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A review of three alcyonacean families (Octocorallia) from Guam

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Abstract—The soft corals of the families Alcyoniidae, Asterospiculariidae and Briareidae are listed for Guam. Collections were carried out on several reef sites by SCUBA diving, involving careful examination of a variety of habitats in shallow waters as well as down to 32 m. The collection yielded 35 species, including one new species: *Sinularia paulae,* and an additional 21 new zoogeographical records for the region, already known from other Indo-Pacific regions. Three species: *S. discrepans* Tixier-Durivault, 1970, *S. humesi* Verseveldt, 1968, and *Asterospicularia randalli* Gawel, 1976, are described and discussed in detail. Some taxonomic comments on intraspecific variability of *S. gaweli* Verseveldt, 1978 and *S. peculiaris* Tixier-Durivault, 1970 are also given. Notes on the distribution and abundance on the reefs are presented for the identified soft coral. Remarks on the underwater features of the most common species have been recorded in an attempt to facilitate their recognition. The vast majority of the species obtained in the survey (33 out of the 35) are of the family Alcyoniidae. Some *Lobophytum, Sarcophyton* and *Sinularia* species, along with *Asterospicularia randalli,* dominate large reef areas as patches composed of numerous colonies. In recent decades Guam's reefs have been severely affected by both natural and anthropogenic disturbances that have devastated the scleractinian corals. Successful space monopolization by soft corals may demonstrate their capability to withstand the disturbances, and even to replace the scleractinians in places where these are unable to survive.

Introduction

The diversity of soft corals on Indo-Pacific reefs has been demonstrated by Dinesen 1983, Alderslade & Shirwaiker 1991, van Ofwegen & Vennam 1991, Benayahu 1985, 1995, Benayahu & Schleyer 1995, 1996, Williams, 1992, and van Ofwegen 1996 among others. Studies of the octocorals of some Micronesian islands have indicated the presence of a rich fauna in this region. Utinomi (1956) listed 29 octocoral species for the islands of Palau, Pohnpei and the Bonins. Later, Gawel (1976) described a new species, *Asterospicularia randalli,* from Guam. In

an extensive survey of the island's reefs, Gawel (1977) listed 19 soft coral species and an additional 12 unidentified species in the families Asterospiculariidae, Alcyoniidae, Nephtheidae, Nidaliidae and Xeniidae. Verseveldt (1978) investigated part of Gawel's collection along with additional specimens from some other Micronesian islands (Palau, Yap and Pohnpei). This survey revealed a total of 40 octocoral species belonging to all the aforementioned families except Xeniidae. Verseveldt described three new species: *Sarcophyton birkelandi, Sinularia frondosa* and *S. gaweli.* The high abundance of soft corals on the Micronesian reefs has stimulated many investigations into the biological and ecological roles played by their secondary metabolites (e.g., Van Alstyne et al. 1994, Kerr & Paul 1995).

Taxonomic revisions of the major genera of the family Alcyoniidae (Verseveldt 1980, 1982, 1983) significantly contribute to the recent soft coral surveys and enable accurate identification of species. The present work examines the soft coral fauna (Order Alcyonacea) of the reefs of Guam and provides a systematic list, with notes on the distribution and abundance of the different species. For some of the more common species the study also presents remarks on their underwater characters.

Methods

During October 1994, in course of land-based field trips, a comprehensive survey of soft corals was conducted on the reefs of Guam, and later few additional specimens were also collected there. The reef sites studied are listed below with their coordinates (Figure 1).

1. Apra Harbor: 13°27′ N; 144°39′ E
   Including 4 sites: a) Barge, b) American Tanker, c) Spanish Steps, d) Finger Reef.
2. Piti Bomb Hole: 13°27′ N; 144°41′ E
3. Hospital Point: 13°30′ N; 144°46′ E
4. Shark's Hole: 13°34′ N; 144°48′ E
5. Double Reef: 13°36′ N; 144°50′ E
6. Janum: 13°35′ N; 144°56′ E
7. Iates: 13°25′ N; 144°48′ E
8. Pago Bay: 13°25′ N; 144°48′ E
9. Cocos Lagoon: 13°15′ N; 144°40′ E
10. Facpi: 13°21′ N; 144°39′ E
11. Anae: 13°22′ N; 144°38′ E
12. Crevice: 13°25′ N; 144°38′ E

On these sites a large variety of habitats was examined by SCUBA diving to a maximum depth of 32 m. Abundance estimates of all the species were made by visual surveys on the reef sites and divided into four categories: rare, sporadic, abundant and dominant. Approximately 120 samples were collected, primarily by the author, representing the variety of species found on the reefs. Prior to collection,

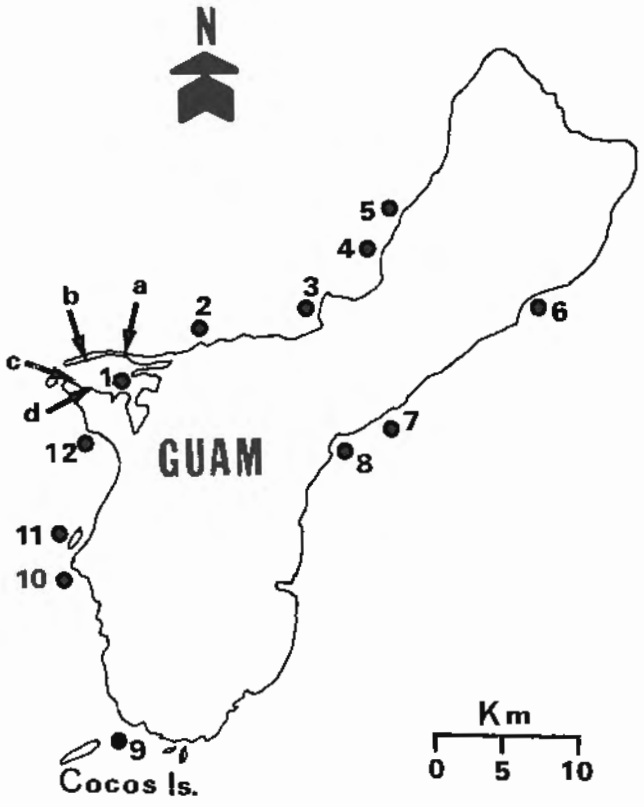

Figure 1. Map of Guam with the collecting sites indicated by numbers: 1. Apra Harbor, including 4 sites: a) Barge, b) American Tanker, c) Spanish Steps, d) Finger Reef; 2. Piti Bomb Hole; 3. Hospital Point; 4. Shark's Hole; 5. Double Reef; 6. Janum; 7. Iates; 8. Pago Bay; 9. Cocos Lagoon; 10. Facpi; 11. Anae; 12. Crevice.

most of the colonies were photographed underwater using an underwater Nikonos V camera with a close-up attachment. All material was fixed in 4% formalin in sea water, rinsed in fresh water after 24 hours, and then transferred to 70% ethyl alcohol. Sclerites were obtained by dissolving the organic tissues in 10% sodium hypochlorite. Identification of most species of the family Alcyoniidae was confirmed by comparison to sclerite preparations from type material kept at the Zoological Museum, Department of Zoology, Tel Aviv University, Israel (ZMTAU) and at the National Natural History Museum, Leiden, The Netherlands. For scanning electron microscopy the sclerites were carefully rinsed with double distilled water, dried at room temperature, coated with gold and examined under Jeol JSM

840A and Amray scanning electron microscopes operated at 25 kV and 20 kV respectively. The whole collection is kept in the ZMTAU.

Results

The current paper presents the results of a study of the soft corals of the families Alcyoniidae, Asterospiculariidae and Briareidae. Members of the family Nephtheidae and Nidaliidae were also collected and are still being examined. The collection yielded 35 species, one of which is new. Three of the species, *Sinularia discrepans* Tixier-Durivault, 1970, *S. humesi* Verseveldt, 1968, and *Asterospicularia randalli* Gawel, 1976, are described and discussed in detail, and in addition some taxonomic comments are given on *S. gaweli* Verseveldt, 1978 and *S. peculiaris* Tixier-Durivault, 1970.

List of Species in the Present Report

Alcyoniidae Lamouroux, 1812
- Genus *Alcyonium* Linnaeus, 1758
  - *Alcyonium simplex* Thomson & Dean, 1931
- Genus *Cladiella* Gray, 1869
  - *Cladiella krempfi* (Hickson, 1919)
  - *Cladiella pachyclados* (Klunzinger, 1877)
  - *Cladiella tuberculoides* (Tixier-Durivault, 1944)
- Genus *Lobophytum* von Marenzeller, 1886
  - *Lobophytum batarum* Moser, 1919
  - *Lobophytum pauciflorum* (Ehrenberg, 1834)
  - *Lobophytum sarcophytoides* Moser, 1919
  - *Lobophytum venustum* Tixier-Durivault, 1957
- Genus *Sarcophyton* Lesson, 1834
  - *Sarcophyton acutum* Tixier-Durivault, 1970
  - *Sarcophyton glaucum* (Quoy & Gaimard, 1833)
  - *Sarcophyton trocheliophorum* von Marenzeller, 1886
- Genus *Sinularia* May, 1898
  - *Sinularia abrupta* Tixier-Durivault, 1970
  - *Sinularia arborea* Verseveldt, 1971
  - *Sinularia brassica* May, 1898
  - *Sinularia compressa* Tixier-Durivault, 1945
  - *Sinularia crassa* Tixier-Durivault, 1945
  - *Sinularia discrepans* Tixier-Durivault, 1970
  - *Sinularia erecta* Tixier-Durivault, 1945
  - *Sinularia gardineri* (Pratt, 1903)
  - *Sinularia gaweli* Verseveldt, 1978
  - *Sinularia gibberosa* Tixier-Durivault, 1970
  - *Sinularia gravis* Tixier-Durivault, 1970
  - *Sinularia humesi* Verseveldt, 1968
  - *Sinularia leptoclados* (Ehrenberg, 1834)

Sinularia macropodia (Hickson & Hiles, 1900)
Sinularia maxima Verseveldt, 1971
Sinularia minima Verseveldt, 1971
Sinularia numerosa Tixier-Durivault, 1970
Sinularia paulae spec. nov.
Sinularia peculiaris Tixier-Durivault, 1970
Sinularia polydactyla (Ehrenberg, 1834)
Sinularia querciformis (Pratt, 1903)
Sinularia variabilis Tixier-Durivault, 1945
Asterospiculariidae Utinomi, 1951
Genus *Asterospicularia* Utinomi, 1951
Asterospicularia randalli Gawel, 1976
Briareidae Gray, 1859
Genus *Briareum* Blainville, 1830
Briareum excavatum (Nutting, 1911)

Description of the Material

Most of the species of this collection have previously been described extensively elsewhere, for references see literature mentioned below for each of the species. The features of the living colonies were derived from notes taken prior to collection and from the underwater photographs. These features might represent only a part of the possible morphological or color variation of a given species. Therefore, it should be noted that an accurate identification must be based on the taxonomical features as presented for each species in the respective literature.

Family Alcyoniidae Lamouroux, 1812
Genus *Alcyonium* Linnaeus, 1758
Alcyonium simplex Thomson & Dean, 1931

Alcyonium simplex Thomson & Dean, 1931: 43–44; Tixier-Durivault 1966: 32–33; Verseveldt 1974: 97–98; 1977a: 173 (listed only); van Ofwegen & Vennam 1994: 136 (listed only); Benayahu 1995: 106 (listed only); van Ofwegen 1996: 207 (listed only).

Local occurrence. Janum, 8 m, 7 October 1994 (ZMTAU Co 29351); Shark's Hole, 12 m, 13 October 1994 (ZMTAU Co 29352).

Field notes. Rare.

Geographical distribution. Bay of Brima, New Caledonia, Madagascar, Ambon (Indonesia), Okinawa (Japan), Bismarck Sea, a new record for Guam.

Genus *Cladiella* Gray, 1869
Cladiella krempfi (Hickson, 1919)

Cladiella krempfi (Hickson, 1919); for synonymy see: Verseveldt 1971: 10–12; 1976: 498 (listed only); 1977b: 4 (listed only); Alderslade & Shirwaiker 1991: 189

(listed only); van Ofwegen & Benayahu 1992: 139 (listed only); van Ofwegen & Vennam 1994: 136 (listed only); Benayahu & Schleyer 1996: 6 (listed only).

Local occurrence. Pago Bay, 1 m, 8 October 1994, 3 colonies (ZMTAU Co 29245); Shark's Hole, 3 m, 13 October 1994, 2 colonies (ZMTAU Co 29237); 12 m, 13 October 1994 (ZMTAU Co 29250).

Field notes. Sporadic. Gray lobate and firm colonies with brown expanded polyps (Plate I A). After polyp-retraction the gray surface of the lobes is seen (Plate I B), with surface pits indicating the site of the polyps. Colonies growing in clusters.

Geographical distribution. Vietnam, Seychelles, Palau, Madagascar, Mauritius, American Samoa, Laccadive Archipelago, Tanzania, Ambon (Indonesia), Mozambique, a new record for Guam.

Cladiella pachyclados (Klunzinger, 1877)

Cladiella pachyclados (Klunzinger, 1877); for synonymy see: Verseveldt 1971: 9–10; 1974: 95 (listed only); 1978: 50 (listed only); Imahara 1991: 62–63; van Ofwegen & Vennam 1994: 136 (listed only); Benayahu 1995: 106 (listed only); van Ofwegen 1996: 207 (listed only); Vennam & van Ofwegen 1996: 438 (listed only).

Local occurrence. Janum, 7 m, 7 October 1994, 2 colonies (ZMTAU Co 29358); Shark's Hole, 2 m, 13 October 1994, 3 colonies (ZMTAU Co 29357).

Field notes. Rare. Clumps of colonies with dark brown polyps, after their retraction bright-gray lobes are seen (Plate I C).

Geographical distribution. Widespread in the Indo-West Pacific reefs.

Cladiella tuberculoides (Tixier-Durivault, 1944)

Lobularia tuberculoides Tixier-Durivault, 1944: 476; 1948: 230–235.

Local occurrence. Janum, 9 m, 7 October 1994, 3 colonies (ZMTAU Co 29403).

Field notes. Rare.

Geographical distribution. Fiji, a new record for Guam.

Genus *Lobophytum* von Marenzeller, 1886

Lobophytum batarum Moser, 1919

Lobophytum batarum Moser, 1919; for synonymy see: Verseveldt 1983: 16–19; Alderslade & Shirwaiker 1991: 189 (listed only); Benayahu 1995: 106 (listed only).

Local occurrence. Iates, 22 m, 4 October 1994 (ZMTAU Co 29324); Double Reef, 8 m, 6 October 1994 (ZMTAU Co 29334, 29327); Janum, 5, m, 7 October 1994 (ZMTAU Co 29326); 13 m, 7 October 1994, 2 colonies (ZMTAU Co 29325); Apra Harbor (American Tanker), 6 m, 10 October 1994 (ZMTAU Co 29333); Shark's Hole, 10 m, 13 October 1994 (ZMTAU Co 29323); 2 colonies (ZMTAU Co 29335); Facpi Is., 6 m, 14 October 1994 (ZMTAU Co 29322).

Field notes. Abundant. Light-beige colonies with laterally flattened lobes (Plate I D).

Geographical distribution. Philippines, Vietnam, Madagascar, Laccadive Archipelago; Okinawa (Japan), a new record for Guam.

Lobophytum pauciflorum (Ehrenberg, 1834)

Lobophytum pauciflorum (Ehrenberg, 1834): for synonymy see Verseveldt 1983: 74–79; van Ofwegen & Benayahu 1992: 139 (listed only); van Ofwegen & Vennam 1994: 138 (listed only); Benayahu 1995: 106 (listed only); van Ofwegen 1996: 208 (listed only); Vennam & van Ofwegen 1996: 438 (listed only).

Local occurrence. Hospital Point, 19 m, 6 October 1994 (ZMTAU Co 29348); Double Reef, 9 m, 6 October, 1994 (ZMTAU Co 29331); Janum, 6 m, 7 October 1996, 2 colonies (ZMTAU Co 29354); Apra Harbor (Barge), 4 m, 10 October 1994 (ZMTAU Co 29355); Apra Harbor (Spanish steps); 5 m, 10 October 1994 (ZMTAU Co 29332); Shark's Hole, 12 m, 13 October 1994 (ZMTAU Co 29353).

Field notes. Abundant. Encrusting colonies with erect lobes, mostly digitiform, sometimes they are fused at their base, light brown, or yellow-brown in color (Plate I E).

Geographical distribution. Wide-spread in the Indo-West Pacific reefs.

Lobophytum sarcophytoides Moser, 1919

Lobophytum sarcophytoides Moser, 1919; for synonymy see Verseveldt 1983: 86–89.

Local occurrence. Apra Harbor (Spanish Steps), 9 m, October 10 1994 (ZMTAU Co 29405).

Field notes. Rare. The colony has marginal open curly folds and additional few inner lobes (Plate I F). The colonies resemble the shape of a *Sarcophyton*.

Geographical distribution. Philippines, New Caledonia, Madagascar, Reunion, Okinawa (Japan), a new record for Guam.

Lobophytum venustum Tixier-Durivault, 1957

Lobophytum venustum Tixier-Durivault, 1957; for synonymy see Verseveldt 1983: 98–99; van Ofwegen & Benayahu 1992: 151–152; Benayahu 1993: 5 (listed only); Benayahu 1995: 106 (listed only); Benayahu & Schleyer 1996: 6 (listed only); van Ofwegen 1996: 208 (listed only).

Local occurrence. Janum, 8 m, 7 October 1994 (ZMTAU Co 29336); 6 m, 7 October 1994 (ZMTAU Co 29350).

Field notes. Rare.

Geographical distribution. Aldabra Is., South Africa, Okinawa (Japan), Tanzania, Mozambique, Bismarck Sea, a new record for Guam.

Genus *Sarcophyton* Lesson, 1834

Sarcophyton acutum Tixier-Durivault, 1970

Sarcophyton acutum Tixier-Durivault, 1970; for synonymy see Verseveldt 1982: 15–16.

Local occurrence. Crevice, 28 m, 12 October 1994, 2 colonies (ZMTAU Co 29406).

Field notes. Rare.

Geographical distribution. New Caledonia, a new record for Guam.

Sarcophyton glaucum (Quoy & Gaimard, 1833)

Sarcophyton glaucum (Quoy & Gaimard, 1833); for synonymy see Verseveldt 1982: 51–57; Imahara 1991: 63; van Ofwegen & Benayahu 1992: 140 (listed only); Benayahu 1993: 5 (listed only); van Ofwegen & Vennam 1994: 138 (listed only); Benayahu 1995: 107 (listed only); Benayahu & Schleyer 1996: 6 (listed only); van Ofwegen 1996: 208 (listed only).

Local occurrence. Iates, 24 m, 4 October 1994 (ZMTAU Co 29372); 21 m, 4 October 1994, 2 colonies (ZMTAU Co 29396); 22 m, 4 October 1994 (ZMTAU Co 29374); Hospital Point, 30 m, 6 October 1994 (ZMTAU Co 29373); 26 m, 6 October 1994 (ZMTAU Co 29356); 20 m, 6 October 1994 (ZMTAU Co 29400); Apra Harbor (American Tanker), 9 m, 10 October 1994 (ZMTAU Co 29371); Crevice, 31 m, 12 October 1994 (ZMTAU Co 29370); Shark's Hole, 12 m, 13 October 1994, 3 colonies (ZMTAU Co 29375); Facpi Is., 5 m, 14 October 1994 (ZMTAU Co 29383); Anae, 8 m, 14 October 1994 (ZMTAU Co 29376).

Field notes. Dominant. Highly variable with respect to the shape and size of the colony (Plate II A).

Geographical distribution. Widespread in the Indo West-Pacific reefs.

Sarcophyton trocheliophorum von Marenzeller, 1886

Sarcophyton trocheliophorum von Marenzeller, 1886; for synonymy see Verseveldt 1982: 83–88; Alderslade & Shirwaiker 1991: 189 (listed only); Imahara 1991: 64; van Ofwegen & Benayahu 1992: 140 (listed only); Benayahu 1993: 5 (listed only); van Ofwegen & Vennam 1994: 138 (listed only); Benayahu 1995: 107 (listed only); Benayahu & Schleyer 1996: 6 (listed only); van Ofwegen 1996: 208 (listed only); Vennam & van Ofwegen 1996: 438 (listed only).

Local occurrence. Iates, 30 m, 4 October 1994 (ZMTAU Co 29359); 22 m, 4 October 1994 (ZMTAU Co 29366); Piti Bomb Hole, 2 m, 5 October 1994, 2 colonies (ZMTAU Co 29360); Apra Harbor (Spanish Steps), 9 m, 10 October 1994 (ZMTAU Co 29391); Shark's Hole, 12 m, 13 October 1994 (ZMTAU Co 29379).

Field notes. Abundant. Colonies with rounded curly margins (Plate II B). The colonies have slimy surface.

Geographical distribution. Widespread in the Indo West-Pacific reefs.

Genus *Sinularia* May, 1898

Sinularia abrupta Tixier-Durivault, 1970

Sinularia abrupta Tixier-Durivault, 1970; for synonymy see Verseveldt 1980: 20–21; Alderslade & Shirwaiker 1991: 189 (listed only); Benayahu 1993: 5 (listed only); Benayahu 1995: 107 (listed only); Benayahu & Schleyer 1996: 6 (listed only); Vennam & van Ofwegen 1996: 438 (listed only).

Local occurrence. Janum, 5m, 7 October 1994, 2 colonies (ZMTAU Co 29341); Shark's Hole, 3 m, 13 October 1994, 3 colonies (ZMTAU Co 29277).

Field notes. Rare. Colonies with thick, crest-like lobes (Plate II-C).

Geographical distribution. Vietnam, Fanning Atoll (Line Is.), Hawaii Is., South Africa, Okinawa (Japan), Mozambique, a new record for Guam.

Sinularia arborea Verseveldt, 1971

Sinularia arborea Verseveldt, 1971; for synonymy see Verseveldt 1980: 21.

Local occurrence. Apra Harbor (Finger Reef), 20 m, 11 October 1994, 2 colonies (ZMTAU Co 29347); Apra Harbor (Spanish Steps), 20 m, 11 October 1994 (ZMTAU Co 29346); Facpi Is., 6 m, 14 October 1994 (ZMTAU Co 29399).

Field notes. Sporadic. The colonies consist of elongated lobes and side lobules (Plate II D).

Geographical distribution. Madagascar, Vietnam, Guam.

Sinularia brassica May, 1898

Sinularia brassica May, 1898; for synonymy see Verseveldt 1980: 22–25; Verseveldt & Benayahu 1983: 4 (listed only); Benayahu 1993: 5 (listed only), van Ofwegen & Vennam 1994: 138 (listed only); Benayahu & Schleyer 1996: 6 (listed only).

Local occurrence. Iates, 24 m, 4 October 1994 (ZMTAU Co 29320).

Field notes. Rare.

Geographical distribution. Tumbatu, Wasin Channel, Red Sea, South Africa, Ambon (Indonesia), Mozambique, a new record for Guam.

Sinularia compressa Tixier-Durivault, 1945

Sinularia compressa Tixier-Durivault, 1945; for synonymy see Verseveldt 1980: 30–31.

Local occurrence. Piti Bomb Hole, 1 m, 5 October 1994 (ZMTAU Co 29398); Apra Harbor (Spanish Steps), 6 m, 10 October 1994 (ZMTAU Co 29397).

Field notes. Rare.

Geographical distribution. Red Sea, Guam.

Sinularia crassa Tixier-Durivault, 1945

Sinularia crassa Tixier-Durivault, 1945; for synonymy see Verseveldt 1980: 36–38.

Local occurrence. Double Reef, 8 m, 6 October 1994, 2 colonies (ZMTAU Co 29251).

Field notes. Rare.

Geographical distribution. Mauritius, Madagascar, Gambier Is., New Caledonia, Vietnam, a new record for Guam.

Sinularia discrepans Tixier-Durivault, 1970
(Figures 2–6)

Sinularia discrepans Tixier-Durivault, 1970: 260–262; Verseveldt 1980: 46.

Local occurrence. Hospital Point, 21 m, 6 October 1994 (ZMTAU Co 29243); Apra Harbor (Finger Reef), 4 m, 11 October 1994, a colony broken into two pieces and a fragment of a colony (ZMTAU Co 29244).

Description. ZMTAU Co 29243 is a curved colony (Figure 2a), while being stretched the colony has maximum dimensions of 14 × 2.5 cm and its height varies between 1.5–2.5 cm. ZMTAU Co 29244 is composed of two pieces (Figure 2b), previously forming a complete colony. The large one has maximum dimensions of 11 × 3 cm and a height of 2–3.5 cm, the smaller piece is 5 × 4 cm and 2.5 cm high (Figure 2b). The firm colonies are encrusting and have umbranched, digitiform lobes along with laterally compressed flatten, wall like lobes (Figure 2). The lobes are rather densely placed. The polyps are entirely retracted, leaving behind small pits and contain no sclerites.

The following description refers to ZMTAU Co 29243 (Figure 2a). The surface layer of the lobes contains various clubs which are 0.11–0.26 mm long (Figures 3, 4). The majority possess warty heads. The handles are with low warts (Fig-

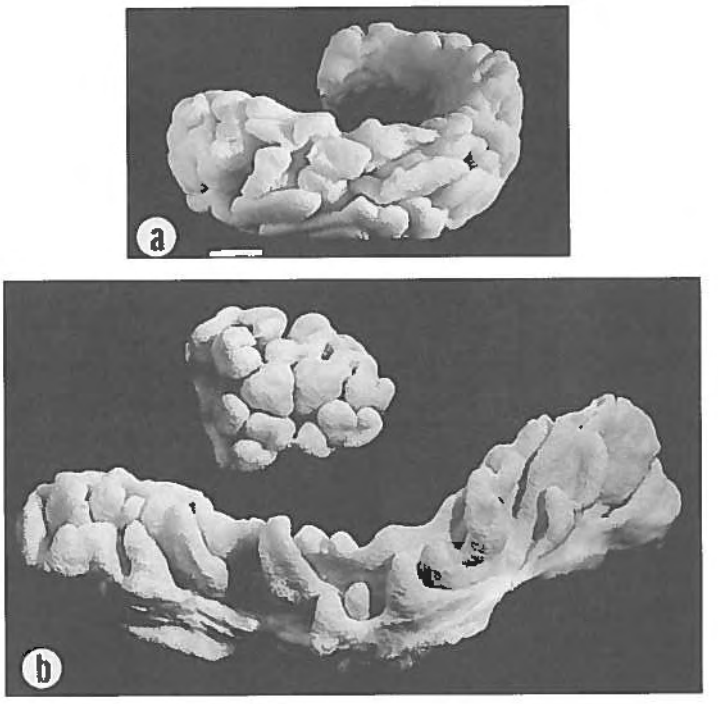

Figure 2. *Sinularia discrepans* Tixier-Durivault, 1970; a, ZMTAU Co 29243; b, ZMTAU Co 29244. Scale in a, 10 mm, applies to both.

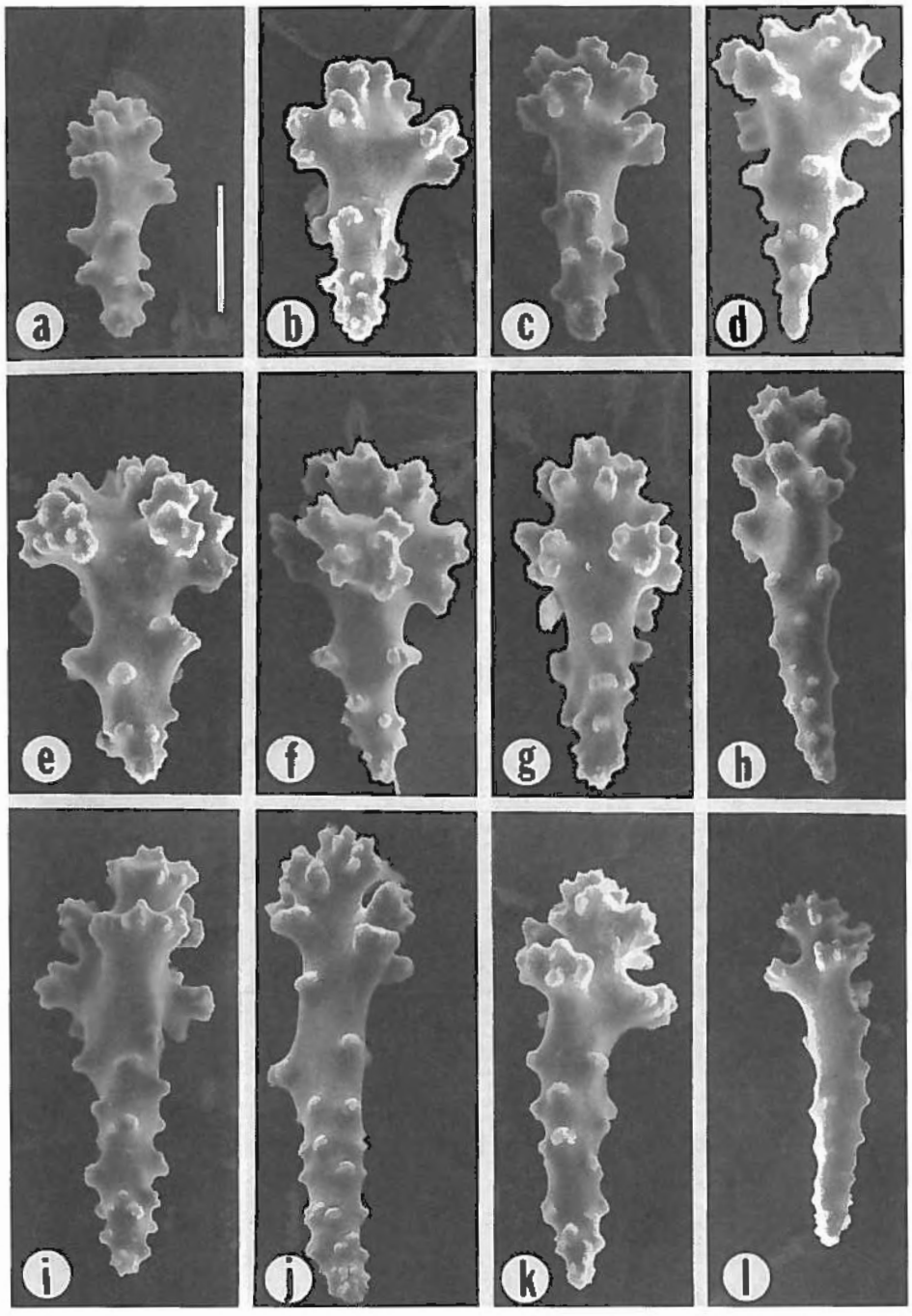

Figure 3. *Sinularia discrepans* Tixier-Durivault, 1970; (ZMTAU Co 29243); sclerites from the surface layer of the lobes. Scale in 3a, 0.05 mm, applies to all.

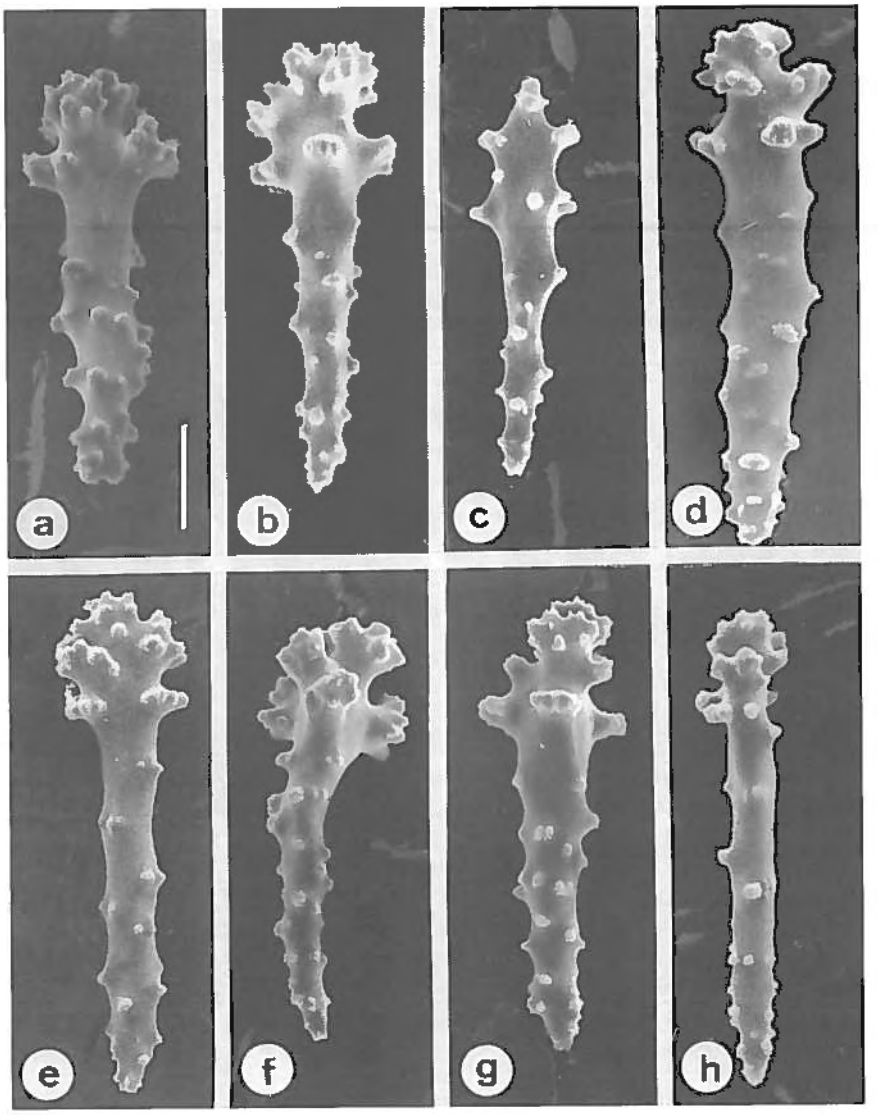

Figure 4. *Sinularia discrepans* Tixier-Durivault, 1970; (ZMTAU Co 29243), sclerites from the surface layer of the lobes. Scale in 4a, 0.05 mm, applies to all.

ure 3a–g), volcano-shaped processes (Figures 31, 4c,e,h) or with a combination of the two (Figures 3h–k, 4a,b,d,f,g). The long clubs have straight (Figure 4d,e,g,h) or sometimes slightly curved handles (Figures 31, 4f).

The surface layer of the base contains clubs, which are 0.11–0.28 mm long (Figures 5, 6a–d). They are coarser and wider than those of the lobes. Some have

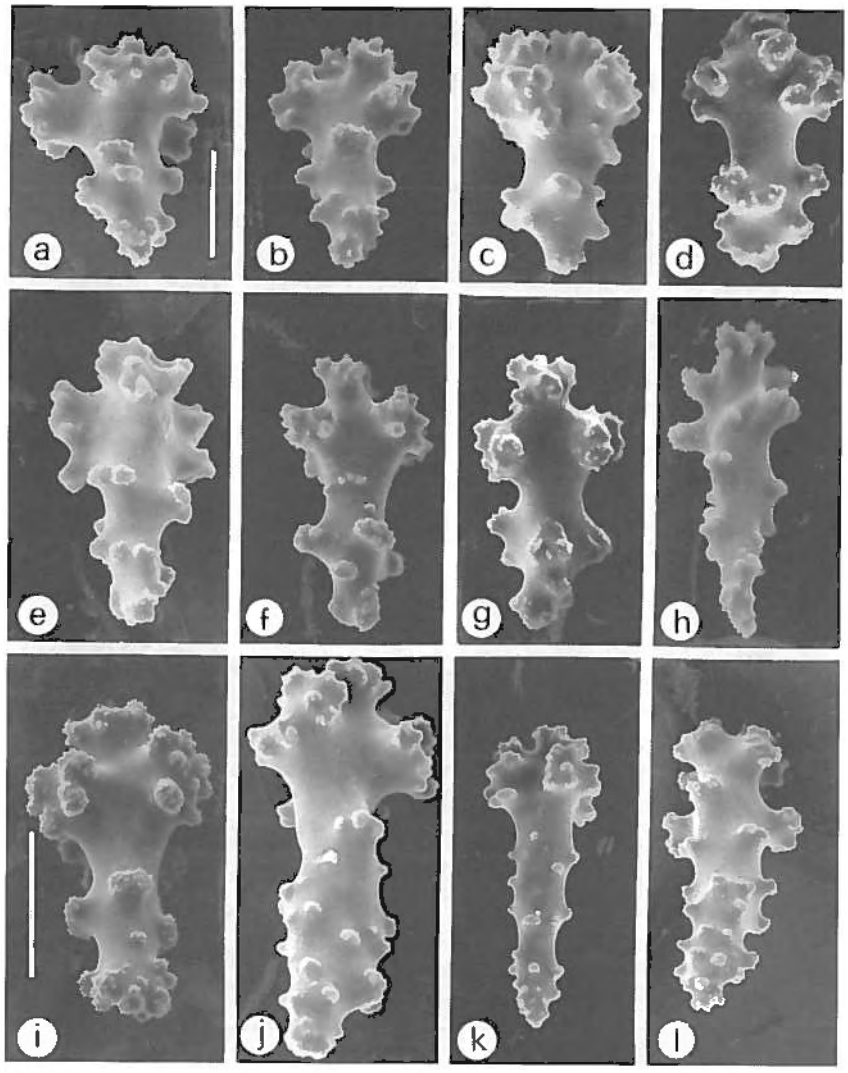

Figure 5. *Sinularia discrepans* Tixier-Durivault, 1970; (ZMTAU Co 29243); sclerites from the surface layer of the base. Scale in 5a, 0.05 mm, applies to all.

rough warts on the handle (Figure 5a–i,l). Few clubs have a bare zone, resembling a waist, between the head and the lower warty handle (Figure 5d,g,i). Some spindles with a maximum length of 0.27 mm also occur in the surface layer of the base (Figure 6e–h). The interior of the lobes and the base contain curved spindles (Figure 6i–k). These sclerites are up to 1.85 mm in length and are covered with irregular warts, up to 0.08 mm in diameter (Figure 6l).

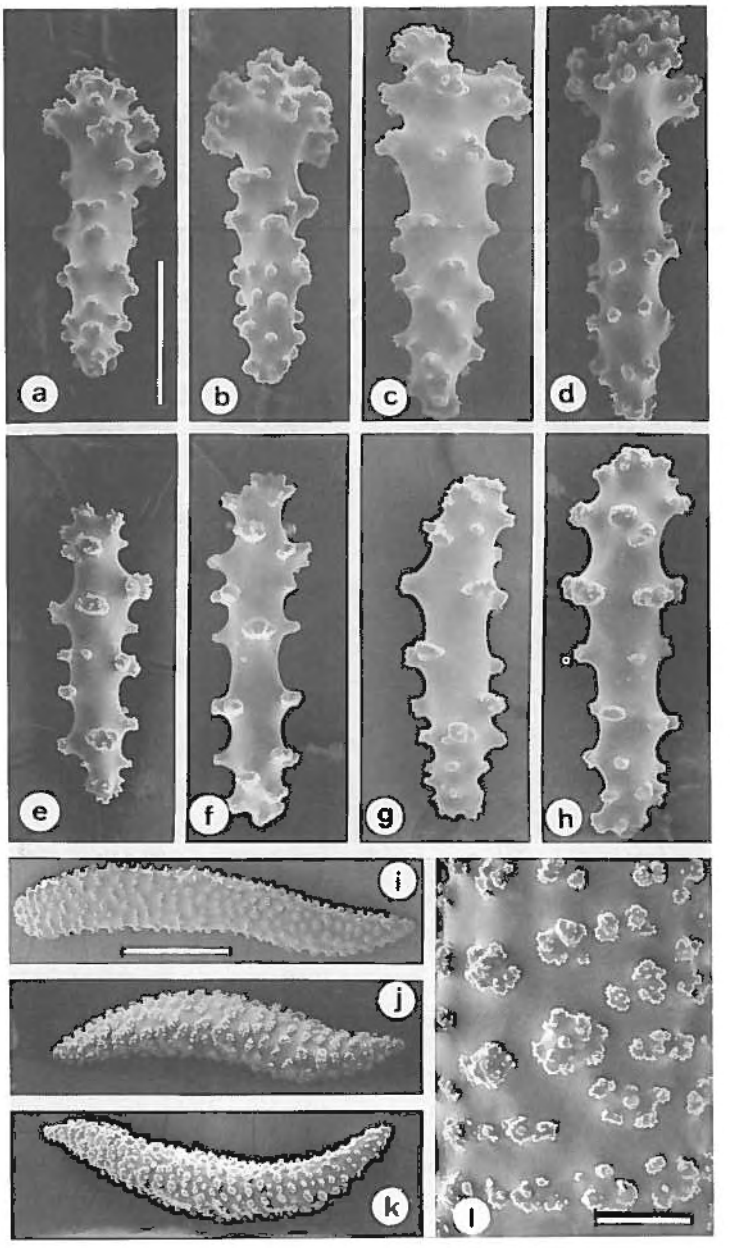

Figure 6. *Sinularia discrepans* Tixier-Durivault, 1970; (ZMTAU Co 29243); a–h, sclerites from the surface layer of the base; i–k, spindles of interior base; l, surface ornamentation of spindle of interior base. Scale in a, 0.1 mm, applies to a–h; scale in i, 0.5 mm, applies to i–k, scale in l, 0.1 mm only applies to l.

Color. In alcohol the colonies are light cream

Remarks. The sclerites of ZMTAU Co 29244 hardly differ from ZMTAU Co 29243. In his revision on the genus *Sinularia* Verseveldt (1980) did not succeed in tracing the type material of *S. discrepans,* and consequently he did not re-describe it. Similarly, the author of this paper failed to obtain the type. Therefore, the specimens of the above species are described in the present study. They resemble the description of the holotype (Tixier-Durivault 1970: 260–262), yet it is important to note the comment made by Verseveldt (1980: 46) about the interchange of the sclerite-drawings in the original description. The above described specimens differ in some respects from the holotype. The lobes are more closely set and the spindles of the interior of the coenenchyme are shorter (up to 1.85 mm long vs up to 2.7 mm). In addition, the club size-range of the surface of the lobes and the surface of the base is slightly different (0.11–0.26 mm vs 0.15–0.30 mm and 0.11–0.28 mm vs 0.14–0.20 mm respectively). Such differences are considered to be a part of intraspecific variation of *S. discrepans* that is described here for the first time.

Field notes. Sporadic. Colonies with flattened lobes (Plate II E).

Geographical distribution. New Caledonia, a new record for Guam.

Sinularia erecta Tixier-Durivault, 1945

Sinularia erecta Tixier-Durivault, 1945; for synonymy see Verseveldt 1980: 49–51, Benayahu 1993: 6 (listed only), Benayahu & Schleyer 1996: 6 (listed only).

Local occurrence. Janum, 6 m, 7 October 1994 (ZMTAU Co 29279).

Field notes. Rare.

Geographical distribution. Red Sea, Madagascar, South Africa, Mozambique, a new record for Guam.

Sinularia gardineri (Pratt, 1903)

Sinularia gardineri (Pratt, 1903); for synonymy see Verseveldt 1980: 59–61; Verseveldt & Benayahu 1983: 13–16; Benayahu 1993: 6 (listed only); van Ofwegen & Benayahu 1992: 140 (listed only).

Local occurrence. Janum, 13 m, 7 October 1994 (ZMTAU Co 29242); Anae, 3 m, 14 October 1994, 3 colonies (ZMTAU Co 29246).

Field notes. Rare.

Geographical distribution. Maldives, Red Sea, Tanzania, South Africa, a new record for Guam.

Sinularia gaweli Verseveldt, 1978
(Figures 7, 8)

Sinularia gaweli Verseveldt, 1978: 54; Ofwegen & Vennam 1991: 143 (listed only).

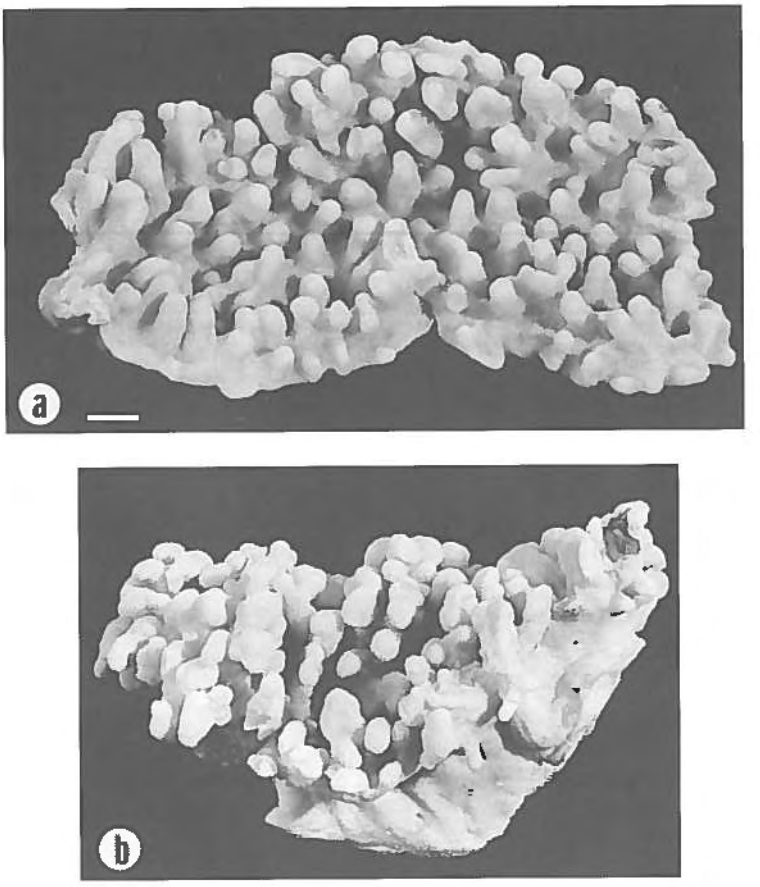

Figure 7. *Sinularia gaweli* Verseveldt, 1978; a, ZMTAU Co 29239; b, ZMTAU Co 29364. Scale in a, 10 mm, applies to both.

Local occurrence. Iates, 21 m, 4 October 1994 (ZMTAU Co 29363); Double Reef, 8 m, 6 October 1994 (ZMTAU Co 29362); 14 m, 6 October 1994, 2 colonies (ZMTAU Co 29239); 9 m, 6 October 1994, 2 colonies (ZMTAU Co 29364).

Remarks. The holotype is low and encrusting with two kinds of lobes: 1) simple round knobs, flattened laterally and not closely packed, and 2) bigger primary lobes bearing knobs of the first kind (Verseveldt 1978: pl. 2, figure 2). The present specimens show some differences from the type. ZMTAU Co 29239 is encrusting and has only short, erect lobes and a few round knobs (Figure 7a). ZMTAU Co 29362–4 (Figures 7b, 8a,b) have closely placed lobes divided into round and knobby lobules, some are flattened laterally, and all colonies have a distinct stalk. These findings present for the first time ranges of intraspecific colony

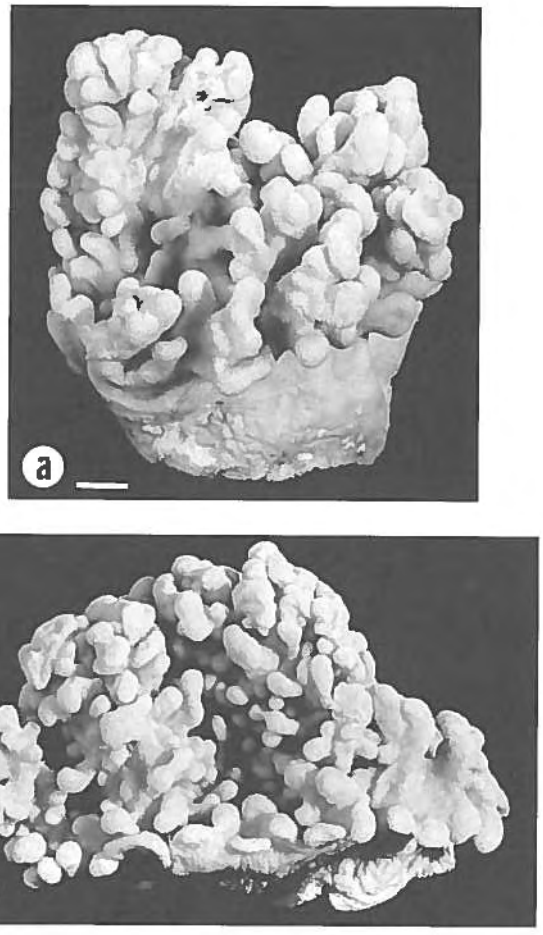

Figure 8. *Sinularia gaweli* Verseveldt, 1978; a, ZMTAU Co 29363; b, ZMTAU Co 29362. Scale in a, 10 mm, applies to both.

variation of *S. gaweli*. The sclerites of all the examined specimens (Figures 7, 8) agree with those of the holotype.

Field notes. Sporadic. Colonies with knobby lobes (Plate II F).

Geographical distribution. Guam, Laccadives.

Sinularia gibberosa Tixier-Durivault, 1970

Sinularia gibberosa Tixier-Durivault, 1970; for synonymy see Verseveldt 1980: 61–63; van Ofwegen & Benayahu 1992: 140 (listed only); Benayahu 1995: 107 (listed only).

Local occurrence. Apra Harbor (Spanish Steps), 9 m, 10 October 1994 (ZMTAU Co 29281).

Field notes. Rare. The most remarkable feature of this species is the closely, laterally flattened, undivided, rounded lobes arranged around a center of the rosette (Plate III A).

Geographical distribution. Ceylon, Vietnam, Nias Island, Seychelles, Tanzania, Okinawa (Japan), a new record for Guam.

Sinularia gravis Tixier-Durivault, 1970

Sinularia gravis Tixier-Durivault, 1970; for synonymy see Vennam & van Ofwegen 1996: 439–452.

Local occurrence. lates, 22 m, 4 October 1994 (ZMTAU Co 29386); Hospital Point, 20 m, 6 October 1994 (ZMTAU Co 29385); Double Reef, 9 m, 6 October 1994, 2 colonies (ZMTAU Co 29384); Apra Harbor (Spanish Steps), 9 m, 10 October 1994 (ZMTAU Co 29380); 4 m, 10 October 1994 (ZMTAU Co 29394).

Field notes. Abundant.

Geographical distribution. Wide-spread in the Indo-Pacific reefs, a new record for Guam.

Sinularia humesi Verseveldt, 1968
(Figures 9–14)

Sinularia humesi Verseveldt, 1968: 54; 1971: 38–41; 1980: 9 (listed only); Verseveldt & Benayahu 1978: 58 (listed only); van Ofwegen & Vennam 1994: 138 (listed only); van Ofwegen 1996: 208 (listed only).

Local occurrence. Piti Bomb Hole, 3 m, 5 October 1994 (ZMTAU Co 29240).

Description. The colony has a maximum cross section of 10 × 8 cm (Figure 9). The height of the stalk varies between 2.5–5 cm. Some of the lobes are flattened laterally and others are digitiform, they are divided into secondary lobules with rounded tips. On the upper parts of the lobes, the polyps are completely retracted, and on their lower portions numerous anthocodiae are seen in various degrees of contraction.

The surface layer of the lobes has a variety of sclerites (Figures 10, 11). Most of them are clubs with a distinct head, and are 0.12–0.33 mm long (Figures 10a–m,p, 11a–o). The long clubs have tapering shafts (Figure 11g–o). Some of the clubs have less developed heads (Figure 101,m,p,s). There are also spindle-like sclerites, which are 0.18–0.28 mm in length (Figure 10n,o,q,r,t,u); these are transitions to the spindles of the interior of the lobes. Furthermore, a few slender spindles up to 0.35 mm are also present (Figure 11p–r). The polyps contain numerous sclerites, mainly rods (Figure 12). Most of them have prominences with either one or two ends with scalloped edges (Figure 12a–k), they are 0.057–0.080 mm long. Few are wider with a large prominences that in part is scalloped (Figure 12l–n).

The surface layer of the base contains clubs up to 0.32 mm in length (Figure 13) and they are wider than those of the lobes (Figures 10, 11).

Figure 9. *Sinularia humesi* Verseveldt, 1968, (ZMTAU Co 29240). Scale 10 mm.

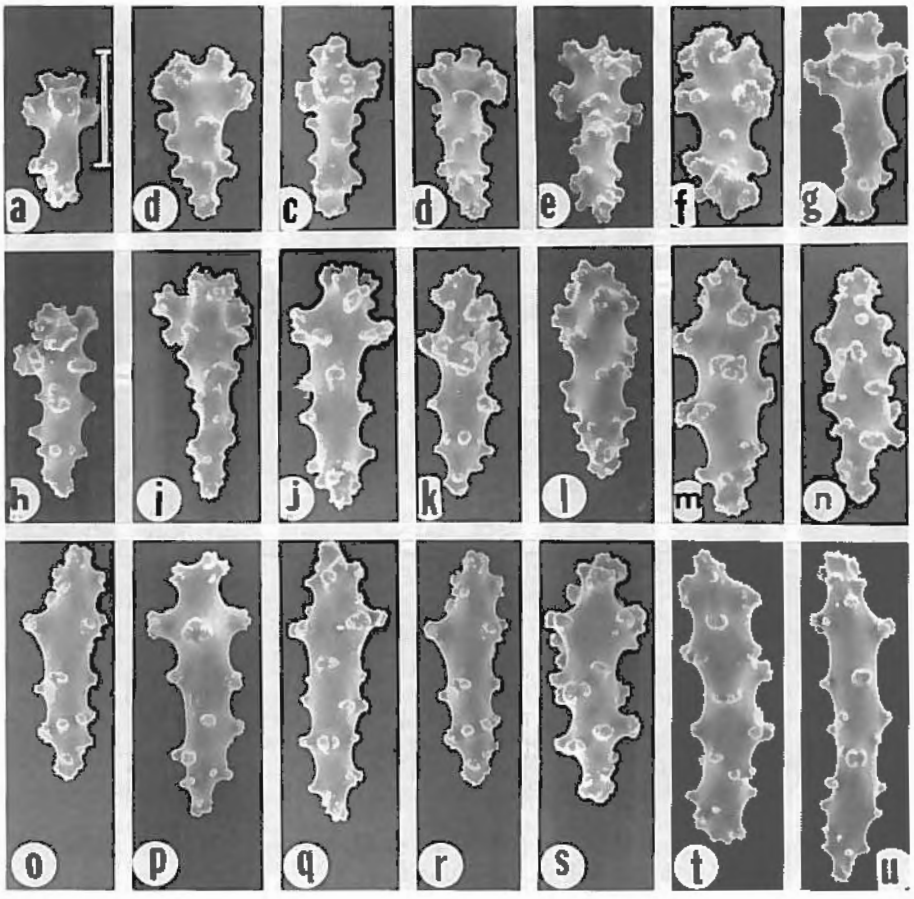

Figure 10. *Sinularia humesi* Verseveldt, 1968, (ZMTAU Co 29240); sclerites from the surface layer of the lobes. Scale in a, 0.1 mm, applies to all.

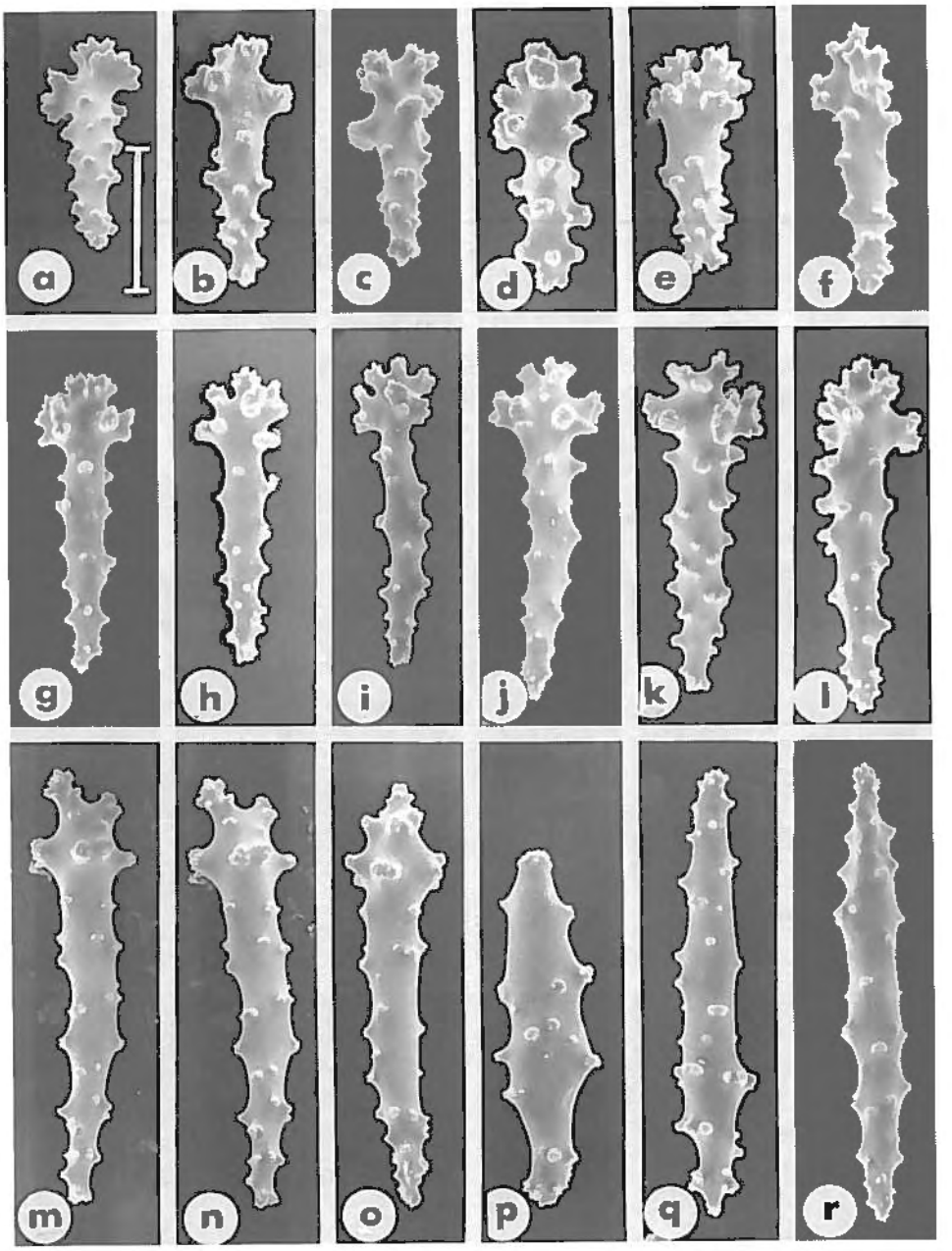

Figure 11. *Sinularia humesi* Verseveldt, 1968, (ZMTAU Co 29240); sclerites from the surface layer of the lobes. Scale in a, 0.1 mm, applies to all.

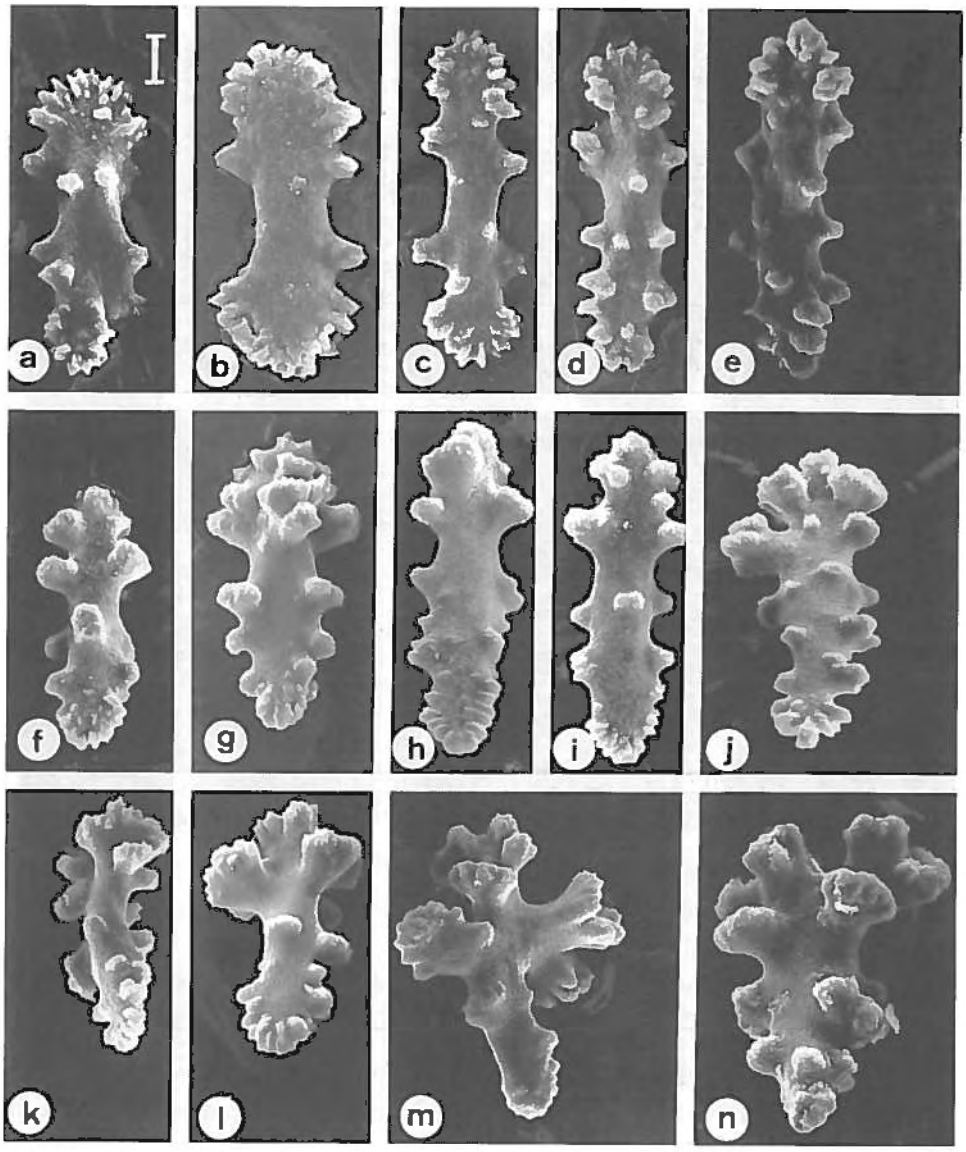

Figure 12. *Sinularia humesi* Verseveldt, 1968, (ZMTAU Co 29240); sclerites of polyps. Scale in a, 0.01 mm, applies to all.

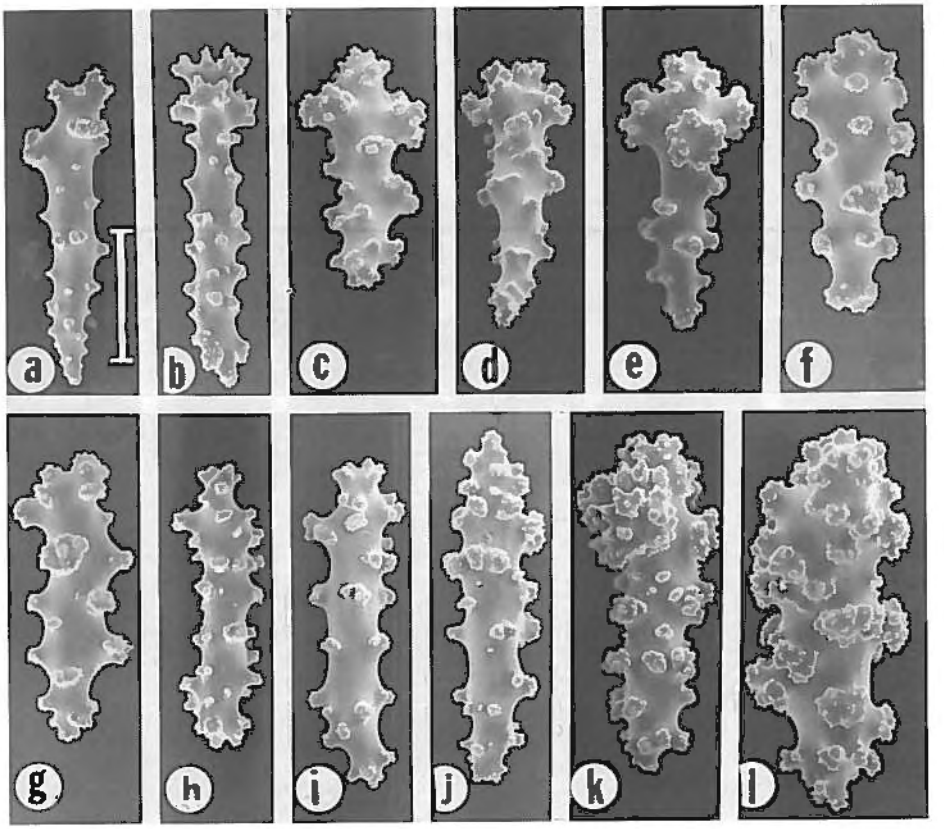

Figure 13. *Sinularia humesi* Verseveldt, 1968, (ZMTAU Co 29240); sclerites from the surface layer of the base. Scale in a, 0.1 mm, applies to all.

The interior of the lobes and the stalk has straight or curved spindles (Figure 14a–f) up to 1.5 mm long. They are rather densely warted with simple or complex tubercles (Figure 14g).

Color.—In alcohol the specimen is beige-light brown.

Remarks.—The colony form of the examined specimen agrees well with the holotype of *S. humesi*. The clubs of the surface layer of the lobes and the base of the specimen fit in with their range in that species. The spindles of the interior of the present specimen are not as long (up to 1.5 mm long vs up to more than 3 mm in length). No polyp sclerites are mentioned in the description of Verseveldt (1968, 1971), however examination of the sclerite preparations of the holotype on microscope slides did reveal some polyp rods. Furthermore, such rods have been already found in other specimens of *S. humesi* (van Ofwegen, personal communication) and are considered as important character for species identification. Therefore, the present colony was identified as *S. humesi*.

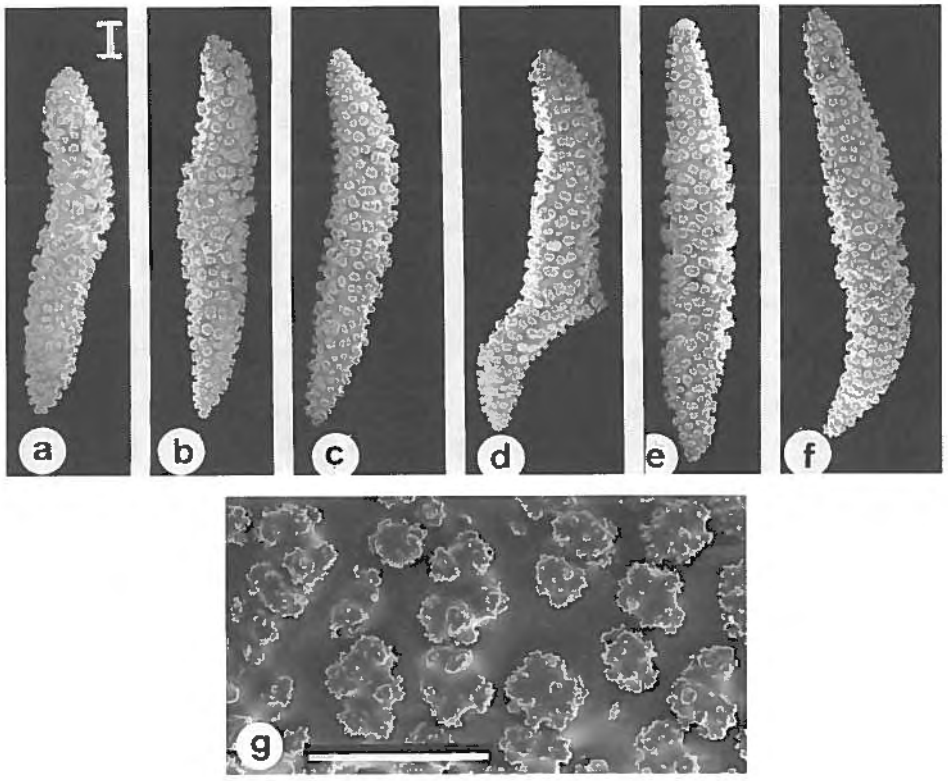

Figure 14. *Sinularia humesi* Verseveldt, 1968, (ZMTAU Co 29240); a–f, sclerites from the interior of the base; surface ornamentation of spindle of interior base. Scale in a, 0.1 mm, applies to a–f; scale in g, 0.1 mm only applies to g.

Geographical distribution. Madagascar, Red Sea, Bismarck Sea, a new record for Guam.

Field notes. Rare.

Sinularia leptoclados (Ehrenberg, 1834)

Sinularia leptoclados (Ehrenberg, 1834); for synonymy see Verseveldt 1980: 78–80; Imahara 1991: 69; van Ofwegen & Benayahu 1992: 140 (listed only); Benayahu 1993: 6 (listed only); van Ofwegen & Vennam 1994: 138 (listed only); Benayahu 1995; 107 (listed only), Benayahu & Schleyer 1996: 6 (listed only); van Ofwegen 1996: 208 (listed only); Vennam & van Ofwegen 1996: 439 (listed only).

Local occurrence. Iates, 28 m, 4 October 1996 (ZMTAU Co 29382); Anae, 5 m, 14 October 1994, 3 colonies (ZMTAU Co 29390).

Field notes. Rare.

Geographical distribution. Widespread in the Indo- Pacific reefs.

Sinularia macropodia (Hickson & Hiles, 1900)

Sinularia macropodia (Hickson & Hiles, 1900); for synonymy see Verseveldt 1980: 85–86.

Local occurrence. Apra Harbor (Spanish Steps), 5 m, 10 October 1994, 2 colonies (ZMTAU Co 29367); Facpi Is., 5 m, 14 October 1994 (ZMTAU Co 29346).

Field notes. Rare.

Geographical distribution. New Britain, Fiji Is., Madagascar, Mauritius, Gambier Is., New Caledonia, Vietnam, Okinawa (Japan), Great Barrier Reef (Australia), Guam.

Sinularia maxima Verseveldt, 1971

Sinularia maxima Verseveldt, 1971: 50–53, 1978: 50 (listed only), 1980: 9 (listed only); Imahara 1991: 66–67; van Ofwegen & Benayahu 1992: 140 (listed only); van Ofwegen 1996: 208 (listed only).

Local occurrence. Cocos Lagoon, 6 m, 9 October 1994 (ZMTAU Co 29278), 2 m, 9 October 1994, 2 colonies (ZMTAU Co 29318), 3 m, 9 October 1994, 2 colonies (ZMTAU Co 29339).

Field notes. Abundant. Numerous patches of colonies were observed on the shallow reef of Cocos Lagoon. When the polyps are retracted the lobes are fleshy and inflated (Plate III B)

Geographical distribution. Madagascar, Seychelles, Guam, Ryukyu Archipelago (Japan), Bismarck Sea.

Sinularia minima Verseveldt, 1971

Sinularia minima Verseveldt, 1971: 49–50; 1980: 9 (listed only).

Local occurrence. Shark's Hole, 2 m, 5 October 1994 (ZMTAU Co 29238).

Field notes. Rare.

Geographical distribution. Madagascar, a new record for Guam.

Sinularia numerosa Tixier-Durivault, 1970

Sinularia numerosa Tixier-Durivault, 1970; for synonymy see Verseveldt 1980: 96–100; Imahara 1991: 65–66.

Local occurrence. Iates, 25 m, 4 October 1994 (ZMTAU Co 29387); 20 m, 4 October 1994, 1 colony and a small fragment (ZMTAU Co 29361); Hospital Point, 28 m, 6 October 1994 (ZMTAU Co 29389); Shark's Hole, 2 m, 6 October 1994 (ZMTAU Co 29378); Janum, 7 m, 7 October 1994 (ZMTAU Co 29368); Apra Harbor (Spanish Steps), 5 m, 10 October 1994 (ZMTAU Co 29393); Shark's Hole, 12 m, 13 October 1994 (ZMTAU Co 29388); Facpi Is. 18 m, 14 October 1994, 3 colonies (ZMTAU Co 29377).

Field notes. Abundant. Firm colonies with unbranched irregular lobes, mostly meandering on the surface (Plate III C).

Geographical distribution. New Caledonia, Gambier Is. Madagascar, Guam, Ryukyu Archipelago (Japan).

Sinularia paulae spec. nov.
(Figures 15–20)

Local occurrence. Piti Bomb Hole, 3 m, 5 October 1994, part of a colony (ZMTAU Co 29241); Cocos Lagoon, 31 May, 1996, leg. V. J. Paul, 3 colonies (ZMTAU Co 30010).

Description. The holotype and the three paratypes are illustrated in Figures 15, 16. The holotype (ZMTAU Co 29241) has a maximum diameter of 4 × 14 cm (Figure 15). The height of its stalk varies between 6–9 cm and has several longitudinal shallow grooves. The lobes are finger like with side branches, and are flexible. The primary lobes are 3–5 cm long. The polyps are completely retracted.

The surface layer of the lobes contains clubs with a distinct central wart, which are 0.06–0.10 mm long (Figures 17, 18). Their handles possess several warts. Some of the short clubs have wide handles (Figures 17b,c,e,f–i,18f). The surface layer of the base has the same clubs which are 0.055–0.10 mm long (Figures 19, 20a–f). They are slightly wider than those of the lobes. The interior of the lobes has no sclerites, only few are found at the basal part of the primary lobes. The interior of the base contains long spindles, up to 3.9 mm (Figure 20g–j) with simple tubercles of 0.075 mm in diameter (Figure 20k).

Color. In alcohol the specimen is dark brown.

Variability. The paratypes (Figure 16) have the same sclerites as the holotype. They differ from the holotype only in size. Most of polyps are fully re-

Figure 15. *Sinularia paulae* spec. nov., holotype (ZMTAU Co 29241). Scale, 10 mm.

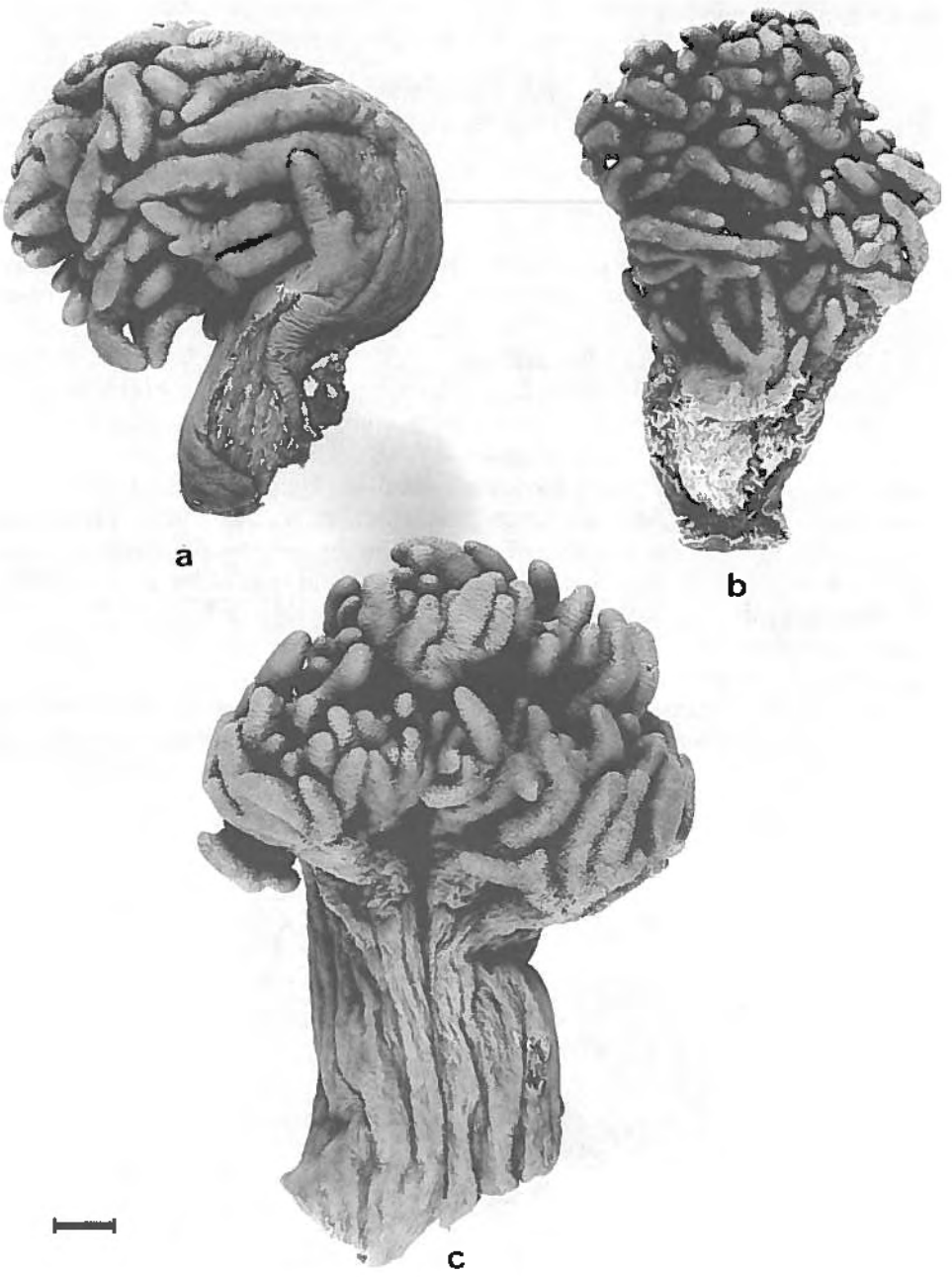

Figure 16. *Sinularia paulae* spec. nov., paratypes (ZMTAU Co 30010). Scale, 10 mm.

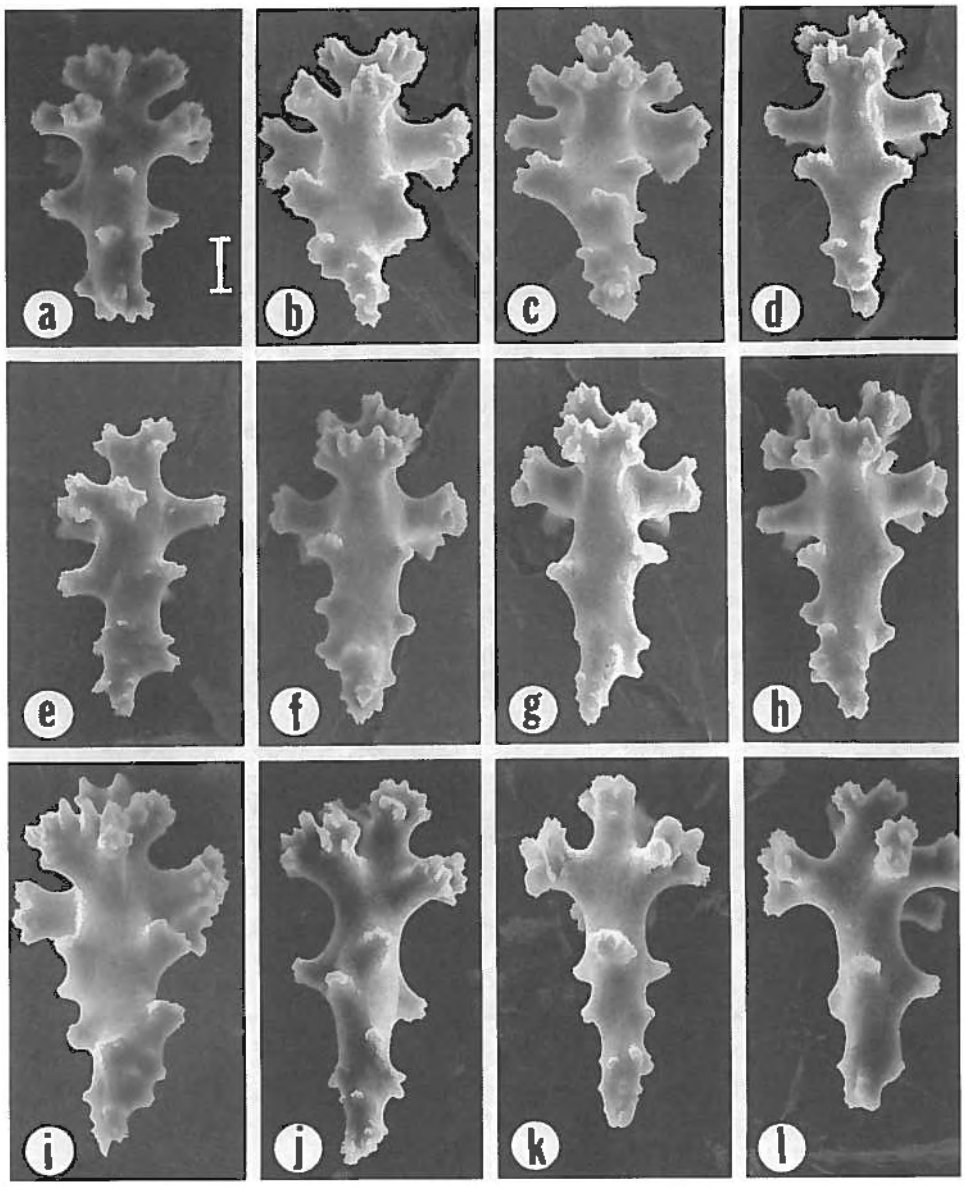

Figure 17. *Sinularia paulae* spec. nov., holotype (ZMTAU Co 29241); sclerites from the surface layer of the lobes. Scale in a, 0.01 mm, applies to all.

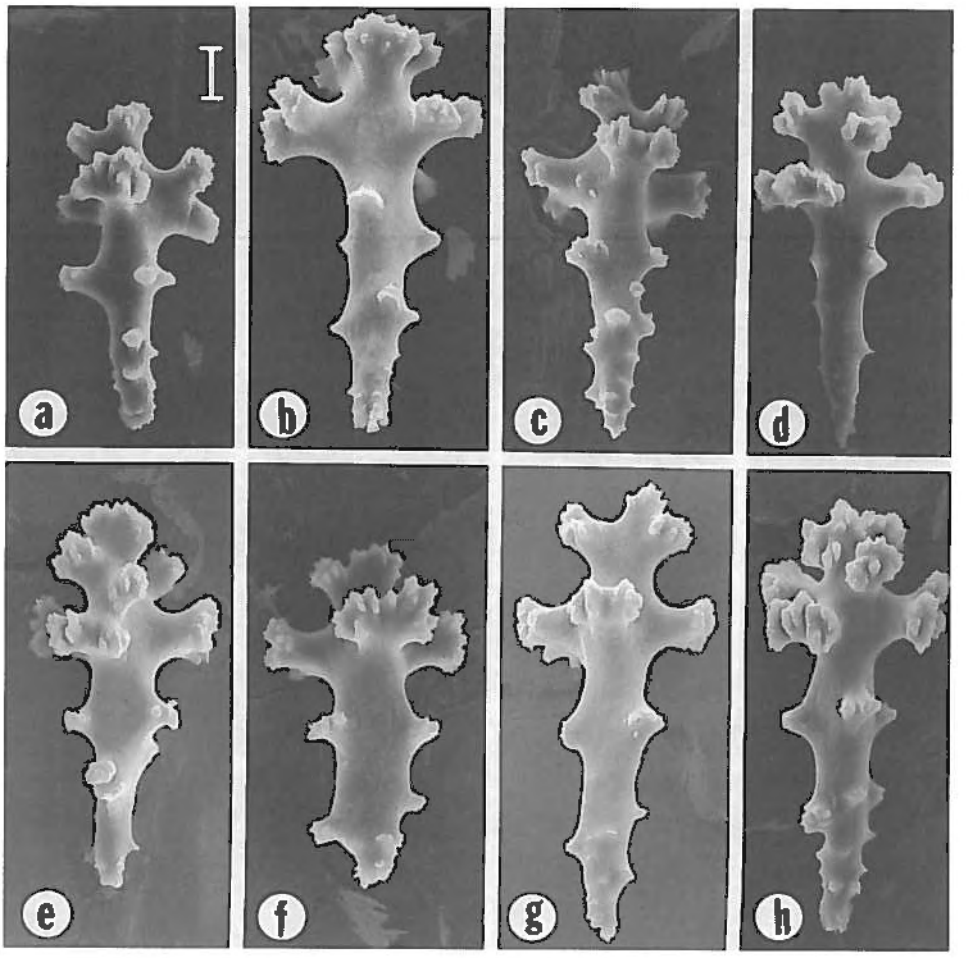

Figure 18. *Sinularia paulae* spec. nov., holotype (ZMTAU Co 29241); sclerites from the surface layer of the lobes. Scale in a, 0.01 mm, applies to all.

tracted but some are seen on the lower part of the lobes. The stalk of the paratypes has remarkable deep longitudinal groves. They are beige, light brown-green in color.

Etymology. The species is named after Dr. V. J. Paul, University of Guam Marine Laboratory, Guam (UOGML), in appreciation to her significant contribution to the study of chemical ecology of soft corals and the initiative to conduct the present survey.

Remarks. Since the clubs of the surface layer of the lobes of the examined specimens are less than 0.10 mm long, a comparison was made with other known *Sinularia* species hitherto described, that contain small clubs with a central wart,

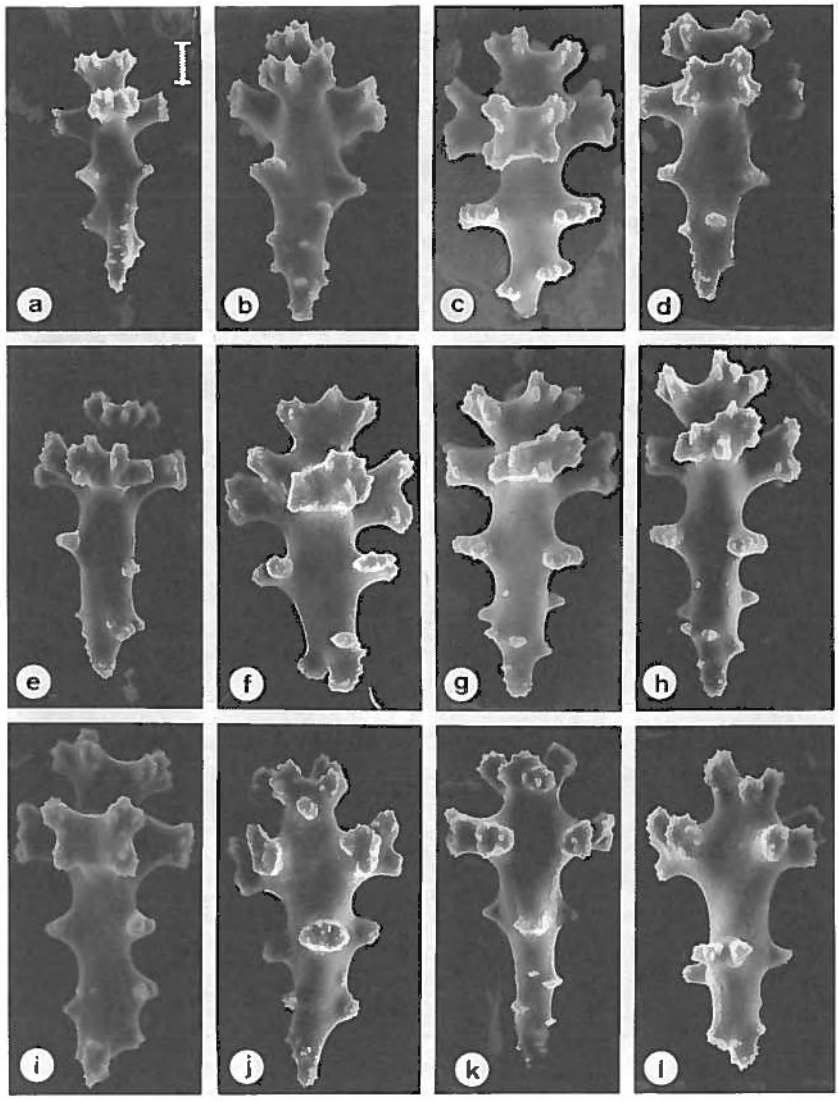

Figure 19. *Sinularia paulae* spec. nov., holotype (ZMTAU Co 29241); sclerites from the surface layer of the base. Scale in a, 0.01 mm, applies to all.

viz.: *Sinularia ceramensis* Verseveldt, 1977; *S. cruciata* Tixier-Durivault, 1970; *S. depressa* Tixier- Durivault, 1970; *S. gibberosa* Tixier-Durivault, 1970; *S. grandilobata* Verseveldt, 1980; *S. microclavata* Tixier-Durivault, 1970; *S. mira* Tixier-Durivault, 1970 and *S. platylobata* van Ofwegen & Benayahu, 1992. All these species have in addition to the small clubs some longer clubs, 0.16 mm or larger (see also

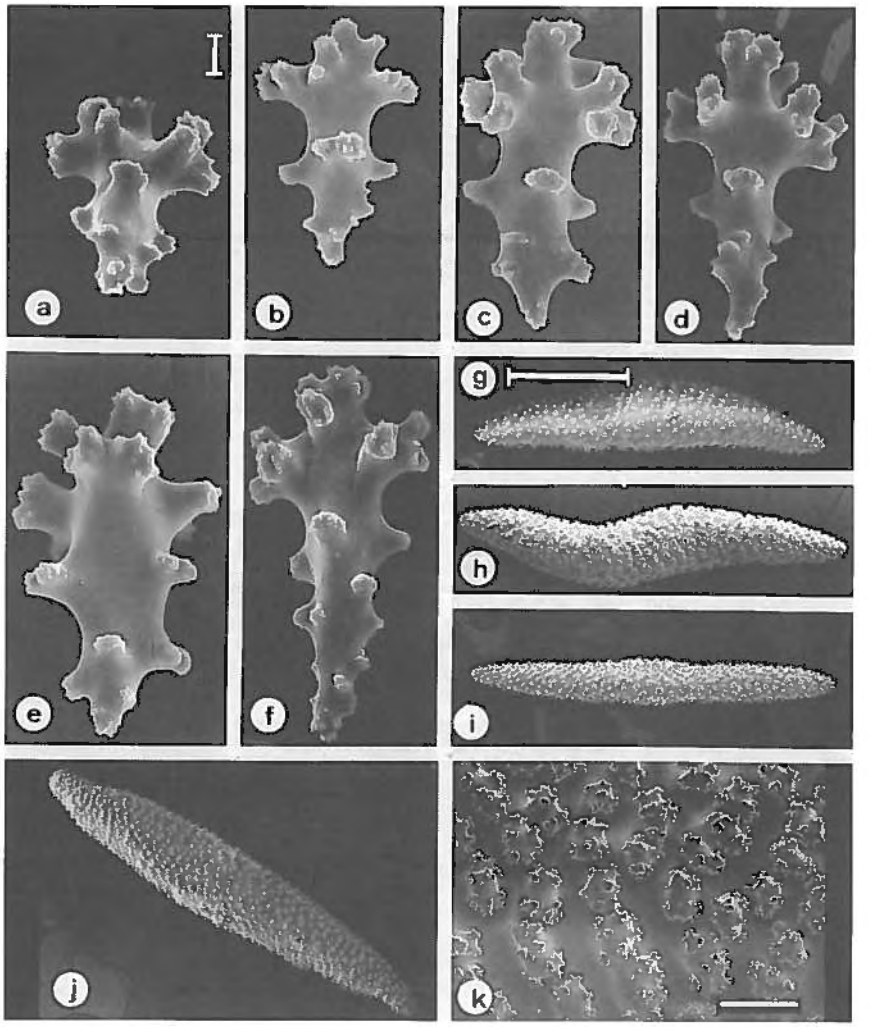

Figure 20. *Sinularia paulae* spec. nov., holotype (ZMTAU Co 29241); a–f, sclerites from the surface layer of the base; g–j, sclerites from the interior of the base; k, ornamentation of the spindle of interior base. Scale in a, 0.01 mm, applies to a–f; Scale in g, 10 mm, applies to g–j; scale in k, 0.1 mm only applies to k.

van Ofwegen & Benayahu 1992). *S. paulae* has a low and narrow size range of clubs with a central wart, not found in any of the listed species. In addition, it has no sclerites in the interior of the lobes, which also makes it different from the aforementioned species.

Field notes. The species is abundant on Cocos Lagoon and Piti Bomb Hole.

Sinularia peculiaris Tixier-Durivault, 1970

Sinularia peculiaris Tixier-Durivault, 1970; for synonymy see Verseveldt 1980: 104–105; van Ofwegen & Benayahu 1992: 140 (listed only); van Ofwegen 1996: 208 (listed only).

Local occurrence. Shark's Hole, 2 m, 6 October 1994 (ZMTAU Co 29395); Apra Harbor (Barge), 5 m, 10 October 1994, 2 colonies (ZMTAU C0 29249); Apra Harbor (Finger Reef), 4 m, 11 October 1994, 2 colonies (ZMTAU Co 29247).

Remarks. All three specimens were confirmed as *Sinularia peculiaris,* by a comparison with the sclerites of the holotype. ZMTAU Co 29395 possesses in the interior of the stalk numerous radiate and bizarre-shaped sclerites as described by Verseveldt 1980: 105. However, only very few of these sclerites are found in ZMTAU Co 29247, while none are present in ZMTAU Co 29249.

Field notes. Sporadic.

Geographical distribution. New Caledonia, a new record for Guam.

Sinularia polydactyla (Ehrenberg, 1834)

Sinularia polydactyla (Ehrenberg, 1834); for synonymy see Verseveldt 1980: 107–108; van Ofwegen & Benayahu 1992: 140 (listed only); van Ofwegen & Vennam 1994: 138 (listed only); Benayahu 1995: 107 (listed only); Benayahu & Schleyer 1996: 7 (listed only); van Ofwegen 1996: 208 (listed only).

Local occurrence. Piti Bomb Hole, 3 m, 5 October 1994 (ZMTAU Co 29340, 29316), 4 m, 5 October 1994 (ZMTAU Co 29369), 2 m, 5 October 1994 (ZMTAU Co 29280, 29392); Shark's Hole, 1–2 m, 6 October 1994 (ZMTAU Co 29330); Cocos Lagoon, 6 m, 9 October 1994 (ZMTAU Co 29321, 29338, 29317); Apra Harbor (Barge), 2 m, 10 October 1994 (ZMTAU Co 29319); Apra Harbor (Spanish Steps), 4 m, 10 October 1994 (ZMTAU Co 29315); Apra Harbor (Finger Reef), 5 m, 11 October 1994 (ZMTAU Co 29282), 6 m, 11 October 1994 (ZMTAU Co 29314), 4 m, 11 October 1994 (ZMTAU Co 29344); Facpi Is., 23 m, 14 October 1994, 2 colonies (ZMTAU Co 29337); Cocos Lagoon, 31 May 1996, leg. V. J. Paul (ZMTAU Co 30003).

Field notes. Dominant. Colonies with long finger-like, branched lobes (Plate III D).

Geographical distribution. Widespread in the Indo-Pacific reefs.

Sinularia querciformis (Pratt, 1903)

Sinularia querciformis (Pratt, 1903); for synonymy see Verseveldt 1980: 112; 1978: 10–17; Alderslade & Shirwaiker 1991: 189 (listed only); van Ofwegen & Benayahu 1992: 140 (listed only); Benayahu 1993: 6 (listed only); 1995: 107 (listed only); van Ofwegen 1996: 208 (listed only).

Local occurrence. Apra Harbor (Finger Reef), 20 m, 11 October 1994, 1 colony and two small fragments (ZMTAU Co 29401).

Field notes. Rare. Small arborescent colonies (Plate III E) with wider branch tips.

Geographical distribution. Maldives, the Malay Archipelago, New Caledonia, Red Sea, Bismarck sea, a new record for Guam.

Sinularia variabilis Tixier-Durivault, 1945

Sinularia variabilis Tixier-Durivault, 1945; for synonymy see Verseveldt 1980: 119–123; Benayahu 1993: 6 (listed only); van Ofwegen & Vennam 1994: 138 (listed only); Benayahu 1995: 107 (listed only).

Local occurrence. Facpi, 20 m, 14 October 1994 (ZMTAU Co 29381).

Field notes. Rare.

Geographical distribution. Tuamoto Is., Gambier Is., New Caledonia, Okinawa (Japan), a new record for Guam.

Family Briareidae Gray, 1859

Genus *Briareum* Blainville, 1830

Briareum excavatum (Nutting, 1911)

Suberia excavata Nutting, 1911: 14.
Solenopodium excavatum; Kükenthal, 1919: 42; 1924: 13; Stiasny 1937: 12–14; Verseveldt 1940: 32–37.
Solenopodium stechei; Aurivillius, 1931: 8–10 (according to Verseveldt 1940).
Not: *Erythropodium stechei* Kükenthal, 1908: 11.
Not: *Solenopodium stechei* Kükenthal, 1919: 38; 1924: 12.

Remarks. Bayer 1961: 62 synonymized the Pacific species of *Solenopodium* with the genus *Briareum.*

Local occurrence. Outer Orote Peninsula, Blue Hole at Margin of Sting Hole, 18–22 m, August 1995, leg. G. Paulay, 2 colonies (ZMTAU Co 30008).

Field notes. Rare.

Geographical distribution. Timor, Indonesia, a new record for Guam.

Family Asterospiculariidae Utinomi, 1951

Genus *Asterospicularia* Utinomi, 1951

Asterospicularia randalli Gawel, 1976

(Figure 21)

Asterospicularia randalli Gawel, 1976: 303–307, figures 1–3.

Local occurrence. Shark's Hole, shallow reef areas, 1–2 m, 6 October 1994, 4 colonies (ZMTAU Co 29404).

Description. The specimens are composed of several capitula and are 2–4 cm across (Figure 21a). Most of the polyps are retracted and leave tiny pits on the surface of the lobes. The tentacles contain disc like sclerites which are 0.015–0.020

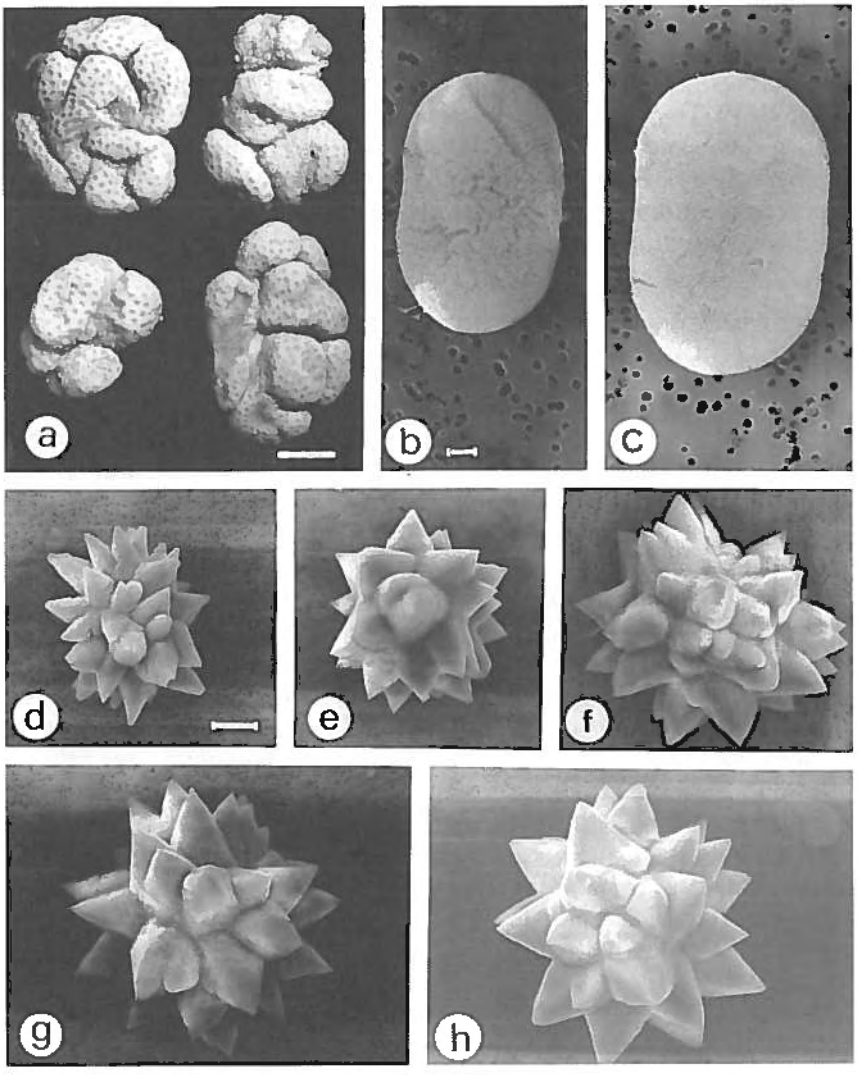

Figure 21. *Asterospicularia randalli* Gawel, 1976, (ZMTAU Co 29404); b, c, discs from the tentacles; d–h, satellite sclerites, scale in a, 10 mm, applies to a; scale in b, 0.001 mm, applies to b,c; scale in d, 0.01 mm, applies to d–h.

mm in length (Figure 21b,c). The characteristic spiny balls of the genus are 0.036–0.079 mm in diameter (Figure 21d–h).

Remarks.—Comparison of these colonies with the description of the holotype (Gawel 1976) shows an agreement, both in colony morphology and sclerite shape. However, the maximal diameter of the spiny balls of the present specimens

(0.079 mm) is higher than the size (0.060 mm) found in the holotype. This study is the first to describe by scanning microscopy the sclerites of *A. randalli.*

Field notes. Sporadic. Numerous colonies form large aggregations on the reef (Plate III F). The colonies have many capitula, and others, probably juveniles, have only a single capitulum. The contractile polyps are beige or light brown, the capitulum is mostly beige-gray.

Geographical distribution. Guam is the type locality of the species and so far it is known only from there.

Discussion

A total of 35 soft coral species of the families Alcyoniidae, Asterospiculariidae and Briareidae is recorded here for Guam. The present survey thus shows a higher soft coral diversity than the 29 species recorded from several Micronesian islands by Utinomi (1956). Gawel (1976, 1977) listed 31 soft coral species, including 12 unidentified, on Guam's reefs. Gawel's collection was later re-examined by Verseveldt (1973), who identified 23 species. All the previous studies have included members of the family Nephtheidae in their species count. Therefore, when considering the specimens of the Nephtheidae, collected in the present survey, the actual number of soft corals is even higher than the 35 listed here. The current collection shares 13 species with the list provided by Verseveldt (1978); it has also yielded one new species and 21 new zoogeographical records, already identified from various other Indo-Pacific sites. At present, Guam is the type locality for four soft coral species, i.e.: *Asterospicularia randalli* Gawel, 1976; *Sinularia gaweli* Verseveldt, 1978, *Minabea goslineri* Williams 1992, and *S. paulae* spec. nov. Together with the four additional Alcyoniidae species already known for Guam, and not found in the present survey, i.e. *Alcyonium utinomii* Verseveldt, 1971, *Lobophytum crebriplicatum* von Marenzeller, 1886, *Sinularia cristata* Tixier-Durivault, 1969 and *S. notanda* Tixier-Durivault, 1966 (see Verseveldt, 1978), the total number of species for these reefs currently amounts to 40.

The Alcyoniidae are noticeably the most conspicuous family, contributing the vast majority of the octocoral species on the Guam's reefs (see results). High species diversity of *Lobophytum, Sarcophyton* and *Sinularia* is a characteristic of many Indo-Pacific reefs (references in: Benayahu, 1995). The dominance of the alcyoniids on Guam's reefs is more pronounced due to the paucity or even absence of other octocoral families. Species of the Nephtheidae are scarce on the studied reefs and mostly confined to deep reef habitats (unpubl. data). No Xeniidae were collected. Gawel (1977) listed for Guam both *Anthelia glauca* and *Sympodium coeruleum* of the family Xeniidae. The absence of xeniids in the present survey is thus also of interest because of their high abundance on reefs of other Micronesian islands (personal observations).

In recent decades the reefs of Guam have suffered various natural and anthropogenic disturbances, or synergistic interactions between the two (Richmond

1993). Sedimentation and terrigenous runoff have killed corals there, and have also been shown to cause a drop in fertilization rates of spawning corals. Changes in water quality impact on Guam's reefs with various sublethal effects. In addition, the reef community composition has been altered by thermal discharge (Randall 1992). Guam's reefs also experienced devastating outbreaks of the crown-of-thorns starfish, *Acanthaster planci* (Marsh & Tsuda 1973, Randall 1973, Richmond 1993). In addition, they suffer from frequent severe tropical storms and typhoons (Richmond 1993). Both these anthropogenic and natural stresses affect the reef fauna, its mortality rate and possibilities of recovery. These disturbances may also caused changes over time to Guam's soft-coral species composition. For example, such stresses might have eliminated the xeniids from Guam's reefs (Gawel 1977; this study). However, the dense coverage of some species on the surveyed reef sites (i.e., *Lobophytum batarum, L. pauciflorum, Sarcophyton trocheliophorum, S. glaucum, Sinularia maxima, S. polydactyla* and *Asterospiclularia randalli*) may demonstrate their capability to withstand such disturbances. In most of the studied sites soft corals and scleractinians coexist, thus contributing to the reef living coverage. The almost complete space monopolization at Cocos Is. by dense and rich coverage of the three *Sinularia* species, (*S. maxima, S. paulae* and *S. polydactyla*) is, however, of special interest. These soft corals are successfully growing there mostly on dead colonies of the stony coral *Acropora.* It is thus suggested that they are able to flourish in areas where soleractinian corals can not survive. Further surveys on other Micronesian islands will enable an evaluation of the spatial patterns of octocoral diversity in the region, and an assessment of the environmental impacts on this faunistic component. Such data are required for an effective conservation policy aimed at maintaining the high biodiversity known for Micronesia and the adjacent reef systems.

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