# HYDROIDS OF THE PHILIPPINE ISLANDS

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SIX PLATES

This report embodies the results of a study of the collection of Philippine hydroids made under the direction of Dr. Lawrence E. Griffin, of the University of the Philippines, during 1909, 1912, and 1913, and includes dredgings, scrapings, etc., from the interisland cables from depths of 8 to 177 fathoms.[1] The localities given by Doctor Griffin in his letter accompanying the transmission of the collection are Bantayan Island, Port Galera, Mindoro, Culion, Luzon, Palawan, and Taytay; there were also names on tags found in most of the bottles and jars in which the specimens were preserved. On most of the jars was also a number with the prefix C; for example, C2315, of the precise significance of which I am not advised'. Perhaps it relates to a given haul of the dredge or it may be some arbitrary designation. In many cases a record of depth was included, but in none was there any record of latitude or longitude by which a given station could be later located.

Most of the material was preserved in 5 to 10 per cent formalin, but in a few cases alcohol had been used. Owing to the considerable interval before its reception at Syracuse and the unfortunate breakage of several jars in transit, some deterioration had occurred and the condition of perishable portions, such as hydranths and medusa buds, left much to be desired.

The collection comprises some fifty species which were identifiable; nearly half of them are probably new, and others had

[1] Earlier collections of hydroids from Philippine waters had apparently been rather small. The more important reports are: Busk, Voyage of H. M. S. Rattlesnake 1852; Kirehenpauer, Ueber die Hydroidenfamilie Plumularidæ, 1872; Bale, Hydroids, 1882, 1884; Allman, Hydroida dredged by H. M. S. Challenger, Part I (1883), Part II (1888); Marktanner-Turneretscher, Annal. k. k. Naturhist. Hofmuseums Wien (1889–1890); records of Japanese explorations; and still more recently the two admirable monographs by E. Stechow, Hydroidpolypen der Japanischen Ostkiiste, Part I (1909), Part II (1913). Besides these there are doubtless other records, but the number is relatively small.

been little known. One of the latter, *Idia pristis* Lamouroux, has long been known, but until relatively modern times has been very inadequately described. In this collection it is one of the commonest, but until now I had not seen the species, end at first it seemed like a new find.

The collections were made from one hundred thirty-five recorded stations, but there were doubtless others, as some containers were devoid of record, and from some that were broken in transit the record, if ever present, had been lost. Naturally, many of the records related to the same species, as implied in the fact that the number identified is, less than half the total recorded.

Another matter of some interest is the intimate relationship of habitat revealed by this material; that is, many species were apparently always found in what seemed symbiotic relations, a smaller growing upon a larger. This has sometimes been designated as parasitism, but I am inclined to doubt the existence of that relationship among hydroids. In some cases the relations were doubtless merely vorable hydroid conditions would be occupied by individuals of two or more species, and their growing together or upon each other is only what all students of hydroids very well know does occur. In the present material this habit was almost universal, an isolated specimen or colony being exceptional.

The study of the collection has been a matter of unusual interest, as it afforded an introduction to a tropical fauna having a large proportion of strange forms, among them the new genus and species *Zanclodea philippina.* This species affords another sidelight upon a problem of long standing and of perplexing difficulty; namely, that associated with Gegenbaur's Cladonemidæ and his genus *Zanclea,* based on the medusa stage alone. Even the medusa has been seldom certainly identified, and the hydroid is unknown to this day.

## Genus CORDYLOPHORA Allman

**Cordylophora dubia** sp. nov.

Two bottles labeled as from stations C2311 and 2312 contained a few fragmentary specimens, poorly preserved, rendering specific identification difficult. Among those from station C2311, taken in June, 1913, in addition to the *Cordylophora,* were fragments of *Eudendrium, Obelia,* and a sertularian, indicating a marine source. Those from station 2312 were definitely labeled as taken from Mololas River, of the same date as those from

the other. Whether or not there may have been some accidental mixing of the specimens it is impossible to say, though it is not impossible that the *Cordylophora* of the former, true to its variable habit, may have had its habitat in the salt water.

*Trophosome.*—This is distinctively of cordylophoran type, main stem branching alternately, perisarc smooth except at regions of branches, the latter having at their origin a few basal annulations; hydranths clavate rather than spindle-shaped with conical hypostome, the twelve tentacles filiform and tending to assume whorls, though scattered downward upon the hydranth body.

Gonosome.—The gonophores were badly preserved and impossible of critical determination as to structure. They usually appeared in clusters or groups on distal parts of branches, ovoid, each borne on its own pedicel; the gonangial capsules were similar to those of Cordylophora *lacustris*, yet in some respects distinctly different. The 'stems were slenderer, hydranths smaller, and gonangia clearly different.

While the material is such as to render uncertain many aspects of form and structure, and so leaves doubtful any definite pronouncement as to specific independence, it seems well for the purpose of record to list it as a doubtful new species, *Cordylophora dubia,* until better material may furnish final certainty.

## Genus BOUGAINVILLIA Lesson

Bougainvillia philippensis sp. nov. Plate 1, fig. 1.

Specimens of this apparently new species of *Bougainvillia* were taken at stations 702 and 799, from depths of 40 and 54 fathoms, attached to small bivalve shells, the stolons creeping more or less in the grooves of the shell, and the surface seemingly covered with a mucous mass resembling somewhat that covering the hydrorhiza of *Hydractinia.*

*Trophosome.*—The hydrocaulus grows to a height of 10 to 15 millimeters, stems and branches covered with a smooth, firm perisarc, with occasional indefinite annulations at the origins of branches. Hydranths large, ovoid or broadly spindle form, with conical hypostome from the base of which arise about twenty to thirty filiform tentacles.

*Gonosome.*—Medusæ arise in compact clusters on the upper portions of stem and branches, and in my specimens in various stages of development, from mere buds to almost fully grown medusæ, some with tips of tentacles protruding from the bell, yet it was not possible to determine their structural details. In

shape the body is rather pyriform as seen attached, and the ocelli could be readily distinguished, though the character of the manubrium could not be determined.

So far as I am aware, the only species with clustered medusae is *Bougainvillia flavida*, described by Hartlaub,[2] though differing in most other features. Bonnevie has also described a species, ***B. obscura***,[3] with some features in common, yet very distinct otherwise.

## Genus PERIGONIMUS M. Sars

*Trophosome.*—Hydrocaulus simple or branched; hydrorhiza a filiform creeping or reticular network; hydranths fusiform, with conical hypostome; perisarc rather thin and usually with an outer encrustment of foreign particles extending to the base of the tentacles.

Gonosome.—Free medusae, usually with high bell, and with two to four tentacles (usually two at liberation), arising from large basal bulbs, devoid of ocelli.

**Perigonimus repens** Hincks.

*Perigonimus repens* HINCKS, Brit. Hydr. Zooph. (1868) 90; CALKINS, Proc. Bost. Soc. Nat. Hist. (1899) 339.

Among material taken at stations 757, 790, and 879 were hydroids indistinguishable from this species, though owing to poor preservation it was difficult to confirm details of medusoid structures. The material was taken from depths of 10 to 100 fathoms, and mostly adhering to shells and stems of *Tubularia*.

**Perigonimus scandens** sp. nov. Plate 1, fig. 2.

The material was taken at stations 738, 778, 861, and 883, at the last from a depth of 110 fathoms. The species differs from any known to me, and from the following description will be recognized as new.

*Trophosome.*—Stems often fascicled in the older portions, and with a generally smooth and transparent perisarc, in striking contrast to that of most known species. Weight, 15 to 20 millimeters; branching; hydranths low, vasiform, with domelike hypostome, tentacles rather short, twelve to sixteen; perisarc smooth, annulated at origin of branches.

*Gonosome.*—Medusæ borne on stems and branches, each on its own pedicel, which is annulated; as the medusae approach maturity the two tentacles become conspicuous and often protrude

[2] Hydromedusen Helgolands (1897) 456–461, pl. 14, figs. 1–10.
[3] Neue norwegische Hydroiden (1898) 7, pl. 1, fig. 4.

from the bell; their basal bulbs are very large and devoid of ocelli.

The species seems to live upon other hydroids, creeping over them in parasitic fashion, and in this material always in such relation. The name proposed for the species is indicative of this climbing habit.

Hartlaub [4] has described a hydroid similar in its trophosome features to that here described, but he offers no specific account, as there were no gonophores present. His species was very minute, 6 millimeters in height and with but eight tentacles, with perisarc extending to their bases, a point of contrast with the above species.

## Genus CORYDENDRIUM Van Beneden

### Corydendrium minor Nutting.

*Corydendrium minor* NUTTING, Bull. U. S. Fish. Comm. Part 3 (1906) 941.

At stations 773, 836, 846, 853, and 855 were taken numerous colonies which seem to be identical with the species described by Nutting from Hawaii. I add such details as seem essential.

*Trophosome.*—Colonies mostly arising from stoloniferous filaments attached most frequently to other hydroids, though occasionally to other objects. I do not recognize any essential aspects of parasitism such as Nutting suggests. Stems average about twice the height given by Nutting, but agree in being fascicled and in most other features. The hydranths are predominantly spindle-shaped rather than pyriform, with about fifteen filamentous tentacles, which are rather promiscuously distributed over the body of the hydranth, with no evidences of whorls.

Gonosome.—Medusa buds arise generally from independent branches and singly. As they approach maturity the general organogeny is easily made out. Four radial canals, numerous tentacles folded within the cavity of the bell; manubrium well developed, indicating a period of freedom during the life history; indeed, in handling the specimens they frequently became detached from their pedicels.

## Genus TUBULARIA Linnæus

*Trophosome.*—Hydrocaulus with a tubular perisarc, usually unbranched, or irregularly and without annulations. Hydranths

[4] Eped. Antarc. Belg. (1904) 8, fig. 2.

relatively large and flask-shaped, with a basal whorl of filiform tentacles, and a distal or oral series of similar shape, usually fewer in number.

Gonosome.—Gonophores medusoid, though not becoming free, borne in racemelike clusters just above the basal tentacles. Eggs develop into actinulæ which are set free and attach themselves as young hydroids.

**Tubularia crocea** (Agassiz).

Specimens of a *Tubularia* taken at stations **846,** 849, and 859 were fragmentary and undeveloped, but in all distinguishable respects closely resembled this species. Specimens were small, **30** to **40** millimeters in height, usually with only twelve to sixteen tentacles in each cycle. Gonophores rudimentary. All the specimens were supporting colonies of a symbiotic hydroid, as were many other species. These will be described in another connection.

**Ectopleura dumortieri** (Van Beneden). Plate **1,** figs. **3** and **4.**

*Tubularia dumortieri* VAN BENEDEN, Rech. sur l'Embryogenie des Tubulaires (1844) 50.

*Ectopleura dumortierii* AGASSIZ, Cont. Nat. Hist. 4: 343; ALLMAN, Ann. & Mag. Nat. Hist. III 13 (1864) 368; HINCKS, Brit. Hydr. Zooph. 1 (1868) 124; BROWNE, Proc. Roy. Soc. Ed. (1905) 748; HARTLAUB, Nord. Plankton (1907) 94; HARGITT, Biol. Bull. 14 (1908) 108; MAYER, Medusae of the World 1 (1910) 69.

This hydroid was taken at station 862, from a depth **of** 10 to 12 fathoms, in a fine state of development, and laden with medusa almost ready to be set free. The specimens were somewhat larger than those I have seen before, yet otherwise seem indistinguishable from the above.

*Trophosome.*—Hydrocaulus simple or sparingly branched, about 50 millimeters in height; hydranth large, flask-shaped, with the two series of tentacles of filiform character in general, but the oral series occasionally somewhat capitate. Proximal, about thirty; oral, fifteen to twenty.

Gonosome.—Gonophores borne on long, branching pedicels with medusæ in various stages of maturity, the larger with two primary tentacles protruding from the bell, and a second pair visible. None mature enough to show the ectodermal zones **of** nematocysts.

I cannot agree with the assumption of Mayer that this species is in any specific respect identical with *Ectopleura* ochracea.

My description of the latter was published in **1904,** and that of Mayer in 1910 in which he designates it as a synonym. In my description of ***E. dumortieri*** I designated it as perhaps a variety, namely, *prolifica;* but later comparisons of the descriptions **of** both Browne and Hartlaub (vide supra), convince me that it is essentially identical with the above, and especially is this sustained by the material here described. Having taken both species frequently at Woods Hole, and compared those with the specimens from the Philippines, I am thoroughly convinced of the validity and distinctness of the two species.

## Genus **CORYMORPHA** M. Sars

**Corymorpha symmetrica** sp. nov. Plate 2, fig. 5.

The genus *Corymorpha* has generally a northern range, but recently Stechow [5] has described a specimen of this genus, *C. nana,* taken at Plymouth, England.

.In the Philippine collection was found at station **2307** a hydroid which is undoubtedly a member of this genus ;this goes to confirm Stechow's account just mentioned, and thus again shows that hydroids, like most organisms, may now and then be found far outside their usual range, in the present case very far removed from an Arctic environment.

At first sight it seemed to be fairly similar to *Corymorpha nana,* especially as described by Bonnevie,[6] and is thus especially significant in the light of Stechow's account; but closer scrutiny showed that it belongs elsewhere; indeed, it seems to be distinctly a new species, and also new for this genus from this region.

*Trophosome.*—Hydroid solitary, yet with stoloniferous growths from its base, forming apparently a distinct rhizocaulus, but I found no disposition toward the formation of colonies. The habitat is peculiar; it grows upon masses of **a** red coralline, which as a background made it very distinct and conspicuous; and in many cases the coral grew about the base **of** the hydroid. Its characters are distinctively true to type; stems with usual cœnosarcal canals, the peculiar perisarc of the genus, hydranths large and flask-shaped and rather sharply constricted at base; two series of tentacles, a basal series of from thirty tu forty which are long and filamentous, depending chiefly on the age of

[5] Journ. Marine Biology **9 (1910-13) 404-406.**
[6] Norw. North-Atlantic Exped. (1876–1878) **1899, p. 22.**

the specimen, an oral series varying from twenty-four to thirty-six. Hydroid from **20** to **30** millimeters in height.

Gonosome.—Medusa are borne just above the basal tentacles, and on peculiar peduncles, which at first seemed to be an elongate raceme with numerous medusa buds; but, in fact, the latter on my specimens appear to be relatively few, and what at first seemed very small buds were complexly branched masses of nematocysts, as shown in the figures. The largest medusa buds had no apparent asymmetry; no tentacles, but tentacular buds of similar size and position. In shape the medusae are typical, apparently devoid **of** functional tentacles, and with faint pigmentlike granules on the outer side; radial and circular canals typical, but no specimen shows the character of manubrium or sex. Largest about 0.7 millimeter in height by 0.6 millimeter in diameter.

The marked symmetry of the medusæ, especially as compared with *Corymorpha* nana (Alder), its nearest relative, distinguishes it from any other known to me.

## Genus EUDENDRIUM Ehrenberg

**Eudendrium attenuatum** Allman.

*Eudendrium attenuatum* ALLMAN, **Hydroida of the Gulf Stream, Mem. Mus. Comp. Zool. 5 (1877) 6.**

Allman's description of this species was based upon the naked stems and branches, neither hydranths nor gonads being present, and he gives it only a provisional name. The material at hand agrees very closely with the description of Allman, and I believe the species to be identical. I therefore add descriptions of the features lacking in the original account, and accept the name given there.

*Trophosome.*—The entire colony is distinctively of the *Eudendrium* type, hydrorhiza filiform and reticulate, stems slender, unfascicled, branching alternately, the branches annulated at origin as are also the pedicels; stem almost devoid of annulation except at its origin from the stolon, or only rarely above: hydranths of usual type, with from twelve to sixteen tentacles, hypostome trumpet-shaped in extension.

Gonosome.—The gonads are **of** the typical sort; females borne in a series on the ends of pedicels having arisen from the hydranth, usually degenerate or entirely aborted; male gonophores lacking in my material.

Taken from a cable at a depth of **100** fathoms, agreeing again in general with Allman's, which was dredged from a depth of 60 fathoms.

Eudendrium griffini Light.

*Eudendrium griffini* **LIGHT,** Philip. Journ. Sci. § D **8 (1913) 333.**

My material was taken at stations **2146** and **2309,** in shallow waters, attached to stones and seaweeds. Light's description is extended and renders unnecessary any extended account here.

*Trophosome.*—The hydroid is rather small, from **15** to **25** millimeters, borne on the usual reticulate stolons, stems mostly smooth with occasional annulations ; hydranths relatively very large, with numerous (forty to fifty) tentacles, and with trumpet-shaped hypostome.

Gonosome.—This is of the usual type, though in the male only about two gonads on a given hydranth, and on opposite sides, with one or two chambers; in females, gonads borne on base of hydranth and of the usual type, though spadix not bifurcated as in *Eudendriwm ramosum,* and as they approach maturity the pedicel weakening and falling upon the stem and becoming fused therewith.

This is a very interesting species among the many interesting ones known. *Eudendrium* hargitti, described by Congdon from Bermuda,[1] is hardly less so.

## Genus PENNARIA Goldfuss

Pennaria tiarella McCrady.

*Pennaria tiarella* **MCCRADY,** Proc. Elliot Soc. Nat. Hist. 1 **(1859) 153.**

**At** stations **795** and **2306** colonies of Pennaria were taken which in all essential features I recognize as this species, though their state of development is not at that condition which would make the comparison wholly demonstrative, except if one would make such comparison with specimens in similar state. This I have been able to **do** with material from Beaufort, N. **C.,** and the, two show such close correspondence that **I** have no hesitation as to their identification. No details of description will be offered in this connection, since the species is too well known to call for such. It may be worth while to state that the specimens at station **795** were attached to *Zostera,* a habitat very common with this species, and one that

[1]Proc. Am. Acad. Arts and Sci. **42 (1907) 463.**

fortunately corresponds very closely with species of this habitat from Woods Mole.

**Pennaria pacifica** Clarke.

***Pennaria*** *pacifica* CLARKE, **Mem. Mus. Comp. Zool. 35 (1907) 6.**

From two stations, **779** and **2310,** specimens were taken that are so closely similar in various aspects of structure that I have no hesitation in referring them to Clarke's species. They are rather sharply different as to the trophosome characters, the stems and branches being unlike those of the preceding species in the extent of annulation, the size, and aspects of the hydranth. Clarke[8] has so fully described this species that it is unnecessary to give any details here.

In view of some recently proposed revisions of species of *Pennaria* by Stechow[9] it seems both pertinent and rather imperative to enter some protest and correct certain obvious errors and misinterpretations of fact.

There need be no doubt of the fact that, in those earlier days when the taxonomist reckoned his success by the number of species described, the temptation to multiply species was responsible for much confusion; but, on the other hand, any hasty reaction and unwarranted nullification of long-standing and well-founded species must inevitably lead to further confusion. I was among the first to show the importance of giving critical attention to the influence of varied environmental conditions upon such plastic organisms as hydroids, in an early paper on the development of *Pennaria tiarella.*[10] On the basis of this study Clarke soon after took occasion to correct certain errors of his own (vide supra). Stechow's attempt to reduce all known species of *Pennaria* to a very few, or perhaps one, seems too radical and reactionary for serious consideration.

I have studied with much care the development of several species of *Pennaria,* and have compared the morphology of both the hydroid and the medusoid aspects of species from widely separated geographic and hence climatic regions, such as Australia, the Mediterranean, Philippine Islands, Porto Rico, Bermuda, Tortugas, etc. I believe that, while there are cases in which species have been founded on local variations, such as *P. gibbosa* and *P. tiarella,* which I sought to correct,[11] for the

[8] **Mem. Mus. Comp.** Zool. **35 (1907) 6.**
[9] **Zool. Jahrb. 32: 336.**
[10] **Bull. U.** S. **Bur.** Fisheries **24 (1904) 32.**
[11] **Loc.** eit.

most part the species earlier established are based upon good characters. The contention of Stechow that temperature may be a serious disturbing feature in its relation to species may be well worthy of consideration, but his application of this to *Pennaria* is a direct reversal of the facts involved. For example, his attempt to interpret the liberation and free life of the medusae of *Pennaria* as being due to the low temperature! of deeper waters, while the fact that those with a habitat on eelgrass during midsummer do not liberate the medusae is attributable to the higher temperature which lessens vitality, is the very opposite of what actually happens. In *P. tiarella* those liberating the medusae in great numbers are the summer variety, while those which mature the medusae in early summer and from deeper waters never liberate them. It is thus in *P. australis* also. During midsummer medusae are liberated in enormous numbers and, as in *P. tiarella,* during early evening. In the ease of ***P.*** *cavolini* the medusae seem never to be set free. At two different times I have worked at the Naples laboratory during the height of the breeding season and, in spite of every effort to secure free medusae of the species, I never succeeded in observing or taking them in the tow. Doctor LoBianca, an expert on the fauna of the Neapolitan waters, assured me that medusae of *Pennaria* are never set free from the hydroid. It seems safe, therefore, to say that conditions of food or temperature can have little direct influence upon the very important point under review.

In *Pennaria cavolini* the distinctions are sharper than in any other species at hand. The pedicels are constantly short, averaging about **0.6** millimeter, and are constantly and completely annulated. The hydranths are shorter than in the other species, and the medusae fixed.

In *Pennaria australis* the general aspects of the hydroid are similar to those of the preceding, pedicels short, averaging from 0.6 to **0.7** millimeter, but with only about five annulations at the base; medusae constantly free, and larger than in any of the other species.

In *Pennaria pacifica,* while the general features are similar to those of *P. tiarella,* again the pedicels are shorter, averaging from **1.4** to 1.6 millimeters, and with five **or** six annulations at the base.

In *Pennaria tiarella* there is a marked difference in these respects; pedicels slender and from **3** to **3.75** millimeters, with five or six annulations at the base.

## CLADONEMIDÆ Gegenbaur, 1856

### Genus ZANCLOIDEA novum

*Trophosome.*—Hydrocaulus well developed, branching, and with dense brownish perisarc; hydranths clavate, with conical or rounded hypostome; tentacles of two sorts, filiform, irregularly distributed over the body, in many cases heavily annulated and bearing numerous masses of nematocysts; a second series, few in number, orally situated, and capitate.

Gonosome.—Gonophores medusoid, with bell well developed, four radial canals, two marginal tentacles, provided with abaxial tuffs of nematocysts borne on stalks; exumbrella free of meridional rows of nematocysts; no ocelli.

Type, Zancloidea *philippina* sp. nov.

**Zancloidea philippina** sp. nov. Plate **2,** fig. **6.**

At a number **of** stations, among them 764, 850, 871, **879,** and 883, were taken colonies of a hydroid of very unusual characters and most puzzling as to its systematic relations. Finally specimens were discovered which bore nearly mature medusae whose characters at once showed affinities with the Cladonemidæ. Careful staining and mounting demonstrated in a few cases the protruding tentacles from the medusa, with the stalked nematocysts **of** Zanclea and Gemmaria. At first it was thought that in this hydroid we might have at last the long-sought hydroid stock of Gegenbauer's Zanclea *costata;* but the medusae showed the presence **of** only two tentacles and, moreover, absence of the exumbrellar rows of nematocysts. Again, the hydroid characters differed in most respects from those **of** Gemmaria, the only genus in which the hydroid is really known.

*Trophosome.*—Hydrocaulus stout, **30** to 50 millimeters in height, irregularly branched, with dense brownish perisarc, generally smooth surface, but with a lamellalike structure, and with annulations only occasionally near base of stems or origin of branches. The interior of the perisarc occasionally shows indications of annular thickenings, similar to those figured by Hincks in Zanclea *implexa.* Hydranths very large, **3** to 5 millimeters in length by about **0.5** to 0.7 millimeter in diameter in larger regions; shape clavate, becoming larger toward the oral region; hypostome rounded, with capacious mouth. In one case two distinct hypostomes and mouths were present. Tentacles numerous and irregularly disposed over the entire body

of the hydranth, chiefly filiform, with occasionally the appearance of a few capitate ones about the mouth; most of them definitely characterized by strong annulations composed chiefly of massed batteries of nematocysts, especially on the distal portions.

The characters of the hydroid will be seen to differ so markedly from those of the hydroids of *Gemmaria* as to exclude it from this genus; but the same is true when one tries to find any clearer affinities with other genera. As will be noted, the medusoid characters point strongly to the Cladonemida.

*Gonosome.—The* medusae are borne over the entire body of the hydranth, each apparently on a single pedicel, though it is common to find the buds arising in clusters, and in some cases they seem to have a common basal peduncle, as I have shown in the case of *Gemmaria implexa* and as is also true of G. *gemmosa.* Some of the medusae seemed to be approaching maturity, the tentacles being protruded from the bell, and in these cases showed clearly the stalked nematocysts mentioned above. Largest buds 0.5 millimeter high, by about half that in width. Color pinkish in preserved material, and in one case a note gave that as the color of fresh specimens.

While there can hardly be reasonable doubt as to the affinities of the species with the Cladonemida, it is likewise even less doubtful that we have to do with an undescribed species. This is particularly true of the hydroid whose distinctive characters differentiate it from any species or genus known to me. Except for the medusan characters, which are strongly suggestive of the cladonemids, it would be difficult to place it under any existing hydroid family. The characters of the hydranth have little indicative of any gemmarian affinities, and the facts that *Zanclea* was established solely on medusan characters, its hydroid being absolutely unknown to this time, and that *Z. implexa* has been adjudged by highest authority to belong to *Gemmaria* leave the genus *Zanclea* without a single clearly recognized hydroid stock. In making this statement I do not overlook the contention of Hartlaub[12] who would identify G. *implexa,* given by me in 1904, as a different species which he designates as *Z. hargitti,* basing the distinction upon the single question of the medusa being distributed over the hydranth body and frequently several upon a single peduncle as contrasted with some earlier descriptions which designate them as

[12] Nord. Plankton 12 (1907) 115, 119.

borne upon a single pedicel and in a whorl below the tentacles—a contention altogether trivial in the face of facts familiar to anyone who has studied the colonies in the height of their breeding season. Having in an earlier paper [13] submitted a brief account of some facts related to this point, I do not deem it necessary to go into further details here.

Mayer [14] has discussed certain phases of this problem, and assigns a specimen of *Gemmaria gemmosa* [15] to *Zanclea costata* Gegenbaur, provisionally but wholly gratuitously. There are also several errors of fact in the account; for example, designation of McCrady's medusa as having four tentacles, and as being 6 millimeters in height by 4 millimeters in width—points absolutely unmentioned by McCrady. Further, it has been observed repeatedly that this species at Woods Hole comes to productivity with only two tentacles and with a maximum height of 1.7 millimeters.

Bigelow [16] describes these medusæ as having a maximum diameter of 1 millimeter, and having but two tentacles, but with ripe gonads, which indicates that they have attained full size. I may merely point out that while Bigelow refers to my earlier discussion of Hartlaub's views he curiously ascribes to me full agreement therewith, the very point against which I had strongly protested.

It remains to refer to a still later account bearing on our problem [17] which describes a medusa designated as *Zanclea implexa* which has four tentacles but differs in two other points from the species as known; namely, the lack of the exumbrellar perradial nettle rows, and the presence of well-defined abaxial, purple-red ocelli on the tentacle bulbs, characters absolutely unknown in any species described. In spite of these facts Neppi ascribes it without hesitation to the species above named, explaining the absence of the perradial nettle rows as probably attributable to their degeneration as the medusae approximate maturity! He also gives the depth from which it was taken as 1,000 meters, a further fact hard to conceive of in a species distinctively of surface habitat!

[13] **Biol. Bull. 14 (1908) 100–106.**

[14] Medusae **of the World (1910) 87.**

[15] **Bull. Mus. Comp. Zool. 37 (1900) 35.**

[16] **Mem. Mus. Comp. Zool. (1909) 187–188.**

[17] **Neppi, Valeria, Adriatische Hydromedusen, Kais. Akad.** Wiss. **Wien 121 (October, 1912) 11.**

Even among the best taxonomists the problems of these sections of Cladonemidæ are extremely perplexing. This I believe to be due largely to the unfortunate disregard of first principles of scientific taxonomy; namely, complete knowledge of the entire life cycle. This was long ago pointed out by such masters as Agassiz and Allman, the former giving expression to the idea in the following words, referring directly to hydroids:[18]

A true regard for science ought to lead us to imitate the entomologists, who raise the larvae of insects before naming them.

Only two years later the latter states:[19]

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 every other group of the animal kingdom, should be almost entirely ignored in our attempt at a systematic arrangement of the Hydroids.

**Cladocoryne floccosa** Rotch.

*Cladocoryne floccosa* ROTCH, Ann. & Mag. Nat. Hist. IV 7 (March, 1871) 228; ALLMAN, The Gymnoblastic Hydroids, London (1871) 380; Du PLESSIS, G., Mitt. Zool. Sta., Naples 2 (1881) 178; HARGITT, Biol. Bull. 17 (1909) 369.

Material collected at station 746 from a cable at a depth of 25 fathoms contained, along with other hydroids, a few colonies of this beautiful hydroid. The species agrees admirably with the descriptions of the above-named authors, the last excepted, and is further considered in a later section.

*Trophosome.*—Stems simple, from a reticular hydrorhiza, and averaging about 7 millimeters in height; hydranth prominent, with long and branched tentacles from its base, ten to twelve in number, and terminating in knobbed masses of nematocysts; a second whorl of about six simple tentacles about the mouth, ending in similar knobs.

The entire trophosome is well protected with a perisarc, extending to the base of the flask-shaped hydranth; it is mostly smooth, or with occasional annulations.

This material agrees in all essentials, including depth, habitat, etc., with that described by du Plessis (vide supra), but seems to lack the batteries of nematocysts which both he

[18] Natural History of the United States 4 (1862) 339.
[19] Ann. Nat. Hist. (May, 1864) 345.

and Rotch describe as located between the tentacle bases on the body of the hydranth. I find no evidence of these in my material.

Gonosome.—This is absent in my material, but du Plessis describes it very fully in his extended paper just referred to.

In this connection I desire to correct certain points of my former account (vide supra), wherein I described a form that I found on Sargassum at Woods Hole in 1909 and designated as a varietal form of *Cladocoryne floccosa*, which form I named *sargassensis*, from its habitat on this seaweed. At that time I was not aware of a species described by Allman [20] and named C. *pelagica* from its floating habitat. As I stated at the time, the species differed in several respects from C. *floccosa;* but, comparing it now with this material and the description of Allman, and that later of Inaba cited by Stechow,[21] I am convinced that the Woods Hole species is identical with C. pelagica, and take this opportunity so to designate it.

**Clytia delicatula** (Thornely).

*Clytia* sp. INABA (1890) figs. 34, 35.
*Obelia delicatula* THORNELY, Zool. Results 4 (1900) 453.
*Campanularia delicatula* JADERHOLM, Neue oder wenig bekannte Ostasiatische Hydroida (1902).
*Clytia delicatula* STECHOW, Hydroidpolypen der japanischen Ostkiiste Part II (1913) 65.

Specimens of my material were taken at station 2130, and agree in all essentials with the descriptions of the above-named authors. The confusion as to genus by both Thornely and Jaderholm was probably due to inadequate material, or misinterpretation of the nature of the gonosome. It remained for Stechow finally to clear up the case, using freely the description of Inaba.

My material was collected by Light in April, 1913, at Taytay, Palawan, and was growing upon barnacles (*Lepas*), which were attached to a piece of bamboo that had been washed ashore.

**Clytia kincaidi** (Nutting).

*Campanularia kincaidi* NUTTING, Hydroids from Alaska and Puget Sound (1899) 743.
*Clytia kincaidi* FRASER, Hydroids of Vancouver (1914) 146.

From stations 732 and 743, among other hydroids, were specimens which I believe to be of this species, though absence

[20] Journ. Linn. Soc. 12: 251.
[21] Hydroidpolypen der japanischen Ostkiiste, Part II (1913) 50.

of gonosomes makes impossible an exact identification. In my material it was not easy to distinguish the deeply fluted hydrothecae described by the above-named authors, yet in all other respects they agree.

**Clytia** alternata sp. nov. Plate 2, fig. **7.**

Material from stations **2310** and **2313,** Port Galera, Mindoro, among other hydroids, contained a species which appears to be new.

*Trophosome.*—Hydrorhiza a creeping reticulum, stems rising to a height of **10** to **20** millimeters, sparingly branched, with hydrothecae arising alternately, giving to the stem a somewhat geniculate aspect, and borne on long annulated pedicels, campanulate in shape, margins with about twelve very acute teeth, the distal portions of the walls very delicate and often appearing to be fluted; hydranths large, with about fifteen tentacles and rather conical hypostome, but poor preservation makes this point doutbful.

*Gonosome.*—Gonangia elongate, obconical and with distal portion abruptly truncate, borne in axils of the stem and hydranth, on short annulated pedicels; orifice smooth with slightly everted lips; medusæ borne in a single row along the blastostyle.

The species resembles somewhat *Clytia linearis,* but careful comparison only emphasizes the distinctness.

Clytia tubitheca sp. nov. Plate **2,** fig. 8.

From station 765 was found a species of *Clytia* rather unique in the greatly elongated hydrothem, averaging about 0.6 millimeter in length by **0.2** millimeter in diameter. Gonothecae, 0.5 millimeter in length by about **0.25** millimeter in diameter. Pedicels annulated, the entire length of stems being about **1** millimeter. Margins of hydrothecae dentate with faint striæ parallel therewith, the entire theca being cylindrical, with a short constriction at the base to articulate with the pedicel.

Gonosome.—Sessile, elongate, rather clavate, and abruptly truncate, orifice smooth. Medusae present in various stages **of** development.

This is the only species of *Clytia* known to me with distinctly cylindrical hydrothem, though Agassiz has described one, *C. cylindrica,* which is claimed to have such, but most of the published figures fail to show this.

**A** species described by Marktanner-Turneretscher has some resemblance to this one, but its trophosome shows distinct dif-

ferences, and it is also doubtful in that no gonosomes are present?

Clytia longitheea sp. nov. Plate 3, fig. 9.

The material containing this hydroid was taken at stations 732 and 874. On first study it seemed to conform in its trophosome character with Allman's Obelia *longicyatha*,[23] which was based upon the trophosome alone. It was later referred by Pictet to *Clytia*, but I have not seen his description, and depend upon those of Billard[24] and of Nutting[25] but have some doubt as to the identification after study of the present material. Except for the marginal teeth, which are single in Nutting's species, it compares well with that here described.

*Trophosome.*—The stems arise from a creeping stolon, somewhat reticular, at first simple but soon branching profusely, and often becoming fascicled by the downgrowth of tubes from the base of branches. Further reference is made to this in the description of Obelia longithem below. Height of stems, 20 to 50 millimeters, hydrothecae long, obconic, distal portions very delicate and hyaline, and margins with about ten pairs of acute teeth, becoming somewhat fluted parallel with the teeth; pedicels short and annulated, hydranth large, with about twenty long stout tentacles.

*Gonosome.*—Gonangia very long and club-shaped, medusæ in all aspects of development, some in process of escape from the gonangium.

The species is one of the largest known to me, and is very beautiful.

Obelia longikheea sp. nov. Plate 3, fig. 10.

Numerous colonies of an Obelia that seems to be new were taken at stations 690, 855, 864, 878, and 884. Except in size it has much in common with a hydroid described by Thornely as Gonothyrea *longicyatha*.[26] Her description was confirmed by Stechow in material obtained at the entrance of Uraga Kanal, Japan, 1904.[27] The absence of gonangia in his material, and what may have been a misinterpretation of the gonosome by Thornely, led both to assign the hydroid to Gonothyrea. I

[22] Die Hydroiden des k. k. Naturhist. Hofmuseums Wien (1889) 215.
[23] Mem. Mus. Comp. Zool. 5 (1877) 10.
[24] Exped. Scientifique du Travail. et Talisman 8 (1907) 168.
[25] American Hydroids, Pt. III (1915) 58.
[26] Willey, Zool. Results, Pt. III (1900) 451.
[27] Hydroidpolypen der japanischen Ostkiiste, Part II (1913) 71.

strongly suspect that it should have been assigned to *Obelia*, an impression that is strengthened by an admission of Thornely as follows:

**If what appears to be an external capsule** is **in reality an escaping medusiform zooid, the species may be an *Obelia*.**

*Trophosome.*—Hydrocaulus large, 8 to 12 centimeters high, branching profusely, stems fascicled in older parts, and showing downgrowths of tubular structures similar to those described by the above-named authors for their Gonothyrea. This is not, however, a character of any specific note, since it is common in many species. Hydranths large and long, with about fifteen filamentous tentacles arising below the hypostome, which is trumpet-shaped but much longer than usual, as will be seen from the figures. Hydrothecæ very long and with about ten pairs of acute teeth about the margin, pedicels rather long and variably annulated, in many cases totally so, while in others they'may comprise only the basal and distal parts. The size is also variable, especially in material from different stations. For example, those from station 690 were 0.9 millimeter long, pedicels averaging **0.35** millimeter, with annulation variable; in those from station 855, hydrothem averaged 1.18 millimeters long, pedicels about 0.5 millimeter; those from station 878 averaged about **0.9** millimeter long, pedicels about as in the others.

*Gonosome.*—Gonangia long, slender, and club-shaped, averaging **1** millimeter long by 0.25 millimeter in greater diameter; medusæ were present in the gonangia in large numbers and in all stages of development, some in process of escape with tentacles, about thirty in number, extended.

Allman has described an ***Obelia*** *longicyatha,*[28] but his account dealt with the trophosome only and the transfer of the hydroid by Pictet (see under *Clytia longitheca*) ; it has many points of likeness with the one here recorded but, for obvious reasons of distinction and to avoid confusion, I have proposed it as a new species under the above caption.

**Obelia** sp.?

An unrecognized species of ***Obelia*** was taken at station 737, at 24 fathoms, which seems worth while recording, though' absence of the gonosome makes an attempt to determine ids specific relations little more than guesswork. The trophosome

[28] Mem. **Mus. Comp. Zool. 5 (1877) 10.**

is characteristically Obelian, stems from a filamentous rhizocaulus branching and with hydranths arising in axils, pedicels short, annulated, and with large hydrothew with undulating, or obscurely toothed, hydranth with about twenty filamentous tentacles. Gonosome absent.

Obelia attenuata sp. nov. Plate 3, fig. 11.

At station 765, associated with several other hydroids, was found a species of Obelia apparently undescribed. In the general shape of its trophosome it resembles Obelia longitheca, yet in most other respects its characters are very different.

*Trophosome.*—Hydrocaulus simple or sparingly branched, very slender, about 15 millimeters high, hydrothew arising alternately, elongate obconic, margins with about ten pairs of bimucronate teeth like those of Obelia longitheca, 0.5 millimeter long, on short annulated pedicels. Base of stems occasionally fascicled.

*Gonosome.*—Gonangia elongate, clavate, ending abruptly, 0.55 millimeter in length by 0.2 millimeter in average diameter. Genital products apparently medusoid, but too young to afford positive characters, borne on a central blastostyle.

The above name is proposed with some doubt, and is given provisionally as a basis of record.

Silicularia rosea Meyen. Plate 4, fig. 12.

*Silicularia rosea* MEYEN, Ueber d. Leuchten d. Meeres (1834) 204.
*Hypanthea aggregata* ALLMAN, Hydroida of the Challenger Expedition, Pt. II (1888) 26.
*Silicularia rosea* JADERHOLM, Hydroiden aus Antarktischen und Subantarktischen Meeren (1905) 17; NUTTING, American Hydroids, Pt. III (1915) 91.

Colonies of this hydroid were taken at stations 857 and $67, all of them small but in good condition, though without gonangia; taken from a cable at depths of 60 and 150 fathoms. Stems simple, from creeping stolons, base of stems expanded into enlarged supporting portion and conical at the point of extension of the very slender and amber-colored stems or pedicels, so thickened as to obscure the inner cœnosarc. Hydrothecæ rather hemispherical, with greatly thickened walls and oblique margins, in many cases with a fissurelike expression of the lower obliquity of the cup. Entire height from 2 to 5 millimeters.

According to Nutting, "This genus is found only in the Southern Hemisphere, and most of the species are in the subantarc-

tic region." On this basis the one here recorded will materially extend its distribution to the Northern Hemisphere.

Nutting makes Allman's *Hypanthea* uggregata synonymous with the species under consideration, but a comparison of their figures with my own will show considerable differences. I have some doubt as to their identity, yet hesitate to propose a new specific name, especially in the absence of the gonosome.

Silicularia minima sp. nov.

At station 2311 there was taken, with small colonies of Obelia and Perigonimus, an extremely small specimen of an undescribed *Silicularia.* Like the former species it has a symbiotic habitat on these hydroids. Like the former, also, the trophosome seems to comprise a stoloniferous, climbing mass from which the single peduncles arise, each with its hydranth. These are very minute, the former varying from 0.3 to 0.4 millimeter in height, hydranths and tentacles from 0.1 to 0.2 millimeter in length; the hydrotheca is rather shallow, bilateral, but attached to the peduncle direct, thus lacking the spherical annulus of the former species.

While there may be some uncertainty in giving to the species a distinctive name, in the absence of gonophores, still, with the distinctness of the hydranths and the extreme minuteness of the specimens, there can hardly arise confusion should later discovery fail to confirm its distinctiveness, and as a basis of record it seems desirable to designate it by the name here given.

## Genus **HEBELLA** Allman

***Generic*** characters.—Hydrocaulus a creeping, monosiphonic stolon. Hydrothem cylindrical, with entire margin, destitute of operculum, and with cavity differentiated from that of the peduncle.

Gonosome unknown.

Hebella corrugata (Thornely).

*Campanularia* ***corrugata*** THORNELY, Ceylon Pearl Oyster Fisheries & Marine Biology, Part II (1904) 114.

*Hebella* ***corrugata*** VANHOFFEN, Die Hydroiden der Deutschen Südpolar-Expedition (1910) 314; STECHOW, Hydroidpolypen der japanischen Ostkiiste, Part II (1913) 105, 107.

This hydroid was very common among the material in this collection, taken at stations 793, 824, 839, 844, 860, and 893, and doubtless would have been noted in others also had critical search been made for it. It was always in association with

other hydroids, perhaps parasitic. The stolons creep over the stems and branches, often in a complex way, but predominantly in a direction parallel to the stem or branch to which they are attached. Hydrothem very large, often curved, with corrugated walls and everted margins, and often reduplications; pedicels short and obliquely annulated. Hydranths rather elongate, with conical hypostome, and with about twelve tentacles. In my specimens hydranths always retracted. Gonosome unknown.

The species was first described by Thornely as *Campanularia corrugata,* and later identified as a *Hebella* by Vanhoffen. I have followed chiefly the account of Stechow as cited above.

**Hebella contorta** Marktanner-Turneretscher.

*Hebella contorta* MARKTANNER-TURNERETSCHER, **Die Hydroiden des k. k. Naturhist. Hofmuseums (1889) 215, figs. 17*a* and b.**

A species of *Hebella* taken repeatedly, associated with *Idia pristis,* and which I take to be identical with the one named above and described by its author from material reported from Singapore, also associated with *Idia pristis,* and especially recorded from stations 778 and **824.** Hydrothecæ long, cylindrical, with everted margins, often contorted variously, which condition I was at first inclined to regard as due to mechanical distortion made during examination and, especially, by the technic of staining and mounting but which was later found to be due to some natural cause during the growth of the hydroid. Hydrothecæ **0.65** millimeter long by **0.2** millimeter in diameter, pedicels very short and plain; hydranths long and slender, with conical hypostome and about ten tentacles. The gonosome is unknown.

**Filellum serratum** (Clarke).

*Laforea serrata* CLARKE, **Bull. Mus. Comp. Zool. 5 (1879) 243; BILLARD, Exp. Scient. du Travail. et du Talisman 8 (1907) 178.**
*Filellum serratum* STECHOW, **Hydroidpolypen der japanischen Ostkiiste, Pt. II (1913) 111, 112, *fig.* 85.**

Like the preceding species, this was always associated with other hydroids, presumably as symbionts, and in most respects is conformable with the descriptions given by the above-named authors. The hydrothem are adnate for about half their length to the stolons, this portion being marked with rather definite serrations giving the appearance of sawteeth, probably due to the wrinkling of the tubes in those regions. The gonosome is unknown.

## Genus HALECIUM Oken, 1815

Halecium lighti sp. nov. Plate 4, fig. 13.

This species was taken by Prof. S. F. Light at Port Galera Bay, Mindoro, attached to tubes of Eunice growing in the strong currents flowing in and out of the bay. In another jar were also specimens, numbered 2315, Galera Bay, attached to a coral clump, in strong current, evidently in the same locality, also collected by Light.

Light had recognized the fact that the hydroid was a new species and had in his description proposed for it the specific name *armatum*, based upon the presence in many hydranths of a pair of extra large tentacles, some of which seemed to be armed with especially large nematocysts; hence the name. Describing the hydranths he had stated "each hydranth bearing on opposite sides two shortened and thickened, curved, club-shaped tentacles (nematodactyls) armed along either side with a row of from 9 to 15 large nematocysts." This particular detail of his description proved to be only partly true, large numbers of hydranths being entirely devoid of these specialized tentacles, some having but one, and thus rendering the specific designation proposed very doubtful and even misleading. Light's description was, by his own option, turned over to me when the collection was assigned, to me for investigation and complete report, with the suggestion that I use such part of his description as I found acceptable. This I am glad to do, and in acknowledgment of his courtesy in the matter I take pleasure in naming the species in his honor as indicated above. I am also taking advantage of certain of his details of description in the account of the species.

*Trophosome.*—Stems about 25 millimeters in height, fascicled in basal portions, branches regular, and both stem and branches divided by straight joints into internodes of approximately the same length; branches and hydrophores in same plane, the latter adnate for most of their length, and in many cases where extension or reduplication occurs extending outward with slightly everted margins. The series of punctæ, so characteristic a feature of many species of Halecium, are lacking or extremely obscure in this one. Light gives the dimensions of the hydrophores as about those of the stem of internode on which found; diameter of base of internodes at base of branch, about 0.12 millimeter; of stem, 0.15; length of internodes of stem, about 0.4; of branches, about 0.3.

*Hydranths.*—In general these are fairly comparable with those of many other species; long and nonretractile, resting on an expanded basal portion by which they are attached to the hydrophores. The shape of the hydranths is somewhat distinctive; the figures will give a fairly good impression of this feature. As will be noted, two rather marked constrictions occur, one just below the circle of tentacles, another just below the expansion upon which it is attached to the hydrophore where it is linked to the cœnosarc of stem or branch. The median region is beautifully spindle-formed, the whole comprising a graceful body including hypostome, tentacles of which the number varies from twenty-five bo thirty-five; neck, body, base, and its attachment to the hydrophore as already noted. The color is white, both in life and in its preserved state, unless discolored by the preservative.

Gonosome.—In this species as yet wholly unknown.

The following discussion of the distribution of *Halecium* is that given by Light in the description referred to above:

> *Halecium* has a very wide bipolar distribution, being found in the colder and temperate waters of all seas. With this there are only three species known from the tropical seas and these all from the tropical Pacific. There is no doubt however that a more careful study of the hydroid fauna of the Tropics will reveal the presence of several more. Of the 57 described species of the genus, some of which are no doubt synonyms, the originals came from the following regions: Arctic and north temperate **39,** distributed as follows: Alaska **6,** Pacific coast of the United States and Puget Sound 6, Atlantic coast of the United States and Gulf Stream **6,** Bermuda **2,** North Atlantic **2,** North Sea **1,** Norway **2,** British Isles **11,** Adriatic **1,** Antarctic and South Temperate including Southern Australia **14;** Tropical Pacific **3.**

While these do not comprise all known species, as to distribution they none the less show in a general way the scope of the *Halecium* fauna of the seas as known.

**Idia pristis** Lamouroux. Plate **4, fig. 14.**

> *Idia pristis* **LAMOIJROIJX,** Hist. des Polyp. Coral Flex. Zoophytes **(1816)** 200 (English translation); **BALE,** Australian Hydroid Zoophytes **(1884) 113,** Further Notes on Australian Hydroids **(1893) 104;** ALLMAN, Hydroida of the Challenger Exped., Pt. II **(1888) 83,** pl. **39.**

Specimens of this remarkable hydroid were taken at many stations, 685, **718, 744, 824, 839, 860, 2314,** and others. While long known, as shown in the old account of Lamouroux, it has not been generally known. Specimens of the present collec-

tion are the first seen by me, and records of its distribution are rather few in the literature available. Bale reports it from some five localities about the coasts of Australia; Allman, from two localities of the Challenger account, Panay, P. I., and off Bahia ; and Marktanner-Turneretscher, Philippines. In the present collection it is one of the commoner species. Its bathymetric range is from 15 to **30** fathoms as recorded by the above-named authorities.

*Trophosome.*—Stems erect, stout, attaining a height of 75 to **130** millimeters, though doutbless more ; pinnae alternate, rather regular, and divided into segments fairly well marked, but this feature is not very evident on the main stem, where it is often obscure or lacking. Allman's descriptions seem too regular and precise to apply to my specimens, as I have had occasion to point out in other connections, and I can verify the statement of Bale that his specimens of gonothecae "differ considerably from specimens" described by Allman, whose figures seem to have been given for the sake of their picture value rather than as precise representations of actual structure.

Gonosome.—The gonangia are borne chiefly but not solely on the stem, as I have found many occurring on pinnæ as well. The figure given is an accurate sketch of a female gonangium; that of the male is slenderer and slightly longer and somewhat less deeply fluted than in the female. In this distinction I am giving what appear to be male and female organs, but the material is not such as to afford an actual demonstration. My specimens fail to show the puncta emphasized by Allman, but not described by others. On the neck of the gonangium are frequently found small particles adhering to the capsular surface, but they are not at all comparable with the puncta of *Halecium.* Again, my specimens show transverse wrinkling of the capsules, as figured by Busk and as given by Bale in his account. Moreover, in my specimens the longitudinal flutings are less numerous than as given by Allman, averaging about ten, often less and rarely over twelve, while he gives sixteen in his figures.

## Genus STEGAPOMA Levinson

**Stegapoma medusiformis** sp. nov. Plate **4,** fig. 15.

*Campanularia fastigiata* **ALDER,** Ann. & **Mag. Nat.** Hist. III 5 (February, 1860) **73.**

*Calycella fastigiata* **HINCKS, A** History of British Hydroid Zoophytes (1868) 208.

*Stegapoma gracilis* NUTTING, Hydroids of the Hawaiian Islands, Bull. U. S. Fish. Comm. (1905) 944.

At stations 854 and 866 were found several colonies of this very interesting and beautiful hydroid, the first of its kind to come under my direct observation. They were taken from a depth of 110 fathoms, and in every case were attached to other hydroids, parasitic (?) in relationship.

*Trophosome.*—Made up of creeping stolons, simple pedicels, and hydrothem, growing over stems of Obelia, usually standing out at a right angle from the supporting hydroid. The pedicels are slender, about as long as the hydrotheca, which measures in large specimens about 1.6 millimeters in length by **0.32** millimeter in diameter in the middle region; operculum made up of a series of strips which meet in a rooflike ridge at the top of the theca. Hydranths large and elongated, with conical hypostome and about twelve filiform tentacles, apparently supported by a diaphragm as shown in the figure, though it was difficult to demonstrate.

Gonosome.—The gonangia are long and club-shaped, sessile from the stolon, and **3.5** to 4.2 millimeters long by about **0.6** millimeter in median diameter. Blastostyle lateral and bearing medusæ in various stages of development. So far as I am aware, these have not been described heretofore. In my specimens they show their distinctive medusoid characters, as fig. 15 will show, and sections made in both long and short directions confirm the surface aspects. These sections fail to show the presence of germ cells at this stage, which implies that the medusae are liberated and lead a free life for a time and that the sex cells are *set* free during this free-living stage. The form of the medusa is fairly typical, bell rather high and narrow, with gastric structures of usual form and structure, with few tentacles; only two show in specimens within the gonangia. I regret the preservation was not such as to afford good microscopic structures, but these were sufficient for the study of the general morphology.

In general the species here described agrees very well with those referred to above, but it agrees more closely with that of Nutting, Stegapoma *gracilis*; yet there appear features which differ from it. I am disposed to suggest that on the basis of the distinctive medusoid characters, and the larger size of the gonangia, it be designated as a new species.

## Genus THUIARIA Fleming

**Thuiaria tubuliformis** (Marktanner-Turnemtscher). Plate 4, fig. 16.

*Dynamena tubuliformis* MARKTANNER-TURNERETSCHER, Die Hydroiden des k. k. Naturhist. Hofmuseums Wien (1890) 70.

*Thuiaria tubuliformis* NUTTING, American Hydroids, Pt. II (1904) 70.

The material was taken at several stations, among them 761, 793, and 817. The colonies were mostly small and none more than 40 to 50 millimeters in height. Trophosome made up of a reticulate mass of stolons from which stems grew erect, but with a definitely geniculate aspect from the alternate origin of the branches; this was particularly apparent in younger specimens and distally; hydrotheca tubular and deeply immersed in the stem, less so on branches, the distal portion facing outward, the aperture closed by two valves which meet at the two opposite teeth of the theca. In my specimens the hydrothecae are arranged in pairs, varying in number for each internode from two to four or five, giving the branches a distinctly segmented aspect, resembling somewhat *Pasythea*, a fact not shown in Nutting's figures nor mentioned in his descriptions. In fact, my specimens agree more closely with those described by Marktanner-Turneretscher than with Nutting's account. I regret that no gonangia were found in my collection, nor does the earlier author describe them. Nutting's figures are difficult to understand, since he gives three drawings of the gonangia, all different; in two the orifice has straight margins, in the other the margin is very much everted. Again, his figures of the stems and branches show such great difference that they might almost be considered as from different species, a fact which perhaps may illustrate how inadequate are trophosome characters in many cases as a basis of specific determination.

Thuiaria quadrilateralis sp. nov. Plate 5, fig. 17.

At station 736 was taken a species of *Thuiaria* which does not seem to have been described; at any rate, I am unable to identify it with any known species.

*Trophosome.*—Colony rather stout, stems arise from a reticulate series of stolons, to a height of 30 to 50 millimeters with branches alternating from successive internodes, each of which bears three hydranths, the pinnae arising just below the third hydranth of the internode; hydrotheca tubular and deeply sub-

merged in stem and branch, with apparently valves attached to inner and outer margins.

*Gonosome.*—Gonangia large, several times the size of hydrothecae, of four-sided shape, borne on short pedicels of pinnae, none on stems of my specimens. The quadrilateral aspect **of** these organs is rather unusual, and so far unknown among the *Thuiaria.* The specific,name is proposed from this character.

Genu, **SERTULARIA** Linnæus (in part)

**Sertularia minuta** sp. nov. Plate 5, **fig.** 18.

This hydroid was taken at station 697 along with fragments **of** several other hydroids. It is a very minute species, yet apparently mature, **as** there are numerous gonangia.

*Trophosome.*—The stems are simple, with no signs of branching in any specimen; they arise from creeping stolons, which **also** bear the gonangia. Height **of** colony, **4** to **7** millimeters, each bearing from four to **six** paired hydrothecae on the upper portion of the stem, which is regularly divided into internodes each with a single pair, adnate for about a third of their length, tubular, the distal part strongly divergent and with apparent abcauline valve; though the delicacy of these terminal portions makes difficult an exact demonstration, in some cases two valves seemed present. Hydranths long and, very slender, but preservation was not such as to make structural features demonstrable.

*Gonosome.*—Gonangia arise from the stolons, though close to the base of a stem, in some cases seeming to attach to the stem, but this was doubtful; the shape is broadly spindlelike, and deeply and regularly corrugated, as shown in the figure, with rather large aperture, from which in some specimens embryos were in process of liberation.

This species has some points of resemblance with Sertularia *pourtalesi,* but in size and shape of hydrothecae there are strong differences, especially as described by Allman and Nutting, the figures of Marktanner-Turneretscher being much nearer my species.

**Sertularia dubia** sp. nov. Plate **5,** fig. **19.**

This minute hydroid was taken at station **2308,** Port Galera, Mindoro. No gonangia were present, and the specimens are apparently young, but I am not able to identify the species with any known to me; so, for purposes of record, I propose the name *dubia* to distinguish it.

The stems are simple, composed of regular internodes, each with a single pair of hydrothem which are relatively large, and with correspondingly large hydranths, each with about fifteen to twenty tentacles. The hydrothem have their distal portions strongly divergent, as in the previous species, and with a two-valved operculum.

Sertularia sigmagonangia sp. nov. Plate 5, fig. 20.

The colonies of a hydroid, apparently new, were taken at stations **704** and **2310,** from a cable at the north shore **of** Batan, at depths of 15 to 177 fathoms.

*Trophosome.*—Stems erect, rigid, with branches at right angles of stem and also rigid and ungraceful; color brown, perisarc dense; hydrothecae of stem alternate, those **of** branches strictly opposite, rather retort-shaped, and two opercular valves not easily distinguishable; hydrothecæ face directly outward, but those of stem just below origin of branch recurve downward in many cases.

**A** point of some importance is the rather constant reduplication of the margins of hydrothecae, which does not appear in *Sertularia versluysi,* the species most nearly resembling it.

Gonosome.—These organs are elongate and fusiform, but rather sigmoid in general outline, due apparently to the direct outgrowth, then an upgrowth, and finally a curving of the distal portion with orifice facing directly outward, the margins ending in some four inconspicuous teeth, the whole gonangium deeply corrugated and some three or four times the length of the hydrotheca, 1.7 and 0.6 millimeter in length and diameter at broadest part, respectively.

I believe the species to be new and propose for it the name suggested by the shape of the gonangium.

## Genus SERTULARELLA Gray

Sertularella gayi? Plate 5, fig. 21.

At station 768 were taken fragmentary colonies of a hydroid resembling somewhat *Sertularia annulata* of Allman,[29] yet differing in some respects. The stems are straggling, irregularly branched, and indefinitely divided into internodes; hydrothem alternate, usually two to each internode, divergent from stem or branch and narrowing to four-angled, margin, with four teeth and a four-valved operculum, distal and upper part of

[29] Hydroida of the Challenger Exped. (1880) 52.

thecae corrugated. No gonangia on my specimens. In some aspects it resembles *S. gayi*?; yet, as stated above, with strongly marked differences. I merely list it **for** record under this name.

**Sertularella philippensis** sp. nov. Plate 6, fig. 22.

At stations **729,** 788, and 882 were taken hydroids of this species, the best and most typical coming from 882.

*Trophosome.*—Stems from reticular stolons attached to rocky fragments, dense and stout, yellowish brown, profusely branched and in alternating order, as are the hydrothew of both stem and branches, divided into fairly regular internodes by indistinct nodes; hydrothem rather short and broad with apparently four-valved openings, the valves difficult to demonstrate; hydranths short, with some fifteen tentacles, body in expansion round, but in contraction folded or retortlike.

*Gonosome.*—Gonangia are large, 2.5 millimeters long by about 0.8 millimeter in diameter, and with broad aperture and three strong and prominent marginal teeth.

**Sertularella punctagonangia** sp. nov. Plate 6, fig. **23.**

At station 884, from a depth of from 65 to 150 fathoms, along with large masses of Obelia *longitheca,* there were taken specimens of a sertularian which seemed quite new, and careful scrutiny of available literature confirmed this impression. The hydroid is a beautiful one, both as to form and structure, as will be noted in the description and figure given.

*Trophosome.*—The specimens were from 50 to 75 millimeters in height, stems slender, amber color, more or less erect and with alternate branches, also delicate and relatively long and curving gracefully, the ends attenuate. Hydranths of stem alternate, a single one occupying the axil of each branch, but those of the branches more or less opposite in position, all of delicate hyaline aspect, and facing outward, tubular and attached for about a third of their length to stem or branch, then curving to a narrowed orifice with what appears to be **a** single abcauline valve. Hydranths elongate, slender, and attenuate, with conical hypostome, and fifteen **to** eighteen, delicate, long, and threadlike tentacles. Stems and branches irregularly annulated, but not showing definite divisions into segments.

Gonosome.—The gonangia are numerous, relatively large and with smooth transparent walls, and borne on stems, occasionally

on branches, usually attached just below a hydrotheca. They are elongate, urnlike structures, with slightly everted margins, each with a convex lidlike operculum, hinged at one point. The beauty of shape is heightened by a series of glistening puncta, variable in number, around the outer shallow constriction, as shown in the figure. So far as I am aware, this is the only instance of such puncta in the Sertularidze. In these specimens the gonangia were apparently male.

As will be noted, the description given of the hydroid shows characters not entirely peculiar to this genus, such as both alternate and nearly opposite positions of the hydrothecze on stems and branches, respectively, and the distinctly unusual aspects of the gonangia. Since it does not appear to be better allied elsewhere, it is tentatively placed here as designated above.

## Genus **SYNTMECIUM** Allman

The following is Allman's characterization of the genus which he established in 1888: Trophosome, stem divided into regular internodes, each of which carries *a* pair of opposite hydrothecæ, or a single one which alternates with those of the adjacent internodes; hydrothecae adnate for about half their length with the mouth facing outward and with margins everted and often reduplicated.

*Gonosome.*—Gonangia borne on peduncles which spring from the interior of cavity of certain hydrothecze where they replace the hydranths.

**Synthecium flabellum** sp. nov. Plate **6,** fig. 24.

Several colonies of this hydroid were taken at station 715, Mindanao. The specimens were mostly small, some having a height of **30** to 40 millimeters, but others not more than **15** millimeters. Branching is usually opposite and in the same plane, and frequently terminates in elongate filaments, much as in *Diphasia* and many other hydroids; hydrothecae opposite and adnate €or about half their length, margins smooth **and** mostly reduplicated. In my specimens the hydranths were badly preserved and the characters not determinable.

*Gonosome.*—Gonangia were borne on both stem and branches, and in these specimens mostly female, ova being recognizable in a looplike spadix not unlike those of *Eudendrium ramosum,* the whole inclosed in the gonangium which is spindlelike but rather depressed and podlike. In certain specimens which ap-

peared to be male, though too poorly preserved to enable one to determine it, there was less of flattening and the generative mass was centrally located.

In these specimens I am unable to confirm certain of the features emphasized by Allman. For example, I often find branching to be alternate, or only a single branch appearing on a given internode, and this is very usual with secondary branches. Again, I find that these branches may arise just as in other hydroids, but also in a telescopic aspect as mentioned by Nutting in *Synthecium rectum.*[30] I also find similar variation as to the hydrothecze, usually opposite and regular, but frequently single and more or less irregular. I find the same variation as to gonangia. In the main they are as described in the original generic account, but not infrequently they arise without the appearance of the hydrothecal envelope, just as with a branch. I am quite inclined to agree with the contention of Torrey[31] that the origin of the gonangia here is not the unique feature Allman has claimed.

## Genus PASYTHEA Lamouroux (in part)

**Pasythea griffini** ap. nov. Plate **6,** fig. **25.**

At stations 771 and 794 were taken colonies of a hydroid of an unknown species. Its generic characters were unmistakable, and except in size its general appearance was similar to Pasythea nodosa or ***P.*** *quadridentata;* but there were sharp differences, the most convincing being the gonangia which were unlike any known.

*Trophosome.*—Stems mostly simple, but occasionally branching, as noted in Pasythea nodosa; borne on creeping stolons which on eelgrass often made a loose reticulum, but those on mollusks did not show this; height of stems from 4 to 9 millimeters, and as in other species, the lower segment frequently with a single pair of hydrothecze, the upper ones with from two to four pairs. It differs from other species known to me in that the nodes are not oblique but square, forming usually a joint resembling an annulus of the form very characteristic of hydroid stems, and the internodes are very short, differing sharply in this character from other

[30] American Hydroids, Pt. II (1904) **135.**

[31] The Hydroida **of** the Pacific Coast of North America, Univ. of Cal. Publ. **Zool. 1 (1902) 62.**

species. Another feature was rather interesting as showing its possible mode of differentiation to the typical sertularian type; namely, that rarely the stem may have but a single pair of hydrothecæ on each internode.

Gonosome.—The gonangia of this species are very distinctive. They usually arise from the basal internode, but they also arise from other internodes;. occasionally three were noted on the basal node, those above usually single; the shape is rather urn-like, with a very short pedicel, outline smooth, and with an elongate, rather narrow neck curved outward and with beautifully everted margin, as shown in the figure.

A species, described from the Philippines by Marktanner-Turneretscher and probably quite distinct though no gonangia were present, is similar in size to *P. griffini,* but they have few characters in common.

In this connection, I may direct attention to the fact that, since the original description of *Pasythea nodosa,*[32] I have carefully compared that material with material of later date, which is identical with the original descriptions of *P. quadridentata,* and find the distinctive trophosome differences very well marked. The later identification of material by Stechow [33] with P. *nodosa* still further confirms the species, allowing for possible modifications which may come from discovery of the gonosomes.

## Genus **PLUMULARIA** Lamarck (in part)

Plumularia **ramsayi** Bale.

*Plumularia ramsayi* **BALE,** Australian Hydroid Zoophytes **(1884) 131.**

From station **2311,** in June, **1913,** Light collected a few fragments of several hydroids, chiefly *Idia pristis,* a *Eudendrium,* an *Obelia,* and small colonies of the above-named hydroid which, though fragmentary, were fairly well preserved. The colonies were devoid of gonangia. They were, however, sufficiently distinct to reveal fairly definite specific characters, which made possible the recognition of the close relationship of this hydroid to Bale's species, though they differed in several points; for example, in the branching which is very regular in my specimens and alternate in others. On this point Bale states that there is "no regularity in their arrangement, as they may be either opposite or alternate, and there are often two or three branches on one side to one on the other." However, the specimens at

[32] "Biol. **Bull. 14 (1908) 114,**

[33] Hydroidpolypen der **japanischen** Ostkiiste, Part II **(1913)** 160.

hand are too few and fragmentary to warrant contention, and as Bale's description designates the species as "extremely variable in habit," it seems better to accept his account than to attempt a detailed description from the material in my possession.

**Plumularia** sp.?

There was another, very small fragment from Taytay, Palawan, of a *Plumularia* of doubtful specific relation, though very distinct from the preceding one, and altogether too fragmentary to warrant any attempt at specific determination. It seems to be very young, rising to only **4** to **6** millimeters in height, branching dichotomously, and supported from a filamentous stolon.

The accounts here, and that of Busk describing *Plumularia effusa,* listed by Bale,[84] seem to be the only records of *Plumularia* from the Philippines.

## Genus **ANTENNELLA** Allman

**Antennella gracilis** Allman.

*Antennella gracilis* ALLMAN, Mem. Mus. Comp. Zool. **5** (1877) **38;** NUTTING, American Hydroids, Pt. **I** (1900) **77.**

**At** stations **749** and **798** colonies of the above-named hydroid were obtained from the submarine cables near Calbayog, at depths of 49 to **54** fathoms. In all essentials except size the specimens agree well with the descriptions of Allman. My specimens averaged only about **12** millimeters in height, and unfortunately were devoid of gonangia, which thus far are unknown. Following Allman, Nutting regards the species as stemless, that which appears to be stem being considered a hydrocladium arising direct from the stolons. It is not clear that this view has any particular value. Why not as well designate it as a case of variation, or perhaps better, mutation, **or** even regression, or other expression of adaptation, **as** Hincks has very strongly suggested concerning *Plumularia secondaria*?[85]

## Genus **SCHIZOTRICHA** Allman

**Schizotrioha** philippina sp. nov. Plate **6,** fig. **26.**

A very delicate and beautiful hydroid was taken at station **839,** but no data as to depth or other particulars were recorded.

[84] Op. cit. p. 130.

[85] A History of British Hydroid Zoophytes (1868) *304.*

*Trophosome.*—The hydroid is a very delicate one, about 25 millimieters in height, the stem arising from reticular stolons; the main stem has annular segments in the basal part, and above is divided into fairly regular internodes, the joints being both square and oblique; hydrocladia sparingly branched, usually only once; hydrothecae cuplike, one to each internode, and with a nematophore just below and a pair attached to the base of the theca.

*Gonosome.*—The gonangia are curved cornucopialike, resembling those of *Schizotricha tenella,* but with relatively broader openings, attached by very short pedicels to the hydrocladium just below the base of the hydrothecze; walls are very delicate and collapse under the slightest pressure, and are apparently devoid of nematophores.

So far as known to me, this is the first record of a member of this genus from the Philippine Islands.

## Genus DIPHASIA Agassiz

**Diphasia digitalis** Bale.

*Desmoscyphus longitheca* ALLMAN, Mem. Mus. Comp. Zool. 5 (1877) 26.

*Diphasia digitalis* BALE, Australian Hydroid Zoophytes (1884) 101; NUTTING, American Hydroids, Pt. I (1900) 110.

At stations 781 and 893 were taken sterile colonies of a species which is in all essentials identical with that above named, at least so far as trophosome characters are concerned. The colonies were more or less fragmentary, attached to fragments of coral rock, seaweed, etc. They were apparently small, about 25 millimeters in largest specimens, while Nutting gives the height as 4 inches. The branching was not regular, with no secondary branches such as figured by Allman. The presence of long terminal growths or filaments was strongly marked in some cases, which is a well-known character of other species also.

## Genus TKYROSCYPRUS Allman

**Thyroscyphus simplex** Allman.

*Thyroscyphus simplex* ALLMAN, Hydroida of the Challenger Exped., Pt. II (1888) 25.

At stations 769, 792, and 893 were taken colonies of a hydroid which I identify as Thyroscyphus simplex, though no gonangia were present; indeed, none have been described, so far as I am aware. Several features in my material differ

from the descriptions and figures of Allman. In several instances I have had occasion to criticize the mechanical aspects of his figures, and in this species his figures differ very much from my specimens. For example, the stems are often devoid of distinguishable segmentation; again, one set of specimens, those from station 769, had hydrothem of very different form from that of specimens from the other stations named above. In other respects they were quite alike; so I interpret the widely divergent hydrothew in these as an individual peculiarity attributable to conditions of growth or environment, and would also so interpret the differences of nodes, the excessive thickenings of the stems or branches having more or less obscured the joints.

**Aglaophenia macgillivrayi** (Busk).

*Plumularia macgillivrayi* **BUSK,** Voyage **of** the Rattlesnake (1852) **400.**
*Aglaophenia* ***macgillivrayi*** ALLMAN, Voyage of the Challenger, **Zool.,** Pt. **I (1883) 34;** MARKTANNER-TURNERETSCHER, Die Hydroiden des k. k. Naturhist. Hofmuseums Wien (1889) 268.

From stations 873, 897, and 898 several fine colonies of this rather remarkable hydroid were taken from the reef near Mindanao, at a depth of 8 to **10** fathoms. The species was first described by Busk as *Plumularia macgillivrayi;* the next account is that of Allman, in which he describes in much detail a very large specimen, "upward of fifteen inches high." My specimens averaged about **20** centimeters.

*Trophosome.*—Colony massive, stem thick, fascicled, with numerous opposite branches, all devoid of hydrothew; secondary pinnae and hydrocladia, the latter with rather deep hydrothecs having smooth margins; median and lateral nematophores, the median adnate to the hydrotheca and not extending beyond its margin, the lateral rather broad and extending beyond the margin of the hydrotheca. An interesting feature of some of these specimens was the presence of stolonlike outgrowths from upper and terminal portions of stems and branches, especially where some evidence of injury was apparent.

*Gonosome.*—Corbulæ similar to those of other species, borne on primary or secondary pinnæ, but never on the stems. In these specimens there was no distinguishing evidence of sex.

The extended description and excellent figures of Allman cited above render unnecessary fuller details here.

## Genus LYTOCARPUS Kirchenpauer

Lytocarpus philippinus Kirchenpauer.

*Lytocarpus philippinus* KIRCHENPAUER, Ueber die Hydroiden der Familie Plumularidæ (1888); MARKTANNER-TURNERETSCNER, Hydroiden des k. k. Naturhist. Hofmuseums Wien (1889) 274; NUTTING, American Hydroids, Pt. I (1900) 122.

From station **803** were taken hydroids of a species which seems identical with that named above, though there are several points of difference, as will be noted.

*Trophosome.*—Stems coarse, fascicled in lower portions, and with a height of 8 to 15 centimeters, ascending from **a** knotted rootlike mass of fibers. Colony branching alternately, with pinnate hydrocladia directed forward and upward; hydrothem arranged rather closely, each with **a** deep constriction anteriorly, median and lateral nematophores of the usual form but differing somewhat from Nutting's description, the median ones extending beyond the hydrothecal margin, while the lateral ones do not extend much if any beyond it.

Gonosome.—The gonangia are ovoid, flattened laterally, the capsular walls rather thick but transparent; usually a single gonangium borne on the greatly reduced phylactocarp, but occasionally two. No distinction as to sex was apparent.

While the differences named are not great, they involve both gonosome and trophosome. Still I am inclined to regard them as not of sufficient importance to warrant any definite pronouncement of more than varietal values.

Lytocarpus sp. ?

At station 896, from a cable at a depth of 45 to 54 fathoms, near Samar, colonies of a large hydroid were found which apparently belongs to this genus, though absence of gonangia makes it difficult to be certain, the trophosomal characters being very similar in this genus and in *Aglaophenia.*

*Trophosome.*—Colony large, ascending from a mass of rootlike fibers, with a height of about **30** centimeters. Stems fascicled, devoid of nematophores or hydrothem, branches alternate, and with 'beautiful pinnate hydrocladia with an average length of about **10** millimeters. The hydrothem are rather deep and cuplike, with undulating **or** crenular margin, the anterior having a spinelike tooth.

Gonosome lacking.

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# ILLUSTRATIONS

[All figures, except 4 and 14, are magnified about 24 diameters.]

## PLATE 1

FIG. 1. *Bougainvillia philippensis* **sp.** nov.
2. *Perigonimus scandens* sp. nov.
3. *Ectopleura durnortieri* (Van Beneden).
4. *Ectopleura dumortieri*, portion **of** gonophore, highly magnified.

## PLATE 2

FIG. 5. *Corymorpha symmetrica* **sp.** nov.
6. *Zancloidea philippina* sp. nov.
7. *Clytia alternata* sp. nov.
8. *Clytia tubitheca* sp. nov.

## PLATE 3

FIG. 9. *Clytia longitheca* sp. nov.
10. *Obelia longitheca* **sp.** nov.
11. *Obelia attenuata* sp. nov.
12. *Silicularia rosea* Meyen.

## PLATE 4

FIG. 13. *Halecium lighti* sp. nov.
14. *Idiffipristis* Lamouroux, gonangium, magnified.
15. *Stegapoma medusiformis* **sp.** nov.
16. *Thuiaria tubuliformis* (Marktanner-Turneretscher)

## PLATE 5

FIG. 17. *Thuiaria quadrilateralis* sp. nov.
18. *Sertularia minuta* sp. nov.
19. *Sertularia dubia* sp. nov.
20. *Sertularia sigmagonangia* sp. nov.
21. *Sertularella gayi* ?

## PLATE 6

FIG. 22. *Sertularella philippensis* **sp.** nov.
23. *Sertularella punctagonangia* sp. nov.
24. *Synthecium flabellum* sp. nov.
25. *Pasythea griffini* sp. nov.
26. *Schizotricha philippina* sp. nov.

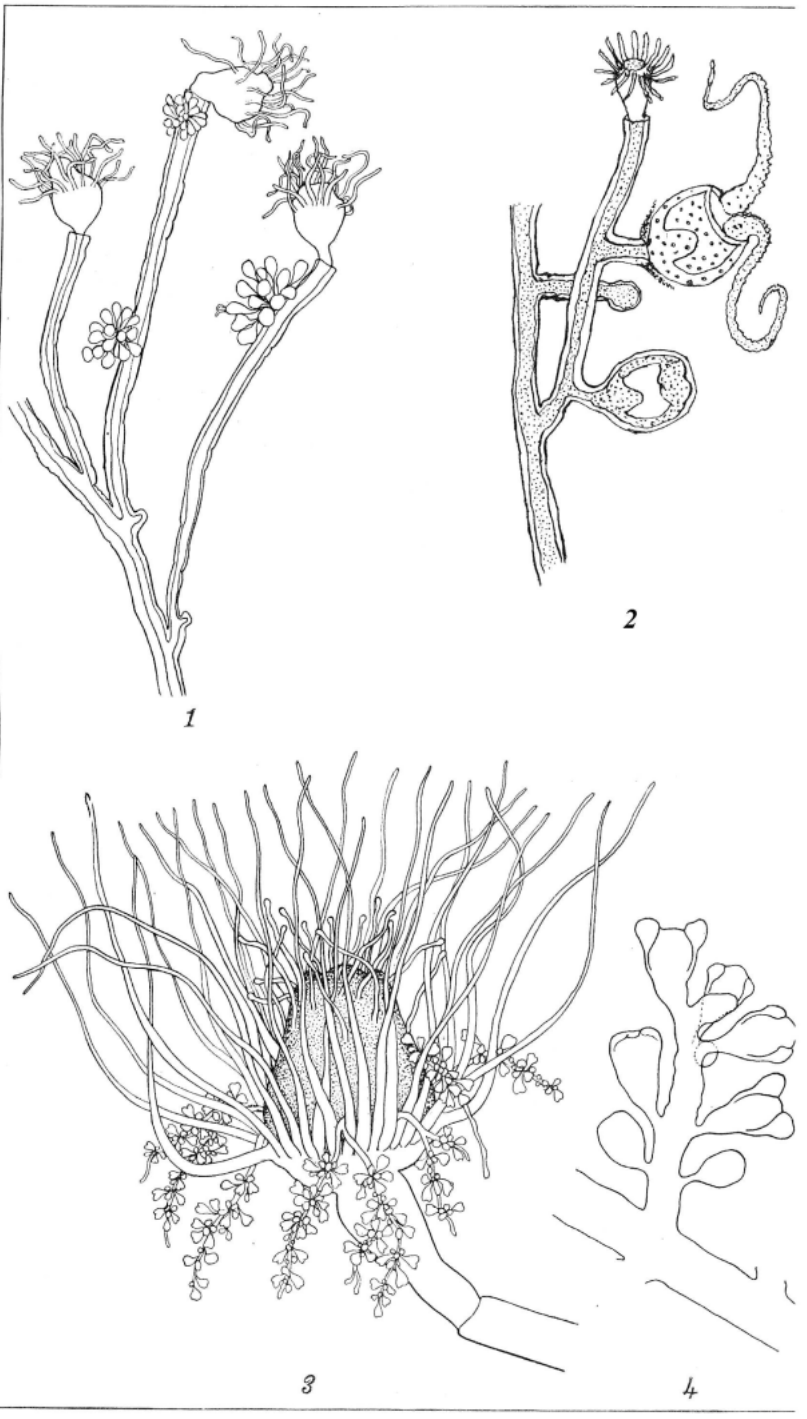
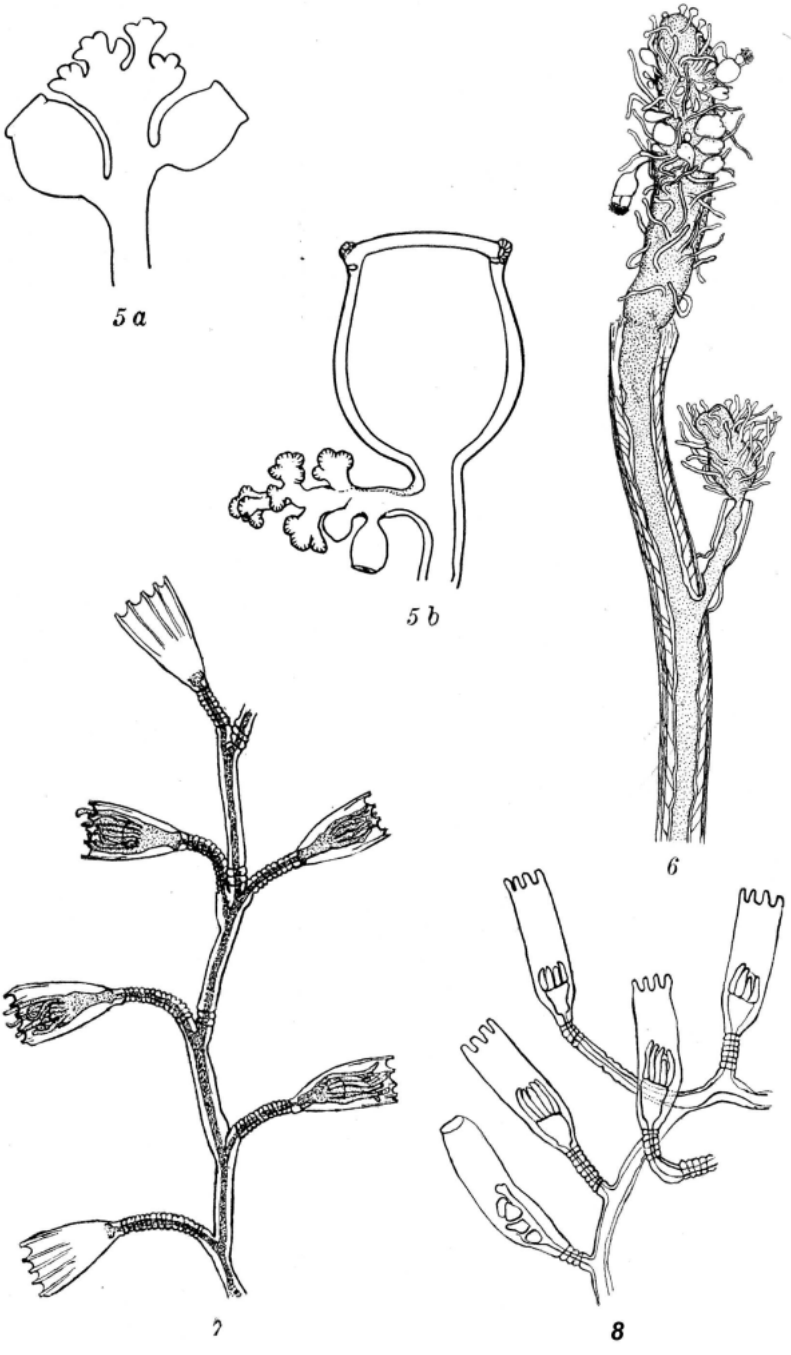



PLATE 1.

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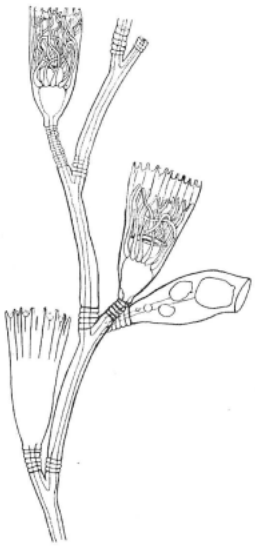

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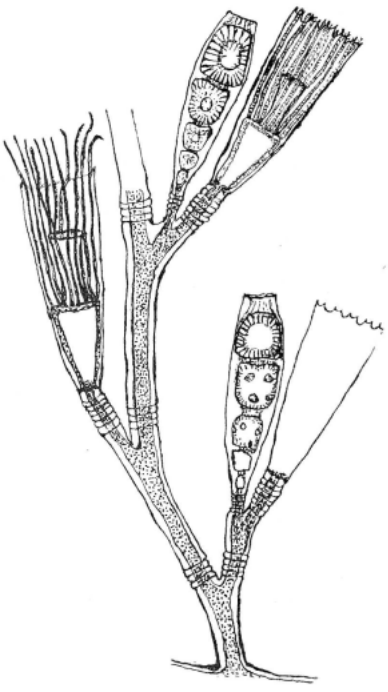

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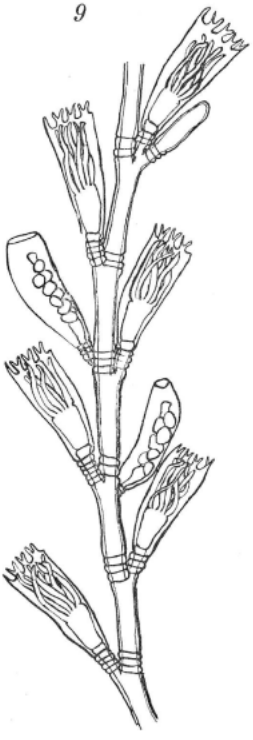

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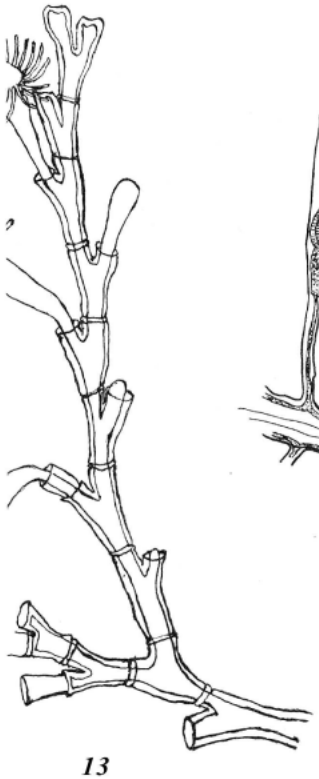
PLATE 3.



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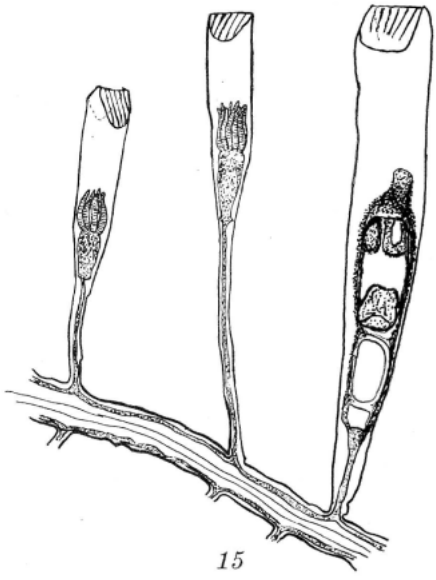
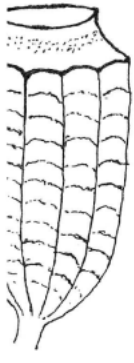


15



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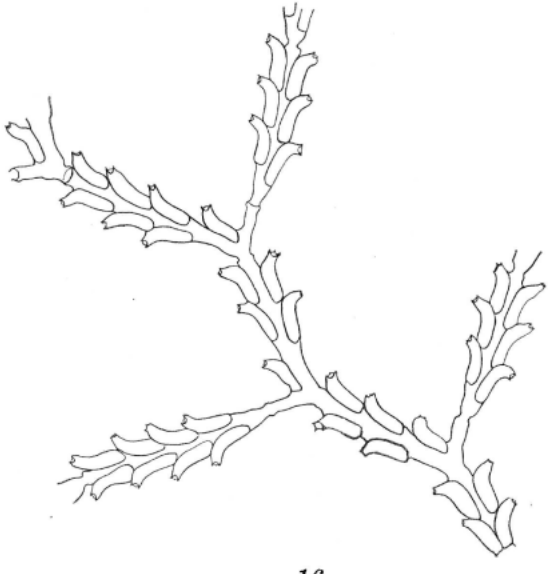

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PLATE 4.

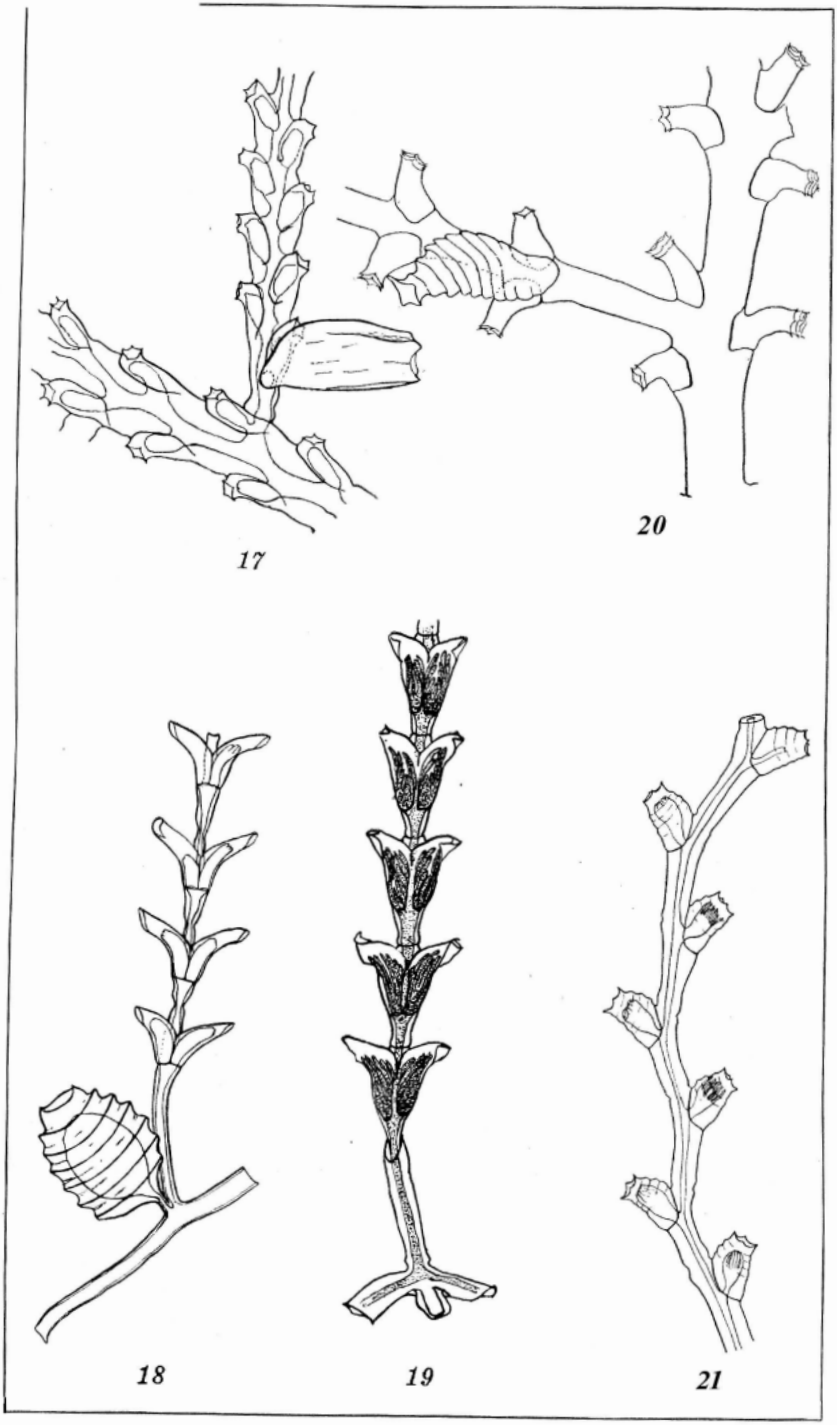


PLATE 5.

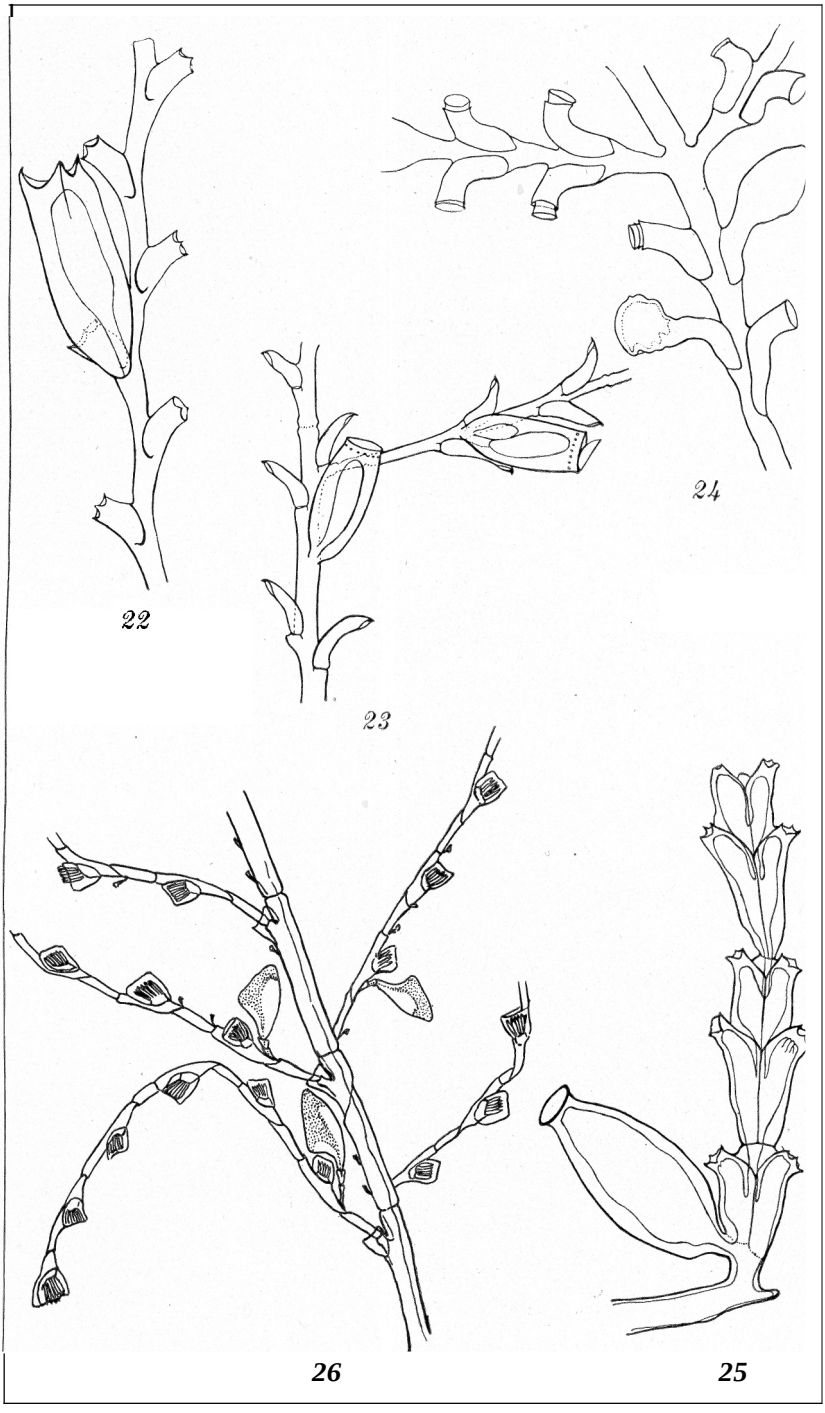


PLATE *6.*