New and redescribed species of *Alcyonium* Linnaeus, 1758 (Anthozoa: Alcyonacea)

J. Verseveldt † & L.P. van Ofwegen

Verseveldt, J. † & L.P. van Ofwegen. New and redescribed species of *Alcyonium* Linnaeus, 1758 (Anthozoa: Alcyonacea).

Zool. Med. Leiden 66 (7), 31.vii. 1992: 155-181, figs. 1-27.— ISSN 0024-0672.

Key words: Octocorallia; Alcyoniidae; new species; redescriptions; Atlantic Ocean; Indo-Pacific Ocean.

Four new species of *Alcyonium* are described and figured: *Alcyonium compactofestucum* from the east coast of South Africa, *A. rudyi* from the west coast of the United States, *A. senegalense* from Senegal and *A. spitzbergense* from Spitzbergen. *A. antarcticum* Wright & Studer, 1889, *A. gruveli* Tixier-Durivault, 1955, *A. monodi* Tixier-Durivault, 1955, *A. patagonicum* (May, 1899) and *A. sollasi* Wright & Studer, 1889, are redescribed and figured. *A. paessleri* May, 1899, is synonymized with *A. antarcticum* Wright & Studer, 1889.

J. Verseveldt, deceased.

L.P. van Ofwegen, Nationaal Natuurhistorisch Museum, P.O. Box 9517, 2300 RA Leiden, The Netherlands.

Introduction

The present report is based on an unfinished manuscript left behind by the late Dr Jakob Verseveldt (see Den Hartog, 1988: vi). The descriptions and drawings are basically from his hand. The second author has verified, and where necessary adapted the descriptions and drawings, and added SEM-photographs of the sclerites.

The following abbreviations for depositories have been used: BMNH = The Natural History Museum (formerly British Museum [Natural History]), London; IFAN = Institut Français Afrique Noir, Dakar, Senegal; MNHN = Muséum National d'Histoire Naturelle, Paris; NNM/RMNH = Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden; RSM = Royal Scottish Museum, Edinburgh; SMF = Senckenberg Museum, Frankfurt am Main; NMNH /USNM = National Museum of Natural History (formerly United States National Museum), Washington, D.C.; ZMH = Zoologisches Museum, Hamburg.

Systematic part

Alcyonium antarcticum Wright & Studer, 1889 (figs. 1-3)

Alcyonium antarcticum Wright & Studer, 1889: 239, pl. 42 fig. 5; Molander, 1929a: 48, fig. 7, pl. 4 fig. 7.
not *Alcyonium antarcticum*; Hickson, 1900: 73 [= *A. variabile* (Thomson, 1921)].
Alcyonium paessleri May, 1899: 6, fig. 1; Hickson, 1902: 293; 1907: 3, pl. 2 figs. 22-23; Molander, 1929a: 50, fig. 8, pl. 4 fig. 11; 1929b: 4; Verseveldt, 1967: 7-10, figs. 3, 4, 7C-F.

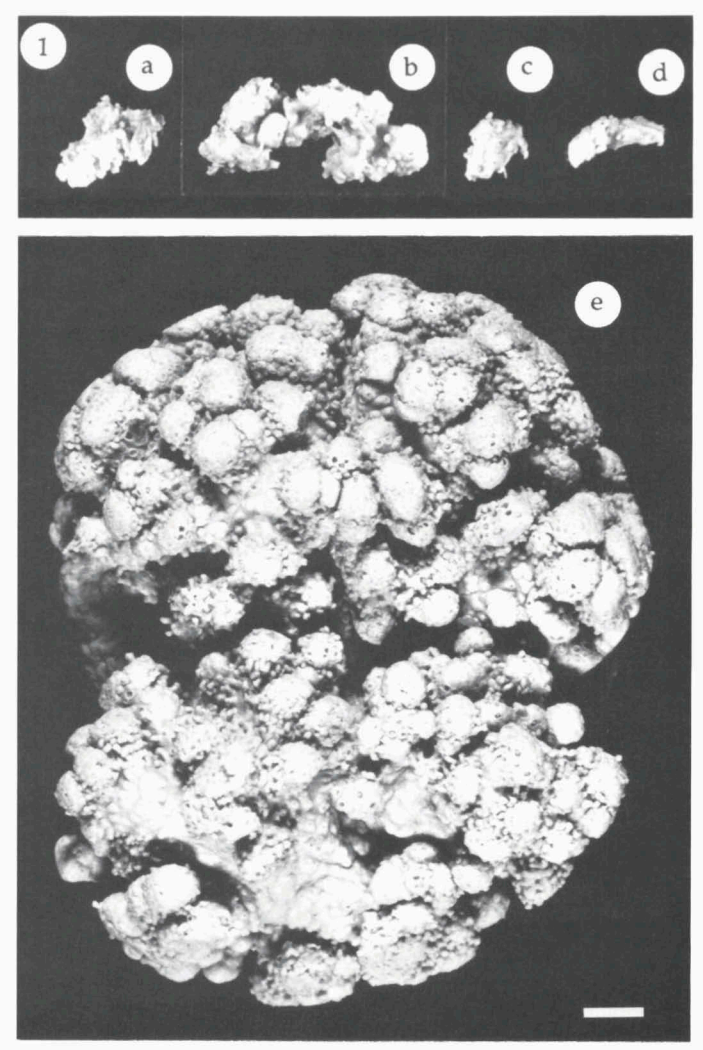

Fig. 1. *Alcyonium antarcticum* Wright & Studer, 1889; a-d, May's type-series of *A. paessleri* (ZMH C2480); e, holotype of *A. antarcticum* (BMNH 90.4.11.30). Scale 1 cm.

Material.— Challenger expedition, sta. 151, off Heard island, 75 fms (135 m), the holotype of *A. antarcticum* (BMNH 90.4.11.30); Smyth Channel, Magellan Region, collector Paessler, 1886, a few fragments, labelled "Types", representing May's type-specimens of *A. paessleri* (ZMH C2480) (redescribed below); off South Georgia, U.S. Arctic Research Program (USARP), R/V Islas Orcada, cruise 575 sta. 32, 54°21.36'S 35°58.42'W, 144-164 m, 19.v.1975, 4 branched and a number of unbranched colonies (USNM 79409; RMNH 17722); Cape Armitage, Ross Island, Antarctica, 30 m, 9.xi.1985, collector P. Dayton, one colony and a few loose lobes (RMNH 17721).

Description.— May's type specimens (figs. 1a-d) of *Alcyonium paessleri* are membraneous fragments. In all colonies the lobes are covered with closely set polyps. These are often completely withdrawn into the coenenchyme. In all colonies the calyces are present as a ring of low elevations. Fig. 2a shows the anthocodial armature of a polyp of one of May's specimens. It consists of spiny rods up to 0.50 mm long (figs. 2b-f). In the

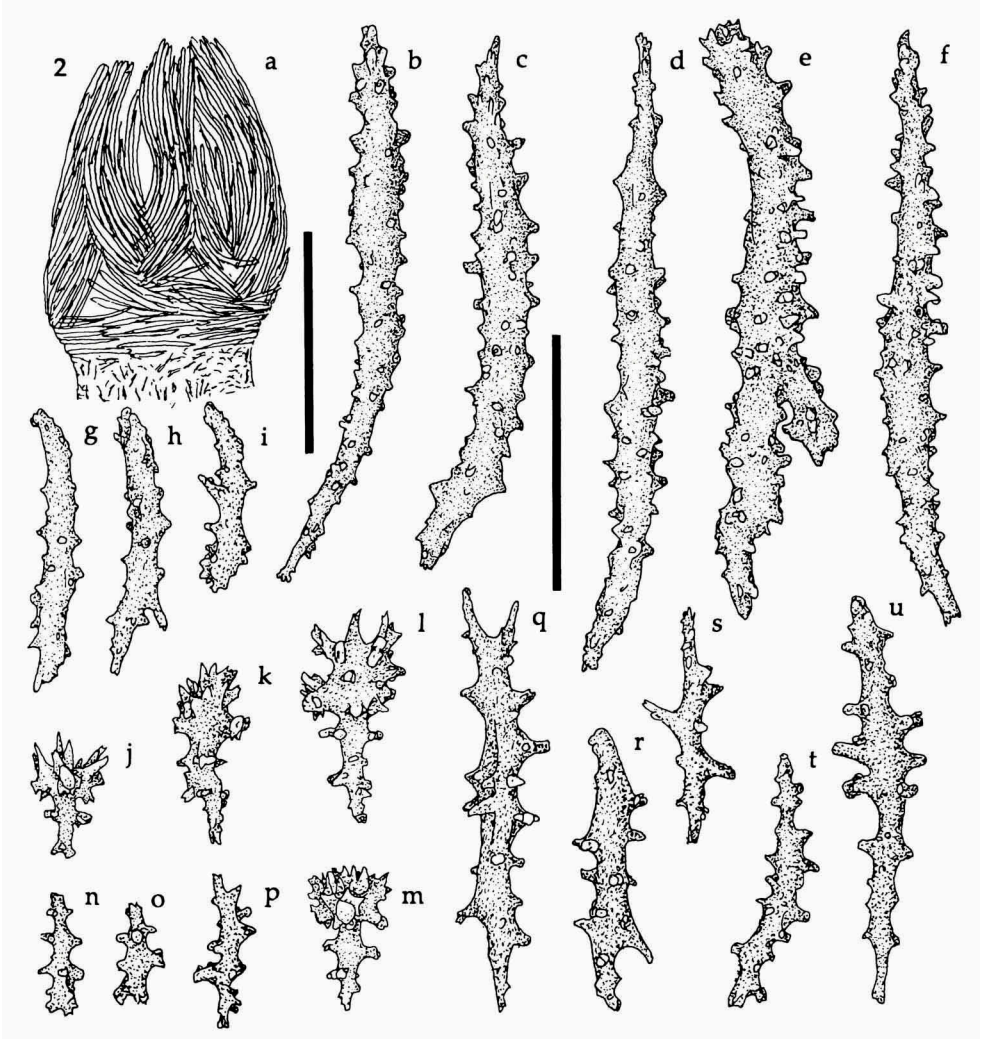

Fig. 2. *Alcyonium antarcticum* Wright & Studer, 1889, one of May's syntypes of *A. paessleri* (ZMH C2480); a, polyp; b-f, anthocodial sclerites; g-i, tentacular sclerites; j-p, sclerites of surface layer; q-u, sclerites of interior. Scale at 2a 1 mm, applies to 2a; 0.20 mm scale at 2c to all others.

tentacles there are many longitudinally arranged rods up to about 0.35 mm long (figs. 3g-i). The pinnules contain one to three narrow, straight or bent rods, 0.10-0.20 mm long.

In the surface layer of May's largest specimen many clubs with spiny heads are present, 0.09-0.19 mm long (figs. 3j-m), and in addition some capstans and rods (figs. 3n-p). The interior has spiny rods up to 0.35 mm long (figs. 3q-u).

Colour.— Most colonies are white; the one from Cape Armitage is light rose.

Discussion.— In the original description of *Alcyonium antarcticum*. by Wright & Studer (1889: 239) it is not clear what is meant with "the upper portion (of the colony) forms a head consisting of numerous rounded tufts carrying the polyps". A few lines further they refer to terminal tufts. These tufts must be the lobes of the

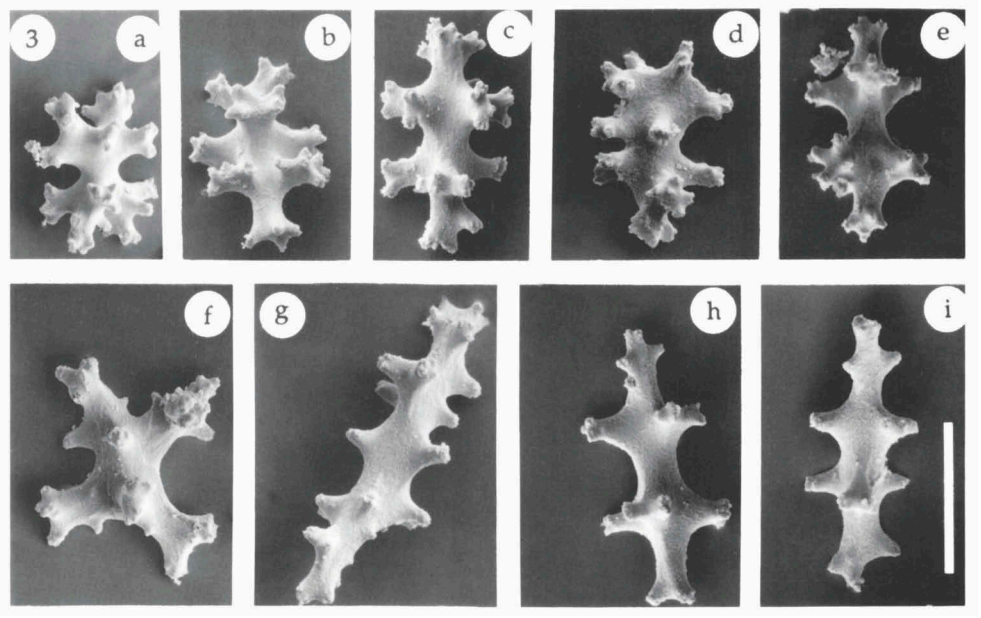

Fig. 3. *Alcyonium antarcticum* Wright & Studer, 1889, holotype (BMNH 90.4.11.30); a-i, sclerites of surface layer. Scale 0.05 mm.

colony, but in the holotype (fig. 1e) the resemblance to tufts is far from clear. When Wright & Studer examined the specimen the polyps were probably extending so far that the lobes looked like tufts of tiny flowers.

There is considerable variation in the sclerites of the surface layer. In the holotype rods and capstans are most abundant (fig. 3), whereas in May's specimens clubs predominate. As all specimens examined contain clubs, rods and capstans with the same shape, although not equally abundant, we consider them to belong to the same species, *A. antarcticum* Wright & Studer, 1889.

Distribution.— Antarctic and subantarctic.

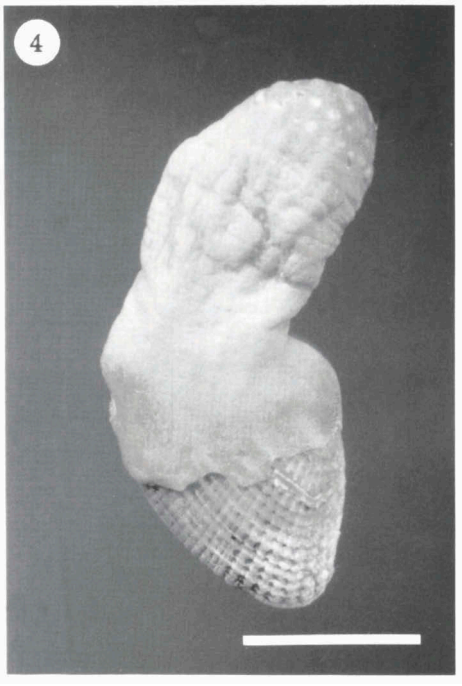

Fig. 4. *Alcyonium compactofestucum* spec. nov., holotype (USNM 85660). Scale 1 cm.

Alcyonium compactofestucum spec. nov.
(figs. 4-6)

Material.— R/V Anton Bruun, sta. 8-394B, 29°27'S 31°31'E (NE of Durban), 68-70 m, 25.ix.1964, the holotype (USNM 85660).

Description.— The colony is finger-

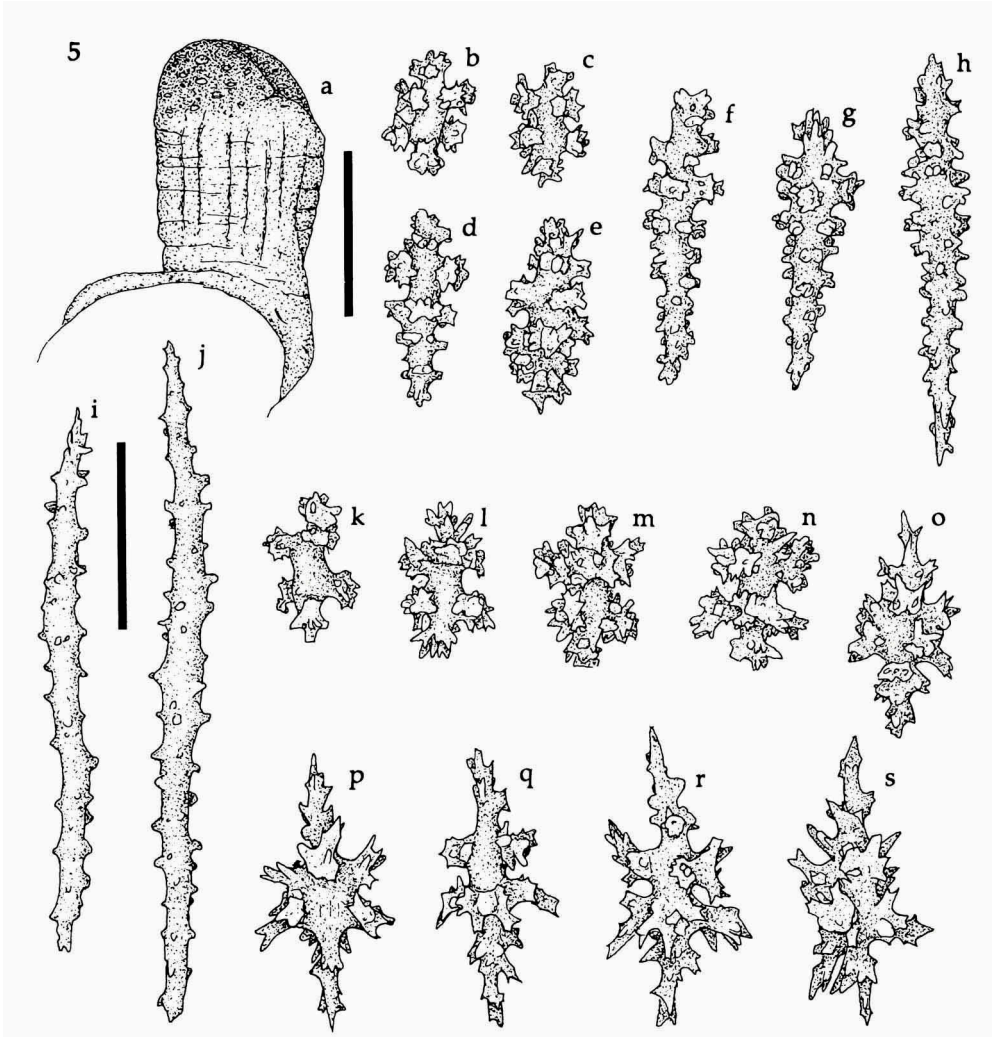

Fig. 5. *Alcyonium compactofestucum* spec. nov., holotype (USNM 85660); a, colony; b-h, sclerites of surface layer polyparium; i-j, sclerites of interior polyparium; k-o, sclerites of surface layer stalk; p-s, sclerites of interior stalk. Scale at 5a 1 cm, applies to 5a; 0.10 mm scale at 5i to all others.

shaped and flattened laterally (figs. 4, 5a). It is attached obliquely to a bivalve shell. The colony is about 20 mm high and has a maximum cross-section of 11 x 5 mm. The stalk is 10 mm high and has longitudinal and transverse furrows. The polyparium is smooth. All polyps are completely withdrawn; their position is indicated by irregularly distributed, oval or circular, yellowish spots. The distance between the polyps is 0.6-1.5 mm.

The anthocodial armature consists of eight points composed of numerous, sparsely spined spindles up to 0.40 mm long (fig. 6k). At the base they are forming an indistinct crown.

The surface layer of the polyparium contains capstans, about 0.07 mm long (figs. 5b-c, 6a-c), and small clubs and spindles, 0.08-0.11 mm long (figs. 5d-e, 6d-e, g), all

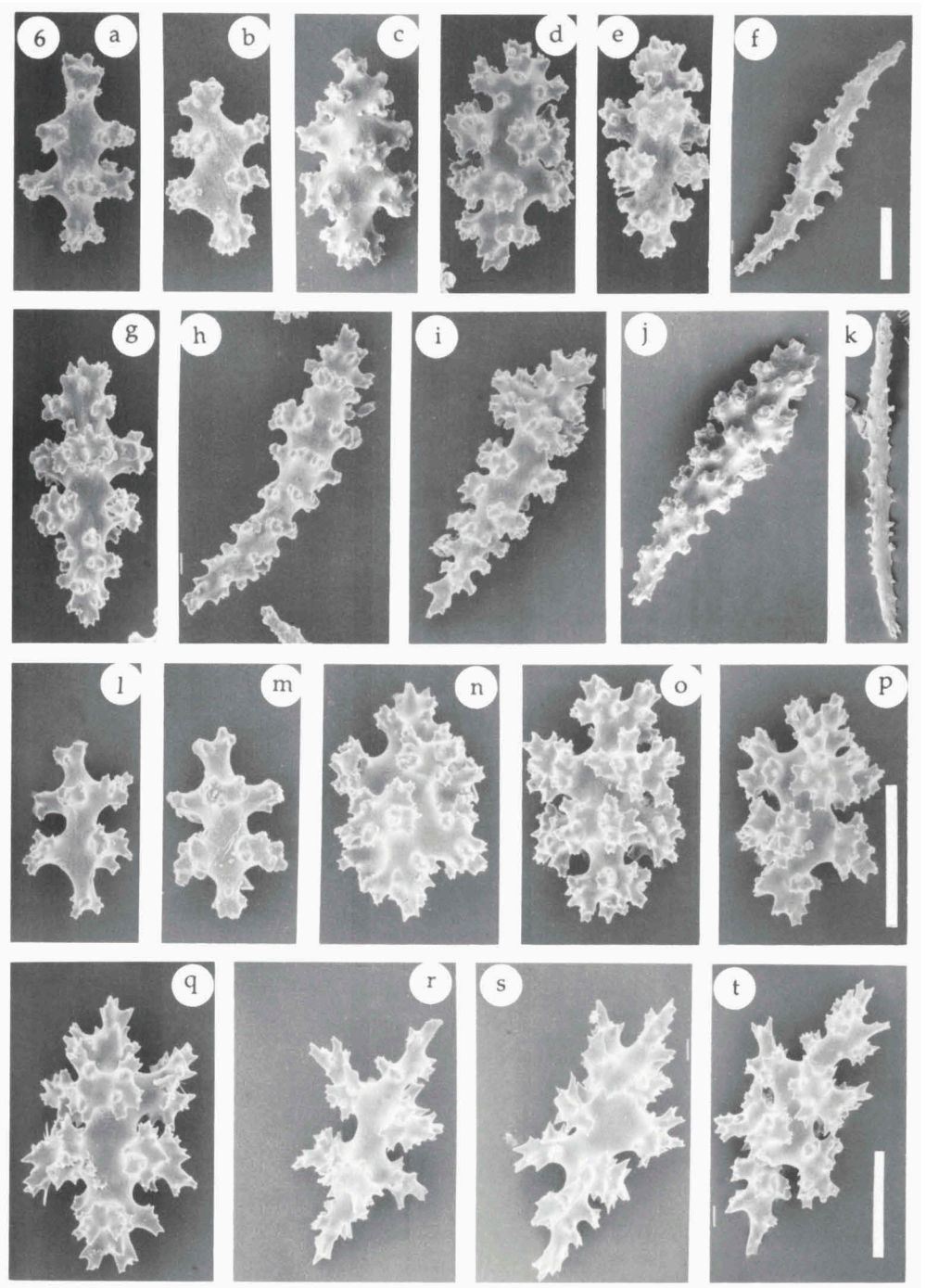

Fig. 6. *Alcyonium compactofestucum* spec. nov., holotype (USNM 85660); a-e, g-j, sclerites of surface layer polyparium; f, spindle of interior polyparium; k, anthocodial spindle; l-q, sclerites of surface stalk; r-t, sclerites of interior stalk. Scales 0.05 mm. Scale at 6f also applies to 6k; scale at 6t to 6h-j and 6r-t; scale at 6p to all others.

at 6p to all others.

covered with high spiny warts. The interior of the polyparium has slender rods, up to 0.37 mm long, with low thorns (figs. 5i-j, 6f). Between the sclerites of the surface layer and the interior more or less clavate sclerites occur (figs. 5f-h, 6h-j).

The surface layer of the stalk contains slightly larger capstans, about 0.08 mm long (figs. 5k-o, 6l-q). The interior has pointed spindles with two girdles of long spiny processes, directed at an oblique angle "upwards" and "downwards" (figs. 5p-s, 6r-t). These sclerites are 0.15-0.17 mm long.

Colour.— The stalk is pinkish, the polyparium red, and the polyps yellowish.

Discussion.— The sclerites show a marked resemblance with those of *Alcyonium variabile* (Thomson, 1921). For a description of that species we refer to Williams (1986b). *A. compactofestucum* differs in being digitiform and having no calyces. Furthermore in the interior of the stalk the spindles are much shorter and of a different shape (figs. 5p-s, 6r-t).

Etymology.— The specific name *compactofestucum* is a combination of the Latin *compactus* (= thick) and *festuca* (= stalk), which alludes to the firmness of the colony.

Alcyonium gruveli Tixier-Durivault, 1955
(figs. 7-9)

Alcyonium gruveli Tixier-Durivault, 1955: 212-215, figs. 10-12.

Material.— Off SW of Nouakchott, Mauritania, sandy bottom, collected by Gruvel, 1905, the holotype (MNHN OCT.A.1992.01) (redescribed below); ORSTOM sta. 4, Dakar, Senegal, 14°31.5'N 17°10.3'W, 13-14 m, 5.v.1983, collected by B. Seret, 3 specimens; (MNHN OCT.A.1992.04, 2 specimens; RMNH 17720, 1 specimen).

Description.— The holotype is 35 mm high and 35 mm wide (fig. 7). The branches of the colony end in small, spherical lobules, which are 7-10 mm in diameter. The polyps on the lobules and the stem are regularly distributed, the distance between them being 0.90-1.25 mm. They are partly or completely retracted. The tentacles bear two rows of 10-12 pinnules.

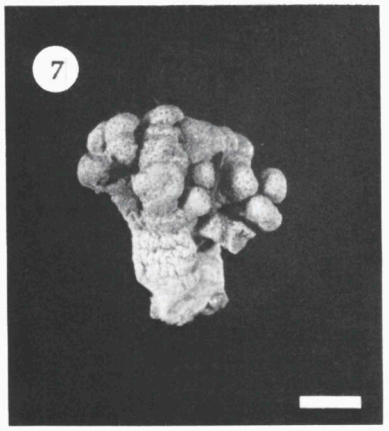

Fig. 7. *Alcyonium gruveli* Tixier-Durivault, 1955, holotype (MNHN OCT.A.1992.01). Scale 1 cm.

The anthocodial armature consists of a few longitudinally placed spindles up to 0.25 mm long.

The lobules contain thorny and warty spindles up to 0.90 mm long (figs. 8c-f, 9c-e). In the surface layer they are sometimes slightly club-shaped (figs. 8a-b, 9a-b).

In the surface layer of the stalk the sclerites are more or less oval-shaped, 0.12-0.35 mm long (figs. 8g-i, 9f-k). The interior contains oval-shaped sclerites up to 0.35 mm long, and spindles up to 0.70 mm long (figs. 8j-m, 9m-r). Especially the sclerites in the stalk are densely warted.

Colour.— Cream.

Variability.— One specimen from Dakar is also creamy. Another has a yellowish stalk and

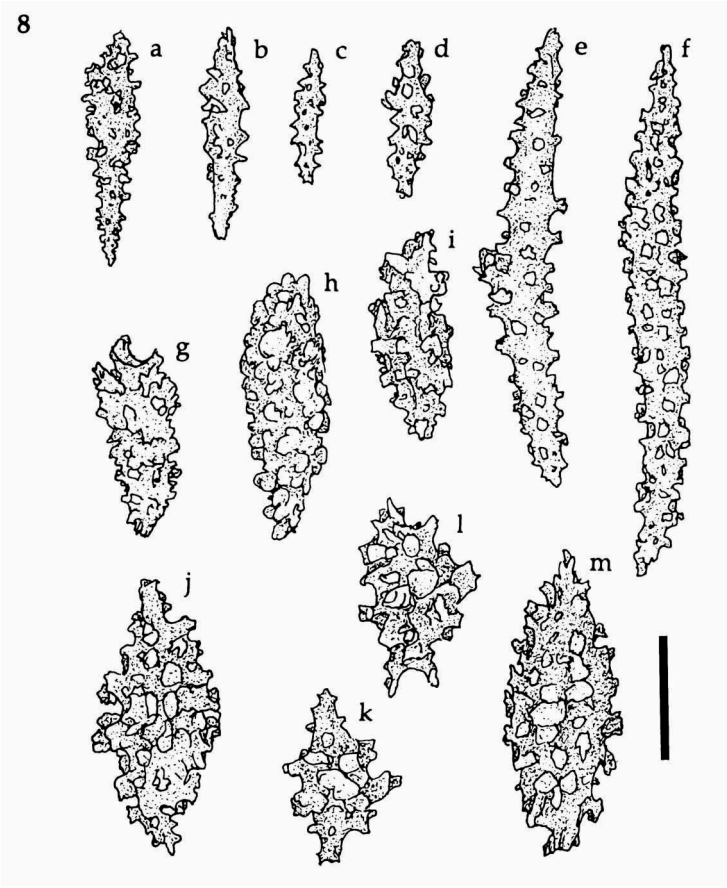

Fig. 8. *Alcyonium gruveli* Tixier-Durivault, 1955, holotype (MNHN OCT.A.1992.01); a-d, sclerites of surface layer polyparium; e-f, sclerites of interior polyparium; g-i, sclerites of surface layer stalk; j-m, sclerites of interior stalk. Scale 0.20 mm

branches, but the upper side of each lobule is purple. The third specimen from Dakar is completely purple.

Distribution.— Continental shelf of West Africa: Nouakchott, Dakar.

Alcyonium monodi Tixier-Durivault, 1955
(figs. 10-12)

Alcyonium monodi Tixier-Durivault, 1955: 225-230, figs. 22-24.

Material.— Joal, Senegal, 10-11 m, 20.ii.1953, collector Forest, 1 small, dried colony, paratype (MNHN OCT.S.1992.03); Missirah (north side of estuarium of river Gambia), R/V Cauri, sta. 4, 4-10 m, 7.v.1983, collector B. Seret, 3 colonies (SMF 6142, 2 colonies; MNHN OCT.S.1992.05, 1 colony); Ghadior (in the neighbourhood of Dakar, Senegal), R/V Cauri, sta. 5, 6-8 m, 7.v.1983, collector B. Seret, 3 colonies, (MNHN OCT.S.1992.06, 2 colonies; RMNH 17719, 1 colony) (the largest colony from Paris described below); "TYRO" Mauritania-II expedition, sta. MAU.004, Mauritania, Passe du Levrier, E of

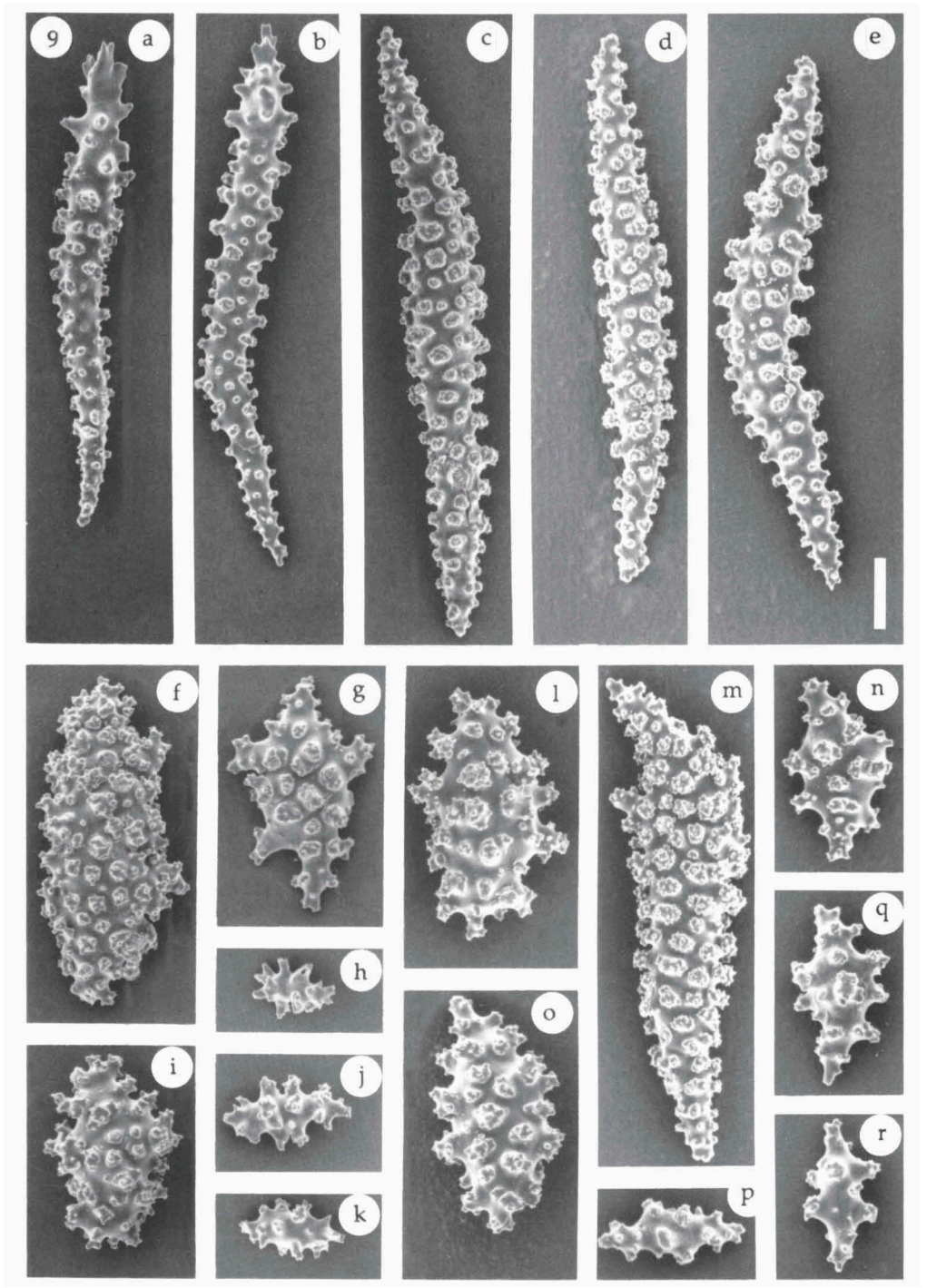

Fig. 9. *Alcyonium gruveli* Tixier-Durivault, 1955, holotype (MNHN OCT.A.1992.01); a-c, sclerites of surface layer polyparium; d-e, sclerites of interior polyparium; f-k, sclerites of surface layer stalk; l-r, sclerites of interior stalk. Scale 0.10 mm.

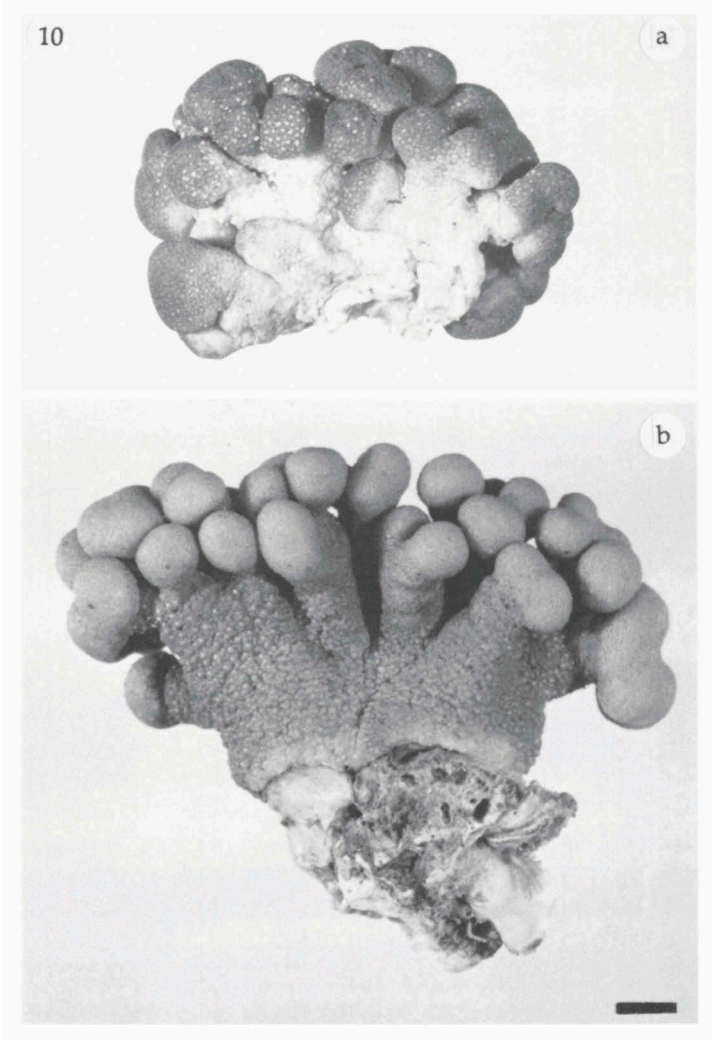

Fig. 10. *Alcyonium monodi* Tixier-Durivault, 1955; a, specimen from Ghadior (RMNH Coel. no. 17719); b, specimen from Ghadior (MNHN OCT.S.1992.06). Scale 1 cm.

Cap Blanc, 20°47'N 17°02'W, 15 m, line fishing, 6.vi.1988, 6 colonies, (RMNH 18976); "TYRO" Mauritania-II expedition, sta. MAU.007, Mauritania, E coast of Cap Blanc, 20°47'N 17°03'W, littoral zone, handcollecting, snorkling, 7.vi.1988, 1 colony (RMNH 18977); "TYRO" Mauritania-II expedition, sta. MAU.063, Mauritania, off Banc d'Arguin, 20°00'N 17°09'W, depth 20 m, hard bottom with some muddy sand, gorgonians, van Veen grab (4x), 13.vi.1988, 6 colonies (RMNH 18978)

Description.— The largest colony from Ghadior is attached to a lump of fused shells (fig. 10b). It is flattened laterally. The colony is 55 mm high and the maximum diameter of the capitulum is 100 mm. The spherical or oval lobes are usually not wider than 15 mm, although a maximum diameter of 23 mm has been observed. The stem is rough owing to numerous tiny elevations. The slightly larger ones are calyces that contain the retracted polyps, which can be seen as white spots. The distance

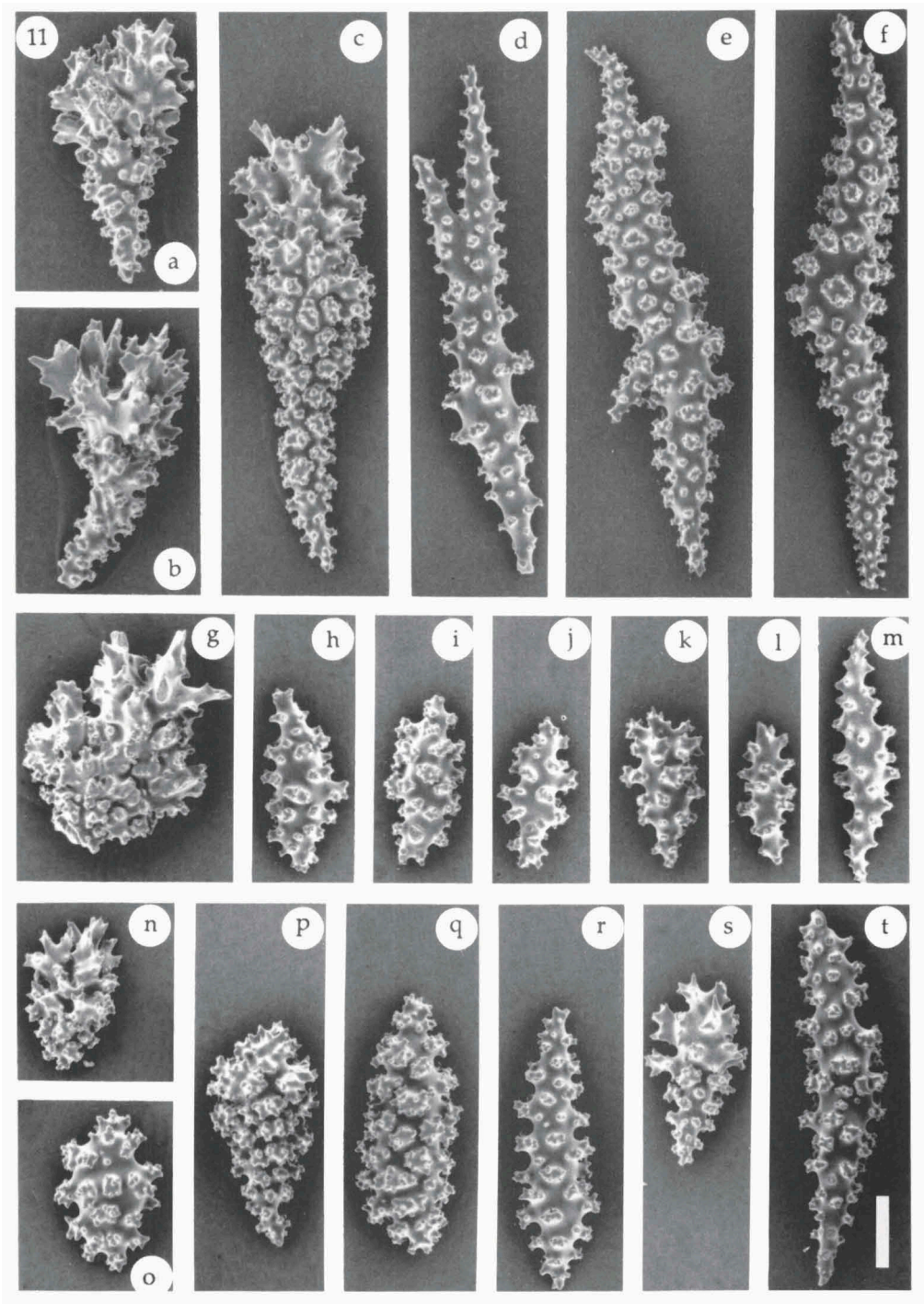

Fig. 11. *Alcyonium monodi* Tixier-Durivault, 1955, specimen from Ghadior (MNHN OCT.S.1992.06); a-m, sclerites of surface layer polyparium; n-t, sclerites of interior polyparium. Scale 0.10 mm.

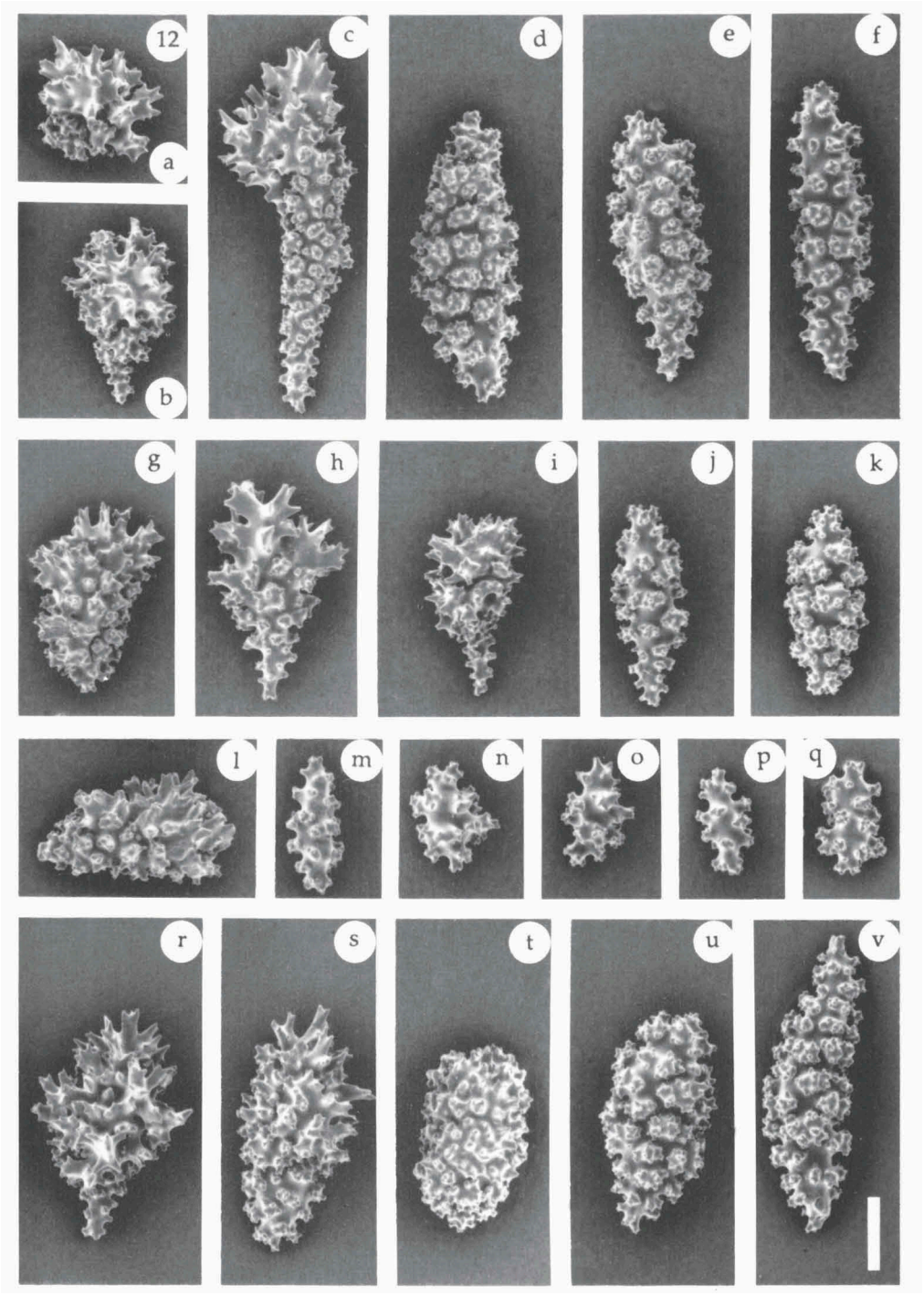

Fig. 12. *Alcyonium monodi* Tixier-Durivault, 1955, specimen from Ghadior (MNHN OCT.S.1992.06); a-k, sclerites of surface layer stalk; l-v, sclerites of interior stalk. Scale 0.10 mm.

between the polyps is 1.4 mm. The surface of the lobes is smooth.

The points of the anthocodiae have three pairs of 0.10-0.40 mm long spiny spindles. They usually show an arrangement in chevrons.

The surface layer and interior of the stem and lobes contain spindles up to 0.90 mm long that are ornamented with many high warts (figs. 11d-f, m, r, t). The smaller ones are oval-shaped (figs. 11h-j, o, q). Furthermore, thorn clubs up to 0.50 mm long are present (figs. 11a-c, g, k-l, n, p, s).

The surface layer and interior of the stalk contain small spheroids, 0.15-0.20 mm long (figs. 12m-q), and ovals and spindles up to 0.50 mm long (figs. 12d-f, j-k, t-v). Many of the ovals of the surface layer and some in the interior have spines on one side (figs. 12a, g, l). Furthermore, thorn-clubs up to 0.50 mm long are present (figs. 12b-c, h-i, r-s).

Colour.— The lobes are yellow; the stem and stalk are purple.

Variability.— The dry paratype consists of a short stem, crowned with three round lobes, the largest of which has a maximum diameter of 12 mm. It has light purple lobes and a white stem and stalk. Other examined colonies are completely purple, yellowish-brown or white. Furthermore, colonies with orange lobes and purple stem and stalk or with purple lobes and yellow stem and stalk are present.

Discussion.— The presence of a stem and the clubs with spiny heads are typical of *A. monodi*.

Dr Verseveldt did not mention in his manuscript from which specimen the SEM-photographs of the sclerites were made. As he based his description on the largest specimen from Ghadior, the SEM-photographs made by Dr F.M. Bayer (NMNH), were probably also from this specimen. Thanks to notes provided by Dr Bayer with the SEM-photographs it was possible to get certainty about this matter. Dr Bayer mentioned that the sclerites of the surface of the lobes are mostly yellow, whereas some are pink or yellow tinged with pink; the sclerites of the interior of the lobes are mostly pink, whereas some are white; the sclerites of the stalk are white, pink or partly pink. Such a colour variation suggests that the specimen had yellow lobes and a purple base. As the largest specimen from Ghadior has such a coloration and the micro-slide preparations of that specimen, which are present in the NNM, have the same colour variation as mentioned by Dr Bayer, this must be the specimen concerned.

Distribution.— Senegal, Mauritania.

Alcyonium patagonicum (May, 1899)
(figs. 13-15)

Metalcyonium patagonicum May, 1899: 8, fig. 3.
Alcyonium (Metalcyonium) patagonicum; Kükenthal, 1906: 47.
Alcyonium patagonicum; Verseveldt, 1967: 11, figs. 5, 6A-B.
Bellonella patagonoca; Tixier-Durivault, 1970: 148 (misspelling).
Not *Metalcyonium patagonicum*; Thomson, 1911: 562, pl. 1 fig. 8, pl. 2 fig. 12, pl. 3 figs. 22-29, pl. 4 figs. 30-32; 1921: 165. [= *Alcyonium variabile* (Thomson, 1921)].

Material.— Patagonian shelf, 44°14'S 61°23'W, 60 fms (110 m), leg. Kophamel, 1888, 3 colonies ("Typus") (ZMH C2454).

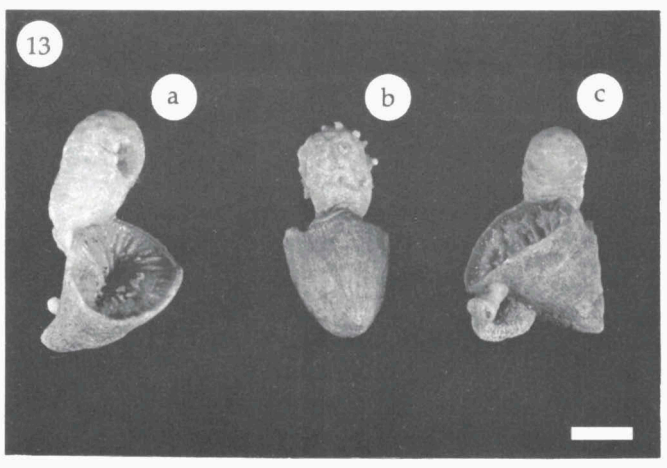

Fig. 13. *Alcyonium patagonicum* (May, 1899); a, lectotype (ZMH C2454); b-c, paralectotypes. Scale 1 cm.

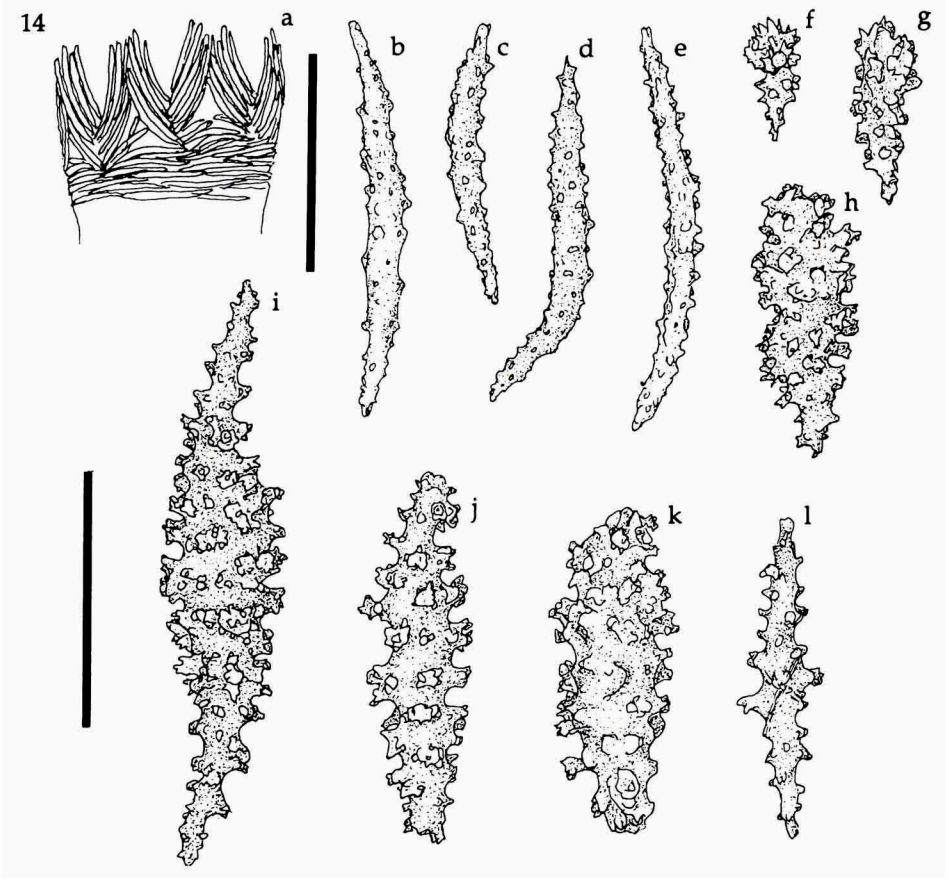

Fig. 14. *Alcyonium patagonicum* (May, 1899), lectotype (ZMH C2454); a, polyp; b-d, sclerites of points; e, sclerite of crown; f-h, sclerites of surface layer polyparium; i-l, sclerites of interior polyparium. Scale at 14a 1 mm, applies to 14a; 0.20 mm scale at 14i to all others.

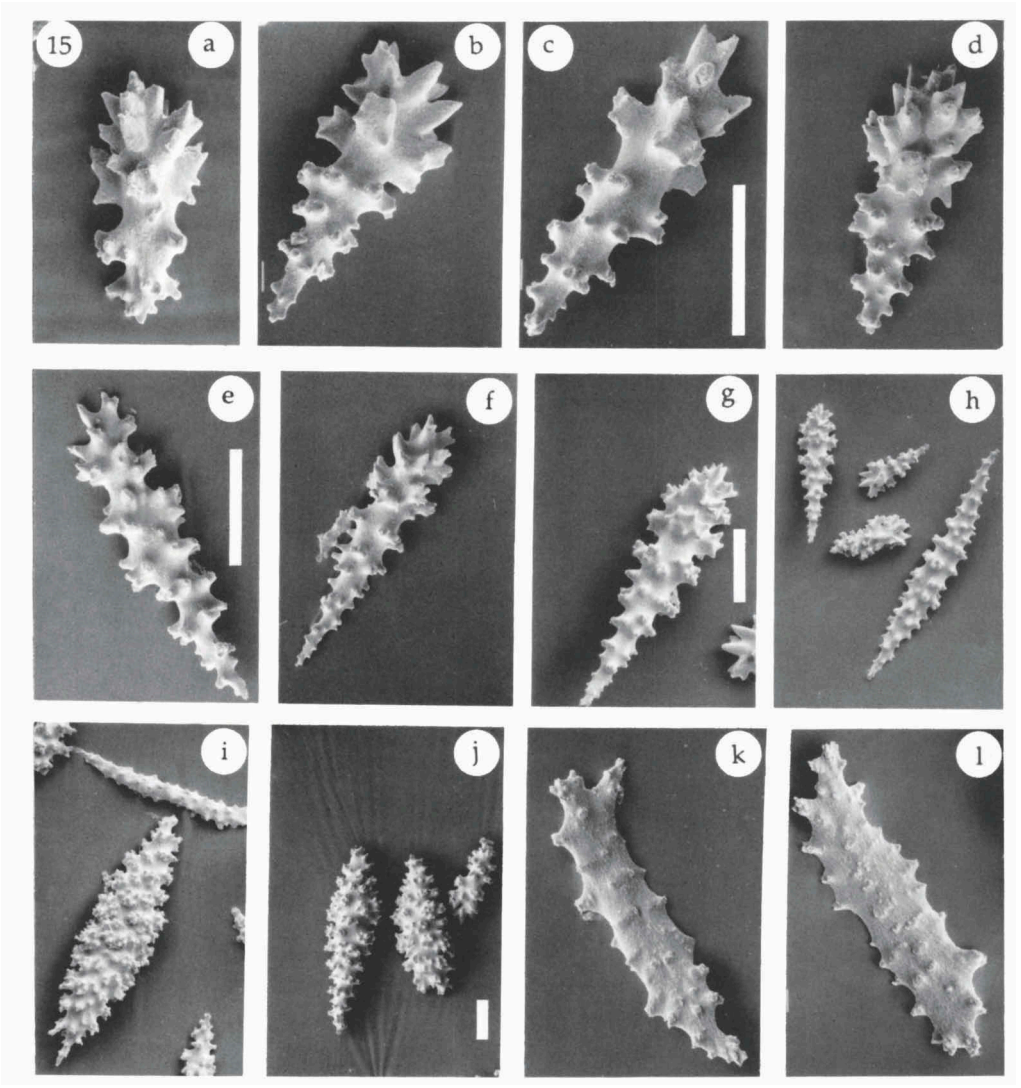

Fig. 15. *Alcyonium patagonicum* (May, 1899), lectotype (ZMH C2454); a-g, sclerites of surface layer polyparium; h-j, clubs of surface layer and spindles of interior polyparium; k-l, tentacular sclerites. Scales 0.05 mm. Scale at 15c applies to 15a-c; scale at 15e to 15d-e and 15k-l; scale at 15g to 15f-g; scale at 15j to 15h-j.

Description.— The specimens described by May (1899: 8) were reexamined. We designate the largest colony as the lectotype. All three colonies are attached to skeletons of the coral *Flabellum thouarsi*.

The lectotype is attached obliquely to the side of the coral (fig. 13a). It is 25 mm long and 12 mm wide. The glabrous basal part is only a few mm high. The polyparium is finger-shaped. The polyps are completely retracted within the coenenchyme, leaving no trace of a calyx. The distance between the polyps is 1.6 to 2.2 mm.

The anthocodial armature consists of a crown and eight points (fig. 14a). The crown has four to six rows of sclerites, the points four to six pairs of chevroned scle-

rites. These sclerites are spiny rods up to 0.42 mm long (figs. 14b-e). The tentacles contain spiny rods up to 0.20 mm long (figs. 15k-l)

The surface layer of the polyparium contains thorn clubs and oval sclerites, 0.09-0.27 mm long (figs. 14f-h, 15a-g). The interior of the polyparium slender spindles (figs. 14l, 15h) with high, often irregularly shaped spines, wider spindles (figs. 14i-j, 15i) with more and coarser warts, and oblong sclerites (figs. 14k, 15j). Most sclerites are up to 0.40 mm long, but a few are larger, up to 0.52 mm long.

Colour.— The colonies are white.

Distribution.— Patagonian Shelf.

Alcyonium rudyi spec. nov.
(figs. 16-18)

Material.— Cape Arago, Middle Cove, Oregon, USA, under intertidal ledge, April 1982, collector J. Goddard, holotype (USNM 79391) and 3 paratypes (USNM 91932).

Description.— The holotype is a small disc shaped colony. The maximum diameter is 15 mm (fig. 16c). In the centre the disc is 3.5 mm thick; the thin margin is curved downwards.

The polyps are evenly distributed over the upper side of the disc; the mutual distance between their centers is 1.5 mm. They are entirely withdrawn into the coenenchyme or they may be extending more than 1 mm. The tentacles are up to 0.8 mm long (fig. 17i). Along each side there are 12 to 14 rounded or cylindrical pinnules. The polyps are entirely destitute of sclerites.

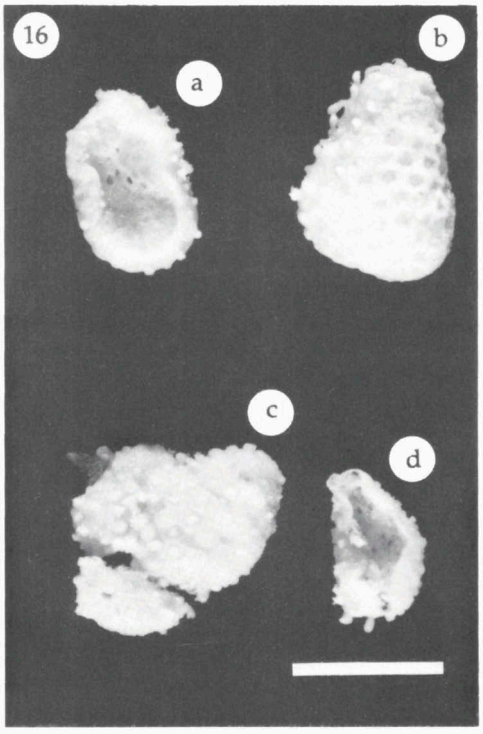

Fig. 16. *Alcyonium rudyi* spec. nov.; c, holotype (USNM 79391); a-b, d paratypes (USNM 91932); a,d photographed upside down. Scale 1 cm.

The oval gastral cavities reach down to the underside of the colony (fig. 17h). Between them there are thin septa. The coenenchyme is closely packed with sclerites: irregularly shaped bodies with proportionally long prominences, which often have rounded or split ends (figs. 17a-f, 18a-h). Their maximum diameter is 0.10-0.22 mm.

Colour.— The colony is white; extended polyps are translucent.

Discussion.— The first author received the specimens from Dr F.M. Bayer (NMNH), who in turn received them from Dr J.H.R. Goddard, (Oregon Institute of Marine Biology, University of Oregon, Charleston). Dr Verseveldt based his description and drawings of the scle-

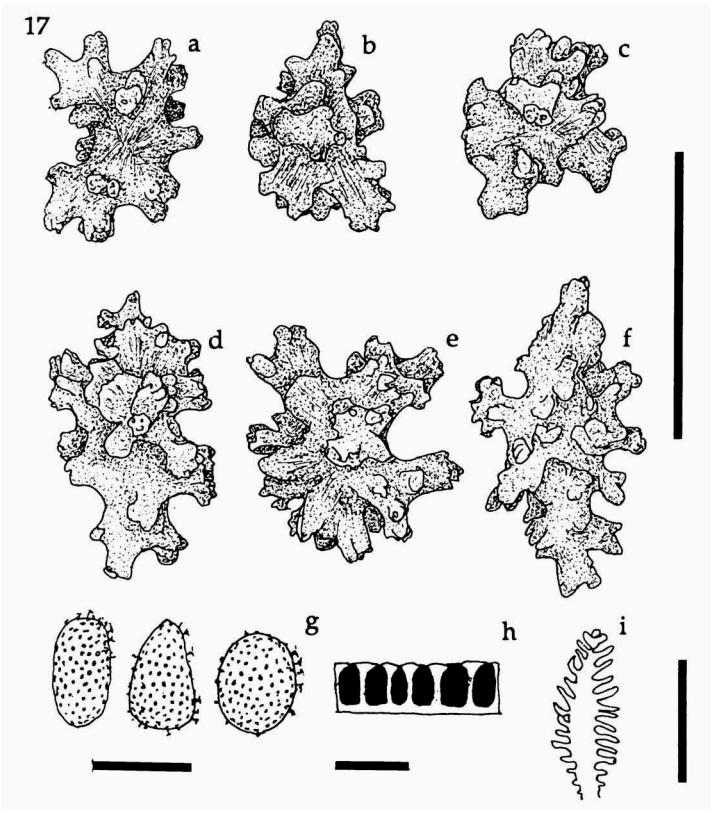

Fig. 17. *Alcyonium rudyi* spec. nov.; a-f, coenenchymal sclerites; g, colonies, h, section through colony; i, tentacle. Scale at 17f 0.20 mm, applies to 17a-f; 15 mm scale at 17g to 17g; 5 mm scale at 17h to 17h; 0.5 mm scale at 17i to 17i.

rites on these specimens. The second author was not able to trace these specimens in the NNM and therefore based the description on the material present in the NMNH (USNM 79391). The drawings of Dr Verseveldt are given for comparison.

As the characters of the species, except with regard to its sclerites, resemble most those of the genus *Alcyonium*, it seems justified to incorporate it in this genus. The most recent diagnosis of the genus (Williams, 1986a: 61) is: "Colony upright, with a definite basal portion or stalk, and with a lobed to digitate, or capitate to spherical, or dish to disk-shaped polyparium; or colony prostrate, without a definite stalk, with a membraneous to encrusting or globular polyparium. Polyps monomorphic. Sclerites spindles, rods, clubs or capstans". In order to incorporate *A. rudyi*, we change the last line of Williams' diagnosis in "Sclerites spindles, rods, clubs, capstans or irregular-shaped bodies".

Biological notes.— With the kind permission of Dr Goddard we mention some interesting features concerning the present coral, which we cite from a few of his letters to Dr F.M. Bayer.

1) The octocoral is abundant in the low-intertidal zone of wave-exposed shores at Cape Arago. Colonies usually occur in crevices and underneath ledges or relatively stable boulders. It also occurs abundantly in the sublitoral down to over 10 m depth.

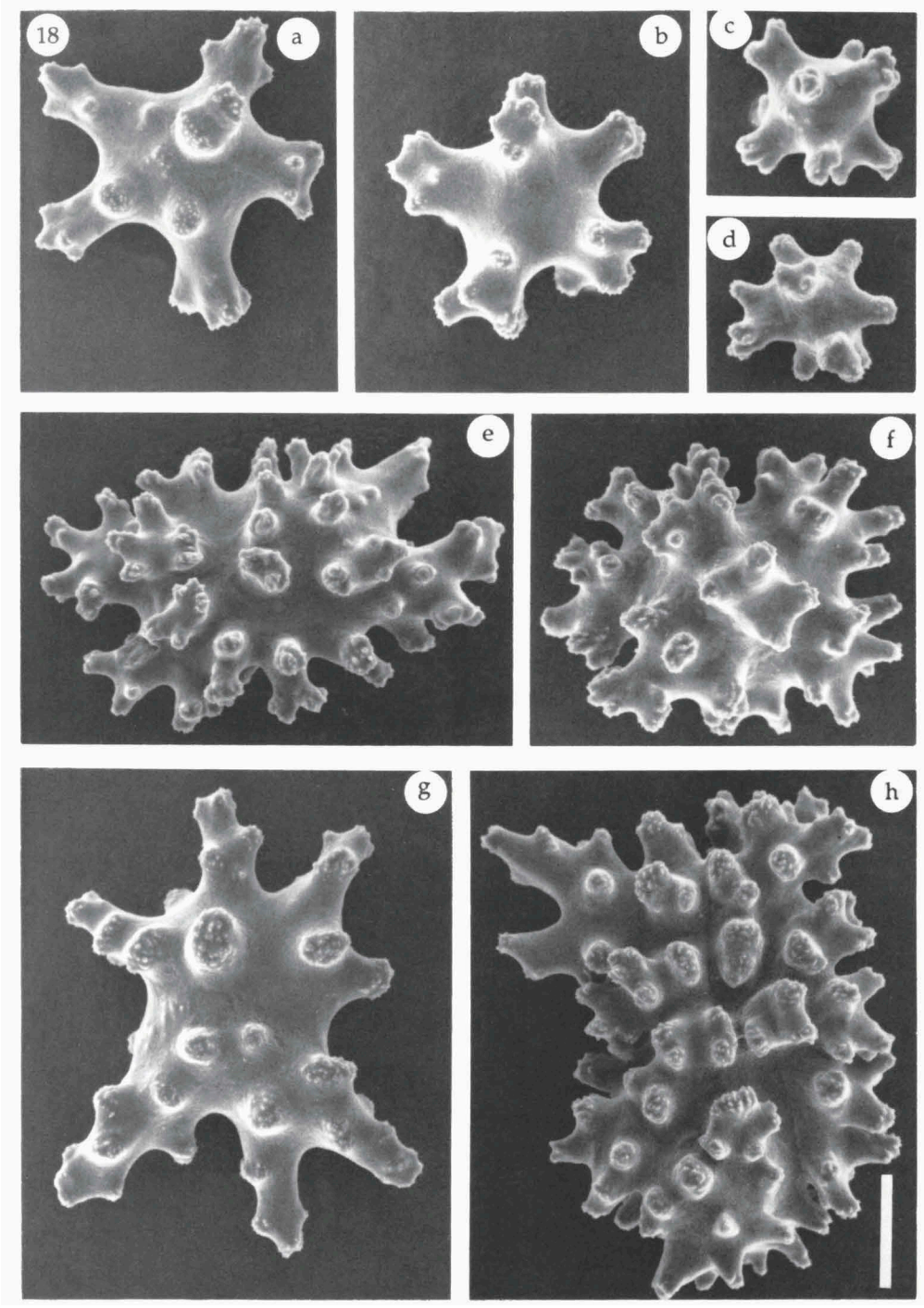

Fig. 18. *Alcyonium rudyi* spec. nov., holotype (USNM 79391); a-h, coenenchymal sclerites. Scale 0.05 mm.

Specimens were also found at Cape Blanco, Oregon, but none were found at Cape Mendocina, northern California.

2) The octocoral is often found in association with sponges, tunicates, bryozoans, and hydrozoans. The octocoral colonies were occasionally overgrown by the tunicate *Metandrocarpa taylori*, and the sponge *Halisarca* spec. Clumps of the octocoral also occur under ledges on surfaces covered with encrusting coralline algae and on surfaces quite barren of any sessile organisms.

3) The nudibranch *Tritonia festiva* is thus far the only known predator of the octocoral. The feeding process is quite remarkable. Upon contacting an expanded colony with the very sensitive, slender processes on its frontal veil, the slug immediately stops crawling and raises the anterior half of its body off the substrate, reaches over the edge of the colony without contacting it, and then quickly comes down on the polyps while extending its buccal mass and jaws. A few polyps are bitten off, and the rest of the colony contracts. Extension of the buccal mass and the actual biting occur very rapidly. *Tritonia festiva* will not attack contracted colonies (probably because it cannot penetrate the tough and densely spiculate coenenchyme), and in all of the instances observed, contact of a colony by *Tritonia*'s frontal veil never resulted in polyp contraction.

Etymology.— At the suggestion of Dr Goddard the species is named after Dr Paul Rudy, director of the Oregon Institute of Marine Biology.

Geographical distribution.— Coast of Oregon, U.S.A.

Alcyonium senegalense spec. nov.
(figs. 19-21)

Material.— IFAN, Senegal, 25 m, 20.iii.1958, the holotype (SMF 5992); IFAN, Senegal, Invertébrés Marins G76-11, Gerard Treca 4, 25 m, 20.viii.1958, 2 paratypes (MNHN OCT.A.1992.07).

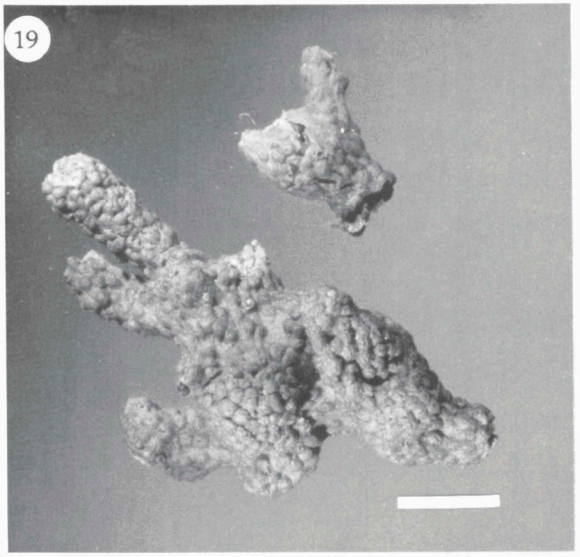

Fig. 19. *Alcyonium senegalense* spec. nov., holotype with broken off fragment (SMF 5992). Scale 1 cm.

Description.— The membraneous colony is encrusting over the hard, branched axis of a gorgonian (fig. 19). It is 50 mm long and 20 mm wide. The polyps are all retracted in the dome-shaped calyces. The diameter of the calyces is 1.4 mm, the height 0.15 mm.

The anthocodiae are oval, 1.00 x 1.25 mm in cross-section (fig. 21a).

The tentacles contain thorny rods, about 0.06 mm long (figs. 20a, 21b-g). The points have thorny spindles up to 0.18 mm long (figs. 20b, 21h-i); sometimes the spindles are arranged in chevrons.

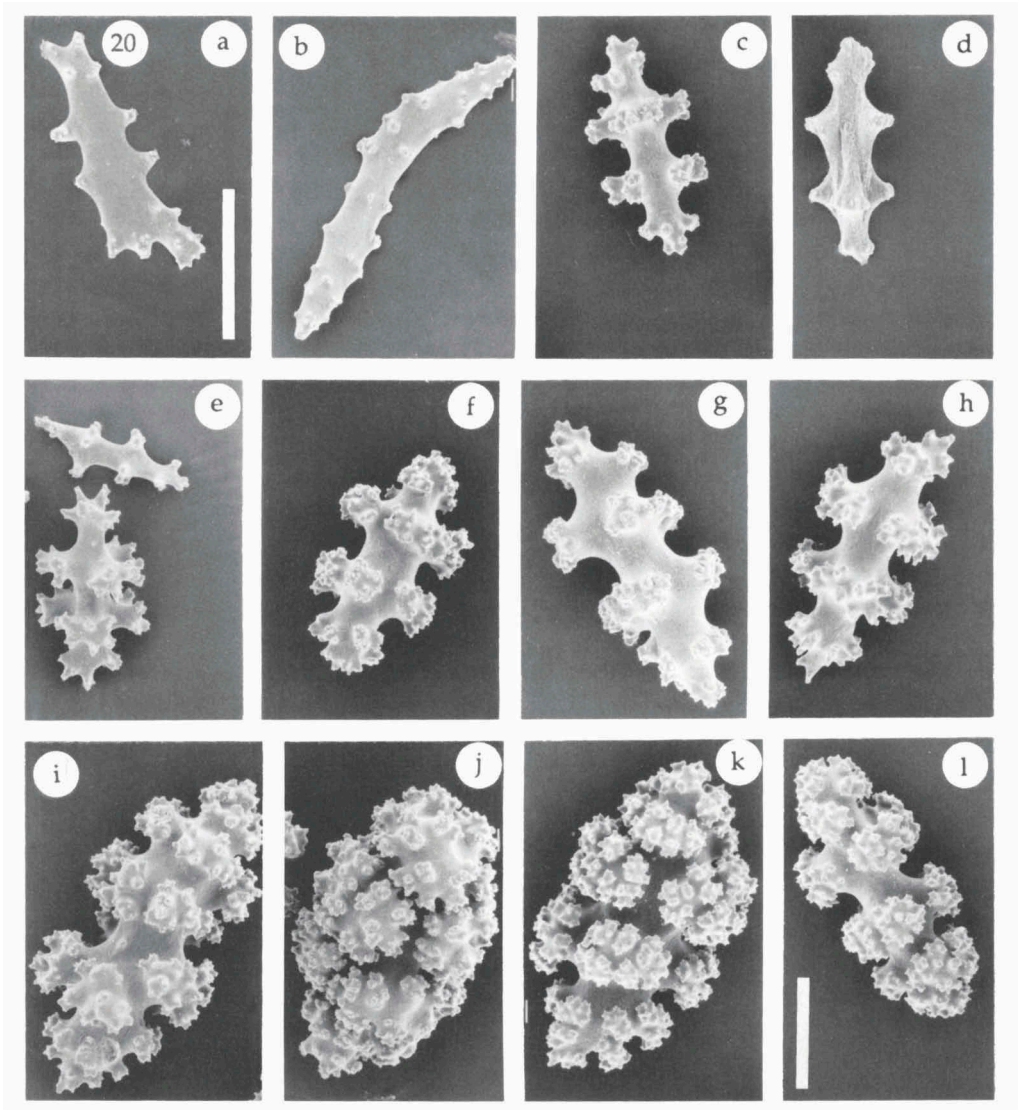

Fig. 20. *Alcyonium senegalense* spec. nov., holotype (SMF 5992); a, tentacular rod; b, sclerite of points; c-l, coenenchymal sclerites. Scales 0.05 mm. Scale at 20a applies to 20a; scale at 20l to all others.

The coenenchyme contains capstans (figs. 20c-d, 21o), small spindles (figs. 21j-n) and ovals (figs. 20j-l). The length of the sclerites is 0.09-0.20 mm.

Colour.— The colony is dark purple. The polyps are white.

Discussion.— The species is characterized by its encrusting growth form and the small spindles and ovals with rather dense tubercular ornamentation.

Distribution.— Senegal.

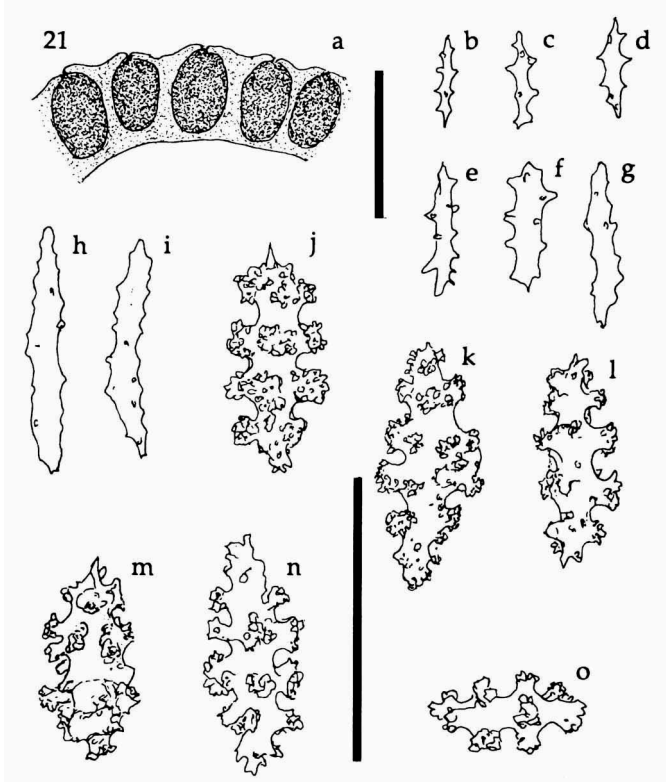

Fig. 21. *Alcyonium senegalense* spec. nov., paratype (MNHN OCT.A.1992.07); a, cross-section through colony; b-g, tentacular rods; h-i, sclerites of points; j-o, coenenchymal sclerites. Scale at 21a 3 mm, applies to 21a; 0.20 mm scale at 21n to 21b-o.

Fig. 22. *Alcyonium sollasi* Wright & Studer, 1889, lectotype (BMNH 89.5.24.124). Scale 1 cm.

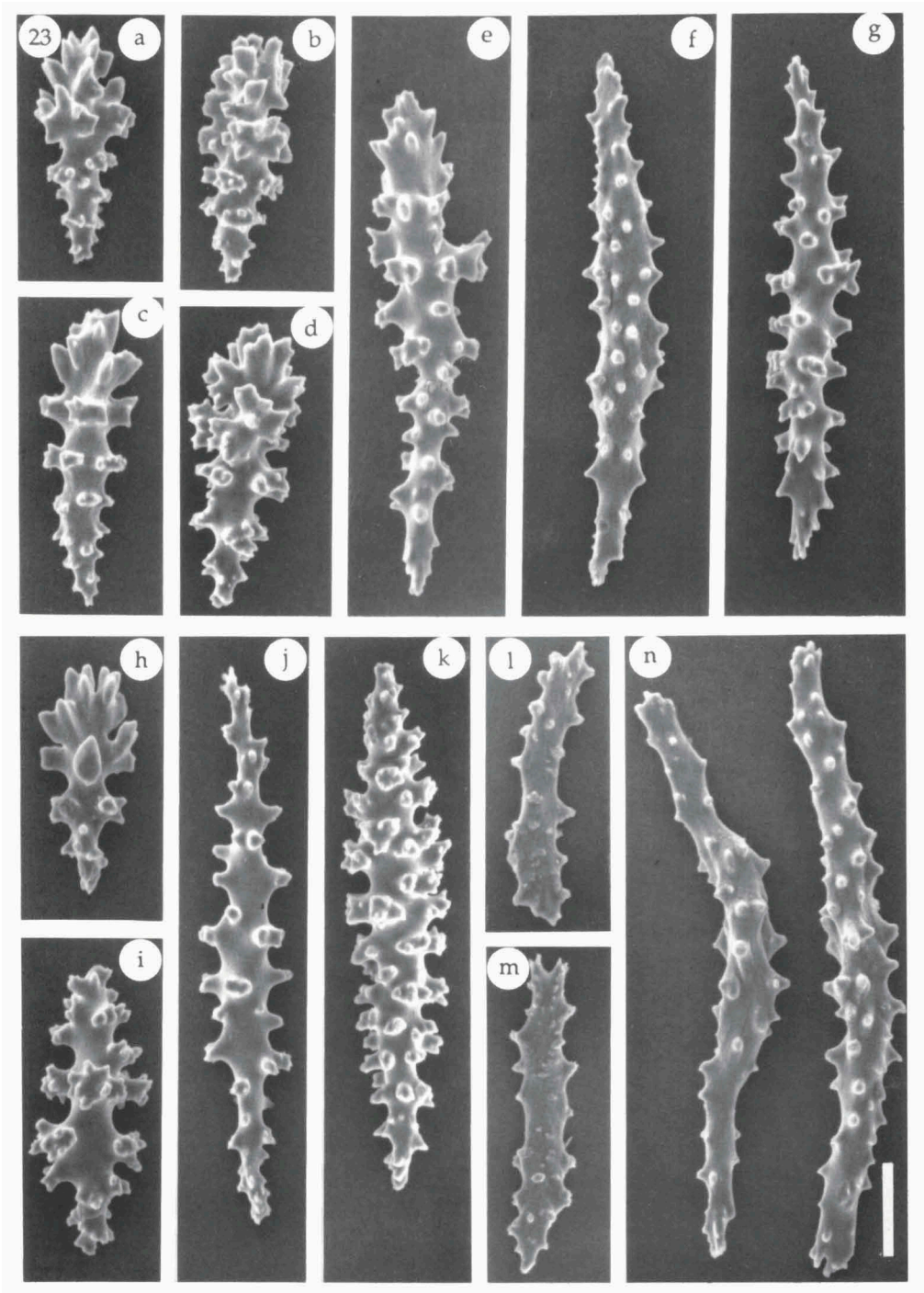

Fig. 23. *Alcyonium sollasi* Wright & Studer, 1889, lectotype (BMNH 89.5.24.124); a-g, sclerites of surface layer polyparium; h-k, sclerites of interior polyparium; l-n, anthocodial sclerites. Scale 0.05 mm.

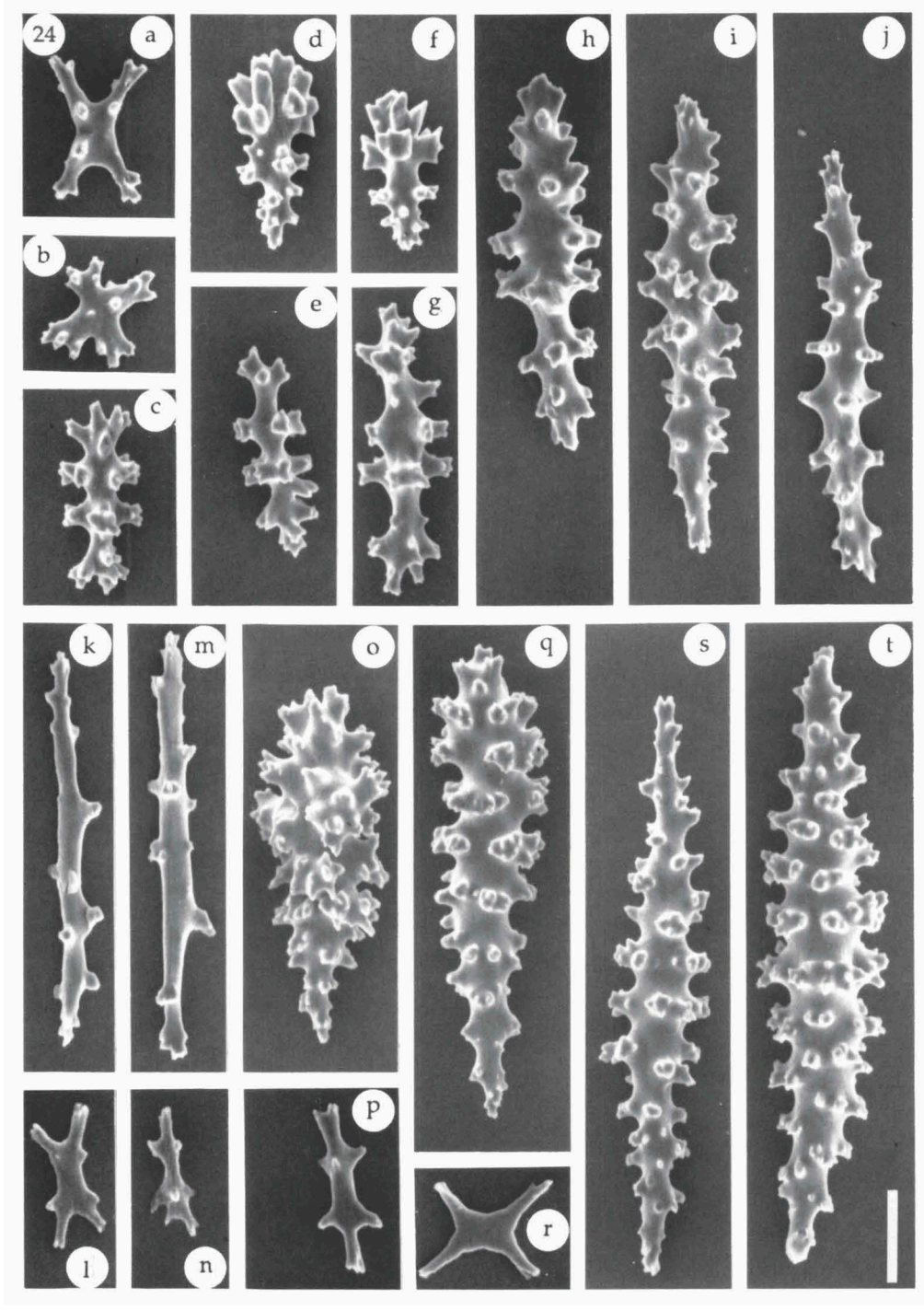

Fig. 24. *Alcyonium sollasi* Wright & Studer, 1889, lectotype (BMNH 89.5.24.124); a-j, sclerites of surface base; k-t, sclerites of interior base. Scale 0.05 mm.

Alcyonium sollasi Wright & Studer, 1889
(figs. 22-24)

Alcyonium sollasi Wright & Studer, 1889: 240, pl. 42 fig. 4; May, 1899: 6; 1900: 402; Lüttschwager, 1926: 285; Thomson, 1921: 157; Macfadyen, 1936: 32.

Material.— Challenger expedition, sta. 313, entrance to the Straits of Magellan, 55 fms (100 m), 1 colony, the lectotype (BMNH 89.5.24.124).

Description.— In the BMNH there are several large syntypes; one of these we designate as the lectotype (fig. 22). It is 40 mm high and the maximum cross-section is 90 x 60 mm. It consists of a glabrous basal attachment, from which a number of lobes arise. Seen from above, the latter are more or less oval in shape. Most polyps are retracted.

The crown and points of the polyps have spindles up to 0.35 mm long (fig. 23n), the tentacles contain rods up to 0.20 mm long (figs. 23l-m).

In all parts of the colony there are the same two main types of sclerites, thorn clubs and spindles. The thorn clubs are up to 0.20 mm long (figs. 23a-d, h, 24d, f) and the spindles up to 0.35 mm long (figs. 23f-g, j-k, 24i-j, s-t). The latter are ornamented with split processes. Between clubs and spindles there are transitional forms, e.g. spindles with one end slightly thickened (figs. 23e, 24h, o, q). Furthermore, some small rods are present (figs. 23i, 24c, e, g). In the stalk also sparsely ornamented rods and crosses are present (figs. 24a-b, k-n, p, r).

Colour.— Light brown.

Distribution.— Straits of Magellan.

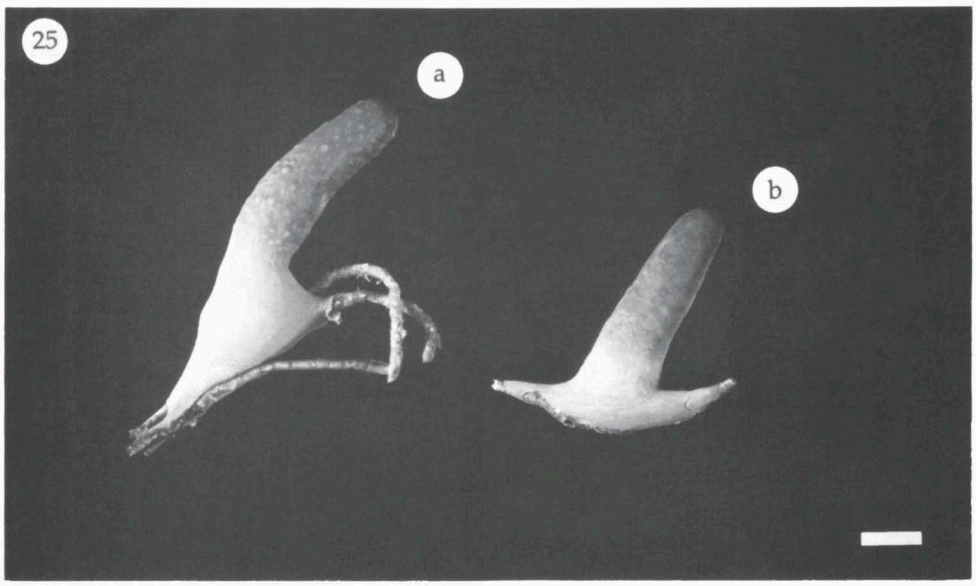

Fig. 25. *Alcyonium spitzbergense* spec. nov. (RSM 1921.145.544); a, holotype; b, paratype. Scale 1 cm.

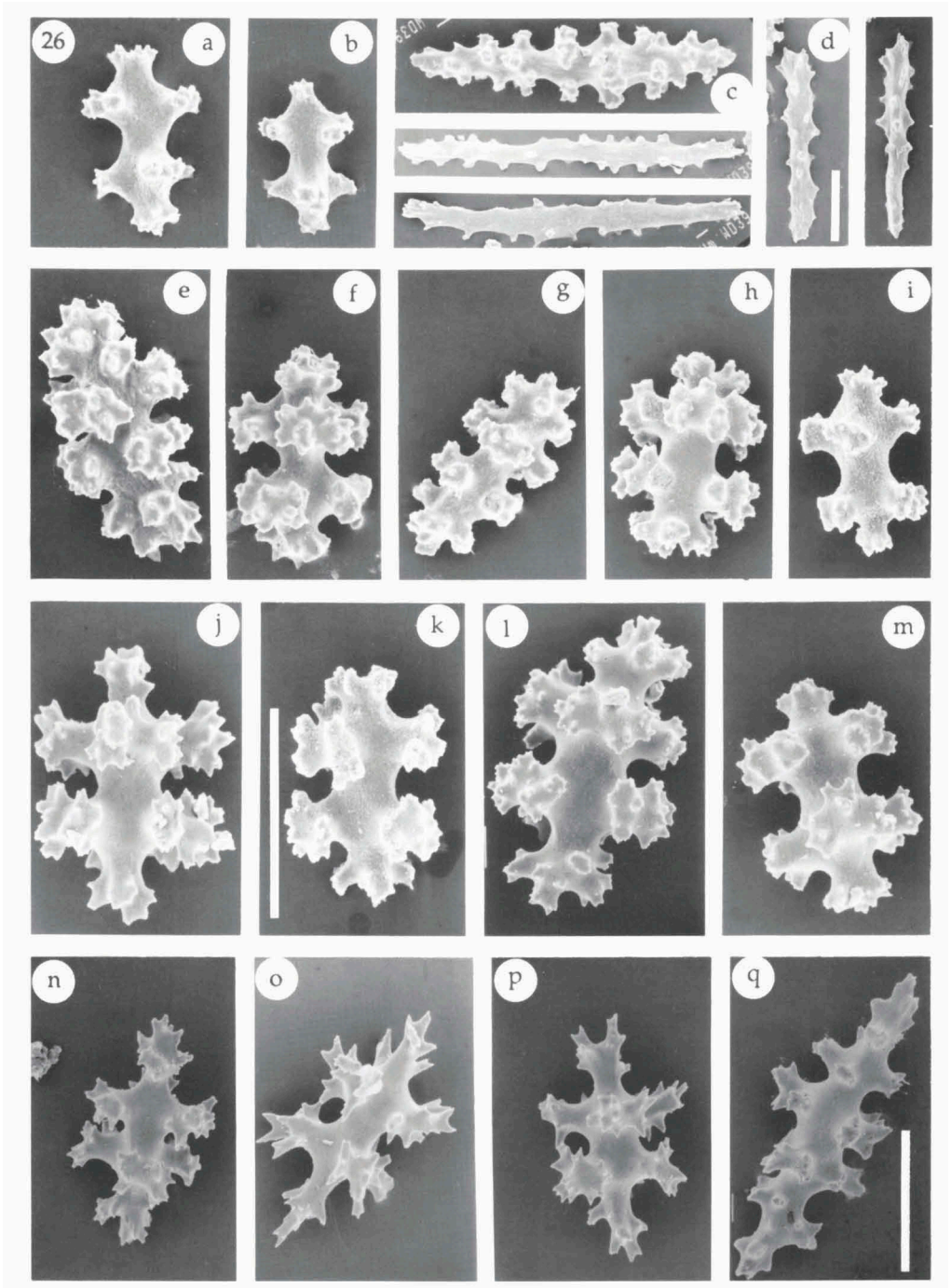

Fig. 26. *Alcyonium spitzbergense* spec. nov., paratype (RSM 1921.145.544); a-c, e-g, sclerites polyparium; d, anthocodial sclerites (4 sclerites); h-q, sclerites stalk. Scales 0.05 mm. Scale at 26k applies to 26a-b, e-m; scale at 26q applies to 26c, n-q; scale at 26d only applies to 26d.

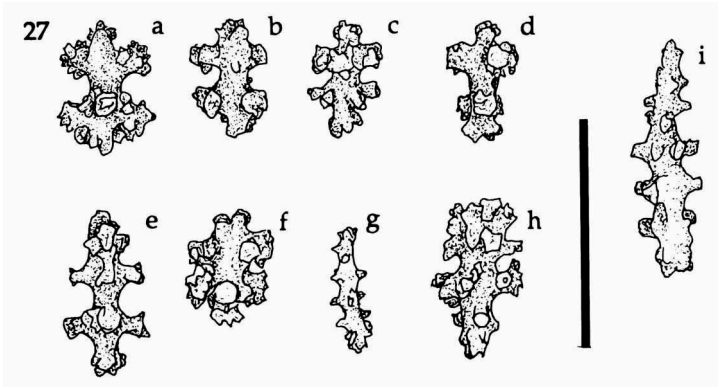

Fig. 27. *Alcyonium spitzbergense* spec. nov., holotype (RSM 1921.145.544); a-i, sclerites of surface polyparium. Scale 0.10 mm

Alcyonium spitzbergense spec. nov.
(figs. 25-27)

Material.— Cape Flora, Spitzbergen, W.S. Bruce collection, holotype (largest specimen) and paratype (RSM 1921.145.544).

Description.— The finger-shaped colony is attached to the axis of a gorgonacean. It is 50 mm long and 10 mm wide. The smooth, light grey base is wrapped around this axis (fig. 25a). Upwards the stalk passes into the red polyparium. Between both parts there is a rather distinct boundary line. The surface of the polyparium is smooth. On the distal part there are some small elevations, but real calyces are absent. The polyps are retracted within the coenenchyme.

The polyps have eight points of 10-12 pairs of spiny rods up to 0.25 mm long (fig. 26d). Crowns are not or weakly developed. The introvert contains tiny rods that are 0.04 mm long.

The polyparium of the colony is filled with capstans and small rods, 0.04-0.08 mm long (figs. 26a-b, e-g, 27a-h). Furthermore, a few spindles are present that are up to 0.25 mm long (figs. 26c, 27i).

In the stalk the same sclerites occur, but somewhat larger, and their ornamentation can be more spiny (figs. 26h-q).

Discussion.— The smaller (40 mm long) paratype agrees in all respects with the holotype.

Distribution.— Spitzbergen.

Acknowledgements

The second author wishes to thank F.M. Bayer (NMNH) for his hospitality during a visit to the NMNH and for providing SEM-negatives of the sclerites of *A. gruveli*, *A. monodi*, *A. rudyi* and *A. sollasi*, M. Grasshoff (SMF) for the loan of the holotype of *A. senegalense*, S. Chambers (RSM) for the paratype of *A. spitzbergense* , and M. d'Hondt (MNHN) for giving the museum numbers of *A. gruveli*, *A. monodi* and *A. senegalense*. I. Henneke (NNM) is thanked for assistance with the photographs, M.

Carpenter (NMNH) for making the photographs of *A. rudyi* and J.C. den Hartog and B.W. Hoeksema (both NNM) for comments on the manuscript.

References

Bayer, F.M., M. Grasshoff & J. Verseveldt (eds.), 1983. Illustrated trilingual glossary of morphological and anatomical terms applied to Octocorallia: 1-75, 20 pls.— Leiden.

Hartog, J.C. den, 1988. Obituary Dr. Jakob Verseveldt in: Verseveldt, J. & F.M. Bayer. Revision of the genera *Bellonella, Eleutherobia, Nidalia,* and *Nidaliopsis* (Octocorallia: Alcyoniidae and Nidaliidae), with descriptions of two new genera.— Zool. Verh. Leiden 245: i-vi, 1-131, figs. 1-64.

Hickson, S.J., 1900. The Alcyonaria and Hydrocorallinae of the Cape of Good hope.— Mar. Invest. S. Africa 1 (5): 67-96, pls. 1-6.

Hickson, S.J., 1902. *Alcyonium paessleri.*— Rep. coll. Nat. Hist. "Southern Cross": 293.

Hickson, S.J., 1907. Coelenterata I. Alcyonaria.— Nat. Antarc. Exped. 1901-1904 Nat. Hist. 3: 1-15, pl. 1.

Kükenthal, W., 1906. Alcyonacea.— Wiss. Ergebn. dt. Tiefsee-Exped. "Valdivia" 13 (1) 1: 1-111, pls. 1-12.

Lüttschwager, J., 1926. Die Gattung *Alcyonium* Linnaeus.— Mitt. zool. Mus. Berl. 12 (2): 279-289.

Macfadyen, L.M.I., 1936. Alcyonaria (Stolonifera, Alcyonacea, Telestacea and Gorgonacea).— Great Barrier Reef Exped. Sci. Rept. 5 (2): 19-72, pls. 1-5.

May, W., 1899. Alcyonarien in: Hamburger Magelhaensische Sammelreise: 1-22.— Hamburg.

May, W., 1900. Die arktische, subarktische und subantarktische Alcyonaceen-fauna.— Fauna arct. 1: 381-408, pls. 1-10.

Molander, A.R., 1929a. Die Octactinarien.— Further zool. Results Swed. Antarct. Exped. 1901-1903 2 (2): 1-86, figs. 1-27, pls. 1-5.

Molander, A.R., 1929b. South and west African Octactiniae in the Gothenburg natural museum.— Göteborgs K. Vetensk.-o. Vitterh. Samh. Handl. B (1) 7: 1-16, figs. 1-3.

Thomson, J.S., 1911. The Alcyonaria of the Cape of Good Hope and Natal. Alcyonacea.— Trans. R. Soc. Edinb. 47 (3): 549-589, pls. 1-4.

Thomson, J.S., 1921. South African Alcyonacea.— Trans. R. Soc. S. Afr. 9 (2): 149-175, pls. 5-6.

Tixier-Durivault, A., 1955. Alcyonaires atlantiques intertropicaux.— Rés. Scient. Expéd. Océanogr. Belg. Eaux Côt. Afr. 3 (4): 197-246, figs. 1-36.

Tixier-Durivault, A., 1970. Octocoralliaires. Campagne de la "Calypso" au large des côtes atlantiques de l'Amérique du Sud (1961-1962).— Annls Inst. océanogr., Monaco 47: 145-169, figs. 1-3.

Verseveldt, J., 1967. The Octocorallia collected by R/V "Vema" in the Atlantic Ocean.— Am. Mus. Novit. no. 2282: 1-19, figs. 1-7.

Williams, G.C., 1986a. A new species of the octocorallian genus *Alcyonium* (Anthozoa: Alcyonacea) from southern Africa, with a revised defenition of the genus.— J. nat. Hist. 20 (1): 53-63, figs. 1-7.

Williams, G.C., 1986b. Morphology, systematics and variability of the southern African soft coral *Alcyonium variabile* (Thomson, 1921) (Octocorallia: Alcyoniidae).— Ann. S. Afr. Mus. 96 (6): 241-270, figs. 1-15.

Wright, E.P. & T. Studer, 1889. Report on the Alcyonaria collected by H.M.S. Challenger during the years 1873-1876.— Rep. scient. Results Voy. 'Challenger', Zoology. 31: i-lxxii, 1-314, 49 pls.

Received: 20.ii.1992
Accepted: 6.iii.1992
Edited: J.C. den Hartog