NEW AND LITTLE KNOWN HYDROIDS OF WOODS HOLE.[1]

CHAS W. HARGITT.

During the summer of 1907, while engaged upon certain problems associated with the work of the biological survey carried on at the Fisheries Laboratory, I described several hydroids, some new, others more or less rare, in a paper published in the BIOLOGICAL BULLETIN, January, 1908. During the following summer I was fortunate in finding a few others which, like the former, were in *part* new and in part hitherto unknown within the locality, and in one case at least, wholly new to American fauna. In the following account will be found such descriptions as seem called for in order to bring them definitely to knowledge as integral factors of the hydrozoan fauna of the region concerned.

CLADOCORYNE FLOCCOSA var. SARGASSENSIS.

In a mass of *Sargassum* which was picked up during the summer of 1907 in Vineyard Sound, bearing a rich hydroid fauna, I found a very minute hydroid which at first greatly puzzled me. It was intricately associated with other species. particularly with *Aglaophenia minuta*, 2nd at first seemed to be a sort of nematophoric accessory of this hydroid, the small round heads of young specimens bristling with nematocysts having but little resemblance to an independent hydroid. But a more extended examination brought to light other and larger specimens, and soon it was found that the thing under examination *was* beyond doubt a very minute and apparently unknown species of hydroid. A series of developmental stages were found giving all conditions, from minute buds just arising from the stolon-

[1] Contributions from the Zoölogical Laboratory, Syracuse University.

iferous base to others with mere buds of tentacles, with still others having growing tentacles from the *base* of a definite hydranth on to the fully developed hydroid with full complement of tentacles, etc. Fig. 1 shows the hydroid enlarged ten diameters, while Fig. 2 shows the hydranth greatly enlarged to show the peculiar branching and knobbed tentacles. With this much clear it was not difficult *to* trace its generic affinities under *Cladocoryne*, Rotch.[1] But it was doubtful as to its specific relations, Rotch had described a species, *C. floccosa*, found at Werm, near Guernsey, having a habitat on stones, and being 6–12 mm. in height. Perrier has *also* described a species, *C. simplex*, found on *Sargassum*,[2] but I have not had access to Perrier's book, and so am unable to form any definite notion of that species.

FIG. 1.

The present species is very minute, being only 2–4 mm. in height and differing more or less as to other features. I have suggested for it a varietal distinction, proposing the name *sargassensis*, as indicative of its habitat. The following characters are diagnostic:

Trophosome.—Stems mostly simple, occasionally branching slightly, rising from a reticulate hydrorhiza. Hydranths relatively large, spindle-shaped, with elongated hypostome similar to that of *Pennaria*. Tentacles about twelve, variously branched and definitely knobbed, and disposed in some three verticels over the body of the hydranth. These tentacles are peculiar and thoroughly distinctive, both in structure and development. A second series of oral tenacles, about six or seven in number, are simple, with knobbed ends, and surround the mouth. All are richly packed with nematocysts.

The perisarc, both of stem and hydrorhiza, is rather dense and irregularly annulated.

Gonosome. — Thisis wholly unknown, in the present specimens at any rate.

Habitat and Distribution.—The present is the only time I have seen the species. As stated before it has its habitat on

[1] *Ann. Mag. Nat. Hist.*, March, 1871, Vol. VII., p. 227; Allman, "Gym. Hydroids," p. 38.

[2] Cf. Billard, "Exp. Talisman," p. 161.

floating *Sargassum*. I have hunted carefully over later collections of gulf weed but without finding trace of it.

CALYPTOSPADIX CERULEA Clarke.

On August 7, 1908, I found growing on the sides of the steamer Fish Hawk, at Woods Hole, several fine colonies of this hydroid, originally described by Clarke,[1] and so far as I am aware has

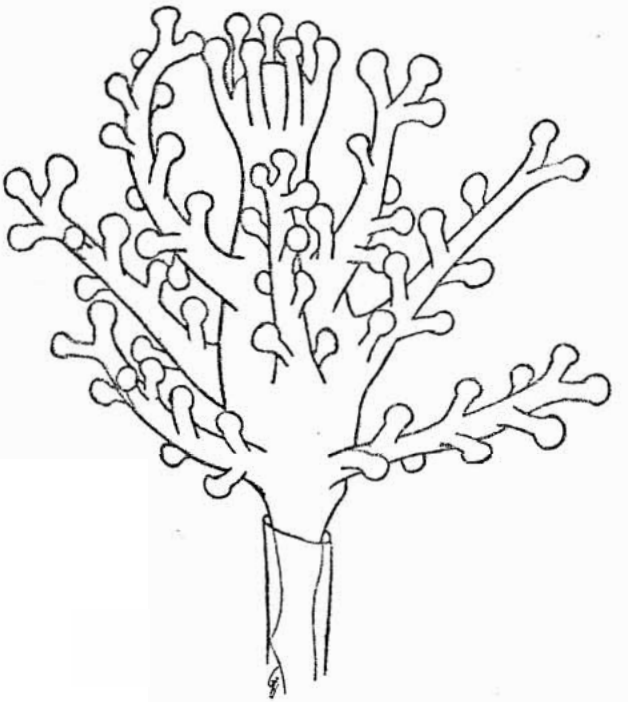

FIG. 2.

not since been a subject of record. In general aspects and size it resembles *Bougainvillia*, and was in the present instance thought to be that hydroid. A closer scrutiny soon revealed its marked differences.

Its original description from Chesapeake Ray, and its occurrence on the Fish Hawk, which had only 2 month previous come from Norfolk, at once suggested the probability of its having been thus transported to this locality. It is not strange, there-

[1] *Mem. Bost. Soc. Nat. Hist.*, Vol. III., 1882, p. 136.

fore, that I made the following entry in my notes at the date above mentioned: "This is a fine illustration of the importance of ships as a means in the distribution of organisms." On the following day it occurred to me to look about the docks at which the steamer was moored as to whether any signs of the hydroid might be found on the piles; and somewhat to my surprise colonies were found at several points, some of them quite remote from the ship. Immediately the query arose, Did the Fish Hawk bring the hydroid, or had it found a place on the ship from contiguous piles of the dock? The smaller and younger conditions of colonies on the ship suggested the latter alternative, but still with the prepossession of theory strongly inclining to the former. An examination of the outer side of the ship showed an almost entire absence of the hydroid, which still further emphasized the doubt as to the ship's relation to the matter of distribution, The matter found a final solution so far as the *present* issue was concerned when on August 10th Mr. Vinal Edwards having at my request brought a few hydroids from Wareham bridge at the upper arm of Buzzards Bay, and I found among the material fine colonies of the same hydroid. This of course ruled out the Fish Hawk so far as the present case was concerned, for the last habitat was entirely beyond the reach of the ship as a means of transportation.

During the current season, 1909, I looked several times at the fisheries docks for colonies during July and early August, but in vain; but again I was able to obtain **luxurious colonies** from the Wareham locality. This clearly established the fact that the species is thoroughly established as a permanent feature of the local fauna. But the matter as to *how* and *when* it became established must be a subject of much uncertainty for the present. That it has been established for any considerable time I seriously doubt, having been collecting throughout the region more or less assiduously for many years without previously finding any trace of its presence.

The hydroid is a large and beautiful species, the bluish color of the female gonophores making it strikingly different from almost all other species of its character. Fig. 3, copied from Clarke's paper, gives a fair idea of the main features of the hydroid.

CLYTIA VOLUBILIS. Fig. 4.

On floating masses of *Sargassum* were found prolific colonies of a hydroid which had many of the characteristics of *Clytia johnstoni*, and which I took for a time to be that species, though recognizing certain features which differed from it. During the current summer I took at Harpswell, Maine, what proved to be very typical specimens of the species, and which upon comparison with the formes showed very marked and constant differences. I was therefore forced to reconsider its specific relations. In

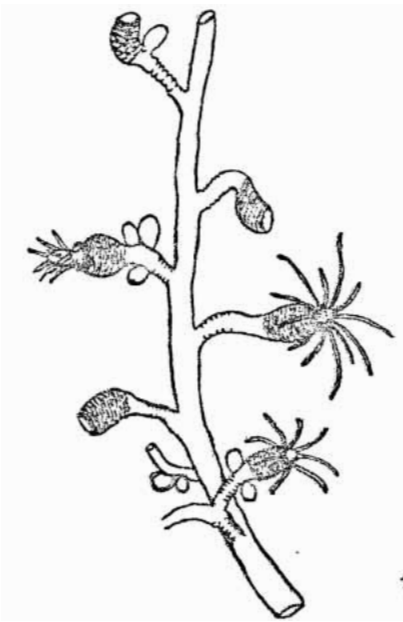

FIG. 3.

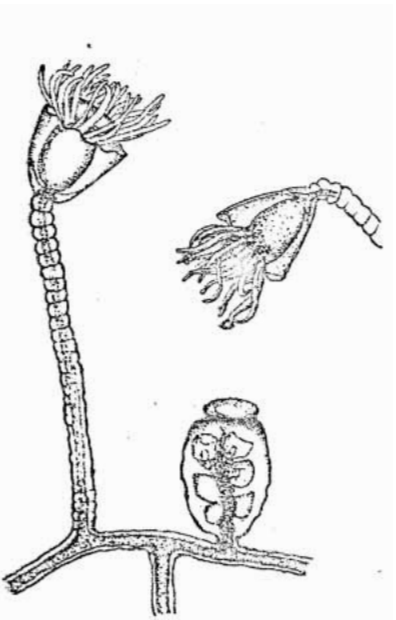

FIG. 4.

doing this I had occasion to compare it with specimens taken at Naples several years ago, and which I had then considered as *C. johnstoni*. The two species had much in common, indeed differed hardly more than might species from remote localities. A review of the literature brought to light the fact that certain authorities have considered the two above named as identical. For example, in his monograph "Die Hydroiden des k. k. naturhistorischen Hofmuseums," Marktanner-Turneretches has thus treated them, giving preference to the earlier name of Ellis and Solander.

A comparison of the characteristic specimens of C. *johnstoni* taken at Harpswell with the Woods Hole and Naples specimens has led me to consider both as entitled to specific distinctness, and I am therefore designating the local species as *C. volubilis*, and believe the Naples specimens to be the same. The following features are diagnostic :

Stems usually simple and unbranched, **2–4** mm. high, annulated at proximal and distal ends, occasionally indefinitely annulated throughout. Hydranths relatively large, with 20–24 stout tentacles, and with a prominent hypostome, more *or* less trumpet-shaped in expansion. Hydrothecæ broadly campanulate, not very deep, and with about 10–12 shallow rounded teeth, in some specimens the margins hardly *more* than undulate.

Gonangia borne on the reticulated hydrorhiza, rather large, and with very short plain pedicels. An interesting feature was the fact of a remarkable variation as to the aspects of these organs. Most were rather smooth, oval structures ; but in not a few cases they were strongly corrugated throughout, and examples showing all phases of intergrading in this particular were easily found.

It may be well in this connection to call attention to a species of *Clytia* described by Congdon from Bermuda,[1] *C. simplex*, which has features in some measure intergrading with the one under review. I have not seen Congdon's type specimens, hence have only- his general description *as* a guide. It will be seen that his specimens average considerably larger than my own, and the hydrotheca is given as longer, and **with** deeper teeth, still **it** might be worth an attempt to critically compare the types of these several species with a view to ascertaining just what grounds might be found bearing upon their interrelations.

CLYTIA CYLINDRICA Ag.

On at least two occasions recently I have taken this beautiful little hydroid. While at times it may be found in considerable numbers, it does not seem to be especially common, though this may be due in part to its very small size. In height the simple stems are from 1–1.j mm. ; the hydrothecae about 0.5 mm.

[1] *Proc. Am. Acad. Arts and Sci.*, Vol. XLII., p. 471, 1907.

long by about 0.2 mm. broad; they are cylindrical in form, with about 8–10 sharp, deeply cut teeth. Gonangia are elongate more or less cylindical, smooth, borne on delicate pedicels ringed at proximal and distal ends. The hydranths are extremely delicate, and with delicate orange to reddish tints just below the tentacles.

OPERCULARELLA PUMILLA Clark.

Among a few hydroids collected in March, 1908, by Dr. F. B. Sumner were found a very few specimens of this species, a record of which is important since I can find no evidence of its occurrence since that of its original description by Clark.[1] He records having taken it at Portland, Maine, and off Montauk Pt., Long Island. The related species, *O. lacerata* Hincks, he records from New Haven, Conn. Clark expressed some doubt as to whether his species really came under the genus to which it was assigned, and Nutting has expressed doubt as to the validity of the species, believing it probably identical with O. *lacerata*. My own specimens conform very closely with Clark's description and figures. It is a most beautiful and delicate little hydroid. Stems and branches are annulated throughout. No gonangia were present on my specimens.

OBELIA CONGDONI, n. sp

On several occasions recently I have taken from floating gulf weed at Woods Hole an *Obelia* which, while apparently closely related to *O. hyalina* Clarke, differs in several important features, as will be pointed out later.

Congdon has recently described a species from Bermuda, which he referred to Clarke's *O. hyalina*,[2] but which I am convinced is identical with the species under consideration, and which seems to me to be an undescribed species.

Congdon's description and figures are sufficiently accurate to obviate necessity for any considerable details In this connection (cf. *op. cit.*). A few points which seem to be in rather sharp contrast with Clarke's species may be given.

According to Clarke[3] the "branches of the stem arise in the

[1] *Trans. Conn. Acad. Sci*, Vol. III., pp. 61–2.

[2] *Proc. Am. Acad. Arts and Sci.*, Jan., 1907.

[3] *Bull. Mus. Comp. Zoöl.*, Vol. V., 1879, p. 241.

axils of the hydrothecæ." This I do not find to be the case in the present species. Again, according to Clarke, the "gonangia are small, about twice the length of the hydrothecæ, rounded off at the distal end, with a simple spherical, terminal opening which stretches across the distal end." On the contrary, the gonangia are large, about four times the length of the hydrothecæ, and the opening is not simple, but *there* is a terminal neck with everted rim. It should also be said that in contrast from Clarke's species in which the colony is said to be "about 12 mm. in height, and but little branched," in the present Case the colony is from 20 *to* 30 mm. in height, and much branched.

Gonosome. — Themedusæ when liberated have 24 tentacles, but others are rapidly acquired and within ten or twelve hours many specimens have from 30 to 36. The general aspects of the medusa are distinctively obelian; there is the eversible bell, the squarish manubrium at base, with rounded oral portion, with two otocysts in each quadrant.

Regarding the species as new, and in deference to Congdon's description, I suggest as its specific designation *Obelia congdoni.*

Calycella syringa.

This species is neither new nor rare in this region. Reference is made to it for the purpose of calling attention to certain features of habitat and variation which seem of *some* interest and importance. Nutting refers to it as "found abundantly in the Woods Hole region, growing over all sorts of plant-like marine organisms, especially other hydroids." This statement I am able to confirm, though with a single qualification, namely, its seasonal oscillations. I have found it rather *uncommon* during the midsummer season, and have never found it actively propagating at this time by sexual modes. In early spring — March to May — it seems much more abundant and immense colonies with prolific crops of gonangia are not rare.

Another feature calls for some attention, namely, the variable size and aspects of the species in midsummer. At this time specimens found by me have been invariably of dwarfed character, so much so that for *some* time I was rather inclined to consider it as a distinct species. Typical specimens taken in

spring have the distinctive elongated and spirally annulated pedicels and large hydrothecæ. But specimens taken in summer, so far as my observations have gone, are uniformly and constantly small — only about one fourth that of typical specimens, and have extremely short pedicels, with only one or two annulæ, or with none. I was not unaware that Clarke[1] had referred to certain variations in size, but he made no special reference to it save as an exception. It was only after careful search among colonies of typical specimens that I was able finally to find an *occasional* specimen of this dwarfed character. I have satisfied myself that it is but another instance of that tendency to seasonal variation which is well known in other cases. It is well, however, that it

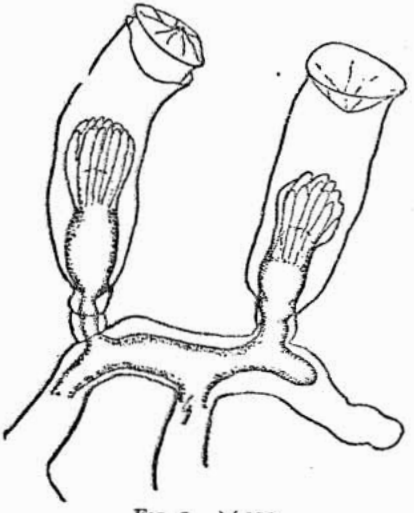

FIG. 5. × 100.

be emphasized, as well as the further fact that at certain times ***dwarf features*** are ***distinctive*** and *constant*. Fig. 5 shows some of these dwarfs enlarged.

One other feature may be referred to in connection with this phase. Clarke called particular attention to the appearance in certain hydrothecæ of this species of a "wide ring, ornamented with from ten to fourteen longitudinal markings, which rises for some distance above the rim and on the summit of which there is borne either an operculum or another ring; in some cases

[1] *Trans. Conn. Acad. Sci.*, Vol. III., p. 66.

there are as many as four of these rings with an operculum at the summit." Such series of rings I have found io be rather common ; but it has not been possible to distinguish, even with high powers, the "ornamental markings" to which Clarke makes reference. The surface of these secondary, or additional rings is quite as devoid of such markings as is that of *the* original hydrotheca itself.

CALYCELLA NUTTINGI, n. sp. (Figs. 6, 7.)

Growing upon colonies of the bryozoön, *Bugula turrita*, taken at the fishing grounds off Sankety, and later at Woods Hole, and even still later at Harpswell, Maine, I have found a microscopic species of *Calycella*, which seems to be undescribed. *It* is hardy more than one tenth the size of an average specimen of *C. syringa*, and differs in other respects as well. Its very minute size may probably account for the fact of its having been overlooked in

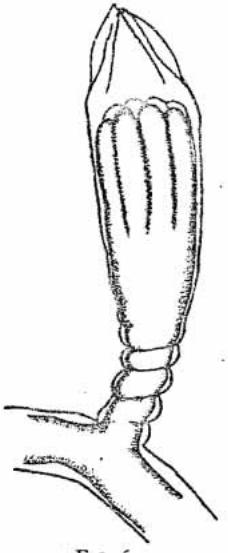

FIG. 6.

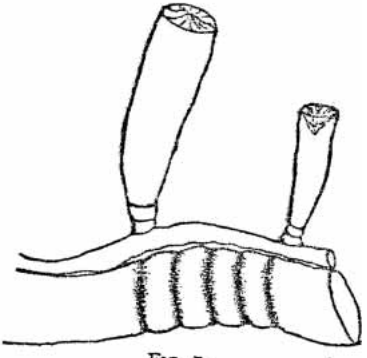

FIG. 7.

spite of continuous collecting throughout the region for many years. The following characters are diagnostic of the species:

Trophosome. — Colony composed of a creeping, filiform stolon, slightly, if at all, reticulated, from which at very irregular intervals arise the hydrothecæ. These are tubular, though not quite

cylindrical, gradually widening from base to margin, as shown in Fig. 7, and are without appreciable constriction at base where it articulates with the short, annulated pedicels, the annulations occasionally extending some distance (rarely over entire body), on the thecal walls, giving the impression of complete annulation when viewed obliquely. The hydrothecæ are very delicate, often collapsing at the distal ends when being prepared for mounting. There is a definite operculum, which often appears plaited, the individual valves being more or less difficult to distinguish. I have not determined their exact number with any degree of certainty. In many cases these valves exhibit the same aspect of inversion as is the case with *C. syringa*, but I have not found the presence of secondary rings or other marginal duplication as in the latter species. Total length of pedicel and theca 0.2–0.3 mm. or an average of about 0.25 mm., by about 0.07 mm. in diameter.

Hydranth extremely small and delicate; body elongate, cylindrical, with conical hypostome; tentacles very delicate aad thread-like, usually ten in number, occasionally eight.

Gonosome unknown. The examination of many colonies from various localities failed to discover signs of gonangia. It may be probable that like *C. syringa* this species has its breeding season at some other time of *year.*

Habitat. — Found only associated with other hydroids, or similar organisms, *e. g.*, bryozoa, and hence is probably of commensal habit. No evidence was found indicating parasitism.

It is a pleasure *to* name the *species*, with his'consent, in honor of my friend and distinguished student of hydroids, Professor C. C. Nutting.

KERATOSUM COMPLEXUM, n. gen. and sp. (Figs. 8–10.)

On three successive summers there has been taken an organism at Crab-ledge which was variously assigned to the Porifera, Bryozoa, and finally came to the writer. A glance at Fig. 8 will show how little there is from a superficial view to suggest hydroidean affinities. Indeed it was only after sections bad been made, or maceration and dissection of the thing, that its true relations became evident. And it was only after considerable re-

search that its generic relations were even approximated. In 1892 Levinsen described a hydroid from Greenland (Meduser, Ctenophorer og Hydroider fra Grönlands Vestkyst),[1] which seemed to have much in common with the one here under review. We had described it as a new species under the genus *Lafœina*, Sars, naming it *L. maxima*. At first it was thought the present

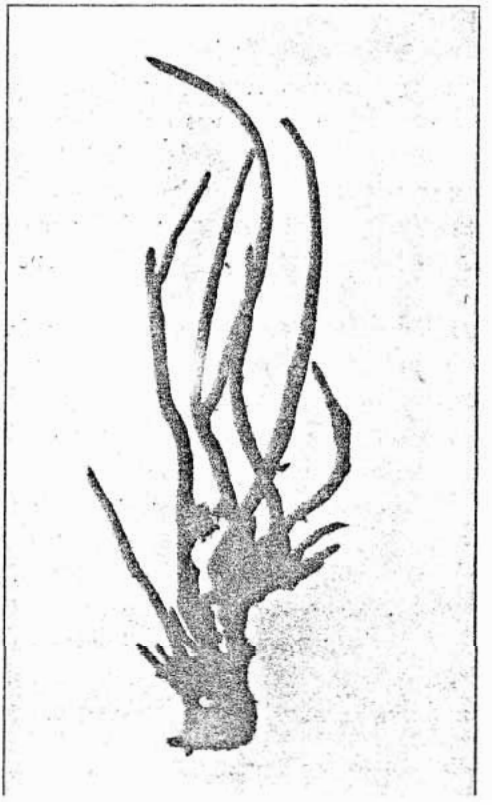

FIG. 8. Photograph of colony ⅔ natural size.

species was probably identical with it, but when one undertook to work out details of morphology it became more or less certain that it not only was not the same species, but that, moreover, it could hardly belong to the same genus, if, indeed, there might not be the necessity of establishing for it a new family.

[1] "Saertryk af Vidensk. Meddel. fra den naturh. Foren.," 1892.

The genus *Lafœina* was established by Sars (Bidrag til Kundskaben om Norges Hydroider)[1] for a very minute hydroid found on sterns of *Perigonimus*, the chief generic character of which was the presence of minute urticating organs, or nematophores, unlike any before known. Levinsen's description is rather inadequate, and his figures not altogether satisfactory, but to the writes there seems to be so comparatively little in common between his species and that of Sars, that it may be doubtful whether it should

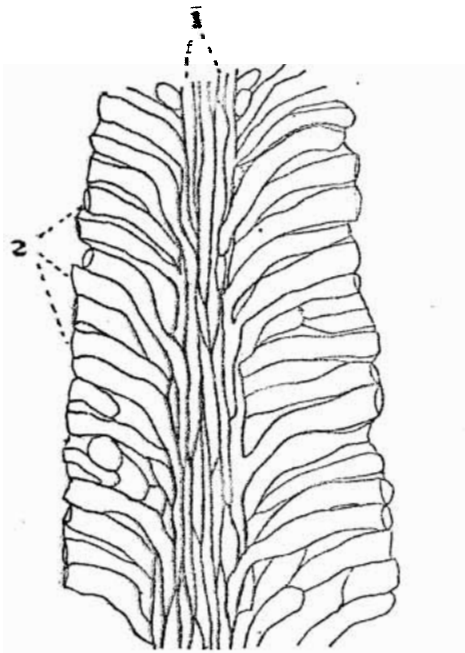

FIG. 9. 1, Axial tubes; 2, hydrothecæ.

not have been placed under a new genus. Be that as it may, it seems very sure that the present one must find different generic housing. For example, in Sars' genus the hydroid has a reticulate hydrorhiza, and Levinsen describes something of the sort for *L. maxima*, but in the present species while there may be comprised something of the sort, it would be more correct to describe the complex stem as arising from a dense, sponge-like base, etc.

Concerning the family relations I am not disposed in this connection to enter into any critical review. While the Perisi-

[1] "Saerskilt aftrykt Selsk. Forhandlinger" for 1873.

phonidæ would be the only one under which it might be placed, still the family as at present defined, according to Allman (Hydroida, Part II., p. 32),[1] would by no means provide for the species. For example, while there is an axial tubular mass, as shown in Fig. 9, there is no single one of these which bears the hydrothecæ as called for by the definition referred to. However, for the time being the species may be left under this family till such time as adequate revision may be undertaken, when the needed modifications may be provided.

As already intimated, it seems necessary to institute a new genus as well as species for our hydroid. For the genus characters the following are designated as diagnostic :

Colony sponge-like, both in generai aspect and in the texture of stems and branches, as well as in growth-habit. Looked at from a short distance it resembles very much our common sponge, *Chalina arbuscula*, in almost every particular. Hence the proposed generic name —*Keratosum*. The sterns arise from a disk-like spongy base and branch much after the manner of "finger sponges." These are composed of a complex and intricate mass of siphon-like tubes which ramify and anastomose irregularly, and from which arise hydrothecæ, and nematophoric organs, the latter with thecoid terminal structures similar *to* the former, the whole cemented together by a dense sponge-like **felt** of very tenacious and resistant character. Longitudinal and transverse sections of stems or branches show them *to* be composed of the following parts : (1) a central, axial portion, made **up** of more or less parallel, anastomosing tubes; (2) a peripheral portion, composed chiefly of hydrothecæ and what may be termed nematothecæ ; (3) ramifying strands of cœnosarc, which seem *to* interpenetrate the elements of the peripheral zone. Figs. 8, 9 and 10 will show both the surface aspects as well as sectional views just mentioned.

Concerning specific diagnosis it must be regretted that the physiological state of the hydroid was such as to afford but meager characters of specific nature. The organism in all the specimens collected seemed to be in a state of hibernation, or better, perhaps, *æstivation*, no hydranths or similar organs being

[1] "Report Chall. Exprd.," Vol. XXIII. (part 70), p. 32, 1888

distinguishable. Hence such organs as tentacles, gonophores, etc., which afford important specific characters, were wholly lacking. I had at first attributed this condition to bad preservation; but collections made at two subsequent seasons, in each case care being taken to preserve by approved methods, have convinced me to the contrary. It seems highly probable that this hydroid during the summer season is in a state of suspended animation, so to speak; a condition quite common among hydroids at various seasons. It must suffice in this connection to make brief reference to a few features, as hydrothecæ, etc. As shown in the figure, the hydrothecæ are tubular structures, arising from the axial tubes by rather narrow necks, and extending

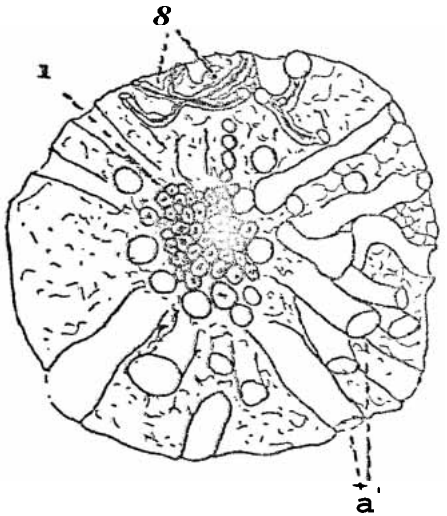

FIG. 10. Cross-section of stem. 1, Axial tubes; 2, hydrothece; 3, cœnosarcal strands.

upward and outward, becoming more or less curved, and opening to the surface by somewhat oblique mouths. While in many cases there seemed to be opercular-like folds at the thecal openings yet they were difficult to definitely demonstrate or describe. As to size hydrotheca: averaged about 0.7 to 1 mm. in length, by about 0.12 mm. in diameter at median portion, somewhat larger at mouth. In no case were gonangia distinguishable, nor evidences of germ cells. This might be expected as to the last, but if gonangia are an organic part of the skeleton one might

expect some trace of them in some specimens, at any rate. But none could be recognized.

Nernatophores were distinguishable, and in a general way seemed similar to those described by Levinsen. They are elongated structures, cylindrical in shape, and with terminal thecoid organs which are smaller than the hydrothecae, much smaller indeed, but with no peculiar or distinguishing features. In many cases the definite organization of the nematophore was distinguishable, and the knobbed heads were found loaded with numerous nematocysts which measured about 0.015 to 0.02 mm. in length by about one third of this in diameter. In shape the nematophores may be designated as elongate-clavate ; and are probably protrusible in life beyond the nematothecæ as organs of defense, or offense, according to circumstances.

In connection with the account of the morphology there should have been mentioned a matter of interest, as well as of difficulty, namely, that concerned with the attempts to dissect and separate the eiements of the complex stern structure. The usual resort to boiling with potash or caustic soda, while affording some aid in clearing out the organic contents of the tubes, afforded very small aid in isolating the elements. Even when macerated for hours or days in strong solutions, or after prolonged boiling, so far as my own efforts were concerned, the macerating processes availed but little. And when resort was Lad to javelle *water* the consequences were worse, for with that agent both the cement substance and the chitinous perisarc itself were attacked about equally, and the end was, naturally, the disintegration of the entire mass.

I was interested to find a similar experience recorded by Allman (*@.cit.*, p. 47). Of the adhesion of the *tubes* of *Grammaria* he says : " So intimate is this adhesion that *I* have found no treatment, even prolonged boiling in caustic potash, of in any way overcoming it. *Grammaria* in this respect presents a striking contrast to *Cryptolaria*, as well as other genera of the Perisiphonidæ, in all of which maceration in a solution cl caustic potash *so* weakens the adhesion of the tubes to one another that they may then be easily separated by the dissecting needle."

All in all, we have in this hydroid one of the most interesting,

and in some ways anomalous, of this remarkable group of organisms. No name compatible with the rules of nomenclature would in any measure serve to more than hint somewhat of this; hence in proposing for it the above title — *Keratosum complexum* — it may be presumed to be modestly christened!

It is a pleasure to acknowledge obligations to Dr. R. C. Osburn for aid in securing material of this species.

SYRACUSE UNIVERSITY,
September 15, 1909.