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Contribution and Limitation  
of Genera among the Hydrozoa.

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CONSTRUCTION AND LIMITATION OF GENERA  
AMONG THE  
HYDROIDA.

BY  
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It will assuredly seem strange that those principles of classification which have been acknowledged as the only sound ones, and which have been our guide in the study of every other group of the animal kingdom, should be almost entirely ignored in our attempts at a systematic arrangement of the HYDROIDA.

The cause of this, however, is sufficiently obvious. The individual Hydroid frequently presents itself in disconnected parts, which are very different from one another; and it is only recently that the researches of zoologists have shown the mutual relation of these parts, and have demonstrated that organisms now enjoying an independent life may have been at one time united in a single individual, and are at all times necessary for an adequate conception of it. So long, however, had the practice prevailed of regarding these component elements of the zoological individual as if they were entirely independent of one another, that even still we find it more convenient to treat them as such, to assign to them separate places in our systems, and record them under distinct generic and specific names.

Yet this is totally at variance with the first principles of natural classification and of a scientific nomenclature; and the sooner we get rid of it the better for the harmony of biological method, and the progress of that department of zoology in which it has prevailed.

For many years it has been known that a considerable number of the fixed Hydroids give origin to buds which detach themselves from the fixed stock, and henceforward lead an independent life in the open sea as free gymnophthalmic Medusæ. The first who entertained, or at least gave definite expression to, the true relation between these two sets of elements in the Hydroid seems to have been Dujardin, when he compared the

polypoid portion to the vegetative mycelium of a mushroom, and the medusoid portion to the reproductive hymenium, with its protecting parts\*. The polypoid and medusoid elements, however, still continued to be treated as primarily independent organisms, receiving each separate generic and specific names; and indeed the time had not yet come when any other plan was practicable; for the number of free Medusa-forms which had been traced to fixed polypoid forms was far too small to render possible any more philosophic system.

Observations, however, gradually accumulated, and at length we became aware of a sufficient number of cases in which the connexion between the polypoid and medusoid elements was apparent to justify an attempt at combining the two in our classification.

Accordingly we find, in an excellent and conscientious paper by M'Crary†, an attempt made to combine the two elements in his arrangement of the so-called Gymnophthalmic Medusæ. M'Crary, however, gives a disproportionate prominence to the medusoid element, and in his nomenclature shows a tendency to adopt a more recent name by which the Medusa may have been known, rather than the older one under which the polypoid element has become familiar to us.

Agassiz, in the fourth volume of his 'Contributions to the Natural History of the United States,' also shows himself impressed with the necessity of combining both elements, in order to allow of our forming an adequate conception of the Hydroid, while he gives no undue prominence to one of these elements over the other, and sees the justice of adopting for the entire Hydroid the name by which it was first systematically described, whether under the form of the free Medusa or of the fixed Polypite-colony. He has thus been frequently compelled to a dismemberment and a redistribution of existing generic groups, as well as to the construction of several new ones. Agassiz has here largely extended our knowledge of the HYDROIDA, and has made an important advance to a philosophic classification of the group; but I cannot admit that he has always made a correct estimate of the value of the characters which he employs in the construction of his genera, while he more than once overlooks the just claims of existing names to adoption.

The necessity of combining the two elements in our conception, description, and classification of the Hydroida is also maintained in a series of excellent papers published in the 'Natural

\* Dujardin in Ann. des Sc. Nat. 1845.

† M'Crary, "Gymnophthalmata of Charleston Harbour," in the Proceedings of the Elliott Society of Natural History of Charleston, South Carolina, 1859.

History Review' (1861-63), where they appear under the form of a review of the work of Agassiz just referred to—papers in which there is no difficulty in recognizing the pen of an accomplished zoologist who holds a chair in an Irish University, and is already well known by his valuable contributions to the literature of the *Cœlenterata*.

I believe that henceforth no classification of the HYDROIDA will be admitted by the zoologist which does not include in the conception of every Hydroid both those parts which are destined for the nutrition of the colony and those which are destined for the sexual perpetuation of the species, whether these last are in the form of fixed sacs or of free locomotive Medusæ.

It must be borne in mind that every Hydroid whose life-history has come fully before us consists (with only a single positively proved exception\*) of two sets of zooids. One of these is destined for the nutrition of the colony, and has nothing to do with true generation; while the other is, on the contrary, destined for true generation, and has nothing to do with the nutrition of the colony. For the whole assemblage of the former I have elsewhere† proposed the term "trophosome," and for that of the latter the term "gonosome;" and whether the gonosome remains permanently attached to the trophosome or becomes in whole or in part free, attaining thereby an independent existence, it is equally necessary that it should take its place in our diagnosis of genera and species. An adequate conception of the Hydroid can thus only be obtained by regarding it as the product of two factors, one of them finding its expression in the trophosome, and the other in the gonosome.

Now the characters to which we shall be justified in assigning a generic value will be found in both of these factors. The trophosome will present them chiefly in the form of the polypite, including the arrangement and structure of the tentacles (whether these be scattered or in one or more verticils, or whether they be filiform or capitate), in the solitary or associated condition of the polypites, and in the nature and extent of the chitinous periderm. In the gonosome, characters of generic value will be found in the mode of origin of the gonophores and in their general form—whether they be in the condition of a fixed sac (*adelocodonic*) or of a developed Medusa (*phanerocodonic*); while each of these forms of gonophore may itself present differences which will afford characters of value in the limitation of our genera. It is true that among the adelocodonic forms it is rare to meet with any differences so well marked as to be-

\* See my "Report on the Reproductive System of the Hydroids," in the Report of the Newcastle Meeting of the British Association, 1863.

† *Loc. cit.*

come of generic value; but among the phanerocodonic forms the differences are numerous and important—differences which, though they are fully recognized so long as we regard the Medusæ as independent organisms, are yet usually ignored when we see in the Medusa only the sexual bud of a polypoid trophosome. They will be found in the form of the umbrella, in the form and development of the manubrium, in the situation of the generative elements, in the number and distribution of the radiating canals, in the structure of the marginal tentacles, and even in their number when we have reason to regard this number as permanent and not merely as the result of an immature condition, and, finally, in the presence or absence of lithocysts, and even in the position which these bodies hold on the umbrella-margin,—all which characters, either singly or combined, will afford valid grounds for the construction of our generic groups.

The classification of the HYDROIDA would be a comparatively simple task if, as has been erroneously asserted, generically identical medusoids always arose from generically identical polypoids, and, on the other hand, that generically identical polypoids always gave origin to generically identical medusoids.

This, however, is far from being the case; and the history of the Hydroida renders us acquainted with two phenomena which signify break the uniformity assumed in the above propositions.

The phenomena to which I refer are, (1) the association of similar gonosomes with dissimilar trophosomes (*isogonism*); and (2) the association of dissimilar gonosomes with similar trophosomes (*heterogonism*). The difficulties which these phenomena throw in the way of a natural classification of the Hydroida may be compared to those which the mineralogist meets with when he finds isomorphism and dimorphism interfering with the uniformity of his mineralogical system.

But the great difficulty, after all, in the application of the method here advocated is found in the fact that the Medusa at the time of its liberation is still in an immature state, and may be destined to undergo important changes before arriving at its adult condition. In such cases, unless we have succeeded in following the Medusa to its ultimate form, our determination of its type must be regarded as only approximative. Analogy, however, will greatly aid us in this determination, by pointing out what are the parts most liable to change, and what the direction in which this change is likely to take place.

From these considerations we learn that the number of marginal tentacles in the recently liberated Medusa must be accepted with great caution as affording valid systematic characters, these organs being especially liable to an increase in number as the Medusa advances towards maturity. In some cases, however,

we may fairly assume the number presented by the marginal tentacles in the young Medusa as representing their permanent condition, as, for example, in the single long tentacle of the Medusa in *Corymorpha*, where we find, by going back to the early stages of the development of this Medusa, that the peculiar asymmetrical form which, in a later stage, finds its expression so decidedly in the great development of a single tentacle is quite apparent before any trace of a tentacle can be detected.

With regard to nomenclature, I am convinced that, except in certain special cases, we must give to our Hydroid the name under which it was first described, whether this name may have been originally given to the trophosome or to the gonosome. The fact of our giving as a generic name to the complete Hydroid that by which the Medusa had been previously known needs not prevent our employing the same name for all those similar Medusæ whose trophosome has not yet been discovered; but we must keep in mind that the name, when used in this sense, is purely provisional, and liable to be changed when the discovery of the trophosome shall determine the true genus of our then no longer incomplete Hydroid.

It is upon the principles here urged that I have drawn up the following synopsis of the genera and species of the Tubularian and Campanularian Hydroids. I have confined myself, however, entirely to those forms in which the trophosome is known, the numerous free Medusæ which have not been traced to a trophosome, or been proved to originate by direct development from the egg, holding places in our system which must for the present be regarded as altogether provisional.

In the generic descriptions I have adopted as far as possible a uniformity in the selection of characters and in the order in which these characters are noted; and I have further, by availing myself of terms already in use, and by introducing one or two new ones, been able to avoid tedious circumlocution, and to condense the descriptions without sacrificing their precision.

In order that the synopsis may be more easily followed, it will be well to give here definitions of the principal terms used, while for a fuller exposition of the terminology of the Hydroida I must refer to Prof. Huxley's 'Oceanic Hydrozoa,' published by the Ray Society, and to some papers of my own, more especially a paper "On the Structure and Terminology of the Reproductive System in the Corynidae and Sertulariadae," published in the 'Annals and Magazine of Natural History' for July 1860, and a "Report on the Reproductive System of the Hydroida," in the Report of the Newcastle Meeting of the British Association, 1863.

The terms "trophosome" and "gonosome" have been already

defined in the present paper; the "cœnosarc" is the common connecting basis of the colony, and is more or less completely invested by a chitinous "periderm" excreted from its surface; the "hydrorhiza" (Huxley) is the root-like proximal termination of the cœnosarc by which the Hydroid attaches itself to foreign bodies; the "hydrocaulus" is the free or (in certain creeping forms) more or less adherent portion of the cœnosarc, which intervenes between the hydrorhiza and the polypites; the "metastome" is that portion of the polypite which intervenes between the mouth and the most distal set of tentacles; the "hydrotheca" (Huxley) is the cup-like receptacle into which the polypites are retractile in the Campanularian and Sertularian Hydroids; the "gonophore" is the proper generative bud, either in the form of a sac or of a locomotive Medusa, upon which devolves the function of giving origin directly or indirectly to the generative elements; the "gonangium" is the capsule or receptacle in which the gonophores are contained in the Campanularian and Sertularian Hydroids; the "gonoblastidium" (Huxley) is a more or less developed column which exists in certain Hydroids, and is destined to give origin to the gonophores, which are produced as buds from its sides; "adelocodonic" gonophores are those which are constructed on the plan of the "sporosac"—that is, in which the umbrella is never developed so as to present a wide orifice or "codonostome," and never becomes capable of acting as a locomotive organ; "phanerocodonic" gonophores are those which present the type of the developed Medusa in which the umbrella presents a wide orifice, and may in almost every case act as an organ of locomotion.

## I.

*Synopsis of the Genera and Species of Tubularian Hydroids  
whose trophosomes are known.*

## Clavidæ.

## I. CLAVA, Gmelin.

*Trophosome*.—Cœnosarc consisting mainly of a filiform hydrorhiza entirely invested by a chitinous periderm; hydrocaulus rudimental, and consisting of very short, simple, tubular processes from the free surface of the hydrorhiza, invested, like the hydrorhiza, by a periderm, and carrying the polypites on their summit. Polypites claviform, with scattered filiform tentacula.

*Gonosome*.—Gonophores adelocodonic, sessile or on very short peduncles, borne on the body of the polypite at the proximal side of the tentacles.

*Clava multicornis*, Forskal (sp.), = *Hydra multicornis*, Forskal.  
*Clava repens*, Wright, = *Clava discreta*, Allm.

*Clava leptostyla*, Agass.

*Clava diffusa*, Allm.

*Clava cornea*, Wright.

*Clava membranacea*, Wright.

*Clava nodosa*, Wright.

Though the three species, *C. cornea*, *C. membranacea*, and *C. nodosa* are described as Scottish, I have not seen any specimens of them, and I here give them on the authority of Dr. Wright.

## 2. TUBICLAVA, Allman.

*Trophosome*.—Cœnosarc consisting of a well-developed hydrocaulus in the form of simple or branched stems, which are given off at intervals from a creeping filiform hydrorhiza, the whole invested by a chitinous periderm. Polypites borne on the summit of the hydrocaulus, claviform, with scattered filiform tentacula.

*Gonosome*.—Gonophores adelocodonic, consisting of clusters of sporosacs sessile on the body of the polypite at the proximal side of the tentacula.

From the above definition the *Tubiclava cornucopia* of Norman \* is excluded, this Hydroid being, in my opinion, the type of a new genus, which is distinguished from *Tubiclava* by having its gonophores borne on distinct gonoblastidia, and which, I believe, Mr. Norman will himself shortly characterize.

*Tubiclava lucerna*, Allm.

## 3. CAMPANICLAVA†, Allman, nov. gen.

*Trophosome*.—Cœnosarc a creeping, filiform, ramified hydrorhiza invested by a periderm; hydrocaulus undeveloped. Polypites sessile on the hydrorhiza, claviform, with scattered filiform tentacula.

*Gonosome*.—Gonophores phaneroecodonic, sessile on the creeping hydrorhiza. Umbrella at the time of its liberation deep bell-shaped; manubrium simple-mouthed, shorter than the height of the bell-cavity; radiating canals four; marginal tentacles two, continuous with two opposite radiating canals, and having bulbous bases without distinct ocellus; two intervening smaller bulbs corresponding to the termination of the other two radiating canals in the circular canal.

There can be no doubt that the Medusa here described undergoes further changes before arriving at maturity. It is, at least, almost certain that two additional marginal tentacles become developed,

\* See Norman in Ann. and Mag. Nat. Hist. Jan. 1864.

† *Campana*, a bell, and *Clava*, the name of a genus of Hydroids.

one from each of the intermediate bulbs, as the observations of Gegenbaur on this Hydroid go to prove.

*Campaniclavata Cleodora*, Gegenb. (sp.), = *Syncoryme Cleodora*, Gegenb.

#### 4. TURRIS, Lesson.

*Trophosome*.—Cœnosarc invested by a periderm, and consisting of a creeping filiform hydrorhiza, with a rudimental hydrocaulus, which forms very short tubular processes supported on the free surface of the hydrorhiza, and carrying the polypites on their summits. Polypites claviform, with scattered filiform tentacula.

*Gonosome*.—Gonophores phanerocononic. The mature Medusa has a subcylindrical umbrella, with four or eight longitudinal bands; manubrium massive, with a four-lipped mouth; radiating canals four; marginal tentacles numerous, each with a bulbous base having a distinct ocellus.

The trophosome of *Turris* was discovered by Gosse, who traced its development from the eggs of *Turris neglecta*, Forbes. It was afterwards observed by Dr. Strethill Wright, who carried its development still further, and named it *Clavula Gossii*.

We do not yet know anything as to the part of the trophosome from which the gonophores are developed, nor of the condition of the Medusæ at the time of their liberation.

*Turris neglecta*, Forbes. Trophosome = *Clavula Gossii*, Wright.

#### 5. CORDYLOPHORA, Allman.

*Trophosome*.—Cœnosarc a creeping filiform hydrorhiza supporting a well-developed branching hydrocaulus, the whole invested by a chitinous periderm. Polypites fusiform, developed from the extremities of the branches; tentacula filiform, scattered on the body of the polypite.

*Gonosome*.—Gonophores adelocononic, borne on the hydrocaulus, never on the polypite.

*Cordylophora lacustris*, Allm.

*Cordylophora albicola*, Kirchenpauer.

#### 6. CORYDENDRIUM, Van Beneden.

*Trophosome*.—Cœnosarc consisting of a rooted and branching hydrocaulus invested by a periderm. Polypites developed from the extremities of the branches, fusiform, with scattered filiform tentacula.

*Gonosome*.—Gonophores phanerocononic, developed from the cœnosarc. Form of Medusa unknown.

*Corydendrium parasiticum*, Van Ben., = *Syncoryme parasitica*, Ehrenb., = *Sertularia parasitica*, Cavolini.

Medusa at the time of liberation deep bell-shaped; manubrium not reaching the orifice of the bell, and having its mouth surrounded by four short tentacles; radiating canals four, each terminating distally in a bulb, from which are developed two tentacles, each with a distinct ocellus at its base.

*Corynopsis Alderi*, Hodge (sp.), = *Podocoryne Alderi*, Hodge.

The genus *Corynopsis* has been constituted for the *Podocoryne Alderi* of Mr. Hodge—a Hydroid, however, whose gonosome will at once separate it from the true *Podocoryne*. It will be noticed that the Medusa, at the time of its liberation, is not to be distinguished from that of *Bougainvillia* at the same stage of its development. The further progress of the Medusa of *Corynopsis* has not been traced; but it is highly probable that we have here a true case of isogonism with *Bougainvillia*.

#### 4. DIPLURA, Greene, MS.

*Trophosome*.—Polypite supported on the summit of a simple hydrocaulus, with a branched and creeping (?) hydrorhiza; periderm?; tentacles filiform, in a single verticil (?) near the distal extremity of the body.

*Gonosome*.—Gonophores phanerocodonic, on simple peduncles, which arise in a verticil from the body of the polypite at the proximal side of the tentacles. Medusa deep bell-shaped, with moderate-sized manubrium; radiating canals four, each terminating in a bulbous expansion at the point of intersection with the circular canal: from one of these marginal bulbs two long tentacles are developed; the rest of the margin is destitute of tentacles.

The genus *Diplura* was originally, under the name of *Diplonema*, established by Prof. J. Reay Greene for a Hydroid of which the Medusa was alone known to him. (Nat. Hist. Rev. 1857, vol. iv.). The name of *Diplonema*, however, happened to be preoccupied by the botanist, and Prof. Greene has since substituted for it that of *Diplura*. The Medusa thus named he found free in the open sea near Dublin; and it is undoubtedly congeneric with that described by Steenstrup as the Medusa of a Hydroid trophosome, which he names *Coryne fritillaria*. Steenstrup's Hydroid, however, is certainly not a *Coryne* in the sense in which we must now understand this genus; and though his description and figure are insufficient for an entirely satisfactory diagnosis, they compel us to regard his Hydroid as the representative of a distinct generic type, to which the name proposed by Prof. Greene for the Medusa, whose relation to Steenstrup's form he recognized at the time of its discovery, must now be given.

Agassiz refers it to *Steenstrupia* (Contr. Nat. Hist. U. S. vol. iv.); but the genus *Steenstrupia* was founded by Forbes for a Medusa of an entirely different type, though possessing unmistakable affinities with *Diplura*.

## Hydractinidæ.

## 1. HYDRACTINIA, Van Beneden.

*Trophosome*.—Cœnosarc forming a continuous expansion whose free surface is destitute of periderm, but whose deeper parts consist of an arcolar mass of freely intercommunicating tubes, which are each invested by a distinct periderm, and are adnate to one another. Polypites claviform, developed at intervals from the free naked surface of the cœnosarc; tentacles filiform, approximated into a single verticil round the base of a very contractile and mutable metastome.

*Gonosome*.—Sporosacs supported on gonoblastidia, which arise, like the polypites, from the naked free surface of the cœnosarc, are destitute of tentacles, and terminated by spherical clusters of thread-cells.

*Hydractinia echinata*, Flem. (sp.), ♂, = *Hydractinia lactea*, Van Ben., ♀, = *Hydractinia rosea*, Van Ben., = *Synhydra parasites*, Quatref., = ?*Dysmorphosa conchicola*, Philippi.

*Hydractinea polyclina*, Agass.

## 2. RHIZOCLINE\*, Allman, nov. gen.

*Trophosome*.—Cœnosarc forming an adherent stratum supported by "a solid chitinous expansion" †. Polypites developed at intervals from the free surface of the cœnosarc; tentacles filiform, in a single verticil round the base of a conical metastome.

*Gonosome*.—Gonophores phanerocondonic, sessile on the free surface of the cœnosarc. Umbrella, at the time of liberation, deep bell-shaped; manubrium large, with a four-lipped mouth, but not extending beyond the margin of the umbrella; four radiating canals continued distally by four marginal tentacles with bulbous bases; three shorter tentacles developed in each interradial space.

*Rhizocline areolata*, Alder (sp.), = *Hydractinia areolata*, Alder.

## Laridæ.

## 1. LAR, GOSSE.

*Trophosome*.—Cœnosarc a creeping, filiform, and anastomosing hydrorhiza, on which sessile polypites are developed at intervals;

\* From *ρίζα*, a root, and *κλίση*, a bed.

† Mr. Alder describes the attached base of the Hydroid for which I have found it necessary to constitute the present genus as "consisting of a solid chitinous expansion, from which arise simple linear spines in regular groups having areolar spaces between them." There can be no doubt, however, that, with specimens favourable for observation, he would have discovered a fleshy cœnosarc in connexion with the chitinous basis.

rocodonic, never become free, and the marginal tentacles then remain in an imperfectly developed state.

*Syncoryne Sarsii*, Lovén, = *Syncoryne decipiens*, Dujardin.

*Syncoryne ramosa*, Lovén.

*Syncoryne* (sp.), Désor.

*Syncoryne turricula*, M'Crary (sp.), = *Sarsia turricula*, M'Crary.

M'Crary figures and describes the Medusa of this species; but his description of the trophosome is not full enough for a satisfactory diagnosis.

*Syncoryne mirabilis*, Agass. (sp.), = *Coryne mirabilis*, Agass.

*Syncoryne eximia*, Allm. (sp.), = *Coryne eximia*, Allm. in Ann. Nat. Hist. 1859.

*Syncoryne gravata*, Wright (sp.), = *Coryne gravata*, Wright.

*Provisional and Doubtful Species.*

*Syncoryne bryoides*, Ehr., = *Tubularia muscoides*, Linn.

*Syncoryne Listeri*, Van Ben.

### 3. ZANCLEA, Gegenbaur.

*Trophosome*.—Cœnosarc consisting of a simple or branching hydrocaulus rooted by a filiform anastomosing hydrorhiza, the whole invested by a periderm. Polypites claviform, developed from the summits of the hydrocaulus; tentacles capitate, scattered over the body of the polypite.

*Gonosome*.—Gonophores phanerocononic, developed from the body of the polypite. Medusa, at the time of its liberation from the trophosome, nearly spherical; manubrium simple-mouthed, not reaching the margin of the umbrella; radiating canals four; marginal tentacles two, developed from the distal extremities of two opposite radiating canals; two intermediate bulbous dilatations at the intersections of the two other radiating canals with the circular canal; the tentacles commence with a large bulbous dilatation destitute of distinct ocellus, and are for the remainder of their extent closely set along their external sides with pedunculated sacs filled with thread-cells; from the bases of the tentacula and intermediate bulbs a cæcal claviform tube filled with thread-cells extends in the walls of the umbrella near its external surface and parallel to the corresponding radiating canal.

It is almost certain that the Medusa here described is destined to undergo considerable change before reaching its adult state, when its characters will, in all probability, be those assigned by Gegenbaur to his genus *Zanclæa*. A Medusa captured by M'Crary in the open sea, and regarded by him (Gymnophthalmata of Charleston Harbour) as a young state of a species of *Zanclæa*, is almost identical with that just described.

*Zanclæa implexa*, Alder (sp.), = *Coryne implexa*, Alder, = *Coryne Briareus*, Allman, in Ann. Nat. Hist. 1859.

## 4. CORYNITIS, M'Crady.

*Trophosome*.—Polypites springing from an adherent base\*; tentacles capitate, scattered over the body of the polypite†.

*Gonosome*.—Gonophores phanerocononic, borne upon the body of the polypite. Umbrella deep bell-shaped, thick-walled, with clusters of thread-cells imbedded in its walls, and with the roof of its cavity rising in four overarched spaces between the radiating canals; manubrium massive; radiating canals four; marginal tentacles four, club-shaped, with basal bulbs, each furnished with an ocellus.

*Corynitis Agassizi*, M'Crady ‡.

## 5. CANDELABRUM, De Blainville.

*Trophosome*.—Polypites clavate, springing from a tubular adherent hydrorhiza, which is invested by a periderm; tentacles wart-like, scattered over the body of the polypite.

*Gonosome*.—Gonophores adelocodonic (?), on gonoblastidia which are clustered round the base of the polypite.

*Candelabrum* is De Blainville's name for the *Lucernaria Phrygia* of Fabricius, which Agassiz has shown to be identical with the *Myriothela* of Sars, and to which he has accordingly restored the original name given by De Blainville.

*Candelabrum Phrygia*, Fabricius (sp.), = *Lucernaria Phrygia*, Fabricius.

*Candelabrum arcticum*, Sars (sp.), = *Myriothela arctica*, Sars.

## Pennaridæ.

## 1. VORTICLAVA, Alder.

*Trophosome*.—Polypites solitary, borne on the summit of a simple hydrocaulus, which is attached by a simple conical (?) hydrorhiza; periderm a delicate transparent film investing the hydrocaulus and the hydrorhiza; tentacles in two verticils, those composing the proximal verticil long and filiform, those composing the distal verticil short and capitate.

*Gonosome* unknown.

*Vorticlava humilis*, Alder.

*Vorticlava Proteus*, Wright.

\* The nature of this base has not been described: it is probably a tubular reticulated hydrorhiza invested by a periderm.

† The trophosome of this genus has been described and figured by Agassiz under the name of *Halocharis* (Cont. Nat. Hist. U. S. vol. iv. p. 239), but has been since (*op. cit.* p. 340) referred by him to the genus *Corynitis*.

‡ The *Halocharis* (*Corynitis*) *spiralis* of Agassiz, *op. cit.* p. 239, may constitute a second species of *Corynitis*; but there is no mention of its gonosome, and it is not clear whether Agassiz does or does not regard it as distinct from *Corynitis Agassizi*.

only with its termination altered so as to adapt it to the ordinary form of zoological nomenclature—a form in which Dujardin's name has been used by most subsequent writers, as Krohn (Müller's Arch. 1853) and Gegenbaur (Zeit. f. w. Z. 1857, p. 230).

Dujardin and the writers who have followed him have given this name to a Hydroid whose trophosome is distinguished by the characters here enumerated; but as it has been shown by Hincks (Ann. Nat. Hist. Dec. 1862) that this form of trophosome may have two very different forms of gonosome, it is necessary to break up Dujardin's genus into two, one of which may retain his original name for the trophosome, while to the other we may give the name of *Cladonema*, that employed by Dujardin for the only form of Medusa which he succeeded in tracing to a Stauridioid trophosome.

*Stauridium productum*, Wright.

### 5. CLADONEMA, Dujardin.

*Trophosome*.—Cœnosarc consisting of a branching or simple hydrocaulus arising from a creeping filiform hydrorhiza, the whole invested by a chitinous periderm. Polypites borne on the summits of the hydrocaulus, clavate, with two verticils of tentacles, each verticil consisting of four tentacles disposed in a cross,—the tentacles of the proximal verticil filiform, those of the distal verticil capitate\*.

*Gonosome*.—Gonophores phaneroconic, developed from the body of the polypite. Umbrella deep bell-shaped; manubrium large, with simple mouth; radiating canals eight, each continued at the margin of the umbrella into a branching tentacle with a bulbous base provided with an ocellus.

*Cladonema radiatum*, Dujardin.

### 6. PENNARIA, Goldfuss.

*Trophosome*.—Cœnosarc composed of a symmetrically ramified hydrocaulus, rooted by a creeping filiform hydrorhiza, the whole invested by a chitinous periderm. Polypites borne on the summits of the branches, oviform, with two sets of tentacles—a proximal set filiform and arranged in a single verticil round the base of the polypite, and a distal set capitate and scattered on the body of the polypite.

*Gonosome*.—Gonophores phaneroconic, developed between the proximal and distal set of tentacles. Umbrella deeply ovate; manubrium large, but not passing beyond the orifice of the

\* It will be noticed that the above description of the trophosome of *Cladonema* is identical with that of the trophosome of *Stauridium*. The differences between the two genera are confined to the gonosome, where they are well marked.

umbrella; radiating canals four; four rudimental, papilliform marginal tentacles\*.

*Pennaria distycha*, Goldf., = *Pennaria Cavolini*, Ehrenb., = *Sertularia pennaria*, Cavolini.

*Pennaria gibbosa*, Agassiz.

## 7. GLOBICEPS, Ayres.

*Trophosome*.—Cœnosarc rooted, symmetrically branched, and invested by a chitinous periderm. Polypites claviform, with two sets of tentacles—a proximal set filiform and arranged in a single verticil round the base of the polypite, and a distal set capitate and arranged in one or more verticils, never scattered.

*Gonosome*.—Gonophores phaneroecodonic, developed between the proximal and distal sets of tentacles. Umbrella deeply ovate, with large manubrium; four radiating canals, and four rudimental, papilliform marginal tentacula.

*Globiceps tiarella*, Ayres, = *Eucoryne elegans*, Leidy, = *Pennaria tiarella*, M'Crady.

## Clavatellidæ.

### 1. CLAVATELLA, Hincks.

*Trophosome*.—Cœnosarc composed of a filiform branching hydrorhiza, with a hydrocaulus consisting of very short simple stems, which arise from the free surface of the hydrorhiza, the whole invested by a periderm. Polypites developed from the summit of the hydrocaulus, and having a single verticil of capitate tentacula surrounding the base of a conical metastome.

*Gonosome*.—Gonophores consisting of naked ambulatory Medusæ, which are developed in clusters from the polypite near its proximal extremity. Umbrella not extended into a bell or disc fitted for natation; marginal tentacles six, bifurcated, the outer branch of the bifurcation terminated by a capitulum of large thread-cells, the inner by a claviform enlargement which carries a suctorial disk of attachment; an ocellus at the root of each tentacle; no lithocysts.

*Clavatella*, though it comes very near to the *Eleutheria* of Quatre-fages, is nevertheless generically distinct from it.

*Clavatella prolifera*, Hincks.

\* Agassiz describes, but not without doubt, the generative elements as produced upon the radiating canals. I entirely participate in Agassiz's doubts on this point. From Cavolini's description, it is plain that in his species the generative elements were produced in the walls of the manubrium, as in all other known cases among the Tabularian hydroids.

**Eudendridæ.**1. **EUDENDRIUM**, Ehrenberg (in part).

*Trophosome*.—Cœnosarc consisting of a well-developed branching hydrocaulus, rooted by a creeping filiform hydrorhiza, the whole invested by a chitinous periderm. Polypites developed from the summits of the branches, vasiform or oval, with the metastome contracted at its proximal and expanded at its distal extremity so as to be more or less trumpet-shaped; tentacles filiform, in a single verticil just behind the metastome.

*Gonosome*.—Gonophores adlocodonic, developed from the body of the polypite at the proximal side of the tentacles, or from the hydrocaulus\*; female sporosacs monothalamic; male sporosacs polythalamic.

*Eudendrium ramosum*, Linn. (sp.), = *Tubularia ramosa*, Linn., = Small ramified tubular Coralline, Ellis, = *Tubularia trichoides*, Pallas, =? *Sertularia racemosa*, Cavolini, = *Eudendrium ramosum*, Ehrenb.

*Eudendrium rameum*, Pallas (sp.), = *Tubularia ramea*, Pallas, = *Eudendrium rameum*, Johnst.

*Eudendrium capillare*, Alder, = *Corynboonium capillare*, Allm.

*Eudendrium arbuscula*, Wright.

*Eudendrium insigne*, Hincks.

*Eudendrium humile*, Allm.

*Eudendrium dispar*, Agass.

*Eudendrium annulatum*, Norman.

*Eudendrium cingulatum*†, Stimpson.

*Eudendrium vaginatum*, Allm.

*Eudendrium pusillum*, Sars.

2. **ATRACTYLIS**, Strethill Wright (in part).

*Trophosome*.—Cœnosarc consisting of a hydrocaulus in the form of simple funnel-shaped stems, which are developed at intervals from a creeping filiform hydrorhiza, the whole invested by a chitinous periderm. Polypites emerging from the summits of the hydrocaulus, into which they are retractile, fusiform, with filiform tentacula placed in a single verticil round the base of a conical metastome.

*Gonosome*.—Gonophores adlocodonic, carried on the sides of the hydrocaulus.

\* The polypite occasionally, from the exhaustion consequent on the growth of the gonophores, becomes arrested, loses its tentacles, and is converted into a false gonoblastidium.

† Stimpson's short description of this species (Marine Invertebrata of Grand Manan), unaccompanied as it is by a figure, is hardly sufficient for a satisfactory diagnosis.

The genus *Atractylis*, as originally defined by Dr. T. Strethill Wright, was made to include all those forms of the older genus *Eudendrium* which are characterized by a fusiform shape of the polypite and a conical metastome, the greater number of the species moreover presenting a more or less complete retractility within the summit of the hydrocaulus, though nothing like a proper hydrotheca is ever developed.

Among the forms, however, which Dr. Wright has included under his genus *Atractylis* are more than one generic type. One of these types had already been characterized under the name of *Perigonimus* by Sars, who described both the trophosome and the gonosome; while another had, under the name of *Bougainvillia*, been long ago described by Lesson, who, however, was only acquainted with the Medusa. That the *Bougainvillia* of Lesson is the Medusa of a Hydroid form of which the *Eudendrium ramosum* of Van Beneden (= *Atractylis ramosa* of Wright) may be taken as the type, has been shown by Dalyell, and confirmed by Wright and others. To this Hydroid and its allied species the name of *Bougainvillia* must accordingly be restored; and indeed we find Agassiz already arranging them partly under Lesson's name, and partly under that of *Margelis*, Steenstrup's name for a Medusa which can scarcely be regarded as different from the *Bougainvillia* of Lesson. There thus remains only one form of Wright's genus *Atractylis* which had not already received a distinguishing generic designation,—that, namely, which is represented by the *Atractylis arenosa* of Alder, whose gonosome has been recently so well described by Dr. Wright (*Micr. Journ.* n. s. vol. iii.). To this form, therefore, it will be necessary henceforth to restrict the name *Atractylis*.

*Atractylis arenosa*, Alder.

The following species cannot be regarded as otherwise than provisionally referred to the genus *Atractylis*. Two of them will probably turn out, when the gonophores shall have been observed, to belong really to the genus *Perigonimus*; while a third is undoubtedly the type of an entirely new genus.

*Atractylis coccinea*, Wright.

*Atractylis miniata*, Wright.

*Atractylis margarica*, Hincks.

The *Atractylis margarica* has been described by Mr. Hincks in the 'Ann. and Mag. of Nat. Hist.' for January 1863. It is certainly not an *Atractylis*, but is the type of an entirely new genus. I refrain, however, from giving here a definite form and name to the genus which I know must be constituted for it, preferring to leave this duty in the hands of its discoverer, Mr. Hincks, who, I have little doubt, will take the same view in his forthcoming work on the Hydroida.

### 3. BIMERIA, Strethill Wright.

*Trophosome* consisting of a branching rooted coenosarc in-

vested by a chitinous periderm. Polypites developed from the summits of the branches, "vase-shaped, destitute of proboscis" (metastome), and having the tentacles in a single verticil round the margin of the distal end of the vase-shaped body. "Coral-lum (periderm) body, mouth, and lower half of each of the tentacles clothed in an opaque brown membrane." (Dr. T. S. Wright.)

*Gonosome*.—Gonophores adelocodonic, developed from the cœnosarc.

Some years ago (Ann. Nat. Hist. July 1859) I constituted a genus, under the name of *Manicella*, for a singular Hydroid which I had discovered in the Firth of Forth. Simultaneously with the publication of *Manicella*, Dr. Strethill Wright published his genus *Bimeria* for a Hydroid which he had previously described and characterized as a new genus under this name at a meeting of the Royal Physical Society of Edinburgh, but of which no published account existed. On seeing Dr. Wright's description of his *Bimeria*, I was at first disposed to regard the two genera as identical, and to believe that we had been, independently and unknown to one another, describing the same form. Further consideration, however, of Dr. Wright's description of *Bimeria* has shown me that, besides differing in some minor points, this description is in one very important point quite inapplicable to *Manicella*; for while *Manicella* possesses a well-developed metastome, it is stated by Dr. Wright that there is no metastome in *Bimeria*.

I have had no opportunity of inspecting authentic specimens of Dr. Wright's Hydroid. It is quite possible that the metastome of *Bimeria* may have been overlooked; this question can be decided only by further examination. Until, however, the absence of a metastome in *Bimeria* be confirmed, I should hesitate to give *Manicella* the position of an established genus; and I shall therefore for the present retain it as entirely provisional.

*Bimeria vestita*, Wright.

#### 1. GARVEIA, Strethill Wright.

*Trophosome*.—Cœnosarc invested by a periderm, and consisting of a branching hydrocaulus, which is rooted by a filiform hydrorhiza, and towards its base composed of aggregated tubes. Polypites fusiform, developed on the summits of the branches, and having the tentacles in a single verticil round the base of a long conical metastome.

*Gonosome*.—Gonophores adelocodonic, borne on the summits of short branches, which spring from the sides of the hydrocaulus.

*Garveia nutans*, Wright, = *Eudendrium (Corythamnium) baciferum*, Allm.

## 5. HETEROCORDYLE\*, Allman, nov. gen.

*Trophosome*.—Cœnosarc consisting of a simple or branched hydrocaulus, which arises from a creeping, filiform and anastomosing hydrorhiza, the whole invested by a chitinous periderm. Polypites fusiform, with a single verticil of filiform tentacula round the base of a conical metastome.

*Gonosome*.—Gonophores adelocodonic, borne by gonoblastidia, which are developed (solely?) from the hydrorhiza; sporosacs of the ordinary kind, destitute of tentacles and cilia, and incapable of locomotion.

*Heterocordyle Conybeari*, Allm.

## 6. PERIGONIMUS, Sars.

*Trophosome*.—Cœnosarc invested by a periderm, and consisting of a branching or simple hydrocaulus rooted by a filiform hydrorhiza. Polypites borne on the summits of the hydrocaulus, fusiform, with a single verticil of filiform tentacula, which surround the base of a conical metastome.

*Gonosome*.—Gonophores planocodonic, developed from the cœnosarc. Umbrella at the time of liberation deep bell-shaped, with a manubrium which is shorter than the height of the bell-cavity, and has a mouth which is simple or with four shallow lips; radiating canals four; marginal tentacles two or four, with bulbous bases, which are not furnished with distinct ocelli.

The changes which occur as the Medusa advances towards maturity are to be chiefly sought for in an increase in the number of marginal tentacles, the new tentacles being intercalated at the middle point between every two older ones.

*Perigonimus muscoides*, Sars.

*Perigonimus repens*, Wright (sp.), = *Atractylis repens*, Wright.

*Perigonimus sessilis*, Wright (sp.), = *Atractylis sessilis*, Wright.

*Perigonimus palliatus*, Wright (sp.), = *Atractylis palliata*, Wright.

*Perigonimus? linearis*, Alder (sp.), = *Atractylis linearis*, Alder †.

*Perigonimus serpens*, Allman.

*Perigonimus minutus*, Allman.

*Perigonimus pusillus*, Wright (sp.), = *Eudendrium pusillum*, Wright.

## 7. BOUGAINVILLIA, Lesson.

*Trophosome*.—Cœnosarc consisting of a branching hydro-

\* From *ἕρεπος*, dissimilar, and *κορδύλη*, a club.

† It is with some doubt that I place this species in the genus *Perigonimus*, the Medusa having been apparently examined in imperfect specimens, and consequently not determinable with sufficient certainty from Mr. Alder's figure and description; but it seems to come nearer to the type which is characteristic of *Perigonimus* than to anything else.

caulus rooted by a filiform hydrorhiza, the whole invested by a periderm. Polypites developed from the summits of the branches, fusiform, with a conical metastome; tentacles filiform, in a single verticil round the base of the metastome.

*Gonosome*.—Gonophores phaneroecodonic, developed from the cœnosarc. Medusæ, at the time of liberation, with a deep bell-shaped umbrella; manubrium shorter than the height of the bell-cavity, with four oral tentacles; radiating canals four, each terminating, at its intersection with the circular canal, in a bulb, from which two tentacles are developed, each with an ocellus at its base.

Before attaining maturity, the oral tentacles become dichotomously branched, and the bulbs upon the margin of the umbrella carry each a fasciculus of numerous tentacles, every tentacle having an ocellus at its base.

*Bougainvillia ramosa*, Van Beneden (sp.), = *Eudendrium ramosum*, Van Ben., = *Tubularia ramosa*, Dalyell, = *Atractylis ramosa*, Wright, = *Margelis ramosa*, Agassiz.

*Bougainvillia fruticosa*, Allm.

*Bougainvillia muscus*, Allm.

### Dicorynidæ.

#### 1. DICORYNE, Allman.

*Trophosome*.—Cœnosarc consisting of a branched or simple hydrocaulus, which arises from a creeping, filiform and anastomosing hydrorhiza, the whole invested by a periderm. Polypites fusiform, with a single verticil of tentacula surrounding the base of a conical metastome.

*Gonosome*.—Gonophores adelocodonic, developed upon gonoblastidia which are borne either upon the hydrocaulus or the hydrorhiza. Sporesacs natatory, ciliated over their whole surface, and having two filiform tentacula diverging from the proximal end.

*Dicoryne conferta*, Alder (sp.).

### Tubularidæ.

#### 1. TUBULARIA, Linn. (in part).

*Trophosome*.—Cœnosarc invested by a chitinous periderm, and consisting of a simple or branched hydrocaulus rooted by a filiform hydrorhiza. Polypites flask-shaped; tentacles filiform, in two verticils, those composing the proximal verticil longer than those composing the distal; distal verticil surrounding the base of a conical metastome.

*Gonosome*.—Gonophores adelocodonic, developed upon ra-

cemiform peduncles, which spring from the body of the polypite between the proximal and distal verticil of tentacles.

The genus *Tubularia* of modern authors has been broken up by Agassiz into four separate genera, for one of which he retains the older name *Tubularia*, while he designates the three others respectively *Parypha*, *Thamnocnidia*, and *Ectopleura* (Cont. Nat. Hist. U. S. vol. iv.). He gives no technical diagnosis of any of these genera; but, from my own knowledge of the European species which he separates from *Tubularia*, as well as from the very detailed descriptions and beautiful figures of the American species which he now for the first time describes and refers to his new genera, I can find only in one of these forms (namely, the *Tubularia Dumortieri* of Van Beneden) characters which would, in my opinion, justify the proposed dismemberment. For *Tubularia Dumortieri* Agassiz constitutes a new genus under the name of *Ectopleura*, and in this I willingly follow him; but the only character of importance by which *Parypha* and *Thamnocnidia* are separated from *Tubularia* is the non-development of gastro-vascular canals in the sporosacs of the species referred by Agassiz to these genera, while they are found in the sporosac of *Tubularia indivisa*.

Now I cannot admit that the presence or absence of these canals in a sporosac, so long as they do not bring with them the development of an open contractile umbrella capable, when detached, of acting as a swimming-organ, can be regarded as affording a character of generic value, even though we leave out of view the great difficulty of detecting it, which is a practical rather than a scientific objection.

Again, between *Parypha* and *Thamnocnidia* the only difference alleged is in the structure of the tentacula-like tubercles which occur upon the summit of the sporosac. I believe, however, that there is here no important difference. I have carefully examined the sporosacs of *Tubularia coronata*, Abildg., a species which Agassiz refers to his genus *Thamnocnidia*, and I can find no essential difference between the tentacular tubercles which crown the sporosac in this species and those described by Agassiz as characteristic of his genus *Parypha*.

*Tubularia indivisa*, Linn., = *Tubularia calamaris*, Pallas.

*Tubularia Couthoyi*, Agass.

*Tubularia coronata*, Abildg., = ? *Tubularia gracilis*, Harvey, = *Thamnocnidia coronata*, Agass.

*Tubularia spectabilis*, Agass. (sp.), = *Thamnocnidia spectabilis*, Agass.

*Tubularia tenella*, Agass. (sp.), = *Thamnocnidia tenella*, Agass.

*Tubularia cristata*, M'Crady, = *Parypha cristata*, Agass.

*Tubularia crocea*, Agass. (sp.), = *Parypha crocea*, Agass.

*Tubularia bellis*, Allm.

*Tubularia attenuata*, Allm.

*Tubularia larynx*, Ellis & Soland.

*Tubularia simplex*, Alder.

? *Tubularia calamaris*, Van Ben.

## 2. ECTOPLEURA, Agassiz.

*Trophosome*.—Cœnosarc invested by a chitinous periderm, and consisting of a simple or branched hydrocaulus springing from a filiform (?) hydrorhiza. Polypites flask-shaped, with filiform tentacula arranged in two verticils, the proximal verticil composed of tentacles which are longer than those forming the distal verticil.

*Gonosome*.—Gonophores phanerocononic, on branched peduncles, which are borne upon the body of the polypite, between the proximal and distal verticils of tentacles. Medusa, at the time of liberation, with a nearly spherical umbrella; a manubrium with a simple mouth, and shorter than the height of the umbrella-cavity; four radiating canals, and four marginal tentacles; no distinct ocelli; the umbrella furnished with eight prominent longitudinal ribs formed of linear series of thread-cells.

To his genus *Ectopleura* Agassiz, as has been already said, refers the *Tubularia Dumortieri* of Van Beneden. In thus separating Van Beneden's Tubularidan from the true *Tubulariæ*, Agassiz seems to me to be fully justified; but I cannot so easily assent to the correctness of associating with it in the same genus the *Sarsia pulchella* of Forbes, the *Sarsia turricula* of M'Crady, and the *Sarsia nodosa* of Busch. (See Contr. Nat. Hist. U. S. vol. iv. p. 343.) These naked-eyed Medusæ are very different from the Medusæ of Van Beneden's *Tubularia Dumortieri*, while one of them (*Sarsia turricula*) has been traced by M'Crady, if not with absolute certainty, at least with high probability, to a Coryniform trophosome.

*Ectopleura Dumortieri*, Van Ben. (sp.), = *Tubularia Dumortieri*, Van Ben.

## 3. HYBOCODON, Agassiz.

*Trophosome*.—Cœnosarc invested by a chitinous periderm, and consisting of a simple (or branched?) hydrocaulus rooted by a filiform hydrorhiza. Polypites flask-shaped, with the tentacles arranged in two sets,—the proximal set long, and forming a single verticil, the distal short, and arranged in two verticils.

*Gonosome*.—Gonophores phanerocononic, springing directly from the body of the polypite between the proximal and distal sets of tentacles\*. Medusa, at the time of liberation, with a deep-bellied umbrella, a moderate-sized, simple-mouthed manubrium, four radiating canals, and with the distal extremity of

\* In *Hybocodon prolifer*, the only described species, "the first Medusa arises directly from the actinal area of the disc, while from the marginal termination of one of the radiating tubes of this Medusa numerous similar Medusæ are developed, the latter again giving rise to other Medusæ in the same manner, and from a corresponding place on their margin." (Agassiz.)

one of the canals prolonged into a single marginal tentacle with a bulbous base, but without distinct ocellus.

*Hybocodon prolifer*, Agass.

#### 4. CORYMORPHA, Sars (in part).

*Trophosome*.—Polypite solitary, borne on the summit of a simple hydrocaulus, which terminates proximally in a conical hydrorhiza; both hydrocaulus and hydrorhiza invested by a very delicate, transparent, filmy periderm. Polypites flask-shaped, with two sets of filiform tentacles, a proximal and a distal, the proximal imperfectly contractile, longer and thicker than the distal, and arranged in a single verticil near the base of the polypite; the distal set very contractile, forming several closely placed, alternate, more or less perfect verticils behind a conical metastome.

*Gonosome*.—Gonophores phanerocononic, borne on branched peduncles, which spring from the body of the polypite at the distal side of the proximal set of tentacles. The Medusa, at the time of its liberation, has a deep-belled umbrella, a well-developed simple-mouthed manubrium, four radiating canals, and a single marginal tentacle; each of the radiating canals terminates, at its junction with the circular canal, in a bulbous expansion without distinct ocellus: one of these bulbs is larger than the other, and from this alone the solitary tentacle is developed.

Judging from *Corymorpha nutans*, it would seem that the further changes undergone by the Medusa before arriving at maturity are of little importance: it is especially to be noticed that the marginal tentacle always remains solitary.

*Corymorpha nutans*, Sars.

*Corymorpha nana*, Alder.

#### 5. AMALTHEA, O. Schmidt.

*Trophosome*.—Polypites solitary, with two sets of filiform tentacles, a proximal and a distal,—the proximal set very long and placed in a single verticil, the distal set very short, numerous, and scattered.

*Gonosome*.—Gonophores phanerocononic, borne upon peduncles which arise between the proximal and distal sets of tentacles. Medusæ with a deep bell-shaped umbrella, four radiating canals, and four equal marginal tentacles with bulbous bases.

*Amalthea wifera*, O. Schmidt, = *Corymorpha wifera*, Sars.

*Amalthea Sarsii*, Steenstrup (sp.), = *Corymorpha Sarsii*, Steenstrup.

*Amalthea Januarii*, Steenstrup (sp.), = *Corymorpha Januarii*, Steenstrup.

## 6. MONOCAULOS\*, Allman, nov. gen.

*Trophosome*.—Polypite solitary, borne on the summit of a simple rooted hydrocaulus; both hydrocaulus and hydrorhiza invested by a very delicate periderm; polypites flask-shaped, with two sets of filiform tentacles,—a proximal set longer and thicker, and arranged in a single verticil near the base of the polypite, and a distal set shorter and thinner, and scattered over a zone close to the summit of the polypite

*Gonosome*.—Gonophores adelocodonic, on simple or branched peduncles, which spring from the body of the polypite at the distal side of the longer tentacles.

*Monocaulos glacialis*, Sars (sp.), = *Corymorpha glacialis*, Sars.

*Monocaulos pendula*, Agass. (sp.), = *Corymorpha pendula*, Agass.

## 7. NEMOPSIS, Agassiz.

*Trophosome*.—Polypite free, conical, with two verticils of filiform tentacula—a proximal near the base, and a distal near the apex; periderm absent.

*Gonosome*.—Gonophores phanerocondonic, on short simple peduncles which spring from the body of the polypite between the two verticils of tentacula. Umbrella deep bell-shaped; manubrium of moderate size, and furnished with four dichotomously branched oral tentacles; radiating canals four, each terminating in a marginal bulb, while from every marginal bulb a tuft of tentacles is given off, two of the tentacles in each tuft being clavate and but slightly contractile, the rest filiform and very contractile, every tentacle carrying a distinct ocellus at its base. The generative elements are developed in four lobes, which spring from the base of the manubrium and thence extend for some distance along the course of the radiating canals.

*Nemopsis Gibbesii*, M'Crady.

## 8. ACAULIS, Stimpson.

*Trophosome*.—The entire trophosome consists of a solitary, free, subfusiform polypite, which, at a later period, becomes attached by its proximal extremity; tentacles of two kinds,—one filiform, forming a single verticil near the proximal extremity, and subsequently disappearing—the other capitate, and scattered on the body of the polypite towards its distal extremity; periderm absent.

*Gonosome*.—Gonophores phanerocondonic, springing from the body of the polypite between the filiform and capitate tentacula. Form of the Medusa unknown.

*Acaulis primarius*, Stimpson.

\* From *μόνος*, single, and *καυλός*, a stalk.

## II.

*Synopsis of the Genera and Species of Campanularian Hydroids with known trophosomes.*

## Campanularidæ.

## I. CAMPANULARIA, Lamarck (in part).

*Trophosome*.—Hydrocaulus simple or branching, rooted by a creeping filiform hydrorhiza; hydrothecæ bell-shaped, with an entire or serrated margin, and destitute of an operculum; tentacles surrounding the base of a large, very contractile metastome.

*Gonosome*.—Gonangium seated either on the hydrorhiza or hydrocaulus, and containing phaneroconic gonophores. Umbrella, at the time of liberation, deep bell-shaped; manubrium of moderate size, with the mouth provided with four shallow lips, or simple; radiating canals four; marginal tentacles four, with bulbous bases, destitute of ocelli; lithocysts eight, two in each interradial space, and never developed upon the base of a tentacle; generative elements developed in special sporosacs, which are borne as buds on the radiating canals.

As the Medusa advances towards maturity, the marginal tentacles increase in number, and the oral lobes of the manubrium become more decided.

The name of *Campanularia* was originally applied by Lamarck to certain Hydroids which had been a short time previously distributed by Lamouroux under two generic names, *Clytia* and *Laomedea*. The genera *Clytia* and *Laomedea*, as defined by Lamouroux, were constructed on insufficient and imperfectly comprehended characters, and cannot stand; while, at the same time, Lamarck's genus *Campanularia* involves two distinct generic types. For one of these types the name of *Campanularia* ought to be retained, while for the other we may choose between *Clytia* and *Laomedea* of Lamouroux. *Laomedea*, however, has been in more general use among authors, and it will therefore be convenient to retain it; while *Clytia*, which includes only forms referable to *Campanularia* or to *Laomedea*, must accordingly be suppressed.

The Medusa of *Campanularia*, as this genus is here defined, is referable to a part of Gegenbaur's genus *Eucopa*. The Medusæ included by Gegenbaur under this name belong to two distinct types,—one distinguished, in its mature state, by its deep bell-shaped umbrella, its comparatively small number of marginal tentacles, and the position of the lithocysts in the centre of the interval between two tentacula; the other by its shallow, almost disc-shaped umbrella, its very numerous tentacula, with reentrant bases, and the position of the lithocysts—each on the inner side of the base of a tentacle. This latter group comprises the forms to which Péron and Lesueur had long ago given the name of *Obelia*; while, if *Eucopa* be retained as a generic appellation, it must be confined to the former.

*Campanularia Johnstoni*, Alder (sp.), = *Campanularia volubilis*, Johnst., = *Clytia Johnstoni*, Agass.

*Campanularia noliformis*, M'Crady (sp.), = *Clytia noliformis*, Agass.

*Campanularia cylindrica*, Agass. (sp.), = *Platypyxis cylindrica*, Agass.

*Campanularia Gegenbaurii*, Sars.

*Campanularia dichotoma*, Kölliker.

The following species are placed provisionally in this genus, the gonophores not having yet been observed in any of them. Further research will doubtless cause their distribution among two or more genera:—

*Campanularia volubilis*, Linn.

*Campanularia verticillata*, Linn.

*Campanularia Hincksii*, Alder.

*Campanularia integra*, Macgillivray.

*Campanularia raridentata*\*, Alder.

*Campanularia breviscyphia*, Sars.

*Campanularia bicophora*, Agass. (sp.), = *Clytia bicophora*, Agass.

## 2. OBELIA, Péron & Lesueur.

*Trophosome*.—Hydrocaulus branching, rooted by a creeping filiform hydrorhiza; hydrothecæ bell-shaped, with an entire or serrated margin, and destitute of operculum; tentacula surrounding the base of a very contractile, conical, clavate, or trumpet-shaped metastome.

*Gonosome*.—Gonangia developed from the hydrocaulus, and containing phanerocononic gonophores. Medusæ very flat, so as to approach the form of a disc, with a short four-lipped manubrium; radiating canals four; marginal tentacles numerous, with their roots prolonged in the form of short œcal continuations into the walls of the umbrella; lithocysts two in each interradial space, each lithocyst placed upon the base of a tentacle at its inner side.

The changes undergone by the Medusa in its progress towards maturity consist chiefly in an increase in the number of marginal tentacula.

*Obelia dichotoma*, Linn. (sp.), = *Laomedea dichotoma*, var. *a*, Johnst., = *Campanularia gelatinosa*, Van Ben.

*Obelia geniculata*, Linn. (sp.), = *Laomedea geniculata*, Johnst.

*Obelia commissuralis*, M'Crady.

*Obelia diaphana*, Agass. (sp.), = *Eucope diaphana*, Agass.

\* Judging from an observation of Wright (Mic. Journ. n. s. vol. ii.), it is quite possible that the *Campanularia raridentata* of Alder may belong to the genus *Thaumantias*. See below p. 377.

## 3. LAOMEDEA, Lamouroux (in part).

*Trophosome*.—Hydrocaulus simple or branched, rooted by a creeping filiform hydrorhiza; hydrothecæ bell-shaped, with the margin entire or serrated, but without an operculum; tentacular verticil surrounding the base of a very contractile, conical or trumpet-shaped metastome.

*Gonosome*.—Gonangia developed on the hydrorhiza or hydrocaulus, and containing adelocodonic gonophores, which never leave the cavity of the gonangium.

English authors generally include under *Laomedea* those species of *Campanulariæ* which are furnished with a branching hydrocaulus, while they refer to *Campanularia* those in which the hydrocaulus is simple. No generic distinction, however, can be based on this character—a character really unimportant, and frequently so little comprehensive that we may find the two conditions combined in the same species, thus rendering caution necessary in the employment of this character, even for the purposes of specific diagnosis.

It will be at once apparent from the diagnoses here given of *Campanularia*, *Obelia*, and *Laomedea*, that the differences in the gonosomes afford excellent characters by which we can distribute between three perfectly natural genera numerous forms of *Campanulariæ* which would otherwise defy our attempts at a satisfactory classification.

\* Hydrocaulus mostly branched.

*Laomedea flexuosa*, Hincks (sp.), = *Laomedea gelatinosa*, var. *a*, Johnst.

*Laomedea neglecta*, Alder.

*Laomedea angulata*, Hincks.

*Laomedea amphora*, Agass.

*Laomedea exigua*, Sars.

*Laomedea decipiens*, Wright.

\*\* Hydrocaulus mostly simple.

*Laomedea volubiliformis*, Sars (sp.), = *Campanularia volubiliformis*, Sars.

*Laomedea poterium*, Agass. (sp.), = *Clytia poterium*, Agass.

*Laomedea caliculata*, Hincks (sp.), = *Campanularia caliculata*, Hincks.

## 4. HINCKSIA, Agassiz.

*Trophosome*.—Hydrorhiza a creeping network of filiform tubes, from which a short simple hydrocaulus is emitted at intervals; hydrothecæ bell-shaped, destitute of operculum. Polypites?

*Gonosome*.—Gonangia borne on the hydrorhiza, and consisting of large, subcordate, pedunculated capsules with a small terminal aperture, transversely ribbed on one side, smooth on the other.

The genus *Hincksia* has been constituted by Agassiz for an Australian Hydroid described by Mr. Hincks from the dried periderm. Though there may be considerable doubt as to the justice of attributing a generic value to the characters assumed by Agassiz as the distinguishing mark of *Hincksia*, I have here retained the genus, with the expectation that the examination of the living Hydroid will confirm its title to a distinct generic rank.

*Hincksia tinctoria*, Agass. (gen.), = *Campanularia tinctoria*, Hincks.

#### 5. GONOTHYREA\*, Allman, nov. gen.

*Trophosome*.—Hydrocaulus branching, rooted by a filiform hydrorhiza; hydrotheca bell-shaped, with entire or serrated margin, and destitute of operculum; tentacula surrounding the base of a large, very contractile metastome.

*Gonosome*.—Gonophores adlocodonic. Sporosacs in the form of imperfect Medusæ (meconidia), carrying round the rudimental codonostome a circle of filiform tentacula, and, when mature, supported on the summit of the gonangium, where they lie entirely external to its cavity.

*Gonothyrea Lovéni*, Allm., = *Campanularia geniculata*, Lister, Lovén, Schultze, = *Laomedea Lovéni*, Allm.

*Gonothyrea gracilis*, Sars (sp.), = *Laomedea gracilis*, Sars.

#### 6. TRICHYDRA, Stretchill Wright.

*Trophosome*.—Hydrorhiza a branched and creeping thread, which sends off at intervals a rudimental hydrocaulus in the form of very short, tubular, cell-like processes, into which the polypites are retractile. Polypites very slender and cylindrical, carrying a single verticil of filiform tentacula round the base of a short conical metastome.

*Gonosome* unknown.

The genus *Trichydra* has been constituted by Dr. Wright for a Hydroid whose most important characters I have endeavoured to combine in the above diagnosis. I am by no means sure, however, of its being a well-established genus: it forcibly suggests the immature condition of some other form; and until its gonosome be discovered, we must continue to regard it as doubtful. It is true that Dr. Wright is of opinion that a Medusa of the type which we find in *Perigonimus*, and which he met with in a vase containing specimens of his *Trichydra*, may have been given off by this Hydroid; but it seems to me that the evidence is by no means in favour of this view, and indeed Dr. Wright does not himself insist upon it. It must be borne in mind that no trace of a gonosome was visible in any of the specimens; and I cannot avoid the belief that the Medusa found in the vase was accidentally present there. The great exten-

\* From γόνος, offspring, and θυραῖος, outside the door.

sibility of the polypites, and their power of complete retraction into hydrotheca-like receptacles, would seem to indicate that the affinities of *Trichydra* are rather with the Campanularian than with the Tubularian Hydroids.

*Trichydra pudica*, Wright.

#### 7. CALYCELLA, Hincks.

*Trophosome*.—Hydrocaulus erect, and rooted by a filiform hydrorhiza, or creeping and adherent; hydrothecæ tubular or conical, and provided with an operculum which is formed of converging lanceolate segments. Polypites cylindrical, with the tentacular verticil surrounding the base of a conical metastome.

*Gonosome*.—Gonophores adelocodonic. Sporosacs of female ultimately delivering their contents into an acrocyest.

The genus *Calycella* was founded by Hincks (Ann. Nat. Hist. Oct. 1861) with the intention of including under it certain Hydroids previously placed under *Campanularia* and *Laomedea*. *Calycella*, however, as constructed by Hincks, really involves two distinct types, one of these being represented by *Calycella dumosa*, Hincks (gen.), and the other by *Calycella syringa*, Hincks (gen.).

Now the *C. dumosa* belongs to a form which had been already defined by Lamouroux under the name of *Lafœa*, a name, therefore, which the rule of priority obliges us to leave undisturbed; and the name of *Calycella* must accordingly be retained for the remaining type alone—that represented by the *Campanularia syringa* of authors, and by the *Campanularia lacerata* of Johnston.

*Calycella syringa*, Linn. (sp.), = *Campanularia syringa*, Lamk., = *Clytia syringa*, Lamx., = *Campanularia syringa*, Van Ben., = *Wrightia syringa*, Agass.

*Calycella lacerata*, Johnst. (sp.), = *Campanularia lacerata*, Johnst., = *Wrightia lacerata*, Agass.

*Calycella?* *humilis*, Hincks.

#### 8. CAMPANULINA, Van Beneden.

*Trophosome*.—Hydrocaulus branching or simple, attached by a creeping filiform hydrorhiza; hydrothecæ with their margin continued by a delicate collapsible membrane [or else provided with a true operculum formed by converging lanceolate segments]. Polypites cylindrical; tentacula connected by a membranous web at their base.

*Gonosome*.—Gonophores phaneroecodonic. Medusa, at the time of liberation, deep bell-shaped, with moderate-sized four-lipped manubrium; radiating canals four, each terminating distally in a non-ocellated bulb; marginal tentacles two, developed from two opposite bulbs [or four, every bulb then carrying a tentacle]; lithocysts eight, two in each interradial marginal space.

The genus *Campanulina* was constructed by Van Beneden (Bull. Ac. Roy. Brux. 1847) for a delicate Campanularian Hydroid whose most striking character appeared to the Belgian naturalist to be the broad membranous web by which the bases of the tentacles were united to one another. He named the Hydroid which he thus took as the type-species of the genus *Campanulina tenuis*.

Mr. Alder, from an examination of authentic specimens of Van Beneden's Hydroid, has since determined its identity with the species which had been described by himself under the name of *Laomedæa acuminata*. As Van Beneden, however, has given us no definite specific diagnosis, while Alder has given us a very full and complete one, and as Alder's specific name has thereby become generally adopted, it will be more convenient to retain the name of *acuminata* rather than that of *tenuis*, and the rules of priority will hardly be so stringently interpreted as to offer any valid objection to this course.

In drawing up the diagnosis which I have given above for the genus *Campanulina*, I have deemed it better to make it sufficiently comprehensive to include *Campanulina repens*, Allm., a Hydroid discovered by myself, and which, with undoubted affinities to *Campanularia acuminata*, may possibly be regarded as presenting a separate generic form. It differs from *C. acuminata* in the fact of the hydrothecæ being provided with a true operculum formed of converging lanceolate segments, instead of having the undivided membranous termination which these receptacles exhibit in *C. acuminata*, and in the web which connects the bases of the tentacles being so slightly developed as to be nearly obsolete.

Besides this, the Medusa escapes from the gonangium with four well-developed marginal tentacles—a feature, however, which may only indicate a more advanced stage of development at the time of liberation, and not such as can be employed as a generic character, unless the difference in this respect between the two Medusæ can, by further observation, be shown to be permanent. I have recorded this Hydroid in my note-book under the generic name of *Hypsorophus* (*ἵψοροφος*, *high-roofed*), in allusion to the high conical operculum by which the hydrotheca is closed on the retreat of the polypite; but I prefer to keep this name as provisional, dependent on further observation proving that the difference between the Medusæ at the time of their liberation is persistent—a character which may then, when combined with the difference between the hydrothecæ, be regarded as truly generic.

*Campanulina acuminata*, Alder (sp.), = *Campanulina tenuis*, Van Ben., = *Laomedæa acuminata*, Alder, = *Wrightia acuminata*, Agass.

*Campanulina?* *repens*, Allm.

#### Æquoridæ.

##### 1. ZYGODACTYLA, Brandt.

*Trophosome*.—Hydrocaulus simple (or branched?), rooted by

a creeping filiform hydrorhiza; hydrothecæ with an operculum formed of converging lanceolate segments. Polypites cylindrical, with a verticil of filiform tentacula connected at their bases by a broad membranous web.

*Gonosome*.—Gonophores phanerocononic. Medusæ with a broad, shallow umbrella and wide and short manubrium whose lips are prolonged into numerous arm-like lobes; radiating canals very numerous; marginal tentacles very numerous, radial and interradial, each developed from a bulbous base; margin of umbrella with lithocysts; generative elements developed along the course of the radiating canals.

We are indebted to Dr. T. S. Wright for the important observation by which he has shown that the ova of *Æquorea vitrina*, Gosse, become developed into polypoid trophosomes having the characters enumerated above. The *Æquorea vitrina* of Gosse, however, is not a true *Æquorea*, but, as Agassiz has pointed out, belongs rather to *Zygodactyla* of Brandt; and *Zygodactyla vitrina* thus becomes one of the few Hydroids in which the development of the trophosome from the ova of the free Medusa has been observed. The characters of the trophosome here given are those presented by this part of the Hydroid in the most advanced state to which it had been traced by Dr. Wright; but it must not be lost sight of, that it probably undergoes further changes before arriving at its completely developed condition.

*Zygodactyla vitrina*, Gosse (sp.) = *Æquorea vitrina*, Gosse.

### Thaumantidæ.

#### I. THAUMANTIAS, Eschscholtz.

*Trophosome*.—Hydrocaulus rooted by a creeping filiform hydrorhiza; hydrothecæ destitute of an operculum. Polypites with the tentacular verticil surrounding the base of a trumpet-shaped metastome.

*Gonosome*.—Gonophores phanerocononic. Mature Medusa with a hemispherical umbrella and short manubrium with lobed mouth-margin; radiating canals four; marginal tentacles numerous; lithocysts absent; generative sacs band-like along the course of the radiating canals\*.

We are indebted to an observation of Dr. T. S. Wright for our knowledge of the trophosome of *Thaumantias*, Dr. Wright having seen developed from the ova of *Thaumantias inconspicua*, Forbes, a

\* The genus *Thaumantias* is here defined in accordance with the limits assigned to it by Gegenbaur, who restricts it to such Medusæ as possess the characters given above. *Thaumantias* as thus limited will include the *T. inconspicua* of Forbes, so far as it is possible to judge from the description of this Medusa given in the "Monograph of the British Naked-eyed Medusæ."

minute polypoid trophosome, which he describes as bearing a close resemblance to the *Campanularia raridentata*, Alder. See Wright in *Micr. Journ.* n. s. vol. ii.

*Thaumantias inconspicua*, Forbes.

### Leptoscyphidæ.

#### 1. LEPTOSCYPHUS\*, Allman, nov. gen.

*Trophosome*.—Hydrocaulus simple or branching, attached by a creeping filiform hydrorhiza; hydrothecæ with an operculum composed of converging lanceolate segments. Polypites cylindrical when extended; tentacula surrounding the base of a conical metastome.

*Gonosome*.—Gonophores phanerocononic. Umbrella, at the time of liberation, deep bell-shaped or conical; manubrium pendent from a conical projection from the roof of the umbrella, of moderate size, with the mouth surrounded by four short capitata tentacula; radiating canals four, each terminating distally in a bulb, without evident ocellus, each bulb giving origin to a cluster of two or three tentacles; a single marginal tentacle with a bulbous base is also developed from the centre of each interradial space.

I constitute the genus *Leptoscyphus* for a very minute Hydroid which I discovered some years ago in Orkney, where it occurs rather abundantly, creeping over the fronds of *Laminaria digitata*. I have already described it (*Ann. Nat. Hist.* Nov. 1859) under the name of *Laomedea tenuis*; but its remarkable Medusa, as well as the general characters of the trophosome, must certainly separate it from that genus. It will be noticed that the Medusa belongs to the type which is destitute of lithocysts, and has its generative elements developed in the walls of the manubrium, thus affording one of the two known exceptions to the rule that the Medusæ of the Campanularian Hydroids are of the type which carry lithocysts on the margin of the umbrella, and have their generative elements developed in special sexual buds which arise from the radiating canals,—the other exception occurring in the Medusa which Agassiz has referred to *Lafœa cornuta*, Lamx.†

It will also be seen that the Medusa of *Leptoscyphus* resembles in all essential points the form for which Forbes has constructed his genus *Lizzia*; and I have little doubt that, when mature, its characters would entirely correspond with this medusal type. I should accordingly have had no hesitation in assigning to the present Hydroid the name of *Lizzia*, instead of constituting for it a new genus, were it not that Claparède has found, in an undoubted *Lizzia*, that

\* From λεπτός, delicate, and σκῆφος, a cup.

† *Thaumantias*, though a Campanularian, is destitute of lithocysts, but its sexual buds are developed from the radiating canals.

the Medusa is produced directly from the egg without the intervention of a polypoid trophosome\*.

The absence of a trophosome affords a differential character of much importance; and the name of *Lizzia* must accordingly be confined to such Medusæ as, with the form of *Lizzia*, are directly developed from the egg, while it may be provisionally used for such as resemble them, but have not yet had the other terms of their life-series discovered; the detection of these will determine the genus, *Lizzia* or *Leptoscaphus*, or possibly some other still, to which the provisionally named Hydroid may belong.

*Leptoscaphus tenuis*, Allm.

## 2. LAFOËA, Lamouroux.

*Trophosome*.—Hydrocaulus creeping and adherent, or erect and rooted by a filiform hydrorhiza; hydrothecæ sessile on the hydrocaulus, or pedunculated, tubular, destitute of an operculum. Polypites cylindrical, with the tentacular verticil surrounding the base of a spherico-conical metastome.

*Gonosome*.—Gonophores phanerocononic. Medusæ deep bell-shaped, with short manubrium, four radiating canals, and four marginal tentacles with bulbous bases, destitute of ocelli; tentacles alternately long and short; lithocysts not present.

I have described the Medusa on the authority of Agassiz. It was observed by Mr. A. Agassiz on a Hydroid which his father refers to the *Lafoëa cornuta* of Lamouroux. In this observation we have thus a second example of the production among the Campanularida of Medusæ belonging to the type which is destitute of lithocysts and develops its generative elements in the walls of the manubrium. The first recorded instance was described by myself some years ago in *Leptoscaphus tenuis*.

*Lafoëa dumosa*, Linn. (sp.), = *Campanularia dumosa*, Fleming, Johnst., = *Calycella dumosa*, Hincks.

*Lafoëa cornuta*, Lamx.

*Lafoëa fruticosa*, Sars, = *Campanularia gracillima*, Alder.

*Lafoëa plicatilis*, Sars.

## Lineolaridæ.

### 1. LINEOLARIA, Hincks.

*Trophosome*.—Hydrocaulus a creeping and adherent tube carrying the hydrothecæ from distance to distance along its length; hydrothecæ sessile on the hydrocaulus, tubular, with the orifice subtriangular and armed with an earlike projection on each side. Polypites not known.

*Gonosome*.—Gonangia large, oviform, and adherent, sessile on the creeping hydrocaulus. Gonophores not known.

The genus *Lineolaria* was constituted by Hincks for a remarkable

\* See Claparède in Zeitschr. f. wissens. Zool. Band x. 1860.

Australian Hydroid, of which, however, he possessed specimens of only the dried periderm. It would seem to offer one of the connecting forms by which the Campanularian pass into the Sertularian Hydroids through *Coppinia*, *Reticularia*, and *Grammaria*; but, in the absence of all knowledge of the living animal, it is impossible to speak with decision as to its affinities.

*Lineolaria spinulosa*, Hincks.