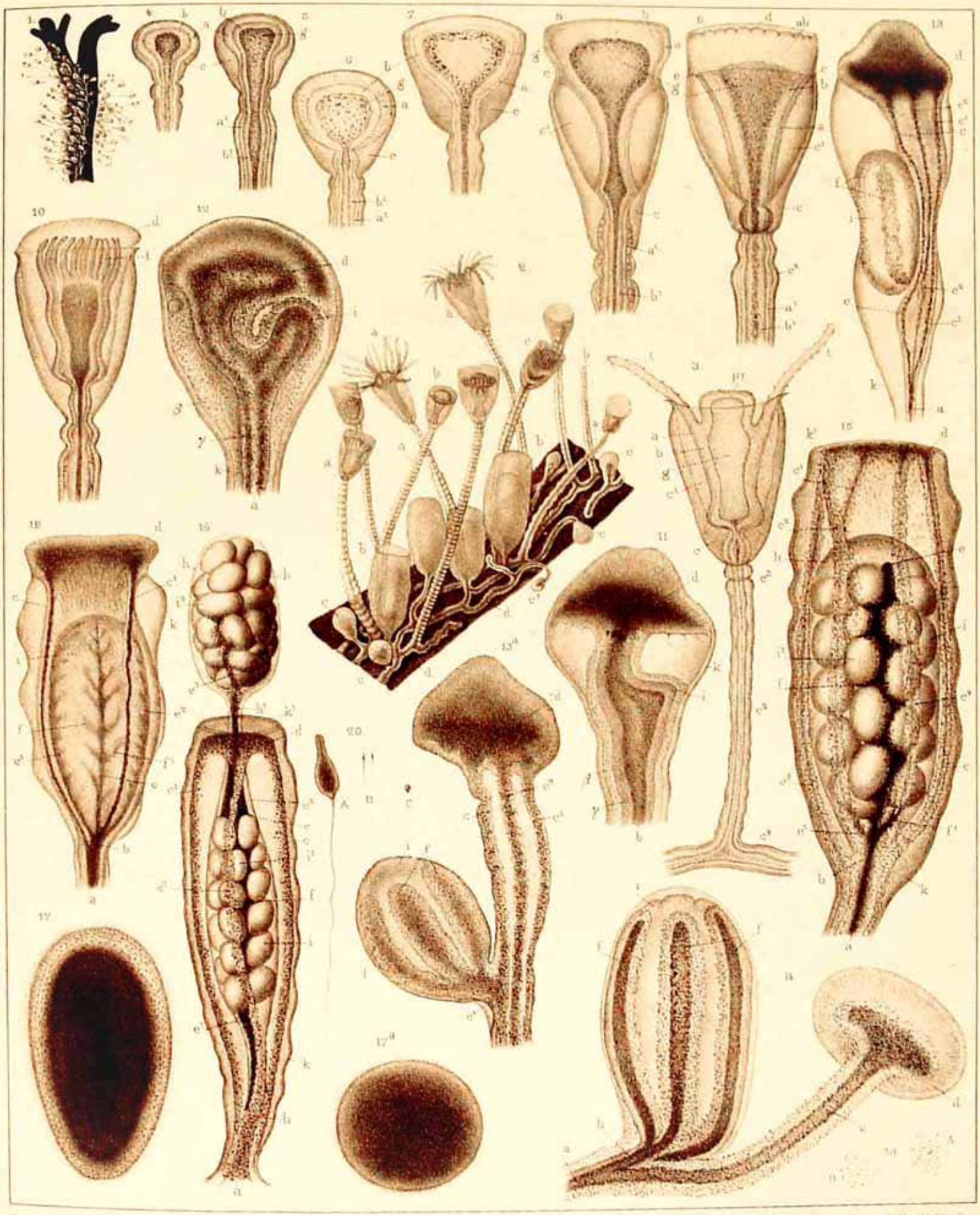
1-6. TUBULARIA COUTHOUYI Ag. — 7-17. CORYMORPHA PENDULA Ag. — 18. HYDRACTINIA POLYCLINA Ag.



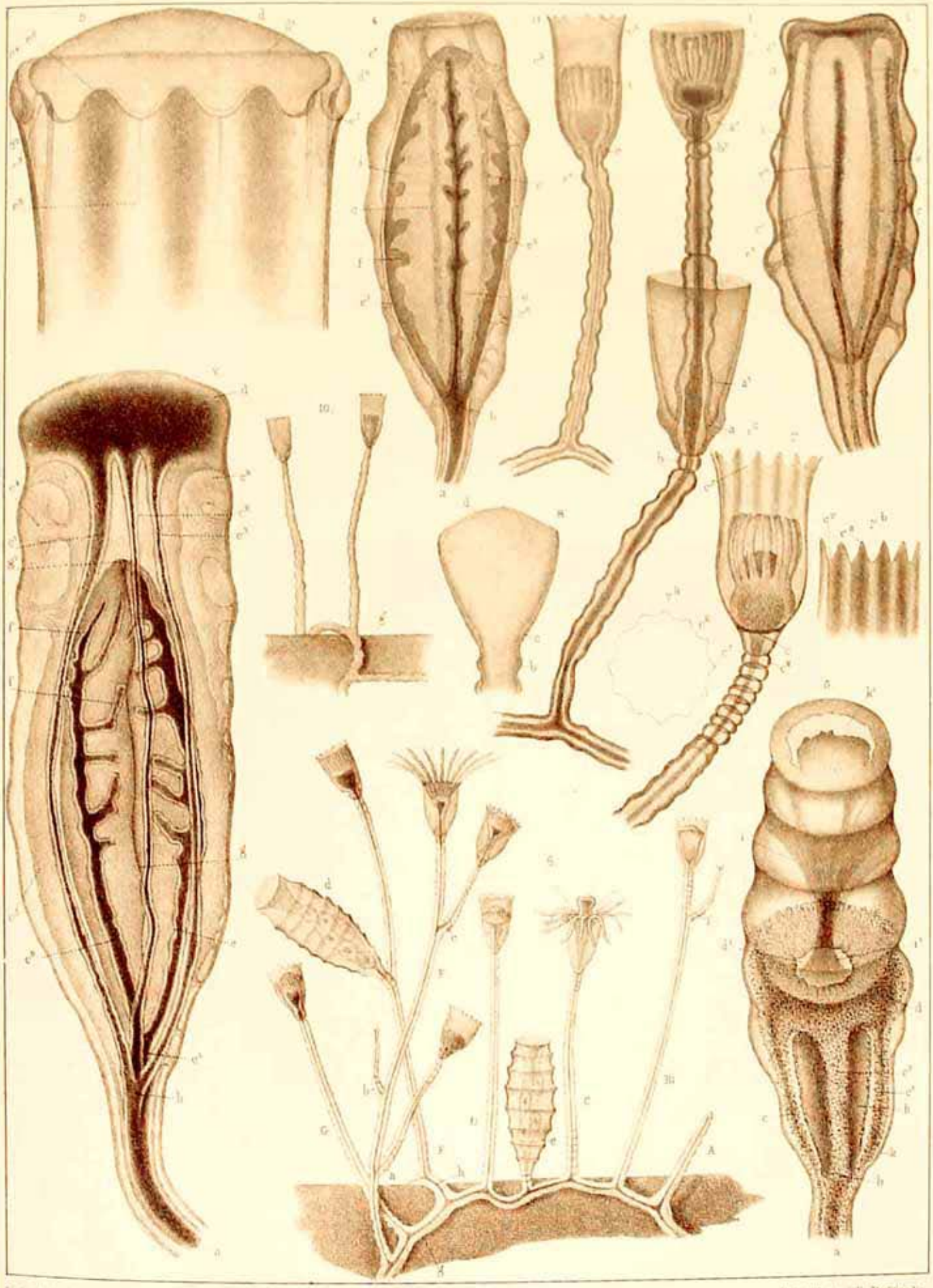
W. J. Clark & A. Sowerby from nat.

Printed at J. H. Bufford's.

1-7 BOUGAINVILLIA SUPERCILIARIS Ag. — 8 & 9. CLYTHIA CYLINDRICA Ag.
10-21. EUDENDRION DISPAR Ag.

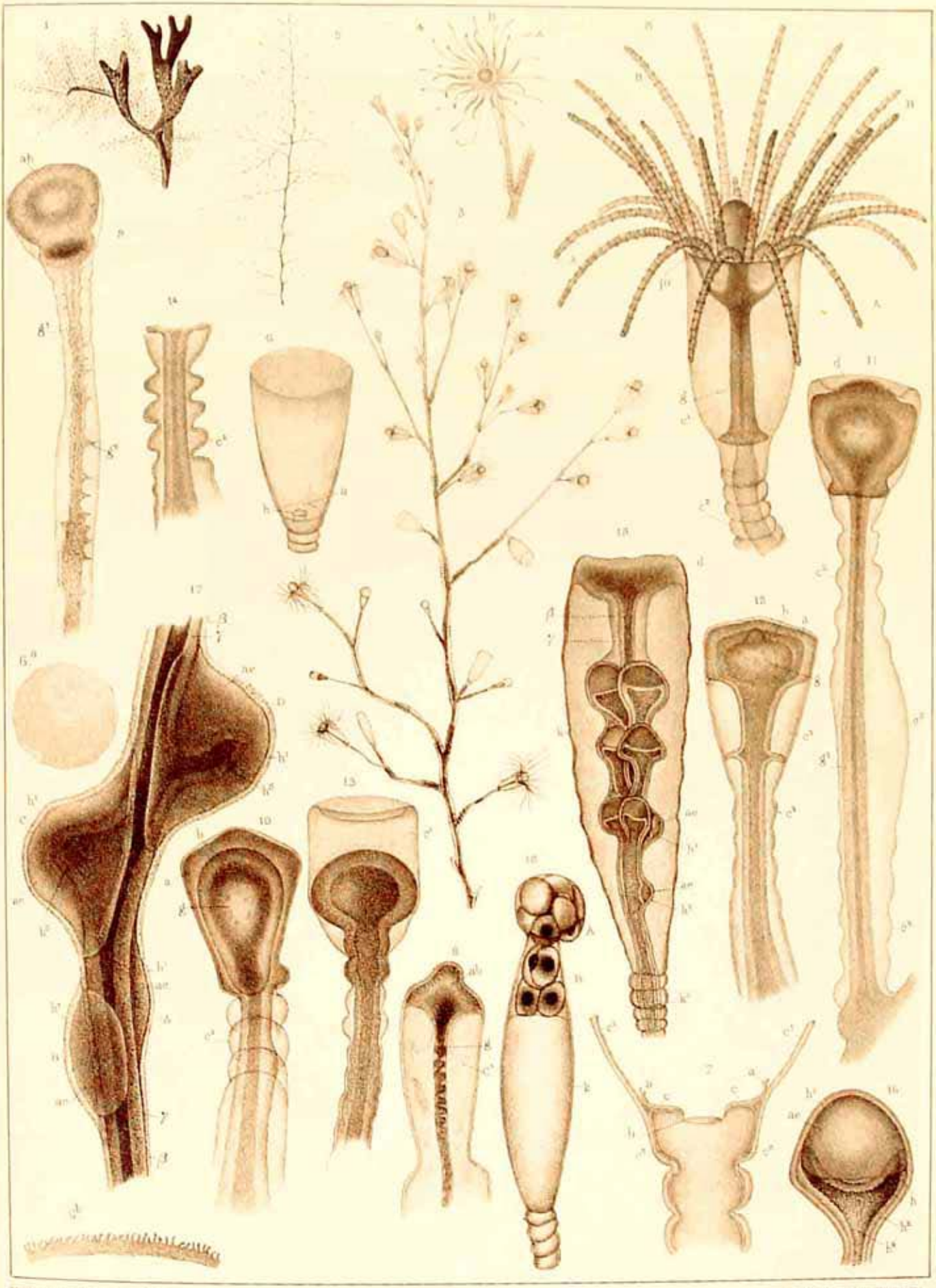


Clythia poterium A8'



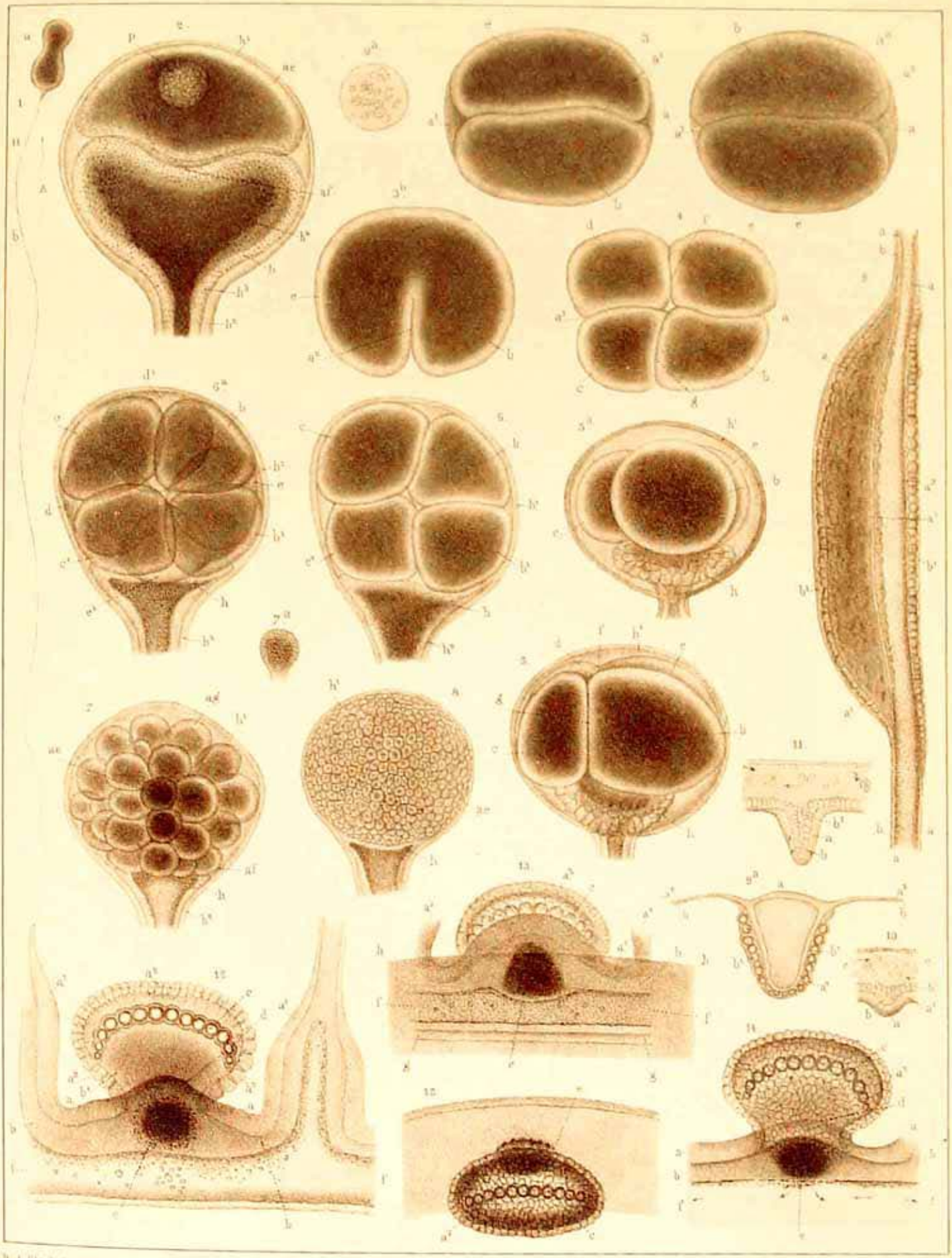
W. J. Clark, from nature. Printed at J. B. Bedford's

1-5, CLYTHIA POTERIUM Ag' — 6-9, C. BICOPHORA Ag' — 10 & 11, C. INTERMEDIA Ag'

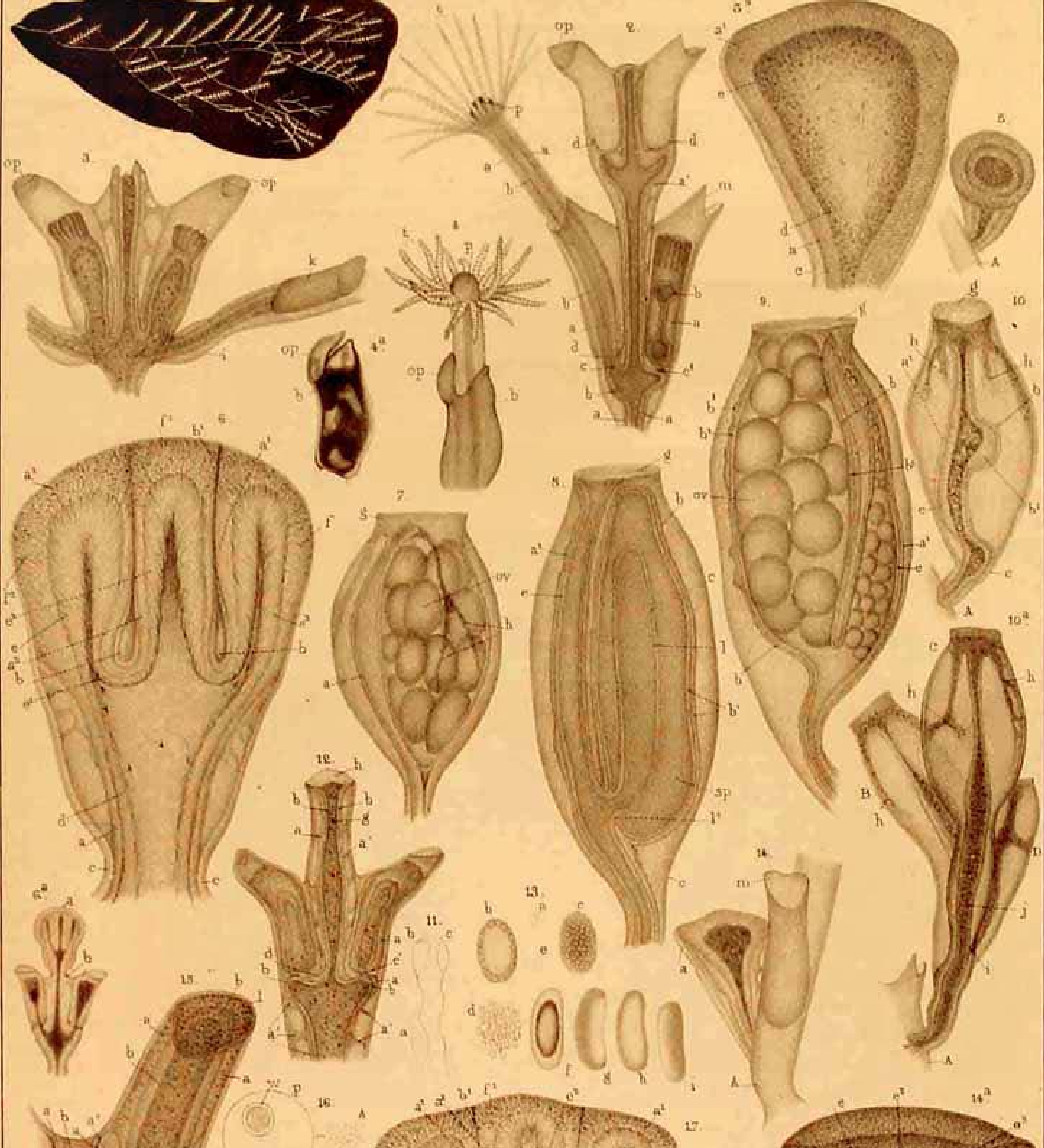


W. J. Clark & A. Sowerby (from nat.) Printed at J. B. Bedford's

LAOMEDEA AMPHORA Ag.



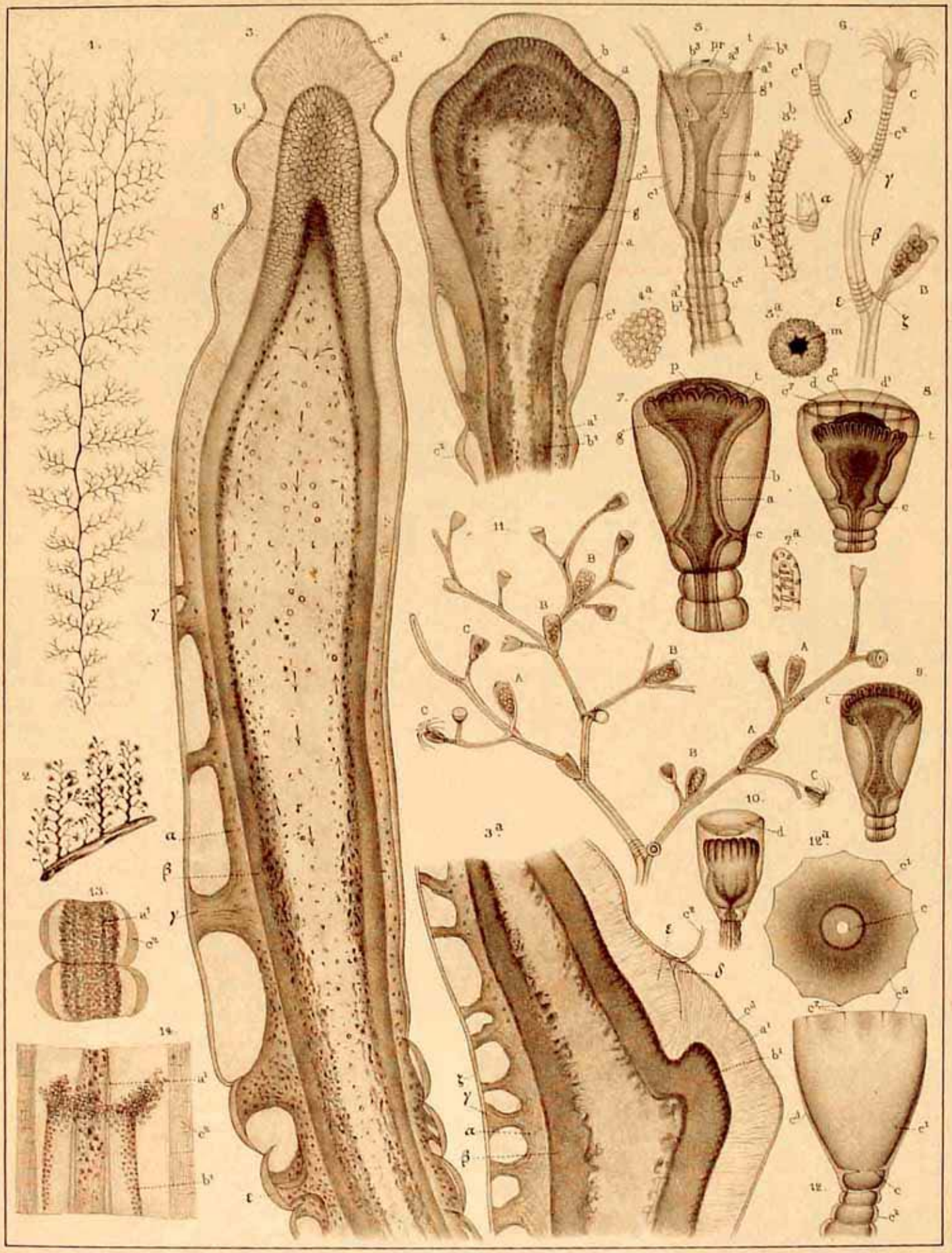
1-8, LAOMEDEA AMPHORA Ag. — 9-15, TIAROPSIS DIADEMATA Ag.



H. J. Clark & A. Sonrel from nat.

Printed at J. H. Bufford's.

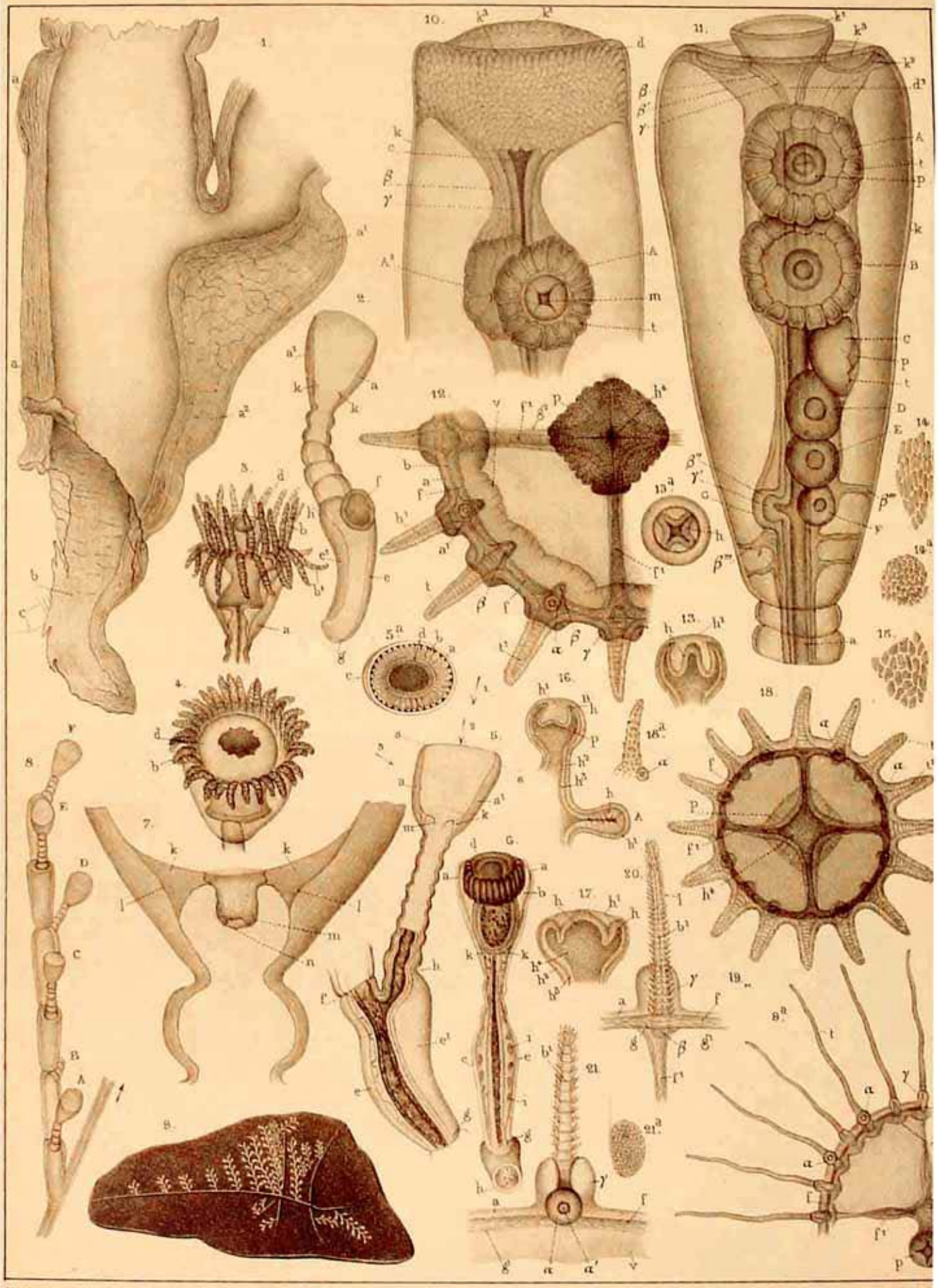
DYNAMENA PUMILA Lamx.



Clark & Sorrel from nat.

Printed at J. H. Bufford's.

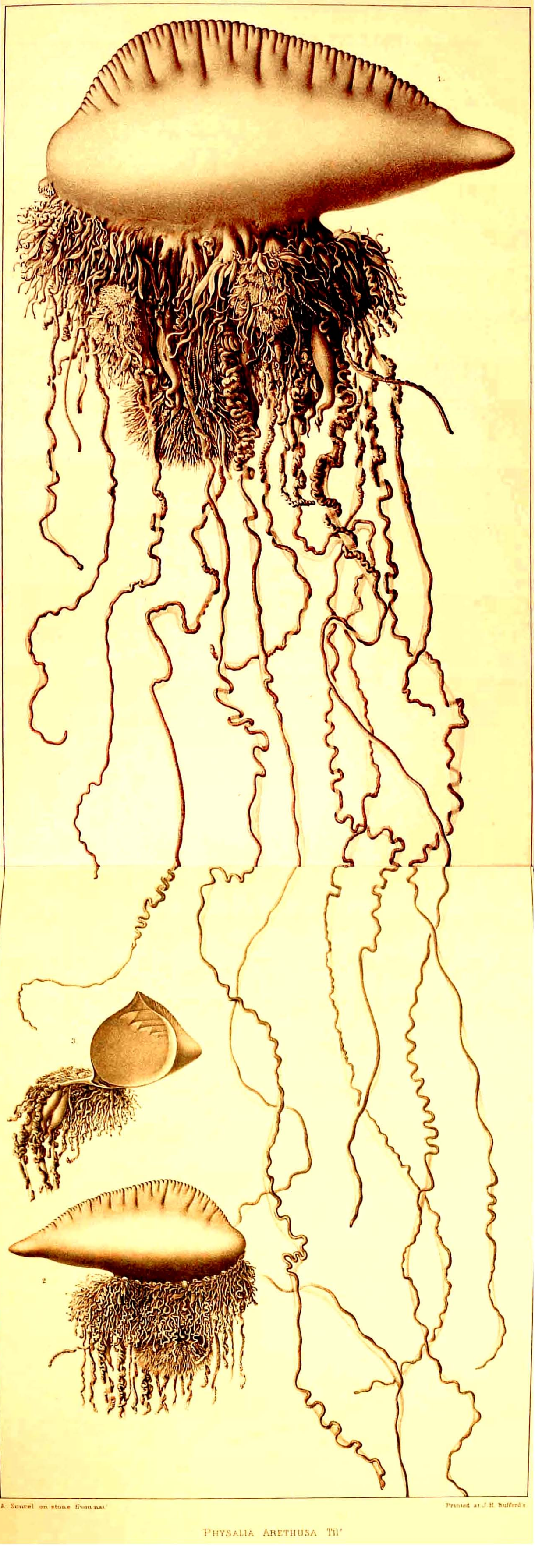
OBELIA COMMISSURALIS McCr.



Clark & Sorrel from nat.

Printed at J.H. Bufford

1-9a EUCOPE DIAPHANA Ag. — 10-21 OBELIA COMMISSURALIS McCr.



A. Sourel on stone from nat.

Printed at J. H. Bulford's

PHYSALIA ARETHUSA Till.