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A New Species of the Gorgonacean Genus *Acanthogorgia*
(Anthozoa: Octocorallia) from Aldabra Atoll
(Figures 1-8)
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Abstract

A new species of the gorgonacean genus *Acanthogorgia* from Aldabra Atoll is described and illustrated by scanning electron micrographs. Characters distinguishing the new species from comparable Indo-west Pacific forms are reviewed, and related species compared insofar as published data permit. The status of *Acanthogorgia flabellum* Hickson sensu Nutting, 1910, and *Paracanthogorgia paratruncata* Stiasny is discussed and the genus *Paracanthogorgia* Stiasny, 1943, is submerged as a junior synonym of *Acanthogorgia* Gray, 1857. A specimen of *Acanthogorgia paratruncata* (Stiasny, 1943) from the Siboga Expedition but not seen by its author is illustrated and briefly described.

Introduction

In 1971, the Royal Society inaugurated a research station on Île Picard of Aldabra Atoll, in the Seychelles Islands of the western Indian Ocean. Since that time, the Smithsonian Institution in collaboration with the Royal Society has conducted eight expeditions to the atoll for the purpose of exploring and revealing the wealth of plant and animal life indigenous there. During the expedition of 1987, a collection of corals, both scleractinian and octactinian, was obtained by Jeffrey Stefani in collaboration with other members of the field party, including Dr. Brian F. Kensley, Ms. Marilyn Schotte and Ms. Janice Clark, all of the National Museum of Natural History, Smithsonian Institution. One of the gorgonians collected at that time proves to be a species of the holaxonian genus *Acanthogorgia* that cannot be assigned to any species of that genus heretofore recorded.

ACANTHOGORGIIDAE Gray, 1859

Diagnosis:

Holaxonian Gorgonacea with axis composed of scleroprotein without calcareous deposits and perforated by a cross-chambered central core. Polyps contractile, not retractile; distal tentacular part not retractile within the proximal calicular part. Tentacles fold inward over the oral disk, without a well-defined operculum consisting of sclerites arranged as a transverse ring and eight points of converging spindles on the tentacle bases. Predominant sclerites colorless, in the form of prickly or warty spindles, sometimes including 3- and 4-armed radiates. (Revised after Kükenthal, 1924)

Remarks:

It should be kept in mind that the genera associated in the Acanthogorgiidae as based upon the lack of an introvert enabling retraction of the tentacles and pharyngeal portion of

the polyp (i.e., "anthocodia") into a proximal "calicular" part as interpreted by Bayer (1981: 920, line 205 of key) is artificial, at least in part. The affinity of *Acalycigorgia* and *Acanthogorgia* is scarcely in doubt, but the relationship of those genera with *Anthogorgia*, *Muricella*, *Versluysia*, and *Cyclomuricea* is more questionable, and the position of *Calcigorgia* in this complex is wholly conjectural.

Acanthogorgia Gray, 1857

Acanthogorgia Gray, 1857: 128, pl. 3, fig. 2 [1851]. — Kükenthal & Gorzawsky 1908: 52. — Kükenthal, 1909: 71; 1924: 239. — Stiasny, 1943: 129; 1947: 31. — Aurivillius, 1931: 32.

Paracanthogorgia Stiasny, 1943: 130; 1947: 11, 53. — Grasshoff, 1973: 1; 1992: 89.

(Type species: *Paracanthogorgia paratruncata* Stiasny, 1943, here designated.)

Type species:

Acanthogorgia hirsuta Gray, by monotypy.

Diagnosis:

Holaxanians with purely horny axis having a hollow, cross-chambered core; colonies flabellate or bushy. Polyps on all sides or roughly biserial, vertically placed, non-retractile but contractile, so the distal, pharyngeal part is more or less clearly distinguishable from the proximal calicular part; sclerites of the polyps in the form of slender spindles more or less bent, arranged en chevron in eight longitudinal double rows, the distalmost surrounding the tentacles prolonged as a strong spine, together forming a thorny crown around the prickles infolded tentacles; tentacles with only numerous small, scale-like sclerites, no operculum consisting of specially differentiated collaret and points; coenenchyme with slender, more or less bent or sinuous spindles sculptured by prickles or simple tubercles, some species with triradiates and crosses often with a projecting central spine.

Distribution:

All seas including boreal and Antarctic waters, from moderate to abyssal depths.

Remarks:

Although the morphological characters of *Acanthogorgia* are so distinctive that members of the genus rarely can be mistaken for anything else, the sclerites are so similar in form throughout that distinguishing species is difficult. Differences in size and sculpturing of sclerites, the number of coronal spines per radius and the degree to which they project, arrangement of the spindles in the eight double rows of sclerites in the polyp body, size and distribution of polyps, manner of branching and presence or absence of anastomosis, are among the kinds of highly subjective characters that traditionally have been used in the establishment of new species. The inadequacy and ambiguity of verbal descriptions and deficiencies (or total absence) of illustrations, added to the equivocal characters available for analysis, makes recognition of individual species from the published literature a doubly difficult and uncertain exercise.

Perhaps in an effort to minimize taxonomic problems at the species level, Stiasny (1943: 128; 1947: 7, 8, 53) established a new genus *Paracanthogorgia* to accommodate those species of *Acanthogorgia* having coronal sclerites with a rough, rather than smooth, spine ("Kroonstekel met ruige vrije stekel"). Unfortunately, even Stiasny's own illustrations reveal intermediate conditions that render the genus untenable, so it is here treated as a junior subjective synonym of *Acanthogorgia* Gray.

Except for a few species that have been described in conformity with reasonably modern standards, the descriptions of no *Acanthogorgia* species are adequate to permit subsequent recognition. When evaluated against descriptions of all species that have been established

since 1857, the specimens from Aldabra Atoll here described cannot be assigned to any known species with any degree of certainty. In such circumstances, the philosophy of C. C. Nutting (1910: 5) seems prudent; "The writer has, in such cases, preferred to carefully describe a species as new whenever he is not reasonably sure that it should be referred to an already described form rather than to call it an old name merely on account of some superficial resemblance... In this way less harm is done than by erroneously ascribing a really new form to an old species, particularly when it involves an incorrect idea regarding distribution." In retrospect, Stiasny's (1947: 8) regret that Nutting did not follow his own wise rule was amply justified ("Het is jammer, dat hij zich in zijn bewerking van het materiaal niet heeft gehouden aan dezen wijzen regel").

As the specimens of *Acanthogorgia* collected at Aldabra Atoll cannot be assigned to any species heretofore described, they are now established as a new species, *Acanthogorgia aldabra*.

Acanthogorgia aldabra n. sp.

Figs. 1-4.

Material:

Seychelles: Île Picard, west of settlement, near bouy, 40-55 feet (12-17 m), sta. JS-14, 7 April 1987. Coll. Jeffrey Stefani et al., two nearly complete colonies, holotype (USNM 80943; SEM 2395, 2378) and paratype (BMNH).

Diagnosis:

Acanthogorgia branching roughly in one plane, with occasional anastomosis. Polyps on all sides, not crowded, up to 1.5 mm tall and 0.75 mm wide, cylindrical, crown of spines consisting of about 3 spines per radius. Coronal sclerites to about 0.6 mm in length, the spine about half the total length, smooth or inconspicuously rough. Coenenchyme with 4-rayed bodies but spindles predominate.

Description:

The colonies are flexible and rather delicate in general aspect. One nearly complete specimen (holotype, Fig. 1, a) retaining part of its holdfast is 12 cm tall and 9 cm wide, flabellate, composed of two inconsistently uniplanar fans formed by distantly pinnate branching only approximately in one plane, the two component fans joined by irregular anastomoses. The other colony (paratype), measuring 10 cm x 6 cm, is an irregular tangle of distantly pinnate branches locally proceeding roughly in one plane and united here and there with anastomoses; one branch had established contact with substrate and formed a small holdfast, but the main holdfast was not obtained. The denuded axis of the main stem of the holotype is only 1 mm in diameter 0.5 cm above the holdfast. Principal branches throughout the colonies are about 0.5 mm in diameter. Secondary branches arise at intervals of 0.5 cm to 1 cm, but occasionally a little more or less.

Polyps are distributed on all sides (Figs. 2-4), closely placed but not crowded, sometimes two with bases contiguous, sometimes separated by as much as 1 mm. Terminal twigs have two or three polyps at the apex but are not clavate in appearance. The tallest polyps (Fig. 2) are 1.5 mm tall, 0.75 mm in diameter near the base and about 0.5 mm in diameter below the tentacular crown, capable of considerable shortening by contraction of the distal "pharyngeal" portion of the body so that the shortest, most strongly contracted, well-developed individuals (not including developmental stages) are less than 1 mm tall (Fig. 3). In the most extremely contracted condition, the "pharyngeal" part of the polyp ("anthocodia") is greatly shortened and pulled down against the wider, "gastric" part stiffened by chevrons of

more or less bent spindles (Fig. 4), which then resembles the "calyx" or "anthostele" of *Paramuricea*. However, as the polyps lack a neck-zone with few or no sclerites to function as an introvert, the "pharyngeal" or "anthocodial" part cannot be withdrawn into the "calicular" or "anthostelar" part, which is therefore homologous with, but not analogous to, the calyx of *Paramuricea*.

The polyps are strongly armed with thorny spindles, most of them curved or bent, arranged in eight interseptal tracts converging *en chevron* toward the bases of the tentacles. Three or four just below the base of each tentacle (Fig. 1, b) project strongly and together form the "crown of spines" ("Stachelkrone," "kroon van stekels") that is the most conspicuous and characteristic feature of this genus. The distal portion ("Stachel," "stekel") of the coronal sclerites ("Kronstacheln," "kroonstekels") is clearly differentiated as a prominent spike projecting from the thorny basal portion embedded in the mesogloea of the body wall (Fig. 1, b). Below the crown of spines, the spindles of the body wall are thorny throughout their length. The longest coronal sclerites reach a length of about 0.6 mm, of which the distal-most half or third forms the spinous portion. Above the crown of spines the tentacles are armed with small, flat scales with scalloped margins (Fig. 1, d), transversely placed and curved to fit the contour of the tentacle. Curved or straight thorny spindles of various sizes up to about 0.6 mm long form the eight longitudinal double rows of converging sclerites that extend along the polyp body. In strong contraction, the uppermost spindles of the calicular part of the polyp may project to a greater or lesser degree, but the projecting portion is not well differentiated as a spine as it is in the coronal sclerites.

The sclerites of the coenenchyme consist of thorny spindles (Fig. 1, c) not unlike those of the polyps and similar in size, together with many triradiates and quadriradiates (Fig. 1, e) which often have a short, outwardly projecting spine at the center. The projecting spine of smaller sclerites may be more strongly developed than the basal rays, resulting in caltrops-like sclerites (Fig. 1, f) that give the coenenchymal surface a somewhat prickly aspect.

Etymology:

Named for the type locality, Aldabra Atoll in the Republic of Seychelles. Noun in apposition.

Comparisons:

With a height of 1.5 mm, the polyps of *Acanthogorgia aldabra* are unusually small for this genus. In his revision of *Acanthogorgia*, Stiasny (1947) recognized only one species having polyps 1-1.5 mm tall: *A. breviflora* Whitelegge, from Funafuti; and only two others with polyps 2mm tall: *A. candida* Kükenthal & Gorzawsky from Japan, and *A. turgida* Nutting from the Malay Archipelago. In his newly established genus *Paracanthogorgia*, Stiasny recognized only one species with such small polyps, *P. paratruncata* Stiasny, established for Nutting's specimens of *Acanthogorgia truncata* Studer from Siboga sta. 310.

Whitelegge's description (1897: 309) of *A. breviflora* was based on a very poor specimen ("small, broken and almost denuded colony, 52 mm, in height) and is so superficial that the species cannot be recognized, although Stiasny (1947: 36) accepted it as a good species with some reservations.

The colony of *Acanthogorgia candida* Kükenthal (1909: 71) from Japan bears a superficial resemblance to *A. aldabra* but appears to be more robust, and the polyps are somewhat larger (2 mm high). The most distinctive difference is in the coronal sclerites, which have a very short, tuberculate base and a strong, smooth spine, the whole exceeding 1 mm in length in the largest examples.

The Siboga specimens of *Paracanthogorgia paratruncata* Stiasny (1947: 73, figs. V, W; pl. 3, figs. 15, 18), which Nutting (1910) previously had misidentified as the eastern Atlantic species *Acanthogorgia truncata* Studer, are similar in general aspect to the specimens from Aldabra, but the polyps are conspicuously different in spite of being similarly small. Stiasny's drawing of an extended polyp (1947: fig. V) reveals the salient distinguishing features.

One of the five lots reported by Nutting (1910: 18) as *Acanthogorgia flabellum* Hickson is from Siboga station 310, the type locality of *Paracanthogorgia paratruncata* Stiasny. This was retained by Nutting at the State University of Iowa (now USNM 91915), and was not seen by Stiasny when he reidentified the Siboga specimens as *Brandella flabellata*. It is not *Brandella flabellata* (Gray) but is a specimen of *Acanthogorgia* in close agreement with Stiasny's description of *P. paratruncata* and specifically distinct from *A. aldabra*. That specimen is here illustrated to confirm the validity of Stiasny's species and to demonstrate its distinctness from *A. aldabra*.

Acanthogorgia paratruncata (Stiasny, 1943)

Figs. 5-8

Acanthogorgia flabellum.—Nutting, 1910: 18 (in part: the specimen from station 310). Not *Acanthogorgia flabellum* Hickson, 1905: 812, pl. 67, figs. 1, 2.

Paracanthogorgia paratruncata Stiasny, 1943: 131; 1947: 73, figs. V, W, X, pl. 3, figs. 15, 18. Not *Acanthogorgia truncata* Studer, 1890: 555; 1901: 46, pl. 6, figs. 5-8.

Brandella flabellata.—Stiasny, 1943: 130; 1947: 83 (in part).

Material:

Flores Sea: 8° 30' S, 119° 7.5' E, 73 m, sand. Siboga sta. 310, 12 February 1900. One incomplete colony lacking holdfast, and two very small colonies, one unbranched and attached to a small fragment of shell, USNM 91915 (SEM 2396, 2397). Not seen by Stiasny.

Diagnosis:

Acanthogorgia branching roughly in one plane, with occasional anastomosis, forming small multiplanar colonies. Polyps on all sides, generally crowded, only 0.75 mm high when strongly contracted but cylindrical and up to about 1.5 mm tall and 1 mm wide when more or less extended; crown of spines not strongly projecting, consisting of 4 or more spines per radius. Coronal sclerites to about 0.5 mm in length, the spine about half the total length, some smooth, some inconspicuously rough. Coenenchyme with 4-rayed bodies predominating, spindles present mostly in vicinity of polyps.

Description:

See Stiasny (1947: 73).

Discussion:

The colonial form has been illustrated by Stiasny (1947: pl. 3, fig. 15, 18). The specimens reported by Nutting as *Acanthogorgia flabellum* Hickson, 1905, were reinterpreted by Stiasny (1947: 13, 83) as *Brandella flabellata* (Gray, 1870), an opinion supported by Nutting's statement that "The operculum is composed of three spindles for each flap," a character consistent with Paramuriceidae but not with Acanthogorgiidae. However, Stiasny did not have access to the specimen of "*Acanthogorgia flabellum*" from Siboga station 310, which Nutting retained in Iowa and which is unquestionably a species of *Acanthogorgia*, not *Brandella* (= *Villogorgia*). Clearly, this specimen from station 310 is conspecific with the specimens from the same station reported by Nutting as *Acanthogorgia truncata* Studer, 1890. Although undoubtedly a species of *Acanthogorgia*, it is unusual in the extent to which the

polyps can contract, as noticed by Stiasny (1947: 74) in the type material of *P. paratruncata* ("in verschillende stadia van contractie: dik, bijna kogelvormig, pyramidevormig, gelijkmatig cilindrisch of aan zijanten iets gezwollen, dikwijls onder de stekelkroon wat ingesnoerd"). Stiasny also observed the distinctive way in which the distal ends of the spindles of the longitudinal rows project and criss-cross along the summits of the eight longitudinal double rows of sclerites.

There can be little doubt that these specimens from station 310 are *Acanthogorgia paratruncata* (Stiasny), which was obtained only at station 310 (Nutting 1910: 17; Stiasny 1947: 73). The largest specimen is about 11 cm tall without holdfast, sparingly branched approximately in one plane, with several anastomoses. The polyps are arranged on all sides, sometimes in whorls of three or in roughly opposite pairs, sometimes singly; in some parts of the colony they are well separated, but in most places they are distinctly crowded. Terminal branchlets are not conspicuously clavate, but a cluster of two or three polyps occurs at the apices.

The contracted polyps of this specimen are short, truncate cylinders or hemispherical and rather dome-shaped (Figs. 6, 7), as mentioned by Stiasny, but none are as extended as shown in his Figure V. The sclerites of the polyp body are spindles more or less strongly bent at roughly the midpoint (Fig. 8, b). Those of the crown of spines below the tentacle bases are only poorly distinguished from those of the proximal, calicular part of the polyp. The coronal sclerites reach lengths slightly more than 0.5 mm, of which the projecting spine occupies about half; in some cases the spine is quite smooth, but in most cases its surface has low, sharp prickles in agreement with Stiasny's illustration (1947: 74, fig. X). The sclerites of the calicular part of the body are similar to the coronal sclerites but the projecting distal end is not as clearly differentiated. Beyond the coronal sclerites the spindles decrease in size (Fig. 8, c) along the proximal part of the tentacles and intergrade with the smaller transverse scales of the tentacle backs (Fig. 8, a). In the calicular part of the polyps the distal ends of the *en chevron* spindles of the eight longitudinal tracts project as strongly as do the coronal spines and cross one another along the midline of the longitudinal double rows, giving the contracted polyps an unusually prickly aspect (Figs. 6, 7).

The tentacles contain small, flat scales (Fig. 8, a) curved to fit the contours of the tentacular rachis, diminishing in size distad from about 0.15 mm to 0.09 mm; those extending into the pinnules are narrow and needle-like, with one end slightly expanded. The coenenchyme contains numerous 4-rayed bodies reaching about 0.25 mm in greatest diameter (Fig. 8, e), often with a strong central spine or wart (Fig. 8, d), together with spindles similar to those of the polyps, but often straight, which occur in most abundance adjacent to polyps

Remarks:

The very short, commonly hemispherical contracted polyps showing minimal external evidence of anatomical subdivision of the polyp into pharyngeal and calicular parts, and the weakly projecting coronal sclerites with poorly differentiated spine, approach the distinguishing features of the genus *Muricella* Verrill, 1869, in which the sclerites of the tentacle bases are not specialized as projecting coronal spines, and the sclerites of the pharyngeal part of the polyp merge with those of the proximal part without interruption so that no calicular part is recognizable.

Acknowledgments

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Explanation of figures.

- Fig. 1. a, *Acanthogorgia aldabra* n. sp. Holotype colony, USNM 80943. Stereoscopic pair. b-f, Sclerites of holotype colony, USNM 80943. b, coronal sclerites; c, large spindles of coenenchyme; d, tentacular scales; e, radiates of coenenchyme; f, calltrops-like sclerites of coenenchyme. 120 μ m scale applies only to a; 200 μ m scale to all other figures. SEM 2378.
- Fig. 2. *Acanthogorgia aldabra* n. sp. Holotype colony, USNM 80943. Part of terminal branch with polyps in most extended condition; Magnifications as indicated. Stereoscopic pairs (SEM 2379).
- Fig. 3. *Acanthogorgia aldabra* n. sp. Top, part of terminal branch of holotype colony with polyps in strongly contracted condition; Bottom, oral aspect of strongly contracted polyp, USNM 80943. Magnifications as indicated. Stereoscopic pairs (SEM 2395).
- Fig. 4. *Acanthogorgia aldabra* n. sp. Top, part of terminal branch of holotype colony with strongly contracted polyp showing division into pharyngeal and calicular portions; Bottom, strongly contracted polyp at greater enlargement, USNM 80943. Magnifications as indicated. Stereoscopic pairs (SEM 2395).
- Fig. 5. *Acanthogorgia paratruncata* (Stiasny, 1943). USNM 91915. Part of terminal branch with closely crowded polyps. Stereoscopic pair (SEM 2396).
- Fig. 6. *Acanthogorgia paratruncata* (Stiasny, 1943). USNM 91915. Strongly contracted polyps. Stereoscopic pair (SEM 2396).
- Fig. 7. *Acanthogorgia paratruncata* (Stiasny, 1943). USNM 91915. Strongly contracted polyps, showing indistinct division into pharyngeal and calicular parts and crossed spines of the calicular sclerites. Stereoscopic pairs (SEM 2396).
- Fig. 8. *Acanthogorgia paratruncata* (Stiasny, 1943). USNM 91915. Sclerites. a, tentacular scales; b, spindles of polyp body, those of crown of spines poorly distinguished from those of the calicular part of the body; c, smaller curved spindles of tentacles; d, e, radiates of coenenchyme. 120 μ m scale applies to a, c, d; 200 μ m scale applies to b, e. SEM 2397.

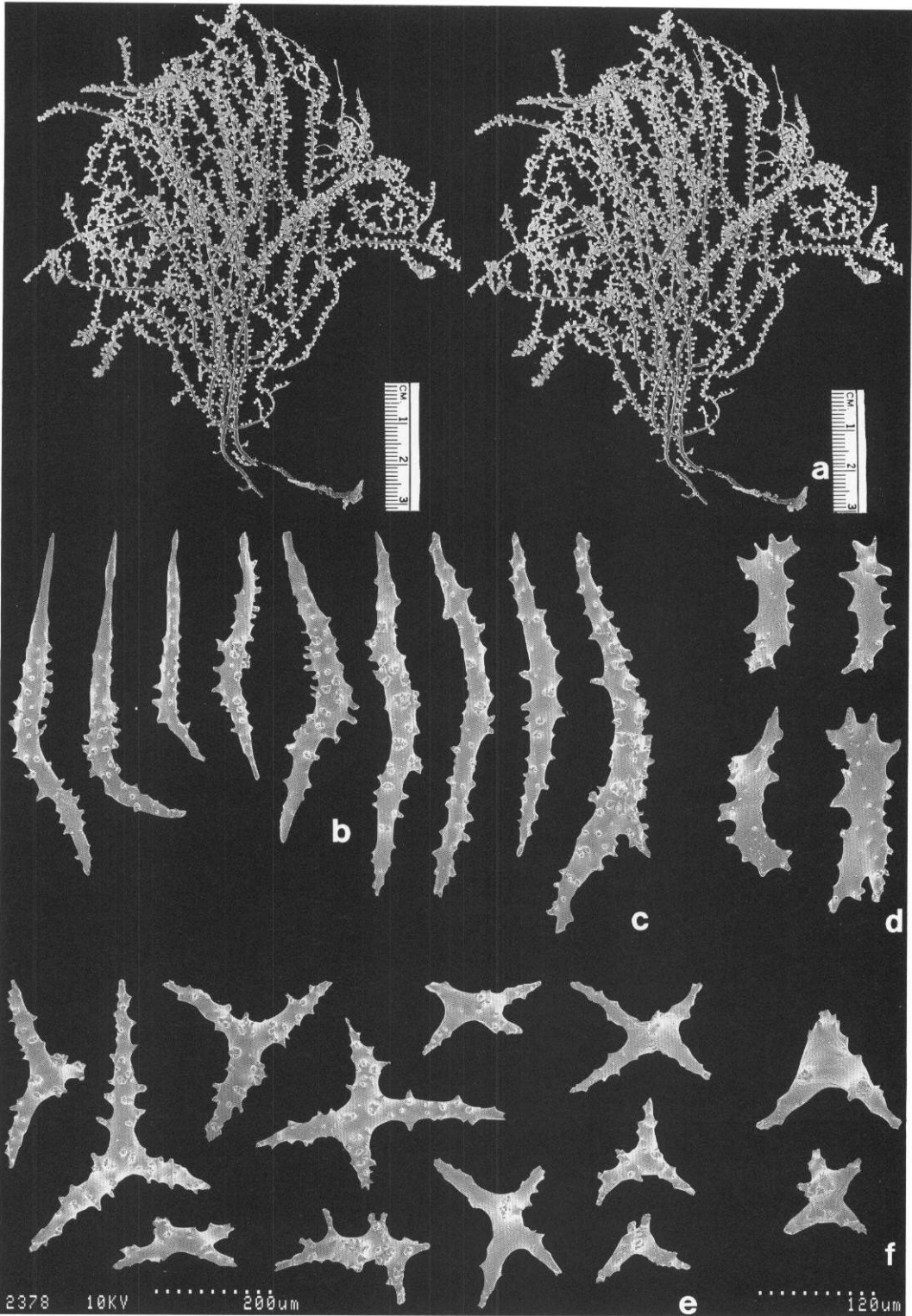


Fig. 1 Captions (see p. 8)

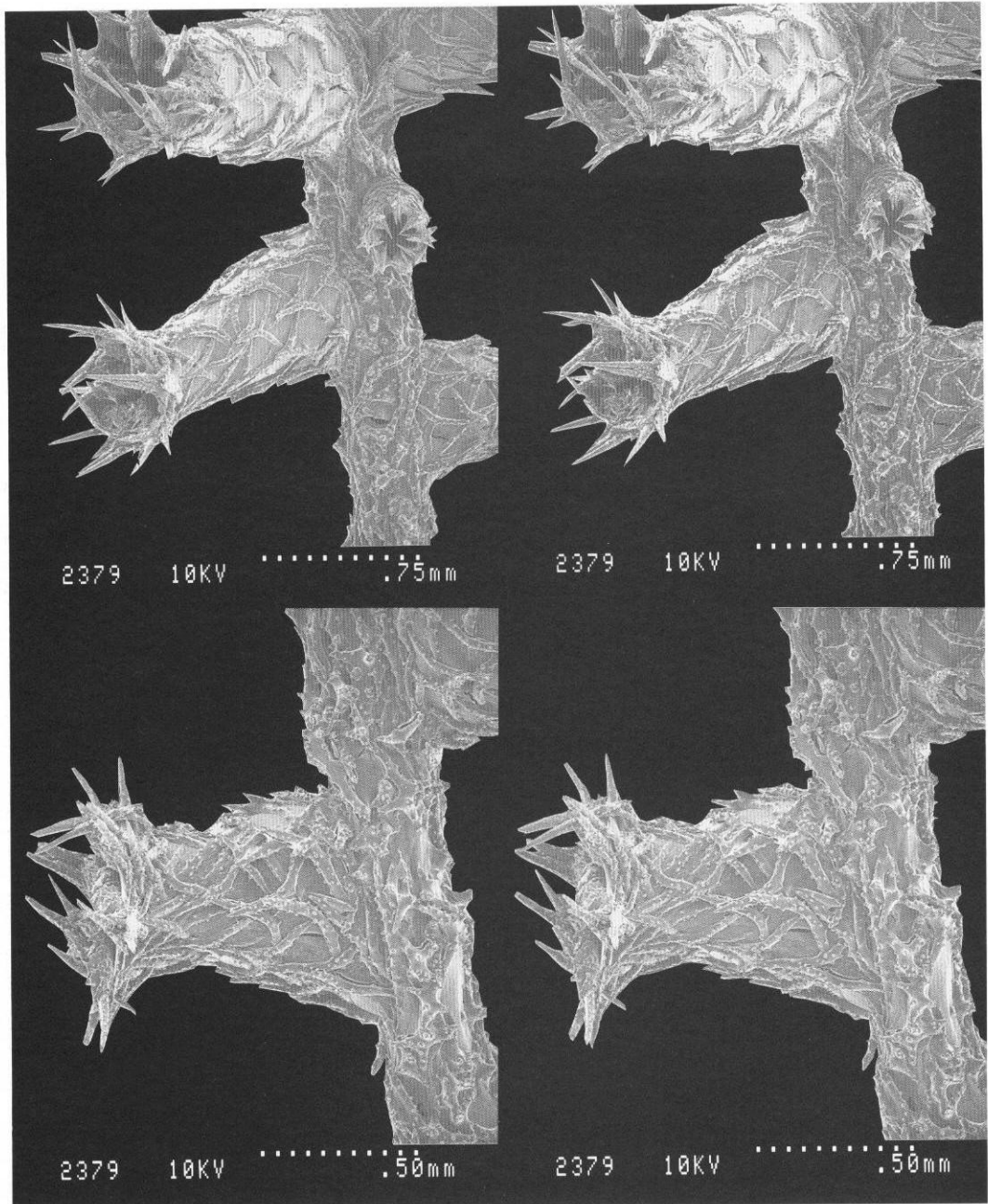


Fig. 2 Captions (see p. 8)

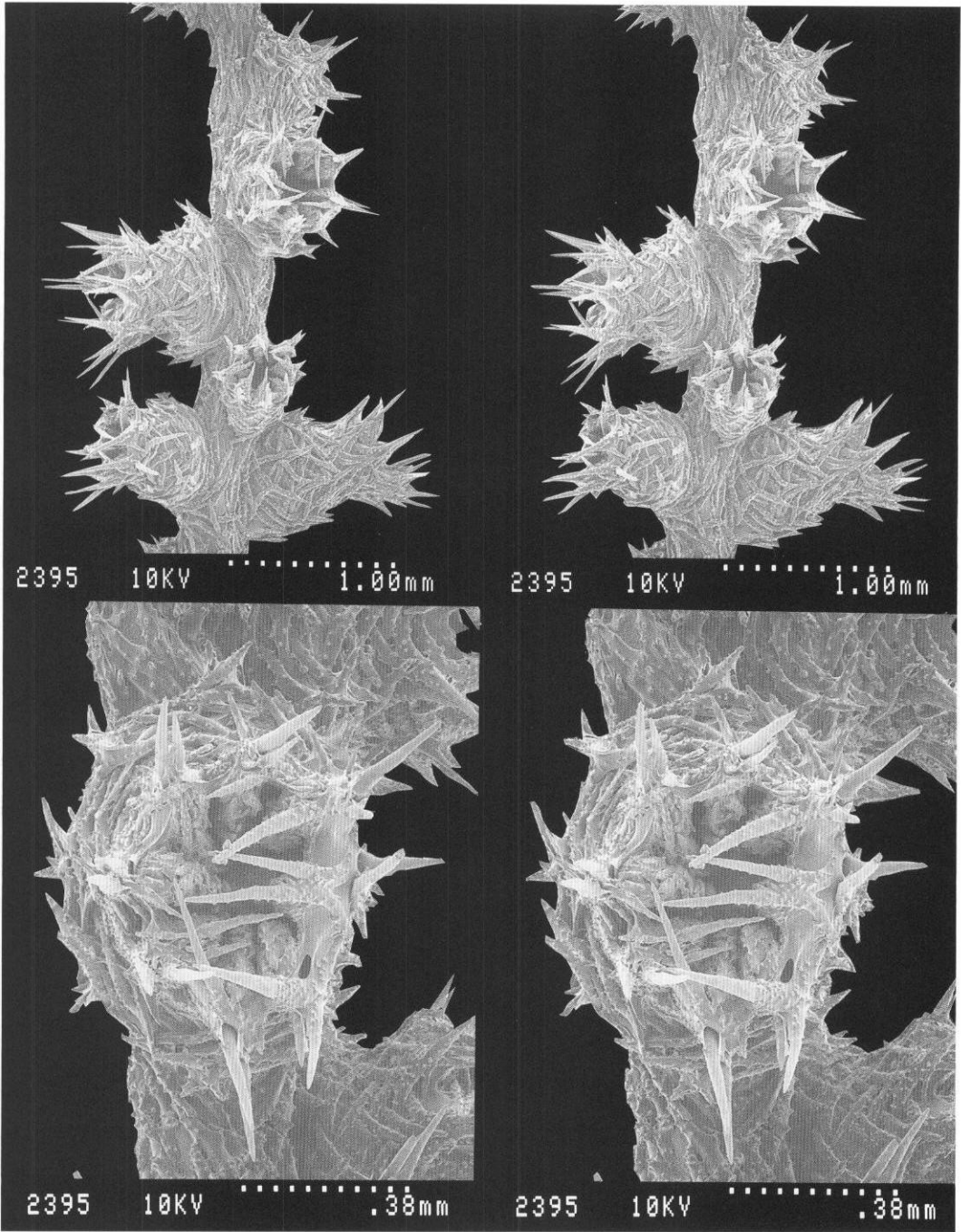


Fig. 3 Captions (see p. 8)

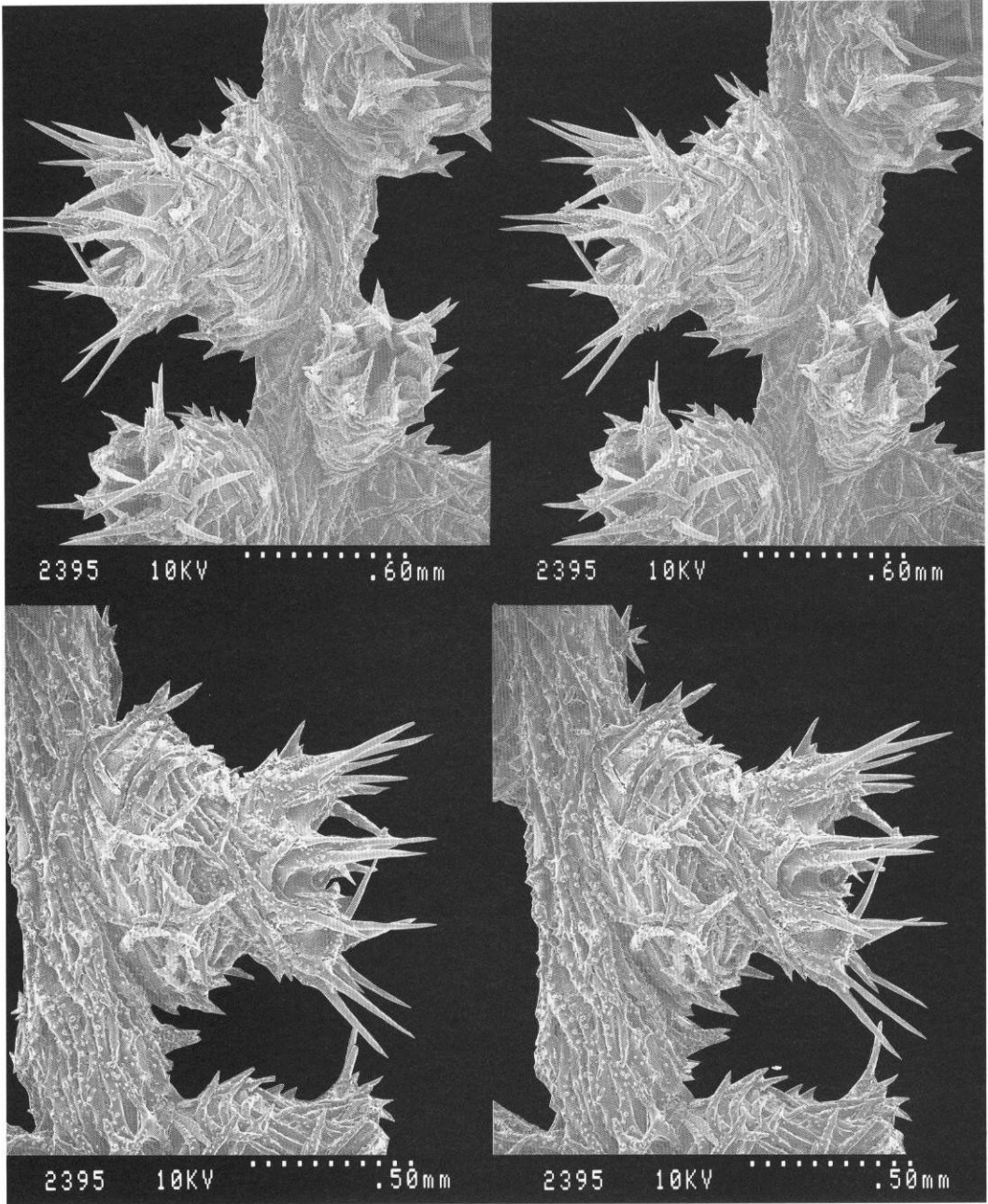


Fig. 4 Captions (see p. 8)

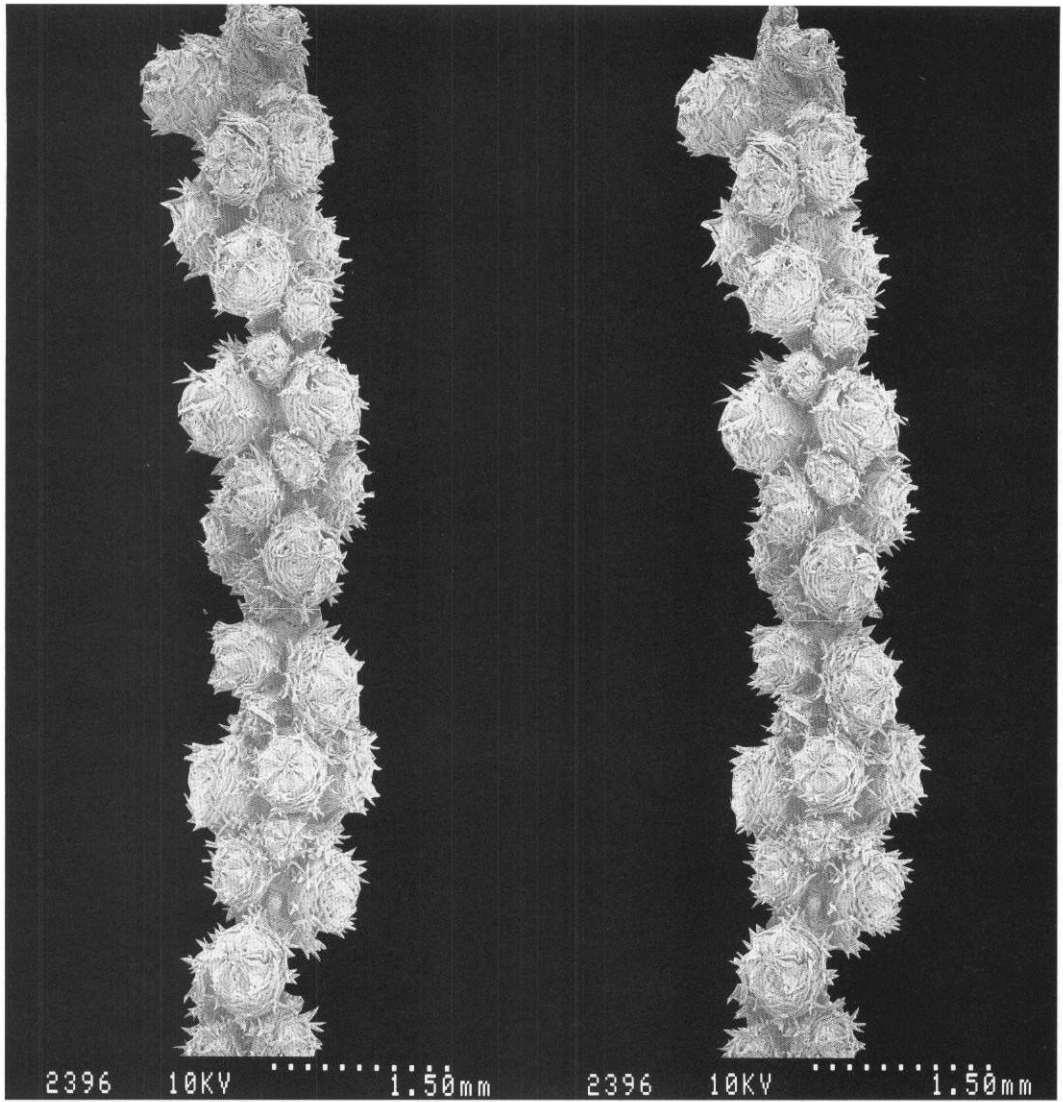


Fig. 5 Captions (see p. 8)

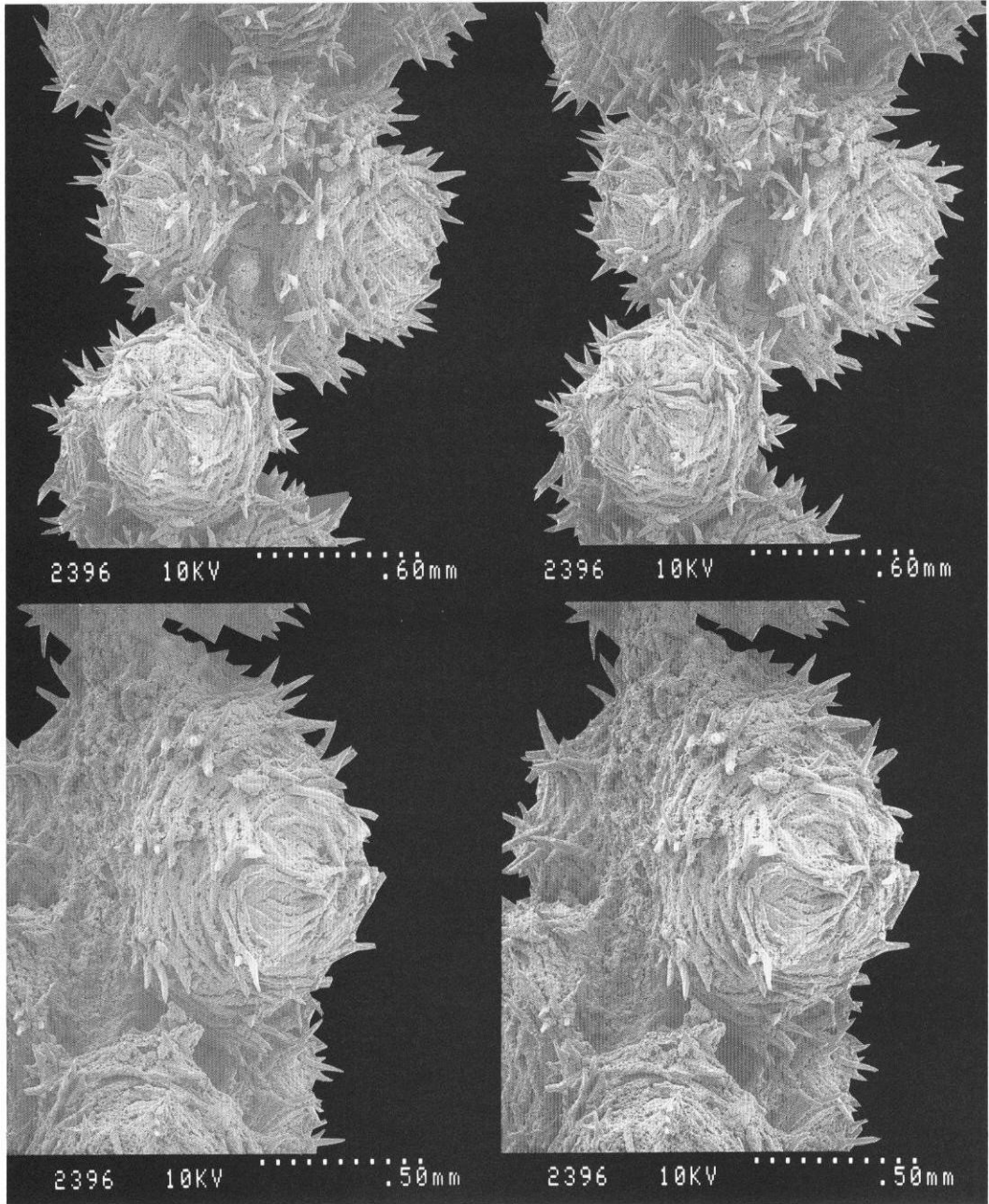


Fig. 6 Captions (see p. 8)

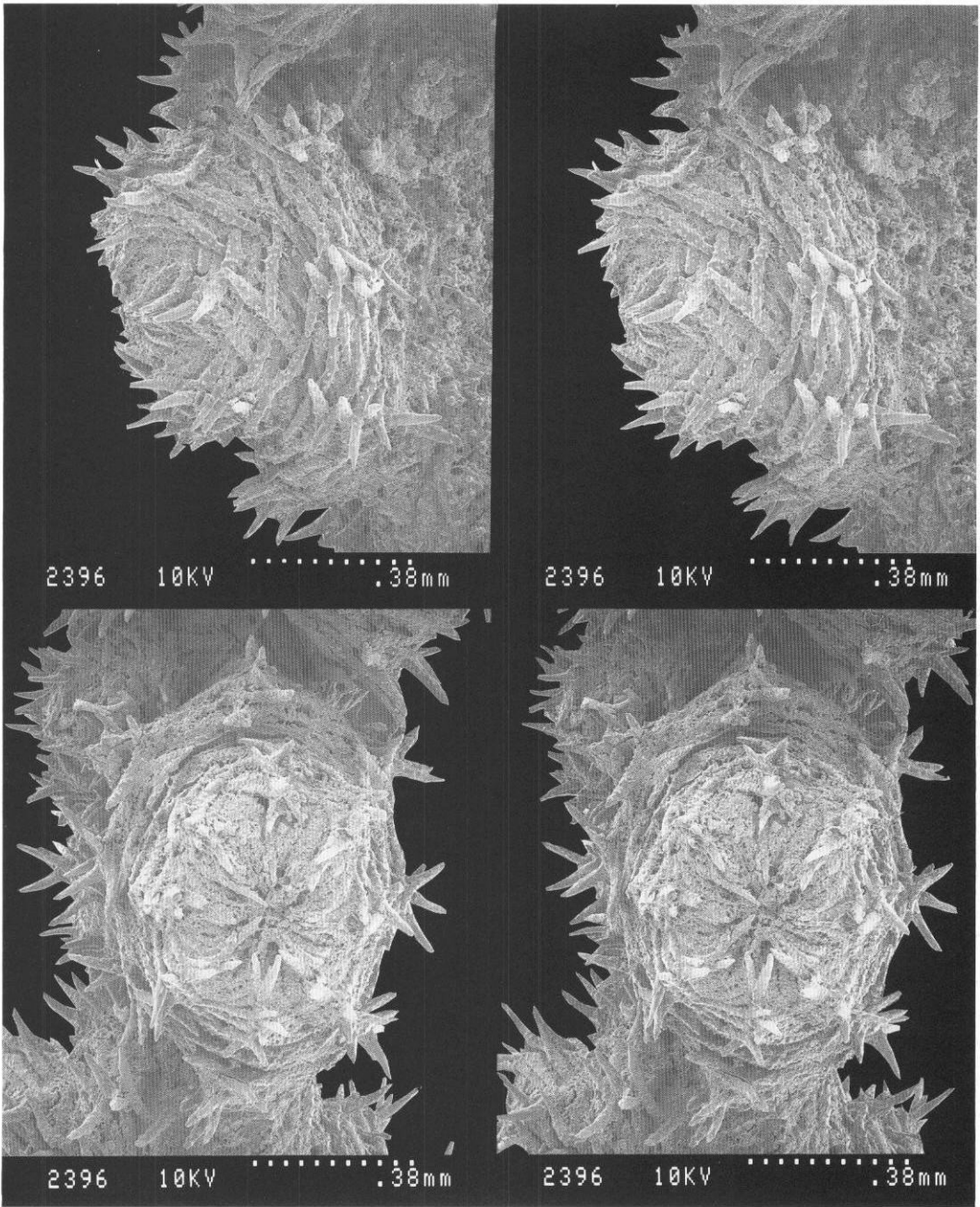


Fig. 7 Captions (see p. 8)

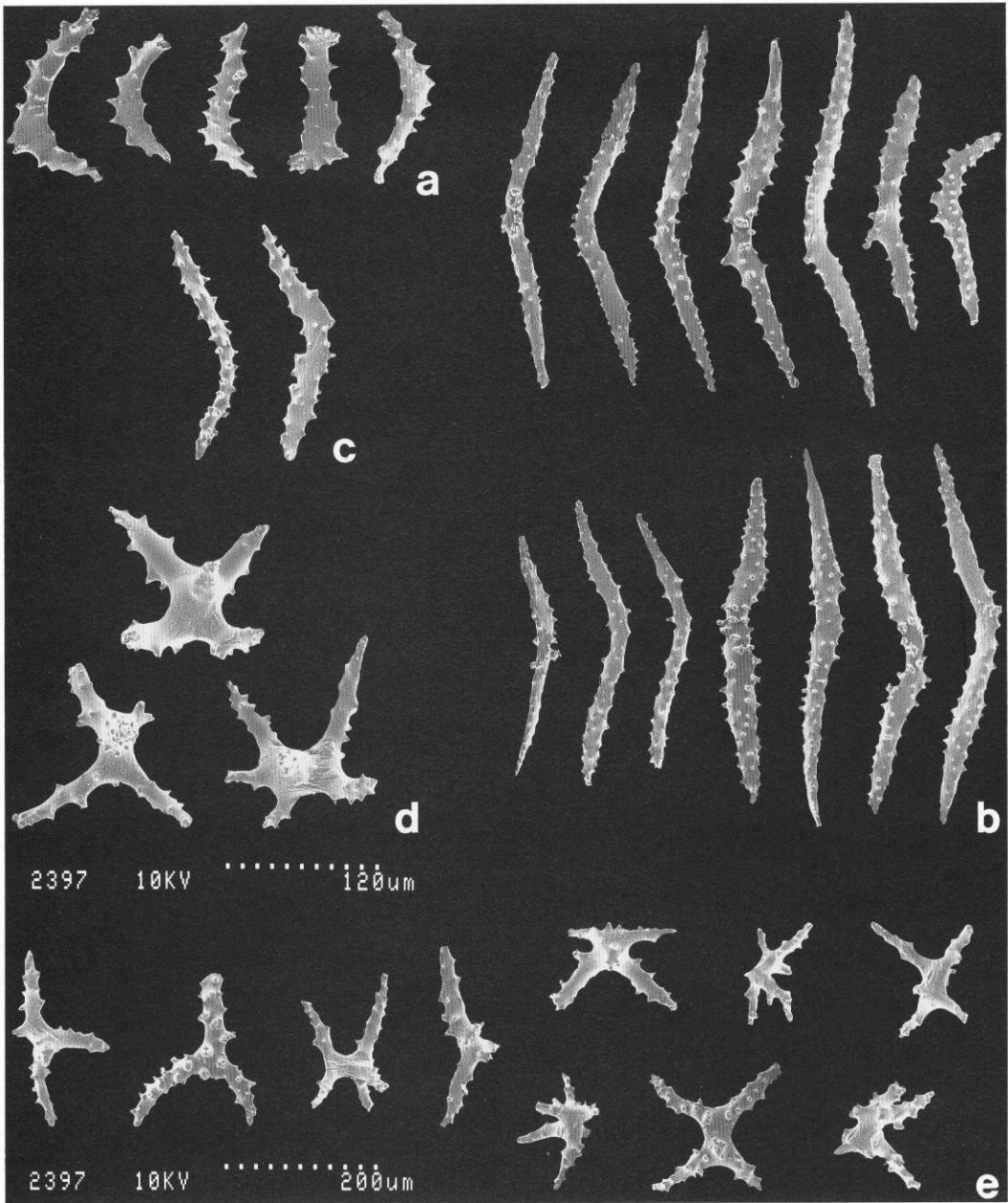


Fig. 8 Captions (see p. 8)