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A qualitative appraisal of the soft corals (Octocorallia: Alcyonacea) off Mandapam, South India

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ABSTRACT

The discovery of rare prostaglandins in soft corals has initiated a general interest in this group as an easily available source of several 'wonder drugs'. During the present study four species of soft corals from the family Alcyoniidae are described in the light of scanning electromicrographs of the sclerites to facilitate easy identification. Although 28 species are recorded earlier, three species listed in the present account are new records to the Gulf of Mannar Biosphere Reserve.

Introduction

Soft corals are colonial animals akin to hard corals and are the most beautifully coloured components of the coral reefs. They play a significant role in the global coral ecology. There is a growing interest in the biomedical applications of octocorals. The discovery of prostaglandins from a Caribbean gorgonid *Plexaura homomalla* in 1969 and from the soft coral, *Sarcophyton crassocaule* in 2000 triggered off a world wide 'hunt' for alcyonaceans. The octocroal fauna of Gulf of Mannar has been the subject of several studies (Foote, 1889; Thurston, 1895 and Sewell, 1935). Recently, distribution and status of soft corals have been reported by Jayasree and Parulekar (1997) and Suresh Kumar and Venkataraman (2005). However, species which are not reported earlier by these authors are recorded and described in detail. Furthermore, this study is aimed at presenting their structural characteristics (sclerites) in the light of scanning electron microscopy so that it will be a reference manual for future workers.

Materials and methods

Soft coral material was studied from the collections made by Andhra University, Waltair under the DOD national Project on "Development of Potential Drugs from the Sea". All specimens reported are preserved in 70% ethanol and deposited in the Marine Biodiversity Museum (MBM) at Central Marine Fisheries Research Institute, Kochi.

Sclerite preparations are made from surface and interior (coenenchyme) of the capitulum, lobe and of the stalk / base. A thin layer of tissue was removed and placed on a cavity slide. A few drops of 10% sodium hypochlorite solution were added and allowed for 3-8 minutes to dissolve the tissue and leave the sclerites

intact. The sclerites were rinsed thoroughly with distilled water and transferred to an ordinary slide for study under a compound microscope. Wet preparations are used for immediate examination. For permanent preparation, the sclerites are dried on a hotplate, treated with xylol and mounted in DPX under a coverslip. However, minute sclerites were studied in detail under the scanning electron microscope. The separated sclerites were processed for SEM, dried, coated with gold, observed and photographed under SEM (Hitachi H – 600 with 6010-A scanning attachment) at 50 KV accelerating voltage at various magnifications. As some of the sclerites are too big to be photographed by electron microscopy, such sclerites were photographed under optical stereozoom microscope (Leica). The photomicrographs were edited using image editing software and the sclerites were classified according to their morphological characteristics for taxonomic identification.

Analysis of the samples revealed the presence of species referable to genera belonging to the order Alcyonacea and family Alcyoniidae. The general classification followed here is that of Bayer (1963) and the revisions of the genera *Sinularia, Sarcophyton* and *Lobophytum* made by Verseveldt (1980,1982, 1983). The account on the soft corals of Laccadive Archipelago by Alderslade and Prita, 1991 was also referred for their identification. Suitable illustrations are provided for species to facilitate their easy identification and comparison with earlier records from the Indian Ocean or elsewhere.

Results and discussion

Phylum : Cnidaria

Class : **Anthozoa**

Subclass : Octocorallia

Order : **Alcyonacea**

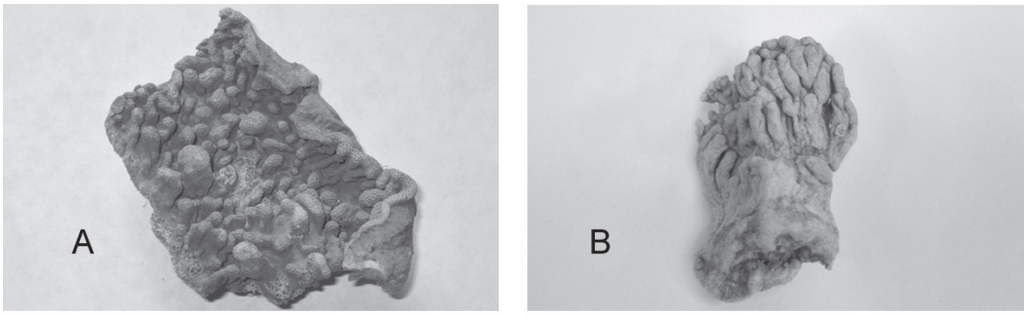
Family : Alcyoniidae

1. *Sinularia parulekari* Alderslade& Prita, 1991 (Pl. I A, figs. 1- 4)

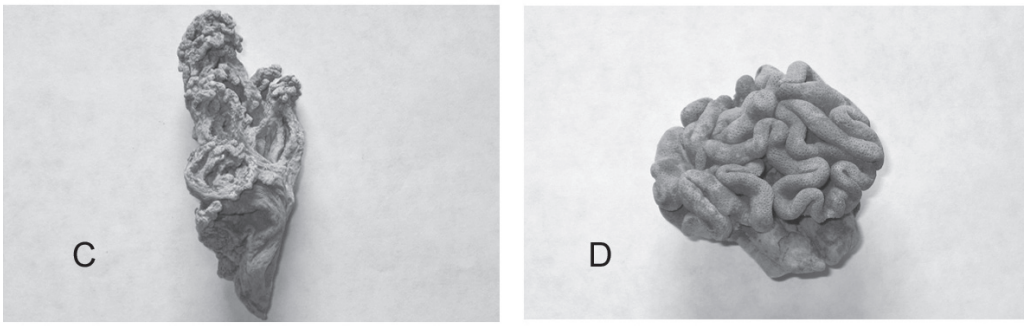
Sinularia parulekari Alderslade & Prita, 1991, 8(1): p.217-219 Fig. 27-35

Material: One specimen (MBM – CF. 5. 1. 1. 1).

Description: The colony measures 77.48 mm in width and 21.90 mm in height and is dark brown in colour. It consists of a stalk and the lobe with some knob like lobules of various shapes. The surface layer of the lobules contains (1) small clubs of the leptoclados type, about 0.15 - 0.20 mm in length (Fig. 1a). (2) clubs, up to 0. 16 mm long, with warted heads and handles along with narrow spindles, up to 0.34 mm long that have warts often in zones (Fig. 1b). Base of the polyp in addition to the poorly developed clubs have a few spindles about 0.15 mm long (Fig. 1d). There are also a small number of rodlets in the polyps ranging from 0.05 - 0.09 mm (Fig. 1c). The interior of the lobes is packed with plump spindles up to 1.70 mm long x 0.37 mm broad (Fig. 2a) and along with these are smaller pointed spindles 0.50 to 1 mm covered with the same form of large warts (Fig. 2b), in some pointed spindles (0.13 - 0.20 mm) the warts are not as densely arranged (Fig. 2c). The clubs in the surface layer of the stalk are similar to those in the lobules. Amongst these are numerous sturdier forms with thicker handles and heads with sharper processes (Fig. 3a). Larger clubs up to 0.13 mm also occur, some of which have warty heads that are not very *leptoclados* – like (Fig. 3b). Amongst the clubs, short plump spindles occur up to 0.16 mm in length which are irregularly warted and



Sinularia parulekari *Sinularia jasminae*



Sinularia kavarattiensis *Sarcophyton elegans*

Plate 1: Soft corals of Mandapam (GULF OF MANNAR BIOSPHERE RESERVE)

many have distinct waist and warts arranged in zones (Fig. 3c). Their length varies from 0.10 - 0.29 mm (Fig. 3a - c). The interior of the stalk has two types of sclerites, the largest are relatively stout spindles that have small bifurcations measuring up to 2.10 mm length x 0.40 mm width (Fig. 4a). Mingled with these long spindles are numerous small oval sclerites. Some are irregularly warted and others are capstan like, about 0.30 – 0.70 mm with distinct waist and two whorls of warts (Fig. 4b); these sclerites together with a few longer forms with many whorls of warts (Fig. 4c) are also quite distinct and measures 0.60 – 1.80 mm. This species has been recorded as new to science from Laccadive Archipelago. However it is a new record to Mandapam, South-east India.

2. *Sinularia jasminae* Alderslade & Prita,1991 (Pl. I B, Figs 5-8)

Sinularia jasminae Alderslade & Prita, 1991, 8(1): p. 211-214 Figs. 20-26.

Material: A single specimen (MBM – CF. 5. 1. 1. 2).

Description: The colony is 63.78 mm high and 42.37 mm wide with light yellowish brown colouration. Surface of the polypary is crowded with digitiform lobules. Surface of the lobes contains leptoclados–type clubs, mostly 0.10 - 0.17 mm in length (Fig 5a). Below the clubs are slender warty spindles up to 0.37 mm in length (Fig. 5b). The interior of the lobes has small spindles ranging from

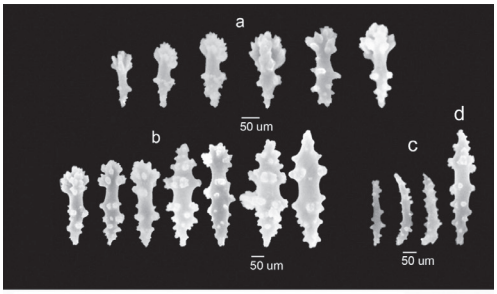


Fig. 1. *Sinularia parulekari* Sclerites from the surface layer of the lobe

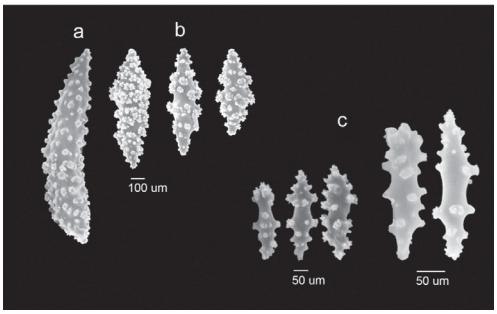


Fig. 2. *Sinularia parulekari* Sclerites from the interior of the lobe

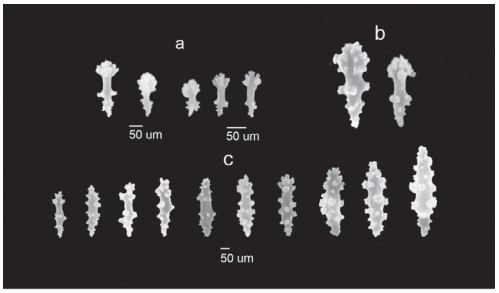


Fig. 3. *Sinularia parulekari* Sclerites from the surface layer of the stalk

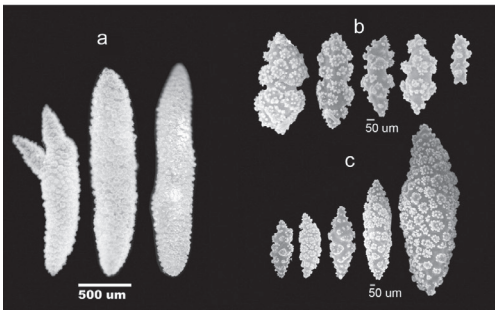


Fig. 4. *Sinularia parulekari* Sclerites from the interior of the stalk (b.c. EM, a - stereozoom)

0.24 – 0.50 mm and some of them are complexily warted (Fig. 6a). Along with these are found large (plump) coenenchymal spindles from about 0.50 mm - 1.70 mm in length and 0.21 – 0.60 mm in width, a few approaching a length of 2.71 mm (Fig. 6b). These spindles have spiny warts. On the surface of the base, only a few *leptoclados* type clubs are found. They are similar to those in the lobes and measure about 0.13 - 0.21 mm in length (Fig. 7a). Amongst them are numerous warty spindles of 0.39 - 0.54 mm (Fig. 7 b-c). As in the interior of the lobes there are numerous small pointed spindles of 0.15 - 0.32 mm (Fig. 8a) The large, heavily warted spindles are shorter than those in the lobes. Although up to 1.46 mm in length (Fig. 8b), most of them are smaller (0.88 - 0.98 mm) (Fig.8c). The smaller ones tend to have the warts in whorls and many of the forms resemble the interior sclerites of *Lobophytum* or *Sarcophyton*. This species has been recorded as new to science from Laccadive Archipelago. However it reported here as a new record to Mandapam, South-east India.

3. *Sinularia kavarattiensis* Alderslade& Prita, 1991 (Pl. I C, Figs. 9-12)

Sinularia karvarattiensis Alderslade & Prita, 1991, 8(1): p.219-225 fig. 36-4

Material: A single specimen (MBM – CF. 5. 1. 1. 3).

Description: The colony is 78.63 mm high and 35.39 mm wide and is light brown in colour. Each lobe branches 20 - 30 mm above the base into a mass of digitiform lobules. The surface of lobes is wrinkled. The surface of the lobes and lobules contain clubs mostly 0.07 - 0.13 mm in length and are clearly of the

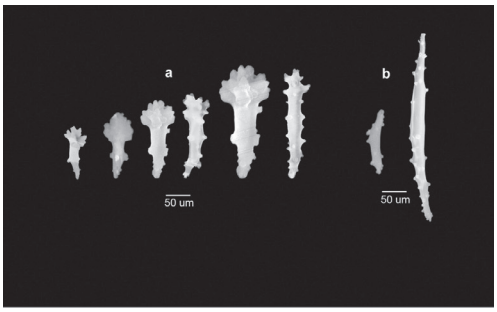


Fig. 5. *Sinularia jasminae* Sclerites from the surface layer of the lobe

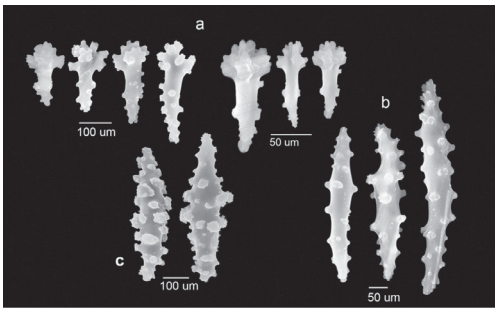


Fig. 7. *Sinularia jasminae* Sclerites from the surface of the stalk

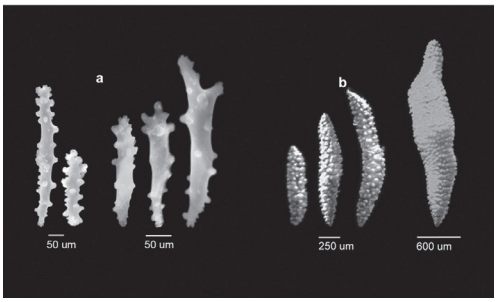


Fig. 6. *Sinularia jasminae* Sclerites from the interior of the lobe

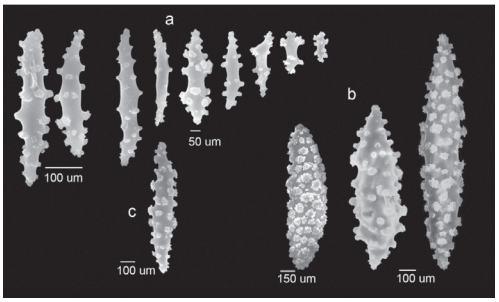


Fig. 8. *Sinularia jasminae* Sclerites from the interior of the stalk

leptoclados type (Fig. 9a). Below the clubs there are slender long spindles about 0.11- 0.19 mm (Fig. 9b). In the surface of the lobes there are also slender clubs of a modified leptoclados type which are mostly 0.19 - 0.23 mm in length (Fig. 9c). They also contain small rods, some flattened, and many curved about 0.11-0.19 mm (Fig. 9d). Below the clubs there are long slender spindles ornamented with simple processes (Fig. 9e); the shorter ones up to about 0.28 mm long, often have simple warts clustered at each end with the middle zone nearly smooth. The larger ones usually have even distribution of warts and can be as long as about 0.45 mm, although this is not common. The interior of the lobes contains slender curved spindles up to 1.90 mm long (Fig. 10b) mostly smaller, with high complex warts that are not densely arranged (Fig. 10a). The surface of the stalk contains clubs about 0.11 - 0.15 mm and are of leptoclados type (Fig. 11a). The longer clubs (Fig. 11b) have modified leptoclados heads (0.30 - 0.42 mm)

The large spindles of the stalk interior are fatter and longer than those in the lobes. They are up to about 2.35 mm long (Fig.12a) and ornamented with complex warts. Among the long spindles there are numerous smaller forms, up to about 0.35 - 0.66 mm long (Fig.12b).

Sinularia kavarattiensis is reported for the first time from Mandapam and the colony shows similarity with that of *S. leptoclados* which is reported in GOMBR. However, *S. leptoclados* lacks long warty clubs and slender spindles (curved) of the surface layer of *S. kavarattiensis.*

4. *Sarcophyton elegans* Moser, 1919 (Pl. I D, Figs. 13-16)

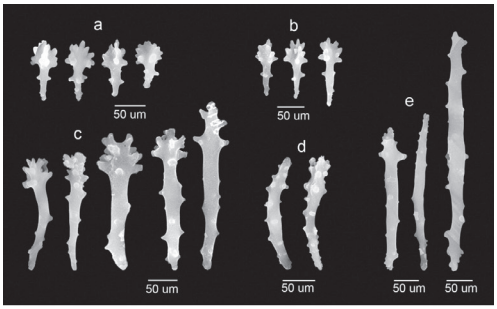


Fig. 9. *Sinularia kavarattiensis* Sclerites from the surface of the lobe

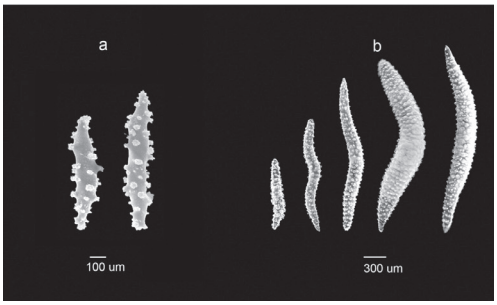


Fig. 10. *Sinularia kavarattiensis* Sclerites from the interior of the lobe

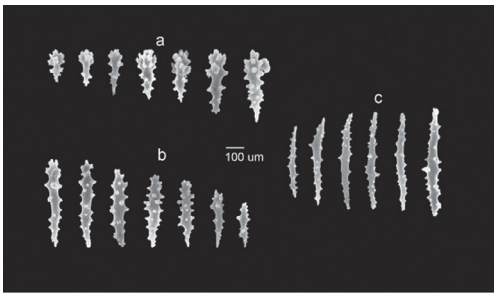


Fig. 13. *Sarcophyton elegans* Sclerites from the surface of the lobe

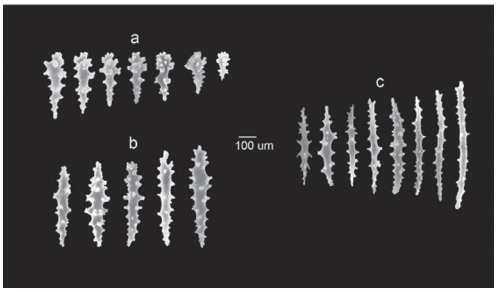


Fig. 14. *Sarcophyton elegans* Sclerites from the interior of the lobe

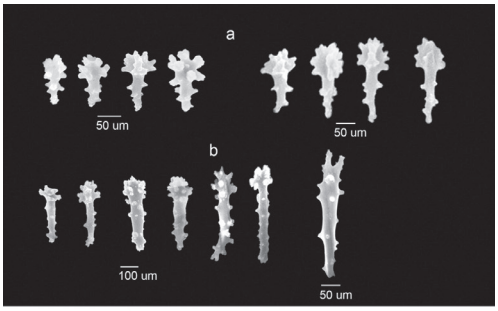


Fig. 11. *Sinularia kavarattiensis* Sclerites from the surface of the stalk

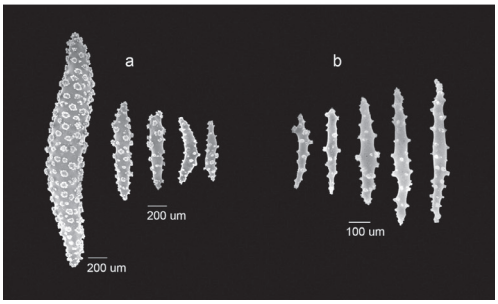


Fig. 12. *Sinularia kavarattiensis* Sclerites from the interior of the stalk

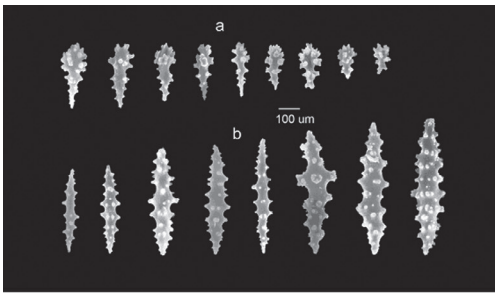


Fig. 15. *Sarcophyton elegans* Sclerites from the surface of the stalk

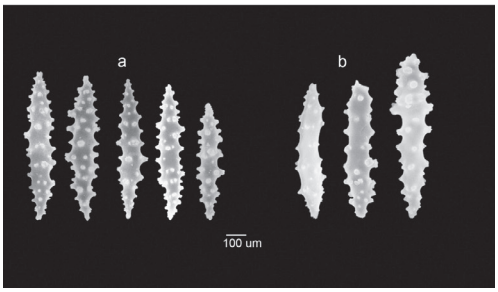


Fig. 16. *Sarcophyton elegans* Sclerites from the interior of the stalk

Sarcophyton elegans Moser, 1919, 9 (2): 250-253, fig. II, pl.5, fig.9

Sarcophyton elegans Verseveldt, !982, (192): 48-51, fig.18, pl. 3 figs.1, 2

Sarcophyton elegans Jayashree *et al*., 1996, 93: 205.

Material: One specimen (MBM – CF. 5. 1. 2. 1).

Description: The polypary of the colony is folded around the periphery and is 58.61 mm in diameter, disc of the colony is light grayish brown. Polyps are dimorphic with autozooids appearing as white spots. The difference in size between the autozooids (0.15 – 0.20 mm) and the siphonozooids (0.05 – 0.10 mm) is very distinct. The distance between the autozooids is 0.80 – 1 mm and that of siphonozooids is 0.20 – 0.30 mm; 1 - 3 siphonozooids are found separating the autozooids. The surface layer of the capitulum or disc contains 0.18 - 0.46 mm clubs with wider and warty heads (Fig. 13a); the warts on the handles are mostly zoned. The longer sclerites are also distinct clubs, measure within the range 0.21 – 0.43 mm and their heads bear spines/warts (Fig.13b). A large number of long, very delicate spindles, with relatively few simple low prominences are very distinct and measure up to 0.60 mm (Fig.13c). Interior of the disc contains rods and spindles with almost the same size range and have numerous low or conical prominences with blunt spines (Fig.14 a-c). Surface layer of stalk contains clubs (Fig.15a) similar to the clubs of the disc (0.13 - 0.33 mm) but the heads are bigger and warts are stouter; long spindles measuring up to 0.58 mm length are also found in this colony (Fig. 15b). Interior of the stalk contains blunt cylinders and spindles up to 0.78 mm long (Fig. 16b), covered with simple spiny warts; narrow spindles up to 0.80 mm long with fewer prominences are also present (Fig. 16a). This species was reported from Gulf of Mannar and Andaman Islands. World wide it is reported from Philippines, Great Barrier Reef, Madagascar, Seychelles, Japan, Vietnam, New Caledonia Laing I. (Papua-New Guinea).

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