

Descriptions and Redescriptions of the Hawaiian Octocorals
Collected by the U. S. Fish Commission Steamer "Albatross."
(1. Alcyonacea, Stolonifera, and Telestacea.)¹

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DURING THE PREPARATION of the report on the Gorgonacea of Bikini, it became necessary to study also the other northern Pacific octocorals in the collections of the U. S. National Museum, mostly obtained by the U. S. Fish Commission steamer "Albatross" during its Hawaiian cruise (1902) and during two cruises to Japanese waters (1898 and 1906). It was immediately evident that many of the specimens from these collections had been incorrectly identified—so many, in fact, that a complete revision of both the Japanese and the Hawaiian collections, as reported upon by C. C. Nutting (1908, 1912), seemed highly desirable. Toward this end, the entire Hawaiian collection of Octocorallia (except the Pennatulacea) was reviewed and reidentified, and will now be redescribed in a series of short papers, of which this is the first. The present part covers seven species and one subspecies in the orders Alcyonacea, Stolonifera, and Telestacea. Of these, one is a correction of specific determination, one is a generic reassignment, and three are reallocations at the ordinal level.

Order *ALCYONACEA*

Family *ALCYONIIDAE*

Anthomastus fisheri n. sp.

Figs. 1, 2

Anthomastus steenstrupi Nutting, 1908: 555.

Not *Anthomastus steenstrupi* Wright and Studer, 1889: 243, pl. 41, fig. 8.

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DIAGNOSIS: Stalk thick, short ($\frac{1}{2}$ to $\frac{3}{5}$ of total height); capitulum spheroidal; autozoid calyces 3–4 mm. across, low, with margins slightly raised; siphonozooids about 9 in 4 sq. mm. Spicules of outer surface of stalk and capitulum as spiny stars and short rods; of interior of stalk, long, slender rods or needles.

DESCRIPTION: The largest specimen is about 23 mm. tall. The stalk is 8–9 mm. in diameter and 12 mm. in length; it is attached by a thin, membranous expansion to a small rock. The capitulum is spheroidal, 12 mm. high and 14 mm. in diameter. It bears about 25 large autozooids which in life probably exceeded 5 mm. in height; these are partially retractile into low calyces which have slightly raised rims. In contraction, the upper part of the anthocodiae project from the bottom of crater-like pits in the capitulum. Between the autozooids, numerous siphonozooids occur; these are seen as small verrucae with simple orifices, slightly raised above the capitulum surface. About 9 siphonozooids occur in an area of 4 sq. mm. The outer wall of the stalk and the surface of the capitulum contain a superficial layer of short, spiny stars, usually with a transverse girdle, which reach about 0.06 mm. in length and 0.05 mm. in width (Fig. 1 *f*); under the layer of stars is a layer of rods which are practically smooth except for a few conical spines, most numerous near their ends (Fig. 1 *e*); these rods attain a length of 0.32 mm., occasionally more. In the interior of the stalk there are similar but longer, more spinose rods (Fig. 1 *d*) often exceeding 0.4 mm. in length. The anthocodial walls contain the spiny, star-like sclerites, many of

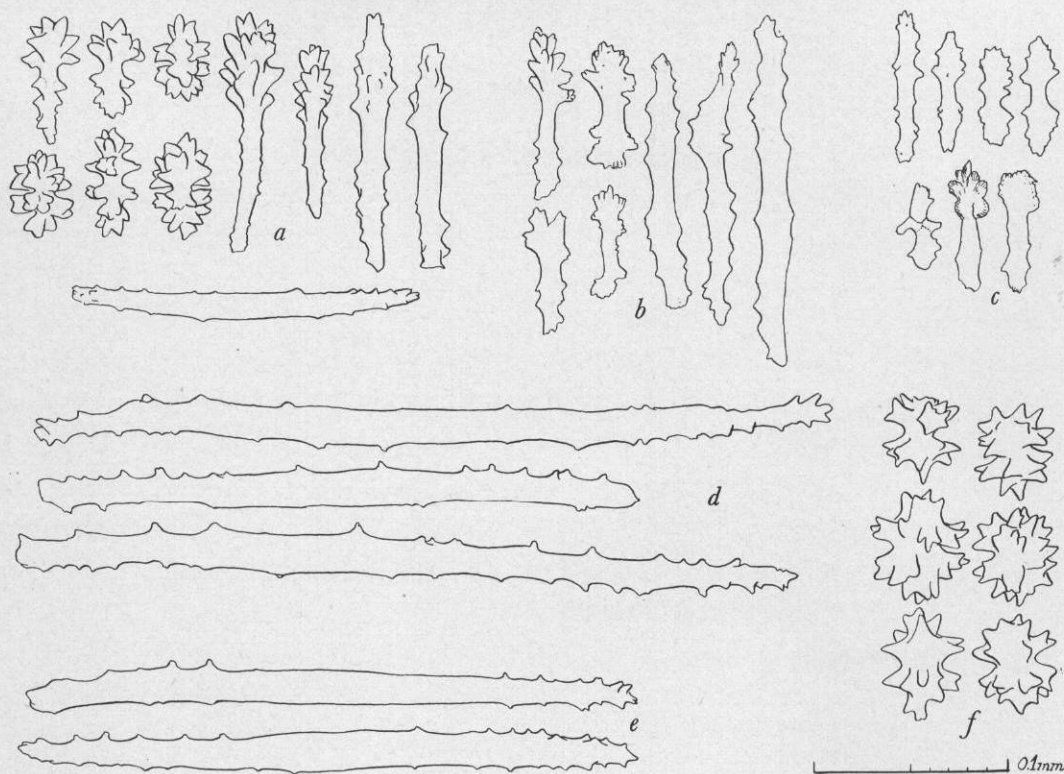


FIG. 1. *Anthomastus fisberi* n. sp. Spicules: *a*, of anthocodial wall; *b*, of tentacles; *c*, of pharynx; *d*, of canal walls of stem interior; *e*, rods of stalk wall; *f*, stellate bodies from outer surface of stalk and capitulum. Scale applies to all figures.

which have the median waist elongated, together with rods and spiny-headed clubs (Fig. 1 *a*). In the tentacles there are flattened rods which often have a club-like expansion at one end (Fig. 1 *b*), and in the gullet there are smaller, flattened spiny rods, often with one or both ends expanded (Fig. 1 *c*).

The color of the colony in alcohol is "ferruginous" (Ridgway); the spicules are practically colorless by transmitted light, but appear pale amber in color by reflected light.

TYPE: U.S.N.M. No. 49623. South coast of Oahu: Honolulu Light bearing N. 2° E., 2.4 miles distant, in 211–253 fathoms, fine coral sand; bottom temperature 47.4°F.; March 27, 1902 ("Albatross" station 3810).

PARATYPE: U.S.N.M. No. 22560. Between Maui and Molokai Islands: Mokuhooniki Islet bearing N. 8°30' E., 4.8 miles distant, in 143–122 fathoms, coral sand, shell, and fora-

minifera; bottom temperature 59.7°F.; July 23, 1902 ("Albatross" station 4101).

RECORD: N. W. coast of Oahu: Kahuku Point bearing N. 83° E., 9 miles distant, in 195–241 fathoms, coral sand and foraminifera; bottom temperature 55.1°F.; July 25, 1902 ("Albatross" station 4115).

REMARKS: *Anthomastus steenstrupi* Wright and Studer, with which Nutting erroneously identified one of these Hawaiian specimens, differs from *A. fisberi* n. sp. in spiculation and in form of the colony. The new species has more slender, needle-like spicules and more compact, stellate sclerites, and its capitulum is spheroidal, whereas that of *A. steenstrupi* is "very slightly convex" (Wright and Studer) on the upper surface. *Anthomastus fisberi* resembles *A. granulosus* Kükenthal (1910: 14, pl. 1, fig. 3), but that species differs in its granular spheres and double spheres, and in

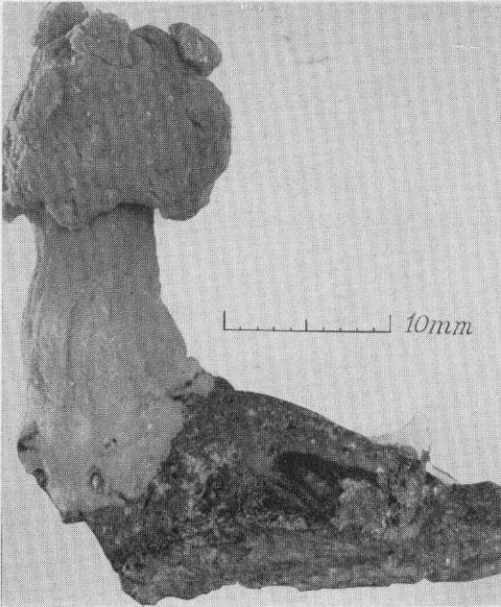


FIG. 2. *Anthomastus fisheri* n. sp. The type colony.

the absence of long needles. *A. fisheri* was taken from depths intermediate between those at which *A. steenstrupi* (565 fathoms) and *A. granulatus* (11–110 fathoms) were found.

It is a pleasure to dedicate this species to Dr. Walter K. Fisher, noted authority on hydrocorals, who was one of the naturalists on the Hawaiian cruise of the "Albatross."

Family SIPHONOGORGIIDAE

Siphonorgia alexanderi (Nutting)

Fig. 3

Spongodes alexanderi Nutting, 1908, U. S. Natl. Mus., Proc. 34: 555, pl. 41, fig. 3; pl. 47, fig. 2.

DESCRIPTION: The loosely branched colony bears on its upper parts scattered zooids which are most crowded at the twig tips. The anthocodiae are protected by shelf-like verrucae which consist of two projecting groups of spicules. There is a wide crown of about six rows of transverse spicules; each of the eight points above the crown consists of one pair of large, unequal, bent spindles together with a small accessory pair. The outer stem walls

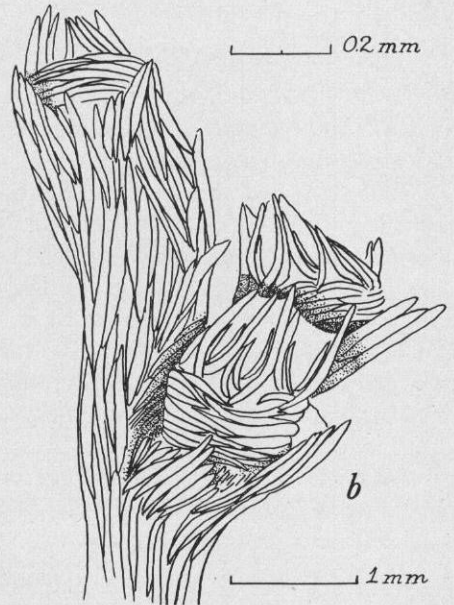
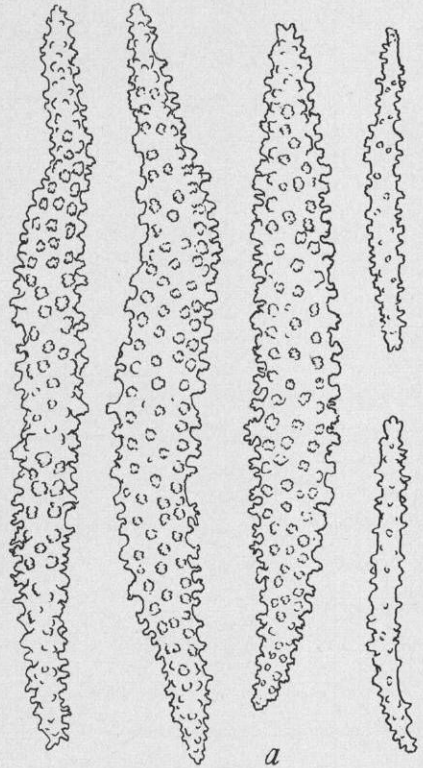


FIG. 3. *Siphonorgia alexanderi* (Nutting). a, Spicules; b, twig tip.

contain long, somewhat bent, tuberculate spindles reaching 1.5 mm. in length; those of the inner canal walls are smaller and more slender. Color (in alcohol) white; usually all spicules white, sometimes those of the crown and points pink.

TYPE: U.S.N.M. No. 25361. Between Maui and Molokai Islands: Mokuhooniki Islet bearing N.8°30'E., 4.8 miles distant, in 143–122 fathoms, coral sand, shell, and foraminifera; bottom temperature 59.7°F.; July 23, 1902 ("Albatross" station 4101).

REMARKS: *Siphonogorgia alexanderi* seems to approach *S. variabilis* Hickson, originally described from the Maldives Islands, and may eventually prove to be the same. The differences between many of the published species of *Siphonogorgia* are so vague that only by a complete revision can their status be decided.

Siphonogorgia (?) *collaris* Nutting

Fig. 4

Siphonogorgia collaris Nutting, 1908, U. S. Natl. Mus., Proc. 34: 556, pl. 41, fig. 4. Thomson and Dean, 1931, Siboga Exped. Monog. 13d: 154.

DIAGNOSIS: Branches thick; calyces tubular, about 3 mm. tall, into which the anthocodiae are fully retractile. Entire surface of branches and calyces covered with large, ill-fitting, thick plates which become more spindle-like near the verrucal margins. Anthocodiae with a wide collaret of about 10 transverse rows of curved spindles, and eight points each consisting of a pair of large spindles and one or two pairs of smaller accessory spindles. In the walls of the stem canals there are smaller, warty spindles.

TYPE: U.S.N.M. No. 25318. Laysan Island Light bearing S.79°30'E., 7.3 miles distant, in 57–79 fathoms, white sand, broken shell, and corallines; bottom temperature 71.1°F.; May 16, 1902 ("Albatross" station 3935).

REMARKS: The single fragment obtained indicates a colony with thick branches, but it may just as well have been an unbranched

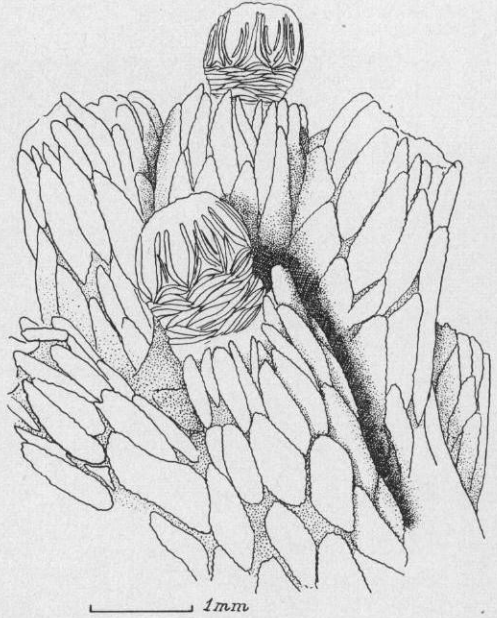


FIG. 4. *Siphonogorgia* (?) *collaris* Nutting. Apex of the type fragment.

Nidalia-like colony only the top of which was sheared off by the dredge. The tall, tubular calyces with their anthocodiae usually more or less exsert, the surface pavement of large plates, and the thick, digitate branches should render the species recognizable when found again.

Color "coral red" (in life?); in alcohol, ivory white, the soft tissue dull brownish.

Order STOLONIFERA

Family CLAVULARIIDAE

Clavularia grandiflora (Nutting)

Fig. 5 a

Menella grandiflora Nutting, 1908, U. S. Natl. Mus., Proc. 34: 584, pl. 44, fig. 5; pl. 48, fig. 6. Kükenthal, 1924, Tierreich 47: 185.

DIAGNOSIS: Stolon membranous, filled with bent spindles. Calyces truncate conic, their spicules in the form of spindles arranged obscurely *en chevron* in eight interseptal tracts. Anthocodial neck zone long, with transversely disposed, scattered, small spindles which grade into the strong collaret. Tentacle bases with several pairs of spindles *en chevron*

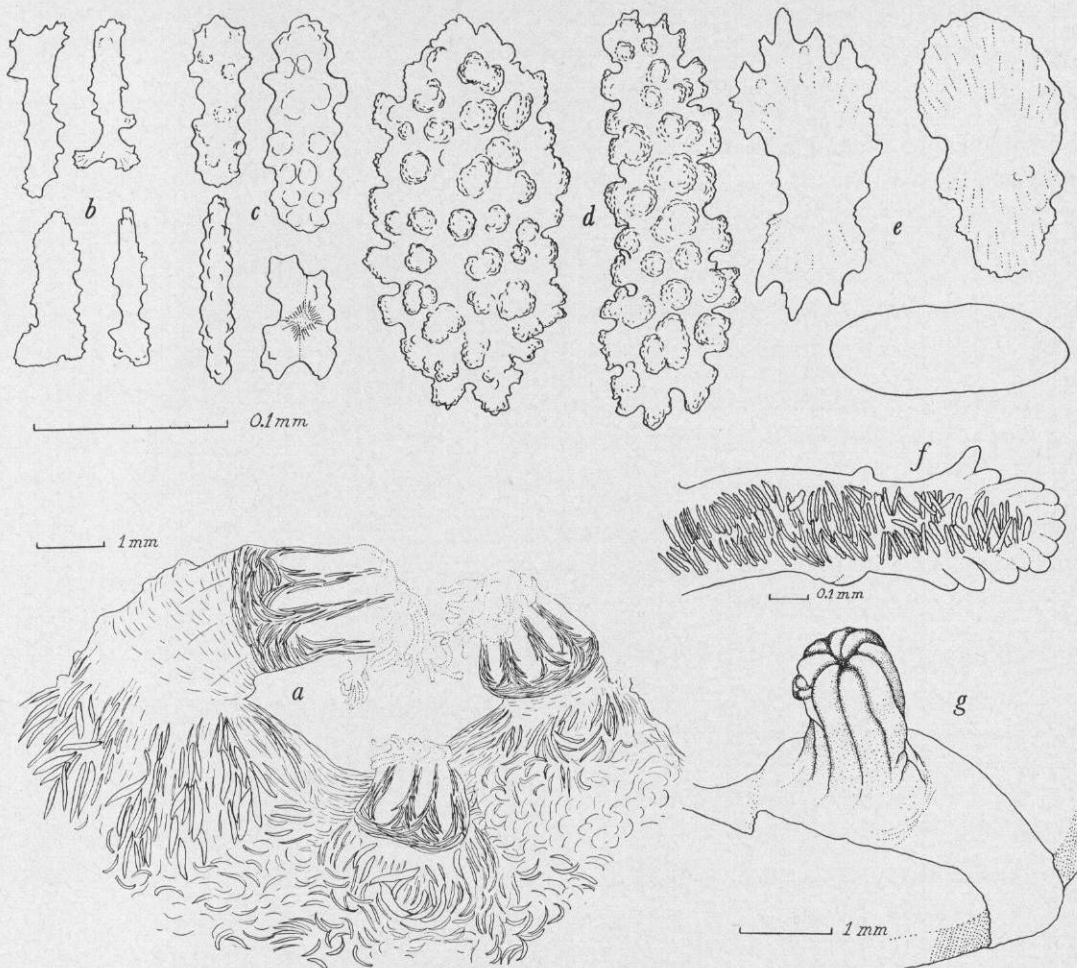


FIG. 5. *a*, *Clavularia grandiflora* (Nutting). Part of membranous stolon with three zooids. *b-g*, *Telestula* (?) *corrugata* (Nutting). *b*, Spicules of the tentacles; *c*, spicules of the neck zone; *d* and *e*, spicules of the stolon and anthostele walls; *f*, a tentacle showing arrangement of spicules; *g*, a zooid.

and continuing in lengthwise arrangement for about one third of the tentacle length, becoming transverse and projecting into the pinnule bases in the distal two thirds of the tentacles.

DESCRIPTION: A membranous stolon bearing numerous zooids completely surrounds part of a dead gorgonian axis. The calyces are low, truncate cones rarely exceeding 3 mm. in height. The anthocodiae usually project considerably, extending 3 or 4 mm. beyond the calyx margins. The spicules of the calyces are stout spindles arranged indistinctly *en*

chevron in eight tracts which form points at the calycular margin. The neck zone is extensive and contains small spindles transversely arranged. In the distal part these increase in size and number to form a broad, distinct collaret; below and upon the tentacle bases they assume an *en chevron* arrangement, becoming practically parallel and continuing along the tentacle backs for about one third of their lengths. Thereafter the spindles are small, transversely set, and project into the bases of the long pinnules which are otherwise free of spicules. The stolon is filled with

spindles somewhat smaller than those of the calyces; they are frequently rather strongly curved, and are arranged with no regularity at all.

TYPE: U.S.N.M. No. 22590. Vicinity of Kauai Island: Mokuaeae Islet bearing S.54°E., 3.5 miles distant, in 528 fathoms, fine gray sand and mud, bottom temperature 39.6° F.; June 12, 1902 ("Albatross" station 3992).

REMARKS: Professor Nutting must have misinterpreted the strong anthocodial spiculation, the *en chevron* arrangement of the calycular spicules, and the horny axis, which is really no more than a substrate for the colony described. In several places there is a considerable amount of bottom detritus between the stolon and the axis. The iridescence and general appearance of this axis suggest that it may have belonged to a primnoid.

The external features of this species immediately recall Thomson and Dean's *Clavularia ornata* (1931: 13, pl. 14, figs. 1, 5; pl. 21, fig. 2), which differs in having the distal tentacle spicules arranged longitudinally instead of transversely as in *C. grandiflora*, fewer and larger spicules in the anthocodial armature, and longer calyces with somewhat shorter anthocodiae.

Order TELESTACEA

Family TELESTIDAE

Genus TELESTULA Madsen

DIAGNOSIS: Octocorals of the Telestacea order, having small slender zooids in which the mesenteries reach down to the stolon only while the zooids are young; the lower part of the coelenteric cavity in the older, more lengthened zooids being partially filled with a mesogloal tissue. The proximal part of the zooid thus developed into a sort of stem which may constitute the largest part of the zooid and from which secondary zooids may rise. The proximal part of the secondary zooids being developed in a similar manner when they reach a certain size. Secondary zooids of higher order may occur. (Madsen, 1944: 16.)

TYPE SPECIES: *Telestula septentrionalis* Madsen (by original designation).

REMARKS: The genus *Telestula* originally included, in addition to the genotype, *Pseudocladobonus mosaica* Thomson and Dean, and possibly *P. versluysi* Thomson and Dean. To this list should be added: *Telestula ambigua* Nutting, *Clavularia expansa* Thomson and Dean, and *Clavularia spiculicola* Nutting. *Clavularia corrugata* Nutting is also a telestid and is tentatively referable to *Telestula*.

In describing members of this genus, I will refer to the greatly elongated anthostelar part of the zooids as the "body tube," the distal-most margin of this as seen in contracted specimens as the "calycular margin," the introversible part between the anthostele and the tentacles as the "neck zone" which, with the remainder of the retractile part bearing the tentacles, forms the "anthocodia." The spiculiferous mesogloal tissue occluding the lower part of the gastrovascular cavity will usually be spoken of simply as "intrusion tissue" and its spicules as "intrusion spicules."

Telestula spiculicola (Nutting)

Figs. 6, 7 a-b

Clavularia spiculicola (part) Nutting, 1908: 553, pl. 47, fig. 1?; not pl. 41, fig. 1.

DIAGNOSIS: Primary zooids 0.6–0.8 mm. in diameter and up to 50 mm. long, arising from ribbon-like or more spreading stolons; secondary zooids usually present on fully developed primaries. Spicules of anthostelar wall oblong, flattened, strongly warted platelets about 0.2 mm. in length; those of stolons narrower, sparsely but prominently warted; those of intrusion tissue large, branched forms about 0.3 mm. in length.

DESCRIPTION: The colonies arise from stolons which encrust or creep along large sponge spicules. The primary zooids are rather sinuous, less than 1 mm. in diameter, and attain about 50 mm. in length. The primary zooids more than 15 mm. long usually bear a few secondary zooids which are well

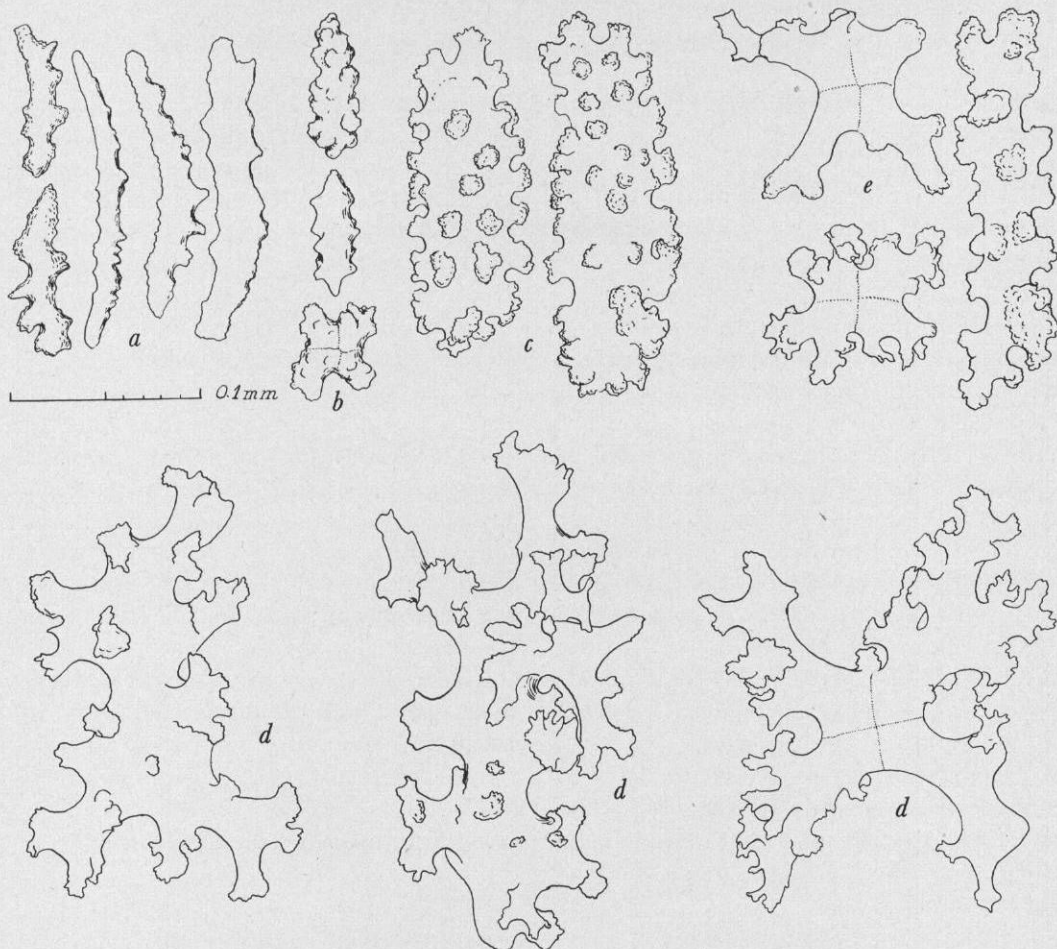


FIG. 6. *Telestula spiculicola* (Nutting). Spicules of: *a*, tentacles; *b*, neck zone; *c*, body tubes; *d*, intrusion tissue; *e*, stolons. Scale applies to all figures.

separated and arise on any side and at no constant angle, although many come off at nearly right angles, subsequently turning upward to about 45° . Well-developed colonies may be a tangled mass of twisted zooids, and there is sometimes fusion of the outer walls where two zooids come in contact, producing a false anastomosis. The primary axial zooids and all subordinates show eight distinct longitudinal ribs which become obscure at the bases of primary zooids and do not continue on the stolons. The outer surface is covered with an exceedingly thin, horny cuticle, and in the gastrovascular cavity there is a horny subepithelial layer which is thick-

ened to form delicate horny ribs along the septal origins. These ribs may be stripped out in dissection just as in *Telesto*. The anthocodiae are fully retractile within the body tubes by virtue of the thin, introversible neck zone in which spicules are less densely distributed; their tentacles are 0.8–0.9 mm. in length and contain a layer of transversely placed narrow rods which are somewhat bent and have irregular margins (Fig. 6 *a*). The tentacle spicules project into the pinnules, which number about 12 on each side of a tentacle. The tentacular deposits are 0.08–0.16 mm. in length. In the neck zone are found short, lumpy rods 0.06–0.08 mm. in length, along with some

crosses and other aberrant forms (Fig. 6 *b*). The thick walls of the body tubes contain coarsely warted, blunt rods 0.15–0.2 mm. in length (Fig. 6 *c*). The lower part of the coelenteric cavity beginning about 5 mm. from the mouth is filled in, except for eight longitudinal canals, with spiculiferous mesogloal intrusion tissue, to form a stem perforated by eight stem canals. It is from this "stem" region that subordinate zooids arise, all of which show similar tissue in their coelenteric cavities as soon as they exceed 7 or 8 mm. in length. The intrusion spicules are branched sclerites about 0.27–0.3 mm. long (Fig. 6 *d*), of the same type found in other species of the genus. The stolons contain slimmer, warted rods, crosses, and branched forms smaller than those in the intrusion tissue (Fig. 6 *e*).

In alcohol the colonies are pale brown or whitish.

TYPE: U.S.N.M. No. 22574. Oahu Island: Diamond Head Light bearing N.7°E., 12.5 miles distant, in 311–337 fathoms, fine gray sand and mud, bottom temperature 43.7°F.; May 5, 1902 ("Albatross" station 3910).

RECORDS: South of Oahu Island: 21°08' N., 157°43' W., in 351 fathoms, fine white sand, bottom temperature unknown; December 6, 1891 ("Albatross" station 3475). Oahu Island: Diamond Head Light bearing N.23°10'E., 16.4 miles distant, in 289–292 fathoms, gray sand, mud, bottom temperature unknown; May 6, 1902 ("Albatross" station 3914).

REMARKS: This species may be recognized by its very slender body tubes, less than 1 mm. in diameter, and its small, oval spicules. Nutting's paratype consisted of specimens so different that I am here describing them as a distinct subspecies.

Telestula spiculicola robusta n. subsp.

Figs. 7 *c–e*, 8

Clavularia spiculicola (part) Nutting, 1908, U. S. Natl. Mus., Proc. 34: 553, pl. 41, fig. 1.

Specimens (including some paratypes of *spiculicola*) from four stations are distinctly more robust than the type of *Clavularia spiculicola*. The diameter of the body tubes is regularly from 1 to 1.25 mm., even in young primary zooids (Fig. 7 *c–e*). The spiculation in general is very similar, but the major sclerites of the body tubes are distinctly larger (0.35 mm.) and frequently pointed (Fig. 8 *c*), and those of the neck zone (Fig. 8 *b*) are larger and of different form. As in *T. spiculicola* s.s., the tentacles are densely spiculate: short rodlets transversely encircle the rachis of the tentacles, chiefly in two dorsal (aboral) and two adoral tracts, and extend in small groups into the pinnules. The inner and outer stolon spicules are like those of the intrusion tissue and body tubes, respectively, but there are, in addition, more crosses, branched plates, and irregular forms.

TYPE: U.S.N.M. No. 43097. Between Maui and Molokai Islands: Mokuhooniki Islet bearing S.80°30'W., 7.8 miles distant, in 277–284 fathoms, globigerina ooze, bottom temperature 45.2°F.; April 16, 1902 ("Albatross" station 3883).

REMARKS: The figure given by Nutting on plate 41 represents this subspecies, but it is impossible to be absolutely certain from which specimen the illustrated spicules were taken. The spicules are so vaguely depicted as to render the figure worthless.

The subspecies *robusta* can be separated from *Telestula spiculicola* s.s. by the stouter body tubes frequently measuring 1.25 mm. in diameter and 100 mm. in length, and by the larger, usually pointed spicules of the body walls. The differences in the neck zone sclerites can best be seen by comparing the figures of those of the subspecies and of the typical form.

Telestula (?) *corrugata* (Nutting)

Fig. 5 *b–g*

Clavularia corrugata Nutting, 1908: 554, pl. 41, fig. 2.

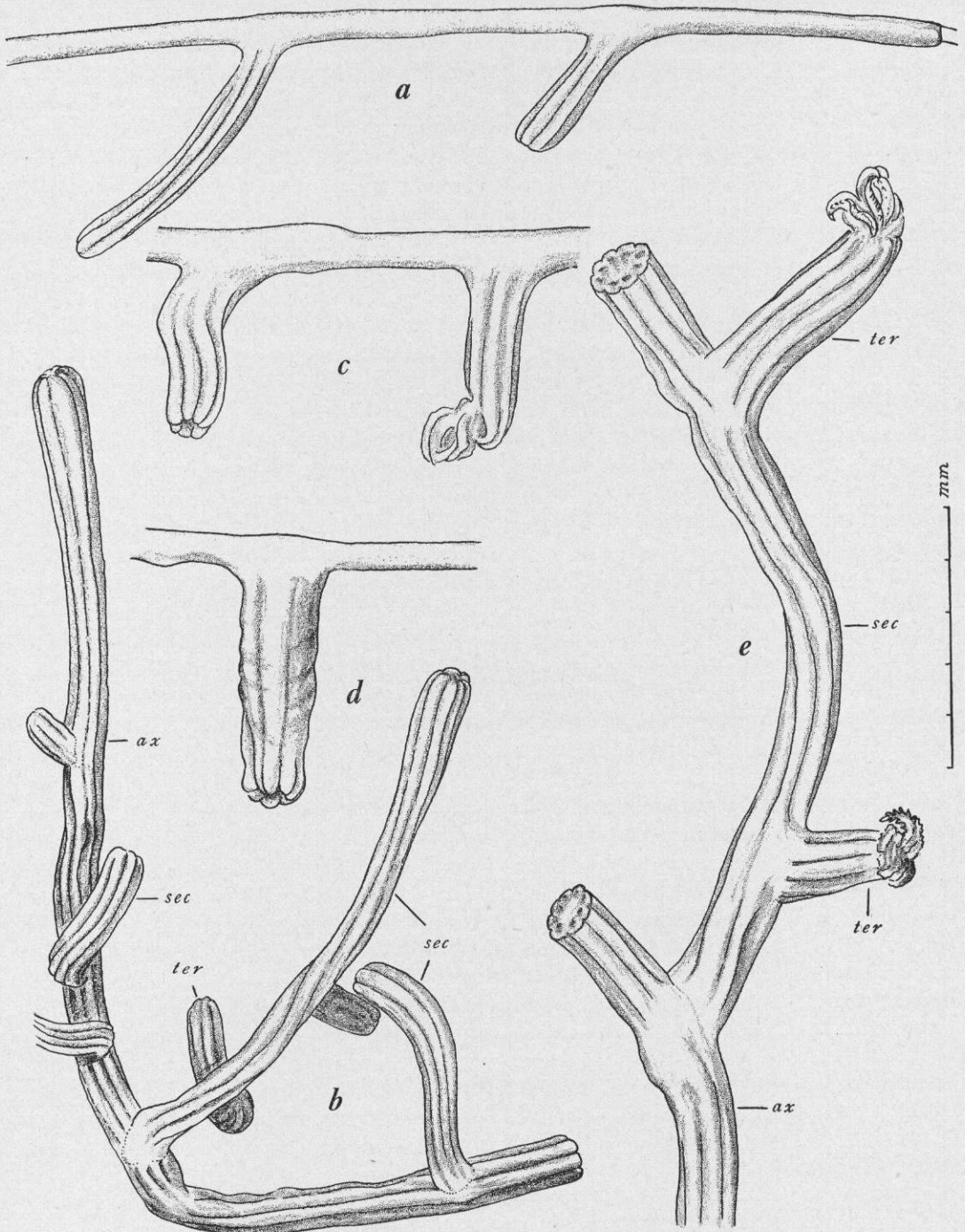


FIG. 7. *a, b*, *Telestula spiculicola* (Nutting): *a*, two young primary zooids arising from a stolon surrounding a sponge spicule; *b*, upper part of fully developed primary or axial zooid (*ax*), bearing secondary (*sec*) and tertiary (*ter*) zooids. *c-e*, *Telestula spiculicola robusta* n. subsp.: *c*, two young primary zooids from the type colony; *d*, young primary zooid; *e*, portion of fully developed part of type colony showing part of an axial zooid (*ax*) producing secondary (*sec*) and tertiary (*ter*) zooids. Scale applies to all figures.

DIAGNOSIS: Simple zooids less than 5 mm. tall arising from band-like stolons; walls of anthosteles with eight longitudinal grooves; anthocodiae completely retractile. Spicules of anthosteles and stolons oval, warty plates and smooth scales; anthocodial wall with warty

rods and flat rods; tentacles with numerous flat rods transversely arranged and not extending into the pinnules.

DESCRIPTION: The colonies form creeping, ribbon-like stolons about 1 mm. wide, which expand a little at the points where the indi-

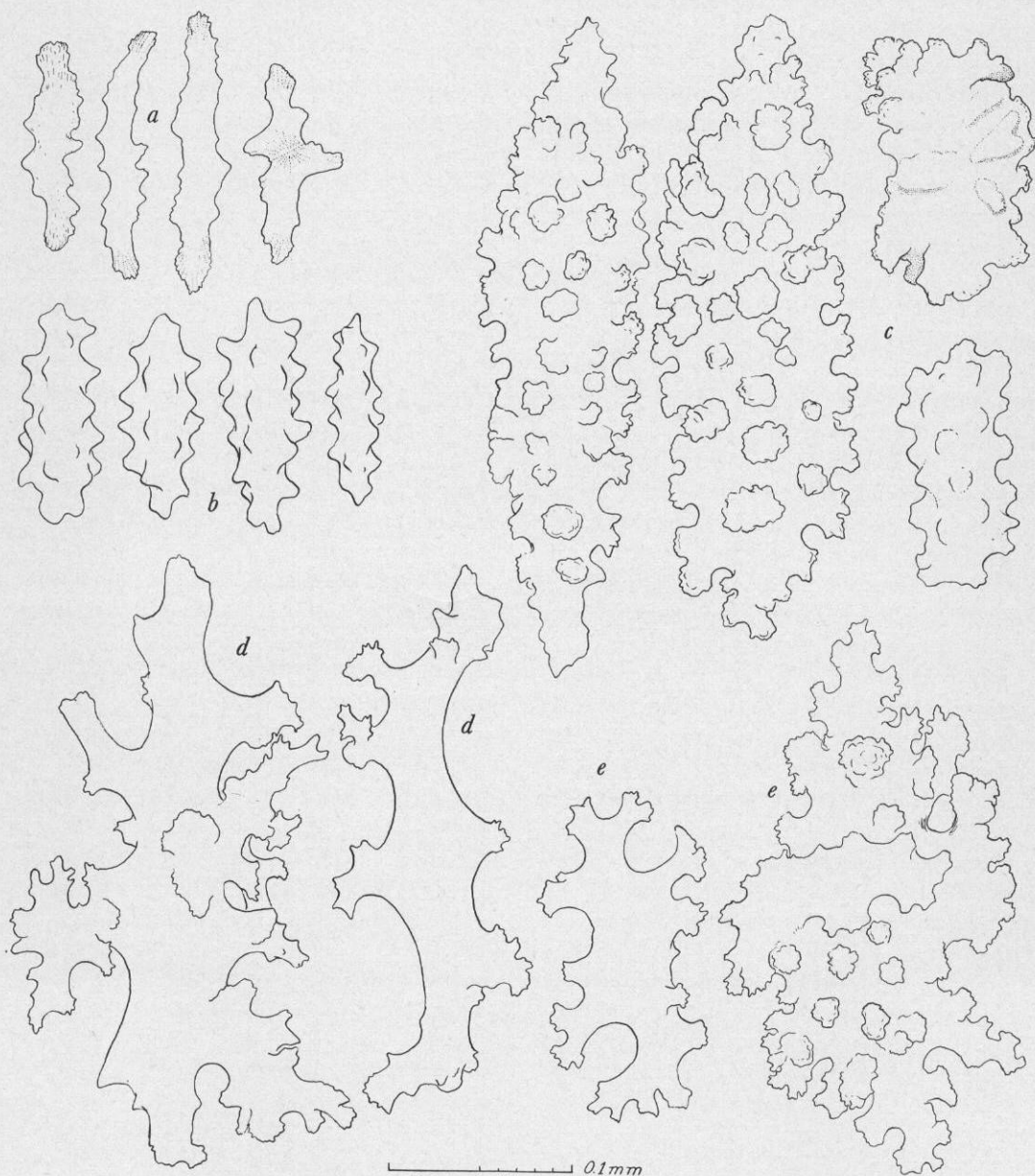


FIG. 8. *Telestula spiculicola robusta* n. subsp. Spicules of: *a*, the tentacles; *b*, the neck zone; *c*, the body tubes; *d*, the intrusion tissue; *e*, the stolon. Scale applies to all figures.

vidual zooids arise. The anthosteles are short, stout tubes with eight narrow, longitudinal grooves separated by broad, rounded ribs (Fig. 5 *g*); the largest is about 4 mm. high and 1.5 mm. in diameter, and none shows evidence of lateral budding. An introversible neck zone permits the anthocodiae to be fully retracted within the anthosteles. The outer surface is covered by a thin, horny cuticle, and the coelenteric cavity evidently has the horny subepithelial layer characteristic of the telestids, since the eight septal ribs of horny matter are present. The stolons and walls of the anthosteles are filled with oval, warty, flat plates (Fig. 5 *d*) and a few practically smooth scales with either entire or notched edges (Fig. 5 *e*). The thin, introversible neck zone contains broad, flat, warty rods, slender, round rods, and a few crosses (Fig. 5 *c*); these are arranged chiefly in eight interseptal tracts and are most numerous near the calycular margin, decreasing in numbers toward the tentacles. The tentacles (Fig. 5 *f*) are about 1 mm. long and are densely packed with flat rods (Fig. 5 *b*) set crosswise but not extending into the pinnules. None of the zooids is long enough to show any intrusion of the coelenteric cavity by spiculiferous mesogloea.

TYPE: U.S.N.M. No. 22594. Alenuihaha Channel between Hawaii and Maui Islands: Kauhola Light bearing S.44°30'E., 16.1 miles distant, in 491–500 fathoms, foraminifera, sand, and rock, bottom temperature 40.2°F.; July 18, 1902 ("Albatross" station 4065).

REMARKS: The telestid affinities of *Clavularia corrugata* are clearly indicated by its spicules and the presence of the characteristic horny layers. Its small, unbranched zooids, the form of its sclerites, and the arrangement of spicules in the tentacles strongly suggest Madsen's genus *Telestula*; unfortunately, none of the zooids is well enough developed to

show the mesogloea intrusion characteristic of that genus. It is possible that *Clavularia corrugata* will prove to be immature *Telestula spiculicola robusta*, in which case the older name will take precedence.

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