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THE HYDROIDS OF THE PACIFIC COAST OF THE UNITED STATES, SOUTH OF VANCOUVER ISLAND.

WITH A REPORT UPON THOSE IN THE MUSEUM OF YALE COLLEGE.

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The Hydroids of the Pacific Coast of the United States, south of Vancouver Island. With a Report upon those in the Museum of Yale College. By S. F. Clark.

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The Museum is indebted for its collection of Californian Hydroids chiefly to Prof. D. C. Eaton, who has presented during the last two or three years, a large number of specimens, that were received by him with dried algæ from that coast. They were collected and sent to him by Dr. C. W. Anderson, Santa Cruz, Cal.; Dr. L. N. Dimmick, Santa Barbara, Cal.; Mrs. Ellwood Cooper, Santa Barbara, Cal.; and Miss Mitchell of Vancouver Island. All the specimens received from these sources were collected in tide-pools along the shore or attached to algæ, washed in from deeper water. A few alcoholic specimens have also been received from San Diego, Cal., collected on the piles of the wharves and along the shore, by Dr. E. Palmer, and a fine specimen of *Plumularia setacea* was dredged in six to eight fathoms, off San Diego, by Mr. Henry Hemphill.

Some of the species, including most of the *Sertularidæ*, do not seem to be injured by being dried, but others, as the *Campanularidæ*, are usually rendered useless for description. The specimens of the two species of *Campanularia* described below are unusually well preserved, both hydrothecæ and gonothecæ being in good condition.

There has been very little published on the hydroids of the western coast of North America, up to the present time. In 1857 Dr. Trask* described and figured nine new species of Zoöphytes from the Bay of San Francisco and adjacent localities. Five of these are Bryozoa; the remaining four represent three genera of the family Sertularidæ, as follows: *Sertularia anguina*, *S. furcata*, *Sertularella turgida* and *Hydrallmania Franciscana*, all of which, so far as I am aware, are peculiar to that coast; unless indeed the last named species prove to be identical with *H. falcata* of Europe,

* Proceedings of the California Academy of Natural Sciences, vol. i, March, 1857. Dr. J. B. Trask.

Africa and New England. In 1860 Andrew Murray* described and figured five species from the Californian coast, of which three are new, and the other two, *Sertularia labrata* and *Plumularia gracilis*, are synonymous with two of Trask's species, viz: *Sertularia anguina* and *Plumularia Franciscana*. Mr. Alexander Agassiz† in 1865 described seven species and recorded seven others from the Bay of San Francisco; and he had three of the same from the Gulf of Georgia, W. T. Five species were also mentioned by him from the North Pacific. Two of these five northern species, *Bougainvillia Mertensii* Ag. and *Cotulina Greenei* A. Ag., are also found at San Francisco. The latter species having also been collected at Santa Barbara, Cal., has the wide range of nearly three thousand miles upon our western coast. Professor Allman mentions having found sixteen species in a collection from the Californian coast, submitted to him for examination; two of them, *Lafoëa dumosa* and *Sertularia pumila*, are common on the European and New England coasts, and the former species is also recorded from South Africa. The collection in the Museum of Yale College contains twelve species and one variety. Of these four are new; nine are recorded only from the Pacific coast of North America, as yet; and three, *Halecium tenellum*, *Sertularia argentea* and *Plumularia setacea*, are also common on the European shores; the first two of these have also been found on the New England coast, from Maine to Long Island Sound. The most common form on the Californian coast is the showy *Aglaophenia struthionides*, which is apparently as abundant there as *Sertularia argentea* and *S. pumila* are upon our eastern shores, for it forms the bulk of every package sent to us from the western coast. The following table gives a list of all the Hydroids known on the western coast of the United States, from Vancouver's Island to San Diego, with the range of the different species and the names of some of the collectors.

List of Hydroida known to occur between San Diego and Vancouver Island.

Coryne rosaria *A. Ag.*	Bay of San Francisco, Cal. (A. Agassiz).
Tubularia elegans *Clark.*	San Diego, Cal. (Dr. E. Palmer).
Thamnocnidia tubularoides *A. Ag.*	Bay of San Francisco, Cal. (A. Agassiz).

* The Annals and Magazine of Natural History, Series 3, No. XXVIII, April, 1860. Descriptions of new species of Hydroids from the Californian Coast. By Andrew Murray.

† Illustrated Catalogue of the Museum of Comparative Zoölogy, No. II. North American Acalephæ. By Alexander Agassiz. 1865.

Parypha microcephala *A. Ag.*	Bay of San Francisco, Cal. (A. Agassiz).
Bimeria gracilis *Clark.*	San Diego, Cal. (E. Palmer).
Bougainvillia Mertensii *Agassiz.*	Bay of San Francisco, Cal. (A. Agassiz).
Eudendrium, sp.	Santa Cruz, Cal. (C. W. Anderson).
Campanularia everta *Clark.*	San Diego, Cal. (H. Hemphill), to Vancouver Island (J. M. Dawson).
Campanularia fusiformis *Clark.*	Vancouver Island (J. M. Dawson).
Campanularia cylindrica *Clark.*	Santa Cruz, Cal. (C. W. Anderson).
Laomedea rigida *A. Ag.*	Bay of San Francisco, Cal. (A. Agassiz).
Laomedea Pacifica *A. Ag.*	Gulf of Georgia (A. Ag.) to Bay of San Francisco (A. Agassiz)
Lafoëa dumosa *Sars.*	
Halecium tenellum *Hincks.*	San Diego, Cal. (Dr. E. Palmer).
Sertularia anguina *Trask.*	Santa Cruz, Cal. (C. W. Anderson), to Vancouver Island (J. M. Dawson).
Sertularia anguina, var robusta *Clark.*	San Diego, Cal. (H. Hemphill), to Vancouver Island (J. M. Dawson).
Sertularia argentea *E.* and *S.*	Santa Barbara, Cal. (Mrs. Ellwood Cooper).
Sertularia pumila *Linn.*	
Sertularia Greenei *Murray.*	Santa Barbara, Cal. (Mrs. Ellwood Cooper), to Vancouver Island (J. M. Dawson).
Sertularia furcata *Trask.*	San Diego (Dr. E. Palmer), to Bay of San Francisco (J. B. Trask).
Sertularia corniculata *Murray.*	Bay of San Francisco (A. Murray).
Sertularella turgida *Clark* (Trask).	San Diego, Cal., to Vancouver Island (J. M. Dawson).
Plumularia setacea *Lamarck.*	San Diego, Cal. (Dr. E. Palmer), to Vancouver Island (J. M. Dawson).
Aglaophenia struthionides *Clark* (Murray).	San Diego, Cal. (D. C. Cleveland), to Vancouver Island (Miss Mitchell).

This list of twenty-four species is very small compared with that of the eastern coast, from Maine to New York, the fauna of the latter region containing five times as many species as that of the former, notwithstanding that the region included on the western coast is over thirteen hundred miles in length, while that of the New England coast is only about eight hundred. It should be borne in mind however that most of the collecting on the Pacific coast has been done along the shore, the dredge having been little used, and there is little doubt that when the fauna has been more thoroughly investigated the number of Hydroids may be at least doubled. Such a variety as exists on the New England coast can hardly be expected from our Pacific shores south of Vancouver Island, for the waters there do not afford the same diversity in temperature.

Bimeria (?) gracilis, sp. nov.

Plate XXXVIII, figure 3.

Stems clustered, rooted by a creeping stolon, erect, simple, delicate, not divided by distinct joints, thickly branched; branches suberect, the larger ones reaching to the end of the stem and resembling the main stalk, the smaller ones bear but one or two hydranths and are also unjointed; perisarc extending over the hydranths and partially covering the tentacles, annulated at the base of each branch and branchlet. Sporosacs developed from the hydrophyton, a single one at the base of each hydranth-bearing branchlet, oval or ovate, supported by a short peduncle consisting of one or two annulations. Hydranths large, tapering uniformly from the distal end to the base, provided with about ten or twelve tentacles and with a large, rounded or slightly conical proboscis. Height of best specimen, 55mm

Collected on the piles of wharves at San Diego, Cal., by Dr. E. Palmer, 1875.

Our specimens were not in a good condition when they arrived, having been crowded in a tin can with many other things, which pressed them all out of shape, and the quantity of alcohol not being sufficient to preserve so much animal matter, the hydroids suffered considerably; the hydranths and sporosacs especially were in a very worn and mutilated state. It is not easy to determine just how far the perisarc extends upon the hydranth, but it certainly covers the body of the latter, and it must, I think, be developed over a portion of the tentacles, for after soaking them in a dilute solution of caustic potash for forty-eight hours the tentacles still retained their normal position, nor did they show any decrease in size. The potash seemed to act very slowly, for after being in the warm solution forty-eight hours the hydranths were not entirely dissolved out. The fact of the tentacles being unaffected would seem to indicate that they are entirely protected by chitin, but tentacles so protected would be of little or no use to the animal, and I think it more probable that the distal portions are free and may be contracted into the basal covering. It is impossible to determine from our specimens how the tentacles are held, whether in a single erect verticil as in *Garveia* or with each alternate tentacle depressed, as in *Bimeria vestita* of Wright. With such imperfect data I feel some doubt about placing this species in the genus *Bimeria*, and only do so provisionally.

Tubularia elegans, sp. nov.

Plate XXXVIII, figure 2.

Stems clustered, rooted by a creeping stolon, erect, unbranched, more or less annulated at intervals toward the base. Hydranths large, with about thirty tentacles in the proximal set and twenty to twenty-four in the distal. Gonophores borne in clusters just inside the proximal tentacles, twelve to twenty in a cluster, each of the larger ones crowned with four conical tubercles. Height of finest specimen, 75mm.

Collected on the piles of the wharf at San Diego, by Dr. E. Palmer, 1875. Intermingled with it and often attached to it were numerous shoots of *Bimeria*. Many of the young had attached themselves to the parent stalk, giving at first sight the appearance of branching stems.

The specimens from which this species is described were crowded in the same can with the Bimeria described above, and are in the same dilapidated condition. There is a Tubularian, *Thamnocnidia tubularoides*, from the Bay of San Francisco, described by A. Agassiz (Cat. of N. A. Acalephæ, p. 196), which he says "is readily distinguished from its eastern congeners by the stoutness of the stem and large size of the head." The description is a very meagre one, but from these two characters I conclude that it must be distinct from *T. elegans*, for the latter species has neither a stouter stem nor larger head than *Thamnocnidia spectabilis* of the New England coast.

Eudendrium, sp.

Plate XXXVIII, figure 1.

We have also received from the California coast the perisarc or chitinous portion of what I take to be a species of Eudendrium.

Stems stout, erect, dark horn color, strongly annulated throughout, rather sparingly branched; branches sub-erect, springing from all sides of the stem and much divided. Hydranths borne at the extremity of the short ramuli. The entire perisarc is strongly ringed, giving it a close resemblance to the tracheæ of an insect. Height of largest specimen, 80mm.

Santa Cruz, Bay of Monterey, Cal.,—Dr. C. W. Anderson.

Campanularia everta, sp. nov.

Plate XXXIX, figure 4.

Stems rather stout, arising at intervals from the creeping stolon, with two annulations at the base of the hydrothecæ, the lower one

smaller than the upper; the remainder of the stem has a wavy outline or is slightly annulated. Hydrothecæ broadly campanulate, not deep, tapering more or less gradually from the distal end to the base, the rim strongly everted and bearing about fifteen rather shallow teeth. Gonothecæ, large, turgid, nearly cylindrical, tapering a little at the base, borne on short, stout peduncles and with the aperture terminal, small and cylindrical.

Found creeping on an Alga from San Diego, Cal.,—H. Hemphill.

This is a very pretty form and may readily be distinguished by the broad hydrothecæ with their strongly everted, toothed rims. The peculiar shape of the gonothecæ is also very characteristic.

Campanularia cylindrica, sp. nov

Plate XXXIX, figures 1–1[d].

Stems are simple, unbranched pedicels, of very variable length, more or less annulated over the entire length and with a single well-marked ring at the base of the hydrothecæ, rooted by a creeping, twisted stolon. Hydrothecæ campanulate, nearly cylindrical, tapering but very slightly toward the base, varying greatly in depth, rim armed with about fifteen very shallow, sharply pointed teeth. The gonothecæ also show considerable variation in size, there being occasionally one or two which are at least twice the size of the ordinary form; they are subfusiform, tapering slightly more toward the proximal than the distal end, supported on short pedicels with one or two annulations.

Campanularia fusiformis, sp. nov.

Plate XXXIX, figures 2–2[g].

Hydrocaulus simple, creeping, bearing the pedicels at irregular intervals; pedicels of variable length, usually two or three times the length of the hydrothecæ, never more than six times their length, with a more or less wavy outline. Hydrothecæ small, deeply campanulate, tapering at the base, rim ornamented with about twelve stout, shallow, acute teeth, a single distinct annulation at the base. Gonothecæ small, fusiform, constricted at both ends, sessile, aperture small, terminal.

Vancouver Island,—J. M. Dawson. Found growing on *Sertularia anguina* var. *robusta*.

This species is closely allied to *C. cylindrica* of the Californian coast from which it may be distinguished by the size of the hydro-

thecæ and by their shape, not being rounded at the base; by the form of the gonothecæ, which are sessile and have a circular terminal aperture.

Found creeping on the old stems of a *Eudendrium* like form, taken at Santa Cruz, Cal., Bay of Monterey, by Dr. C. W. Anderson.

The variation in the length of the stems is very great; sometimes they are about equal to the length of the hydrothecæ, and again they will be five or six times that length. The stolon is quite uniformly twisted and is at least twice the diameter of the stems.

Halecium tenellum Hincks.

Halecium tenellum Hincks, Annals and Mag. of Nat. Hist., 3, VIII, 252, pl. VI.

Plate XXXIX, figure 5.

Some very good specimens of this delicate species have been received from San Diego. There were no gonothecæ but the hydrosome is so exactly similar to our New England specimens and to the figure and description of Hincks that I do not hesitate to call it the same. A glance at our figure will show how exactly it corresponds.

Found parasitic on a species of *Bimeria*, collected on the piles of wharves, San Diego, Cal.,—Dr. E. Palmer, 1875.

Sertularia anguina Trask.

Sertularia anguina Trask, Proc. Cal. Acad. Nat. Sci., 112, Plate V, fig. 1. March 30, 1857.

Sertularia labrata Murray, Ann. and Mag. for April, 1860, 250, Plate XI, fig. 2.

Plate XL, figures 1, 1ª, 2.

Stems clustered, simple, erect, straight from the proximal end to the first branch, above the first branch flexuous, becoming more and more so toward the distal end, sparingly branched, divided by transverse joints into short internodes, those below the first branch bearing a single pair of nearly opposite hydrothecæ, while those above the first branch have three hydrothecæ and give origin to a single branch; branches regularly alternate, ascending, slightly curved, mostly short, a few have a much larger growth and exactly imitate the main stems in every particular; color corneous. Hydrothecæ nearly opposite, somewhat flask-shaped or tapering evenly to the distal end without any constriction or flask-shaped neck; aperture usually entire, slightly oblique, facing toward the stem, or with the outer margin much more produced than the inner and in some cases showing a dis-

tinctly sinuous outline. Gonothecæ unknown. Height of largest specimen, 75mm. Plentiful on a large species of *Mytilus* from Monterey, Tomales Pt., Punta Reyes, and on old shells, Bay of San Francisco (Dr. Trask); Santa Cruz,—Dr. Anderson; Vancouver Island, —J. M. Dawson.

Our specimens of *S. anguina* agree so closely with Hinck's description and figures of *S. filicula* that I cannot separate the trophosomes, but the gonosomes being unknown, I prefer to let the species remain distinct rather than to unite them on such incomplete data. Murray also noticed the similarity to *S. filicula* although he only possessed "a minute portion without vesicles."

Dr. Trask says of his specimens, "Their affinity is with that of *S. fallax* of Johnston more nearly than with any other species with which I am acquainted." He could not have known of *S. filicula* at that time or he would at once have noticed the much closer resemblance to that form. He also says that his specimens have four hydrothecæ between each pair of branchlets, while ours have but three: one pair opposite each other and one odd cell in the axil of the branch. His description and figure agree so well, however, in every other respect that I am inclined to regard this as an error of observation.

This description has been made from specimens which were dried before they were sent to us and have since been soaked out in warm water. The perisarc being very stout and durable I do not think that it can have changed to any great extent.

Sertularia anguina, variety robusta Clark.

Plate XL, figures 3, 4, 5.

The variety *robusta* differs from the ordinary form in having a stouter stem, larger hydrothecæ, longer pinnæ, and in being in every way a much larger and stouter form. The mode of growth, the branching, the shape and arrangement of the hydrothecæ are the same as in the normal form. Gonothecæ borne on the pinnæ, more or less fusiform, arising from just below the hydrothecæ, distal extremity slightly curved to one side, the terminal aperture, large, circular. Length of largest specimens, 100mm.

San Diego, Cal.,—Henry Hemphill; taken from kelp roots washed ashore during a storm.

San Diego, Cal.,—D. C. Cleveland, 1875; Santa Cruz, Cal., Bay of Monterey,—Dr. C. W. Anderson; Vancouver Island,—J. M. Dawson.

This variety is very similar to *S. abietina* of Linnæus in many

respects. It has the same mode of growth, the same robust habit, the same style and arrangement of hydrothecæ. There is quite a difference in the natural size figures of *S. abietina* given by Hincks and by Johnston. Our specimens from the New England coast agree very well with Johnston's figure, which is just about twice the size of Hincks' figure.

Sertularia argentea Ellis and Solander (Linn.)

Three fine specimens of this widely distributed species have been found at Santa Barbara, California; they are in good condition and loaded with gonothecæ. The only characteristic which shows any variation is the gonothecæ, which are proportionally a trifle longer and also have the orifice a little larger than in our east coast specimens. This slight difference being the only one and this character varying considerably in the same specimen, I should not think of separating them.

Santa Barbara, Cal.,—Mrs. Ellwood Cooper. Height of largest specimen, 160^{mm}.

Sertularia Greenei Murray.

Sertularia tricuspidata Murray, Ann. and Mag. for April, 1860, p. 250, Pl. XI, fig. 1.
Sertularia Greenei Murray, Ann. and Mag., v, p. 504. 1860.
Cotulina Greenei A. Agassiz, Cat. of N. Amer. Acalephæ, 1865, p. 147.

Plate XXXVIII, figure 6.

Stems erect, slender, densely clustered, simple, thickly branched, basal portion straight, above the first branch becoming slightly flexuous, forming a graceful arc between each two branches, color corneous, usually darkest at the base; joints placed at right angles to the stem and very irregularly distributed, forming internodes which bear from one to eight pairs of hydrothecæ; branches alternate, erect, many of them short; some of the lower ones equal in length to the main stem and closely resembling it in every respect; others from the middle portion of the stem are of a medium length and, like the longest branches from the lower part of the stem, reach to the extremity of the main stem forming a corymb-like structure. The branchlets, like the branches, are mostly short, but a few are of considerable length, extending to the ends of the branches. Hydrothecæ sub-alternate, tapering uniformly to the distal end, with oblique, toothed apertures, which face toward the stem; on the outer edge of the aperture are two large, prominent teeth separated by a deep notch.

Gonothecæ borne in rows on the upper sides of the branchlets; the upper portion cylindrical, the proximal half tapering toward the base, aperture terminal, in a small cylindrical process elevated from the center of the distal end. **Height of largest specimens, 90^{mm}.**

Bay of San Francisco, Cal.,—Murray; Santa Cruz, Cal.,—Dr. C. W. Anderson; Santa Barbara, Cal.,—Mrs. Ellwood Cooper; Vancouver Island,—J. M. Dawson.

This is an interesting form as it is the only member of the *Sertularidæ* on the American coast having the peculiar aperture to the gonothecæ, by Agassiz called bottle-shaped, though it is by no means an uncommon form among our *Campanularidæ*,—*Obelia gelatinosa*, *O. geniculata* and *O. dichotoma* having the same general form of gonothecæ.

A peculiar discrepancy occurs in the descriptions of Murray and A. Agassiz in regard to the number of teeth on the rims of the hydrothecæ; the former describes them with three teeth, the central one being larger than the two lateral, while Agassiz describes them with four, two prominent exterior points and two smaller ones near the stem. We have quite a large supply of specimens in a good state of preservation and after having carefully examined them all, I cannot find a single hydrotheca that would afford any reason for changing the above description of *two* teeth upon the rim of each cell.

I should judge from Murray's figure that his specimens were not well preserved and by contracting had thrown out the inner margin of the rim, giving it, in some views, the appearance of a tooth. But how he made out one tooth to be much larger than the other two, I am at a loss to understand. And the fact of Agassiz having seen four teeth I am at present unable to account for.

Sertularia furcata Trask.

Sertularia furcata Trask, Proc. Cal. Acad. Nat. Sci., Mar. 30, 1857, 112, Plate V, figs. 2, a, b, c, d, e.

Plate XXXIX, figure 3.

Stems short, unbranched, rooted by a creeping stolon, simple, spreading in every direction forming dense verticillated clusters around the pieces of fucus on which it is usually found, attached to the stolon by a short, slender, twisted process about the length of an internode, divided by transverse joints into short regular internodes each bearing a single pair of hydrothecæ, color corneous. Hydrothecæ opposite, deeply immersed in the stem, with two large, sharp teeth on

the outer margin and a large aperture generally reaching to the stem. Gonothecæ large, sessile, generally borne near the base of the stems though occasionally found scattered over the entire length, of an elongated oval form, sometimes slightly compressed, with a large circular, terminal aperture. **Height of largest specimen, 45mm.**

Bay of San Francisco and Farallone Islands,—Trask; Santa Cruz, Cal., Bay of Monterey,—C. W. Anderson; San Diego, Cal.,—Dr. E. Palmer; Santa Barbara, Cal.,—Mrs. Ellwood Cooper; Santa Barbara, Cal.,—Dr. L. N. Dimmick.

S. furcata seems to be more nearly allied to *S. Greenei* than to any other Sertularian of the west coast known to us, both having the same style of hydrothecæ, arranged in about the same manner and with similarly toothed apertures. It is the same style seen in *S. operculata* of Linnæus.

S. furcata may be readily distinguished from *S. Greenei* by its entirely different gonothecæ, by the different size of the aperture in the hydrothecæ, by the extent to which the latter are immersed in the stem and by the habit or mode of growth. In general appearance it strongly reminds one of the *Sertularia pumila* of the New England coast.

Sertularella turgida Clark (Trask).

Sertularia turgida Trask, Proc. Cal. Acad. Nat. Sci., Mar. 30, 1857, 113, Plate IV, fig. 1.

Sertularia turgida A. Agassiz, Cat. N. Am. Acalephæ, p. 145, 1865

Plate XXXVIII, figures 4, 5.

Stems attached by a creeping stolon, sparingly branched, attached to the stolon by a pedicel consisting of three or four rings, short, stout, simple, spreading in every direction from the branches of fucus and pieces of laminaria which seem to be the favorite stations of this species, divided by oblique joints into short, stout internodes each bearing a single hydrotheca, color light corneous; branches stout, erect, usually about half the length of the main stem and very irregularly arranged, in some cases alternately, in others all the branches spring from one side of the stem and sometimes there seems to be no regular arrangement. Hydrothecæ large, full, alternate, deeply immersed in the stem, the inner angle of the proximal end extending more deeply into the stem than the outer, aperture large, armed with three stout teeth, two of which are larger than the other and are situated on the outer side of the rim, facing the stem, the third tooth

is on the inner margin of the rim midway between the other two. Gonothecæ, arising in the axils of the hydrothecæ, are large and of two forms; the larger form, similar to the gonotheca of *Sertularella polyzonias* Gray (Linn.), is obovate, sessile, armed with a few stout, blunt spines around the distal end, aperture, terminal and at the outer end of a small cylindrical process formed by a constriction or a very sudden tapering near the extremity and surrounded by a number of the largest spines; the smaller form is supplied with about twice as many spines as the larger form and is shorter and proportionally broader, the broadest portion being nearer to the distal end; this variation in form undoubtedly indicates a sexual difference, the smaller form probably being the male and the larger the female gonothecæ; both forms have the surface more or less roughened by transverse wrinkles. Length of largest specimen, 38^{mm}.

Bay of San Francisco, Monterey, Tomales Point, Cal,, on mollusca and algæ,—Trask; Santa Cruz, Bay of Monterey, Cal.,—Dr. C. W. Anderson; San Diego, Cal.,—D. C. Cleveland; Vancouver Island, —J. M. Dawson.

The nearest ally of *S. turgida* is the *S. polyzonias* of Gray, to which in many respects it bears a striking resemblance.

Hydrallmania Franciscana Clark (Trask).

Plumularia Franciscana Trask, Proc. Cal. Acad. of Nat. Sci., vol. i, p. 113, Pl. IV, fig. 3.

Plumularia gracilis Murray, Ann. and Mag. of Nat. Hist. for April, 1860, p. 251, Pl. XII, fig. 1.

Trask and Murray both had representatives of a species which they referred to the genus *Plumularia* and which, from their descriptions and figures, undoubtedly belongs to Hinck's genus *Hydrallmania*, though at the time their descriptions were published, this genus had not been recognized. This species is certainly very close to *H. falcata* of Hincks, but Murray, who had an opportunity of comparing the two, says they are distinct.

Unfortunately we have had no specimens.

Bay of San Francisco, Cal., among rejectamenta on the beach, —Trask.

Plumularia setacea Lamarck.

Sertularia pinnata, β, Linn., Syst. Nat., 1312.
Sertularia setacea Pallas, Elench., p. 148.
Plumularia setacea Lamk., An. s. Vert. (2d ed.), ii, 165.

Plate XLI, figures 1, 2.

Stems simple, slender, erect, rooted by a creeping stolon and divided by transverse joints into short internodes of uniform size, regularly branched; pinnæ alternate, regularly arranged, one from each internode, arising from the stem by a prominent process produced from the outer and upper side of each internode, divided by transverse or slightly oblique joints into internodes of two sizes arranged alternately. In large specimens 150^{mm}. to 300^{mm}. long, the main stems are considerably branched, the branches alternately arranged and clustered, extending quite or nearly to the distal end of the stem; the branches give off branchlets, which like themselves resemble the main stems in every particular. Hydrothecæ with an even rim, small, borne on the larger sized internodes of the pinnæ. Nematophores compound, those on the pinnæ not quite equal in length to the hydrothecæ, those on the main stems a little longer than the hydrothecæ; three on each internode of the stem, two in the axil of each pinna, one on the opposite side of the internode near the base, one only on the upper side of the smaller joints of the pinnæ and three on the larger joints, one just below the hydrotheca, and one on each side of the aperture. Gonothecæ sessile, borne in the axils of the pinnæ; female elongate-oval, produced at the distal end into a tubular neck with a discoidal, terminal orifice; male, smaller than the female, fusiform, and with a much smaller aperture.

Santa Cruz, Cal.,—C. W. Anderson; San Diego, Cal.,—Dr. E. Palmer; San Diego, Cal.,—H. Hemphill; Vancouver Island,—Dawson.

Most of our specimens consist of dense clusters of the delicate shoots, about 50$^{mm.}$ to 80$^{mm.}$ long, and usually attached to some large, coarse alga. Ellis' old name of "*Sea Bristles*" was well chosen, for it conveys quite an accurate idea of the appearance of these smaller forms. The larger forms are more branched, usually of a darker color and have a closer resemblance to hair than to bristles; one of our largest specimens from San Diego consists of a tuft 200$^{mm.}$ in length composed of about three hundred branched shoots; this had been washed ashore and was found by Dr. Palmer; a still larger specimen was dredged off San Diego in six to ten fathoms by Mr. Hemphill, which measures 300$^{mm.}$ in length and forms a thick cluster of about a thousand shoots.

Aglaophenia struthionides Clark (Murray).

Plumularia struthionides Murray, Ann. and Mag. of Nat. Hist. for April, 1870, 251, Plate XII, fig. 2.

Aglaophenia franciscana A. Agassiz, Cat. N. A. Acalephæ, p. 140, 1865.

Plate XLI, figures 3–3^{d}.

Stems rooted by a creeping stolon, simple, erect or spreading in every direction, divided by slightly oblique joints into very short internodes of equal length, each bearing a single pinna, varying from the lightest to the darkest horn-color; shoots tall, stout, plumose, tapering slightly toward the base, the distal end abruptly pointed; pinnæ slightly curved, sub-erect, unbranched, not in the same plane, the sides bearing the hydrothecæ curving toward each other, divided into short internodes by slightly oblique joints, each internode bearing a single hydrotheca. Hydrothecæ large, cup-shaped, expanding toward the distal end, aperture large, patulous, rim denticulated, armed usually with eleven, sometimes nine, sharp, uneven teeth. Nematophores tubular, the lateral ones of medium size, projecting ear-like from the sides of the hydrothecæ, the anterior one long, adnate for the greater part of its length, free near the distal end, extending nearly or quite to the edge of the toothed rim, aperture small, discoidal, terminal; those upon the corbulæ are a trifle larger than the lateral ones and are arranged in transverse rows, the ends of which do not meet. Corbulæ large, cylindrical, with numerous ridges (ten to sixteen) composed of oblique rows of nematophores; usually from two to six hydrothecæ at the base of the corbula. In luxurious specimens the corbulæ are very abundant, there being between seventy and eighty on a single shoot. Length of largest specimen, 150^{mm}.

Bay of San Francisco,—Trask; San Francisco, Cal.,—A. Agassiz; Santa Barbara, Cal.,—L. F. Dimmick; Santa Barbara, Cal.,—Mrs. Ellwood Cooper; Santa Cruz, Cal., Bay of Monterey,—C. W. Anderson; San Diego, Cal.,—D. C. Cleveland; Vancouver Island,—Miss Mitchell; Vancouver Island,—J. M. Dawson.

In the various lots of Hydroids which we have received from the western coast, this species has always been the most abundant. It seems to be as common and as widely distributed on the western coast of the United States as *Sertularia pumila* is upon the eastern coast. Both are also very often found parasitic on algæ, but *A. struthionides* is often found in deeper water than *S. pumila*.

As Murray remarks, this species is nearly allied to *Plumularia cristata*, the *A. pluma* of Linnæus, but is much closer in habit, the hydrothecæ are wider-mouthed and shallower and the teeth upon the rim are unequal. An important error occurs in the synonymy of this species given by Mr. A. Agassiz. He has, under the name *Aglaophenia Franciscana* the following synonymy:

Plumularia Franciscana Trask.

Plumularia struthionides Murray.

The *Plumularia Franciscana* of Trask belongs to the genus *Hydrallmania* of Hincks, as a glance at the figures and description of Trask will show; and it is synonymous with the *Plumularia gracilis* of Murray. Hence the name of the above described species should not be *A. Franciscana*, but *A. struthionides*.

EXPLANATION OF PLATES.

PLATE XXXVIII.

Figure 1.—*Eudendrium, sp.;* from Santa Cruz, Cal.

Figure 2.—*Tubularia elegans;* *a*, cluster of medusæ buds; *a'*, and *a''*, buds in different stages of development; *a'''*, an actinula escaping.

Figure 3.—*Bimeria gracilis;* *a*, *a'* and *a''*. sporosacs.

Figure 4.—*Sertularella turgida;* *a*, the gonangium or gonotheca.

Figure 5.—*Sertularella turgida;* another form of gonotheca.

Figure 6.—*Sertularia Greenei;* *a*, and *a'*, the gonangia (gonothecæ); *h*, hydrotheca.

PLATE XXXIX.

Figure 1.—*Campanularia cylindrica;* 1*a*, the same showing the full length of the pedicel; 1*b*, the female gonotheca; 1*c*, an abnormally developed hydrotheca; 1*d*, the male gonotheca.

Figure 2.—*Campanularia fusiformis;* 2*a*, 2*b*, and 2*d*, the same showing the amount of variation in the width and depth of the hydrothecæ; 2*e*, 2*f*, and 2*g*. the gonothecæ; *r*, the rootstock or creeping stem.

Figure 3.—*Sertularia furcata;* *a*, and *a'*, the gonothecæ.

Figure 4.—*Campanularia everta;* *a*, and *a'*, the gonothecæ; *r*, the creeping stem.

Figure 5.—*Halecium tenellum;* from San Diego, Cal.; *r*, the creeping stem.

PLATE XL.

Figure 1.—*Sertularia anguina;* 1*a*, a single hydrotheca showing the outline of the outer margin of the rim.

Figure 2.—*Sertularia anguina;* a portion of the main stem.

Figure 3.—*Sertularia anguina*, var. *robusta;* a portion of the main stem.

Figure 4.—The same; portion of a branch; *a*, gonotheca.

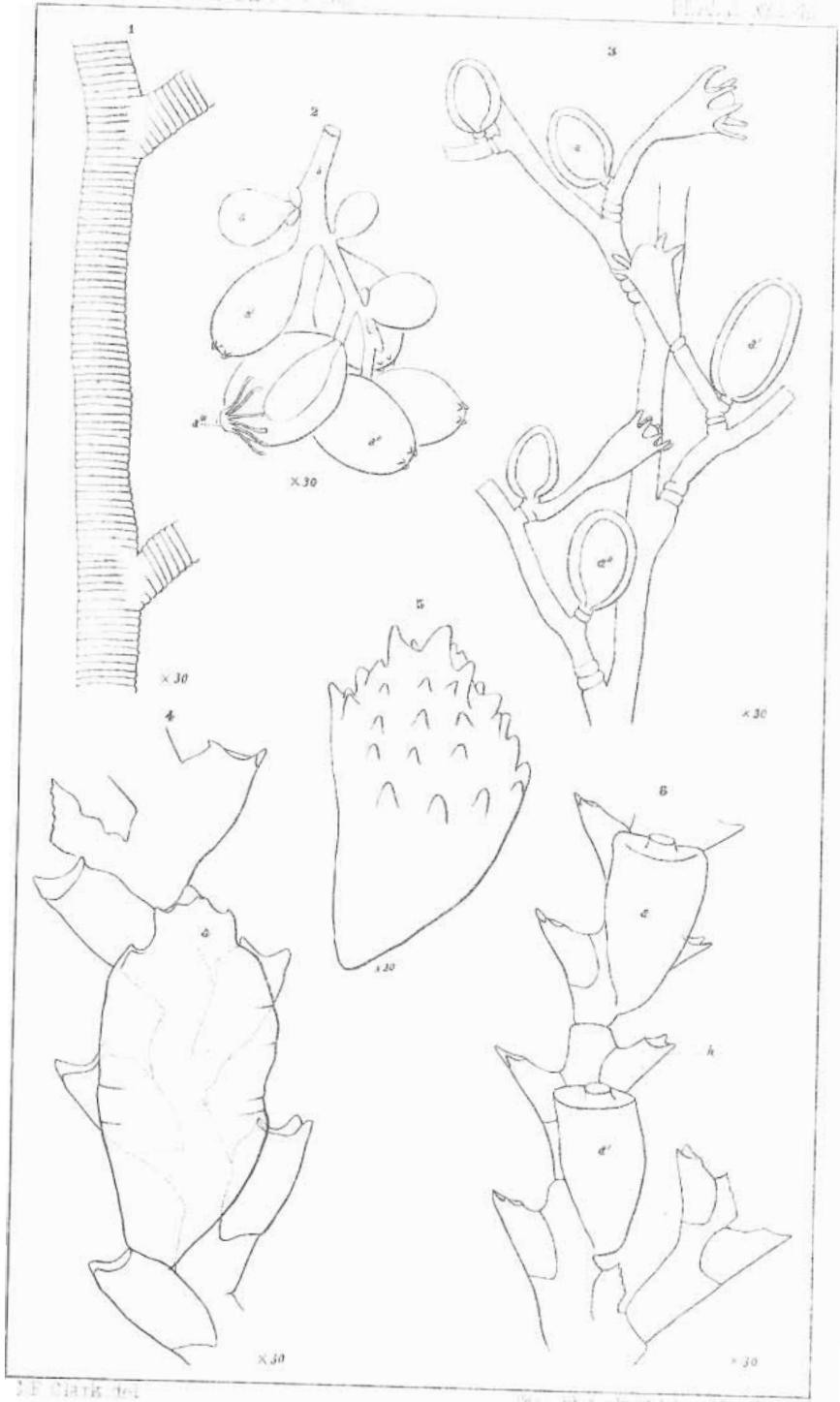
Figure 5.—The same; with a monstrosity, *a*, at the extremity of the branch.

PLATE XLI.

Figure 1.—*Plumularia setacea;* portion of a branch with nematophores and female gonothecæ, *a.*

Figure 2.—The same; a portion of the main stem; *n*, nematophores; *h*, hydrothecæ; 2*a*, male gonotheca.

Figure 3.—*Aglaophenia struthionides;* a portion of a pinna; 3*a*, 3*b*, and 3*c*, different views of the same; *n* and *n'*, nematophores; *h*, hydrotheca; 3*d*, corbula; *a*, the body of the corbula; *b*, the wing-like processes at the base; *n*, and *n'*, the nematophores; *h*, the hydrothecæ.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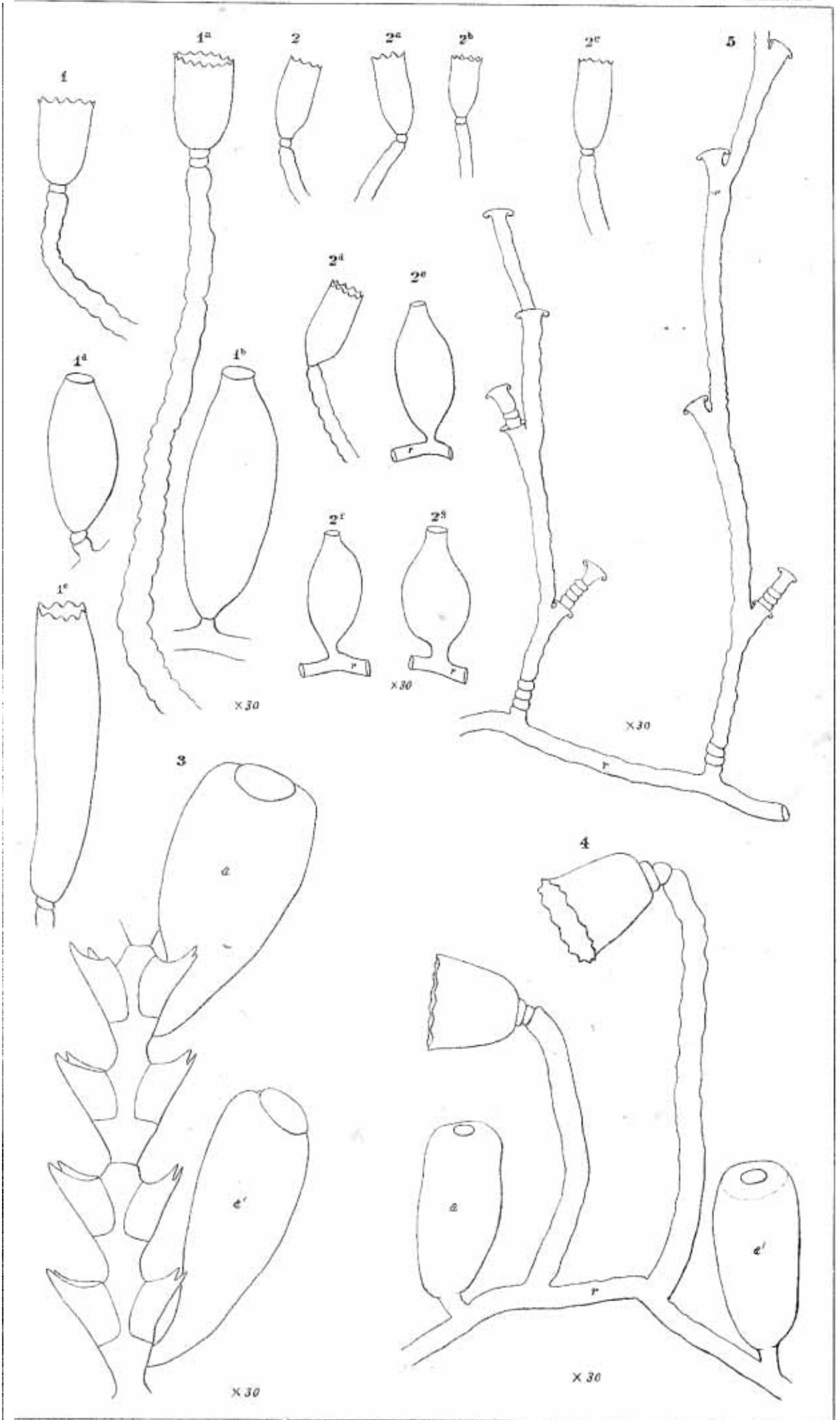

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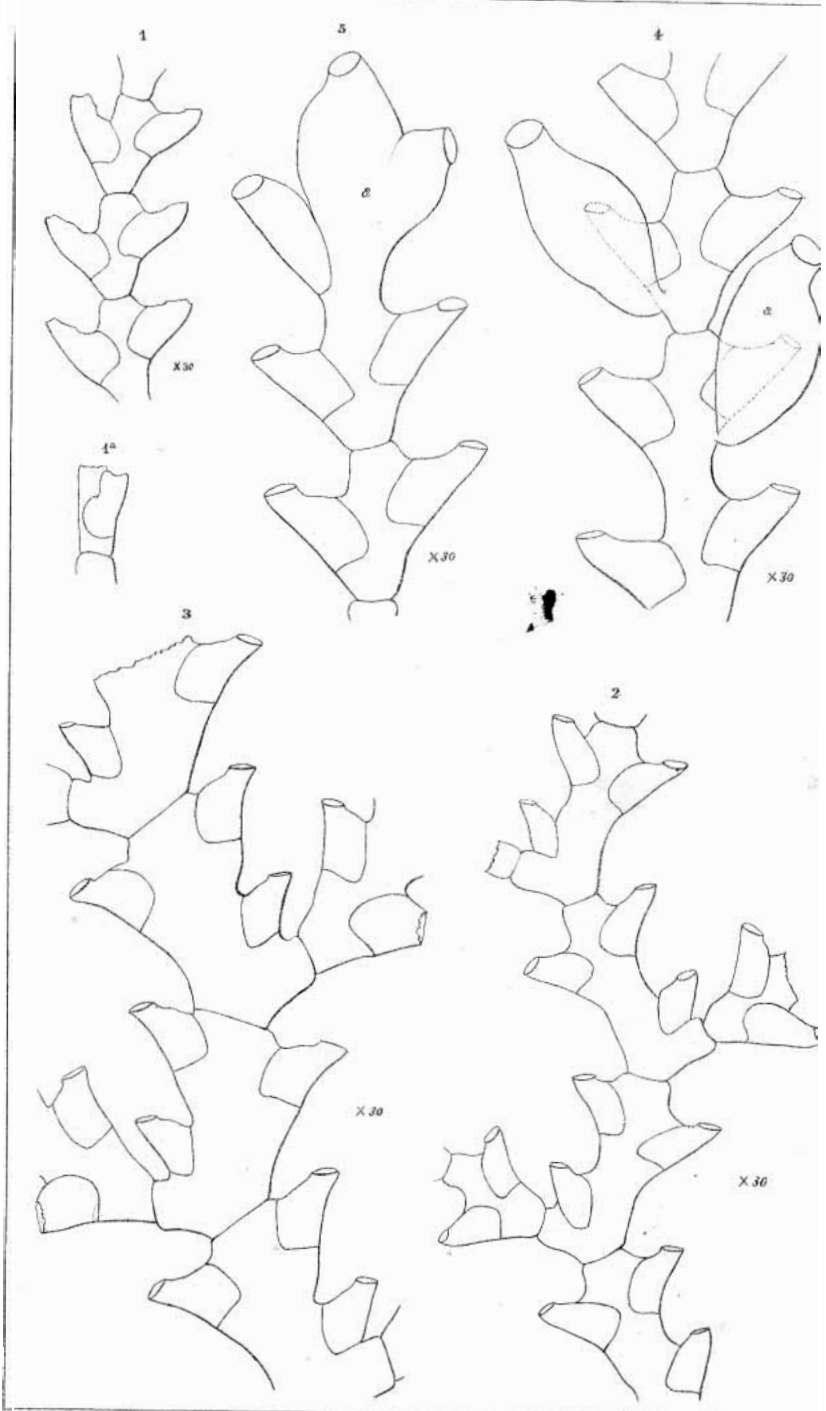
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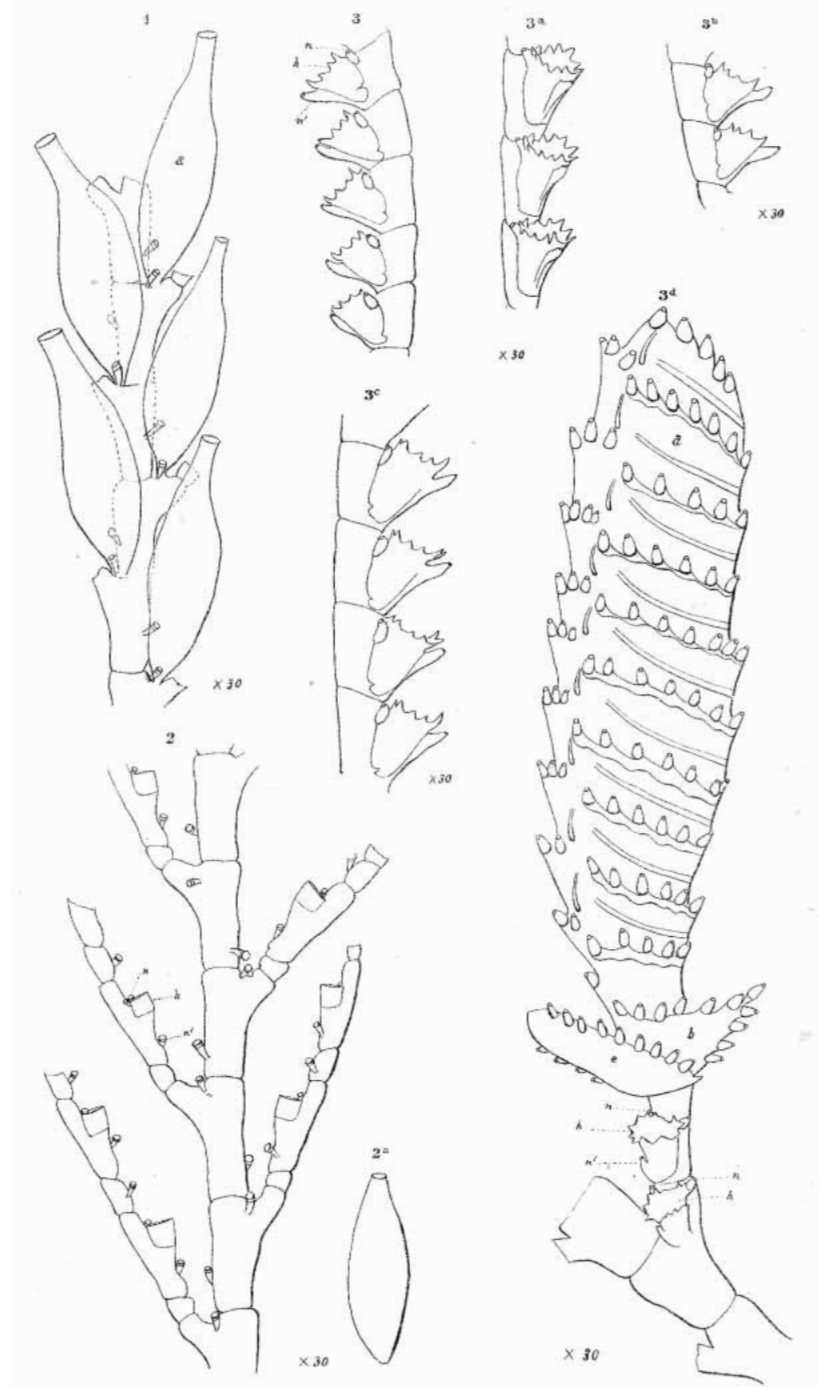
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