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**Corals of the South-west Indian Ocean
I. Alcyonacea from Sodwana Bay, South Africa**

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EDITOR'S PREFACE

The Oceanographic Research Institute has had an interest in the corals of the south-west Indian Ocean for a number of years, evidence of this fact being the publication of a taxonomic review on South African Scleractinia at the start of the eighties (Boshoff, 1981)¹. Our Institute is about to enter a further publication phase on a number of aspects of coral reefs in the region. This is the result of a fresh initiative by the Institute in which Dr Benayahu of the Tel Aviv University is collaborating. The present paper is thus the first of a number of investigational reports dealing with the taxonomy and ecology of hard and soft corals as well as the associated communities.

M.H. Schleyer (ed)

Durban, February, 1993.

¹ Boshoff, P.H., 1981. An annotated checklist of Southern Africa Scleractinia. *Invest. Rep. Oceanogr. Res. Inst.* (49): 1-45.

ALCYONACEA FROM SODWANA BAY, SOUTH AFRICA

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ABSTRACT

A list of 37 species of Alcyonacea is presented for the coral reefs of Sodwana Bay in northern Natal, South Africa, including two new species. The latter are *Sinularia schleyeri* and *Efflatounaria sodwanae*, both of which are described and illustrated. This is the first description of an *Efflatounaria* species using scanning electron microscopy, revealing the fine structure of its platelets. In addition, a description of *Anthelia flava* (May, 1899) is also given and the structure of its sclerites, presented by scanning electron microscopy, indicates that they are unique in structure, consisting of needle-like skeletal units.

INTRODUCTION

The present survey deals with Alcyonacea (Cnidaria: Octocorallia) from the coral reefs on the northern Natal coast, Sodwana Bay, South Africa. These coral reefs are among the most southerly in the world (Ramsay & Mason, 1990). Previously, the southernmost records of African octocorals were from Inhaca Island, Mozambique (Tixier - Durivault 1960), which is north of Natal on the coast of South Africa bounding the Indian Ocean. A provisional annotated list of octocorals occurring on the sublittoral reef at Sodwana Bay was presented more recently by Williams (1989), who also presented information on the faunistic composition of Alcyonacea in southern Africa and aspects of their biogeography (Williams 1992 a,b). However, there is no taxonomic account on Alcyonacea from Natal reefs.

Alcyonacea were collected during land-based field trips to two reef sites at Sodwana Bay in 1991 and 1992: Two-mile Reef (27°31.2'S; 32°41.3'E) and Nine-mile Reef (27°24.9'S; 32°43.6'E; Fig. 1). A large variety of habitats was examined by SCUBA diving to a maximum depth of 24m. Approximately 125 samples were collected, primarily by the author. This is the first report dealing with the detailed species composition of Alcyonacea from this region. The collection is kept in the Zoological Museum, Department of Zoology, Tel Aviv University, Israel, abbreviated in the paper as ZMTAU. In this publication 37 species are recorded, two of which are new.

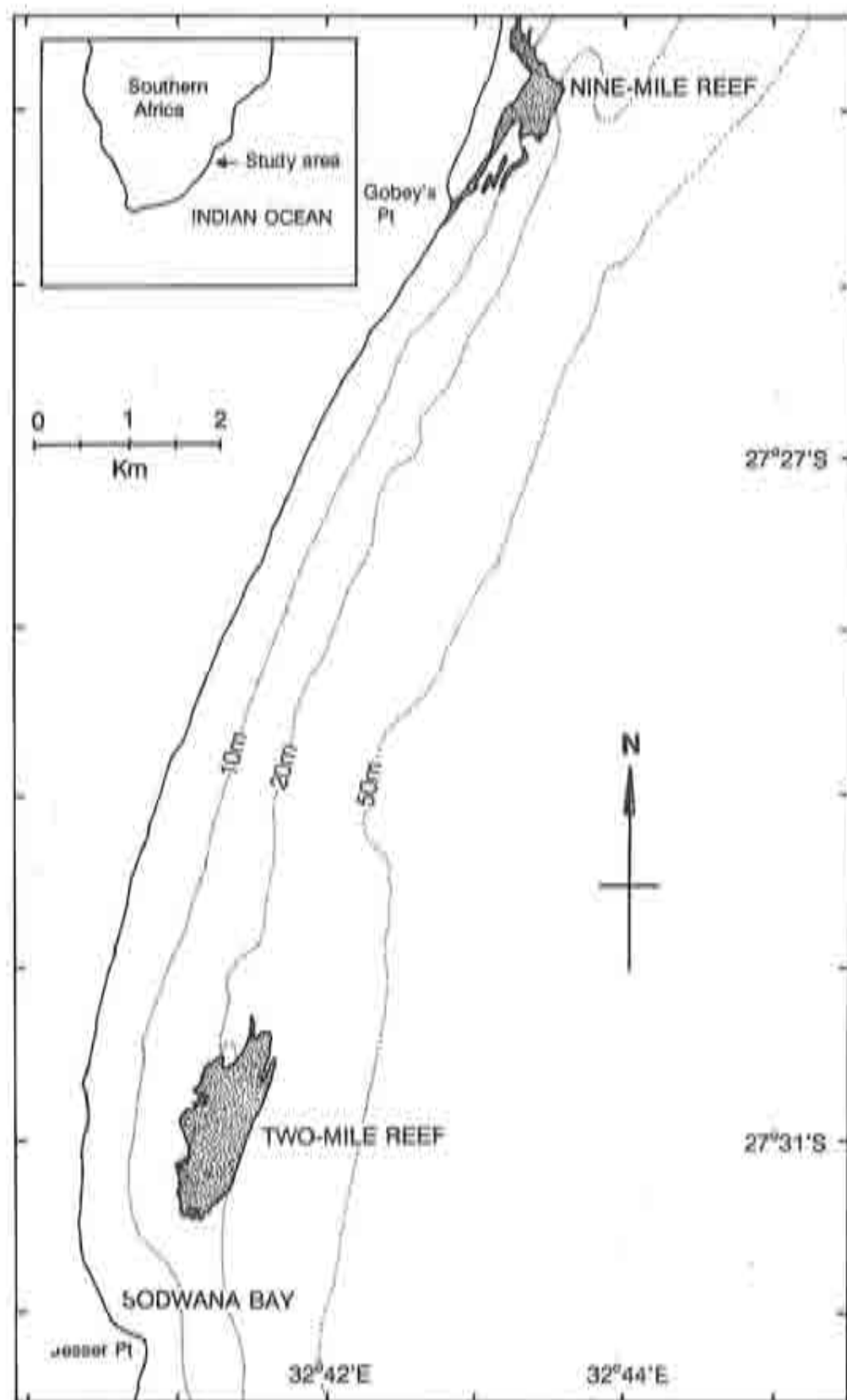


Fig. 1. Map of the study area (after Ramsay and Mason, 1990). Arrow in the inset indicates the position of Sodwana Bay.

LIST OF SPECIES

Order Alcyonacea Lamouroux, 1816; amended by Bayer (1981)

Family Tubiporidae Ehrenberg, 1828

- Genus *Tubipora* Linnaeus, 1758
Tubipora musica Linnaeus, 1758:
 ZMTAU Co 27815, 27875

Family Alcyonidae Lamouroux, 1812

- Genus *Cladiella* Gray, 1869
C. australis (Macfadyen, 1936):
 ZMTAU Co 27792, 27850, 27853

- Genus *Lobophytum* von Marenzeller, 1886
L. crassum von Marenzeller, 1886:
 ZMTAU Co 27790, 27800, 27869
L. depressum Tixier-Durivault 1966:
 ZMTAU Co 27808
L. latilobatum Verseveldt, 1971:
 ZMTAU Co 27818, 27892
L. patulum Tixier-Durivault, 1956:
 ZMTAU Co 27785
L. venustum Tixier-Durivault, 1957:
 ZMTAU Co 27786, 27805, 27811, 27846

- Genus *Sarcophyton* Lesson, 1834
S. crassum Tixier-Durivault, 1946:
 ZMTAU 27867
S. ehrenbergi von Marenzeller, 1886:
 ZMTAU Co 27816, 27886
S. flexuosum Tixier-Durivault, 1966:
 ZMTAU Co 27826
S. glaucum (Quoy & Gaimard, 1833):
 ZMTAU Co 27817, 27833, 27843, 27878
S. infundibuliforme Tixier-Durivault, 1958:
 ZMTAU Co 27793, 27824
S. trochellophorum von Marenzeller, 1886:
 ZMTAU Co 27809, 27839

- Genus *Sinularia* May, 1898
S. abrupta Tixier-Durivault, 1970:
 ZMTAU Co 27788, 27801, 27842, 27848, 27849, 27854,
 27859, 27874, 27890
S. brassica May, 1898:
 ZMTAU Co 27807, 27830, 27832, 27844, 27881, 27894
S. dura (Pratt, 1903):
 ZMTAU Co 27803, 27827, 27834, 27835, 27856, 27880,
 27884, 27885

S. erecta Tixier-Durivault, 1945:
 ZMTAU Co 27879
S. firma Tixier-Durivault, 1970:
 ZMTAU Co 27837, 27841
S. gardineri (Pratt, 1903):
 ZMTAU Co 27873, 27876
S. gyrosa (Klunzinger, 1877):
 ZMTAU Co 27789, 27794, 27799, 27852, 27888
S. heterospiculata Verseveldt, 1970:
 ZMTAU Co 27813, 27823, 27855, 27877
S. hirta (Pratt, 1903):
 ZMTAU Co 27882
S. leptoclados (Ehrenberg, 1834):
 ZMTAU Co 27791, 27814, 27819, 27822, 27831, 27831,
 27840, 27887
S. muralis (May, 1899):
 ZMTAU Co 27891
S. notanda Tixier-Durivault, 1966:
 ZMTAU Co 27820
S. querciformis (Pratt, 1903):
 ZMTAU Co 27851, 27865
S. schleyeri spec. nov.:
 ZMTAU Co 27900, 27931, 27932
S. triangula Tixier-Durivault, 1970:
 ZMTAU 27787, 27847
S. variabilis Tixier-Durivault, 1945:
 ZMTAU Co 27806, 27836, 27893

Family Xeniidae Ehrenberg, 1828

Genus *Anthella* Lamarck, 1816
A. flava (May, 1899):
 ZMTAU Co 27901
A. glauca Lamarck, 1816:
 ZMTAU Co 27796, 27797, 27804, 27833, 27838, 27858,
 27863
 Genus *Efflatounaria* Gohar, 1939
E. sodwanae spec. nov.:
 ZMTAU Co 27902
 Genus *Heteroxenia* K  lliker, 1874
H. fuscescens (Ehrenberg, 1834):
 ZMTAU Co 27802, 27920
 Genus *Sympodium* Ehrenberg, 1834
S. caeruleum Ehrenberg, 1834:
 ZMTAU Co 27895

Genus *Xenia* Lamarck, 1816
X. crassa Schenk, 1896:
 ZMTAU Co 27861, 27862, 27889, 27921
X. garciae Bourne, 1894
 ZMTAU Co 27866
X. kukenthall Roxas, 1933:
 ZMTAU Co 27922

Members of the Nephtheidae were also collected and are still being examined.

MATERIAL AND METHODS

The collected 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 with 10% sodium hypochlorite. Sclerites were prepared for scanning electron microscopy as follows: they were carefully rinsed with double distilled water, dried at room temperature, coated with gold, and then examined with a Jeol JSM 840A scanning electron microscope operated at 25 kV.

Sinularia schleyeri spec. nov. (Figs 2-4)

Material

Holotype, Nine-mile Reef, Sodwana Bay, Natal, South Africa, depth 16m, 22 July 1991 (ZMTAU Co 27900), 2 paratypes (ZMTAU Co 27931, 27932).

Description

The holotype (Fig. 2a) is an encrusting part of a colony, with a maximum cross section of 11.5 x 4 cm. The margins of the colony are raised to form a distinct rim, which is 20 to 30 mm high, making the colony cup-shaped. The surface of the colony is devoid of lobes and resembles a disc which has some ridges and low mounds. Some of the polyps are individually placed on calicular mounds, while many others occur on the surface of the colony. The centres of most polyps are 0.8-1.4 mm apart but this distance is reduced to 0.6-1.0 mm at the rim. The sclerites of the surface layer of the disc are mostly clubs, their length varying from 0.12 to 0.21 mm (Fig. 3a-g). Their heads have warty prominences and their pointed handles bear some spines and small warts. A few spindles with a maximum length of 0.26 mm also occur in the surface layer of the disc (Fig. 3h). The spindles of the interior of the disc are up to 3.6 mm in length and are rather densely covered with crenulated warts, 0.03-0.06 mm in diameter (Fig. 3i-l). The clubs in the surface layer of the base are shorter than those in the surface of the disc, with their length varying from 0.11 - 0.16 mm (Fig. 4a - j). Some have a distinct median waist (Fig 4a - e) and others have a triangular form (Fig. 4f-j). Spindles with a maximum length of 0.19 mm are also found here (Fig. 4k-l). Tuberculate spindles of up to 2.7 mm long are found in the interior of the base (Fig. 4m-o).

Colour

In alcohol the colour is beige to light brown. Living colonies with expanded polyps are brown; after their retraction the colonies are greenish to light beige.

Variability

The paratypes hardly differ from the holotype, except in size (Fig. 2b-c).

Etymology

The species is named after Dr. M.H. Schleyer, Oceanographic Research Institute, Durban, South Africa, as a token of gratitude for his inspiration to study the coral reefs of Natal.

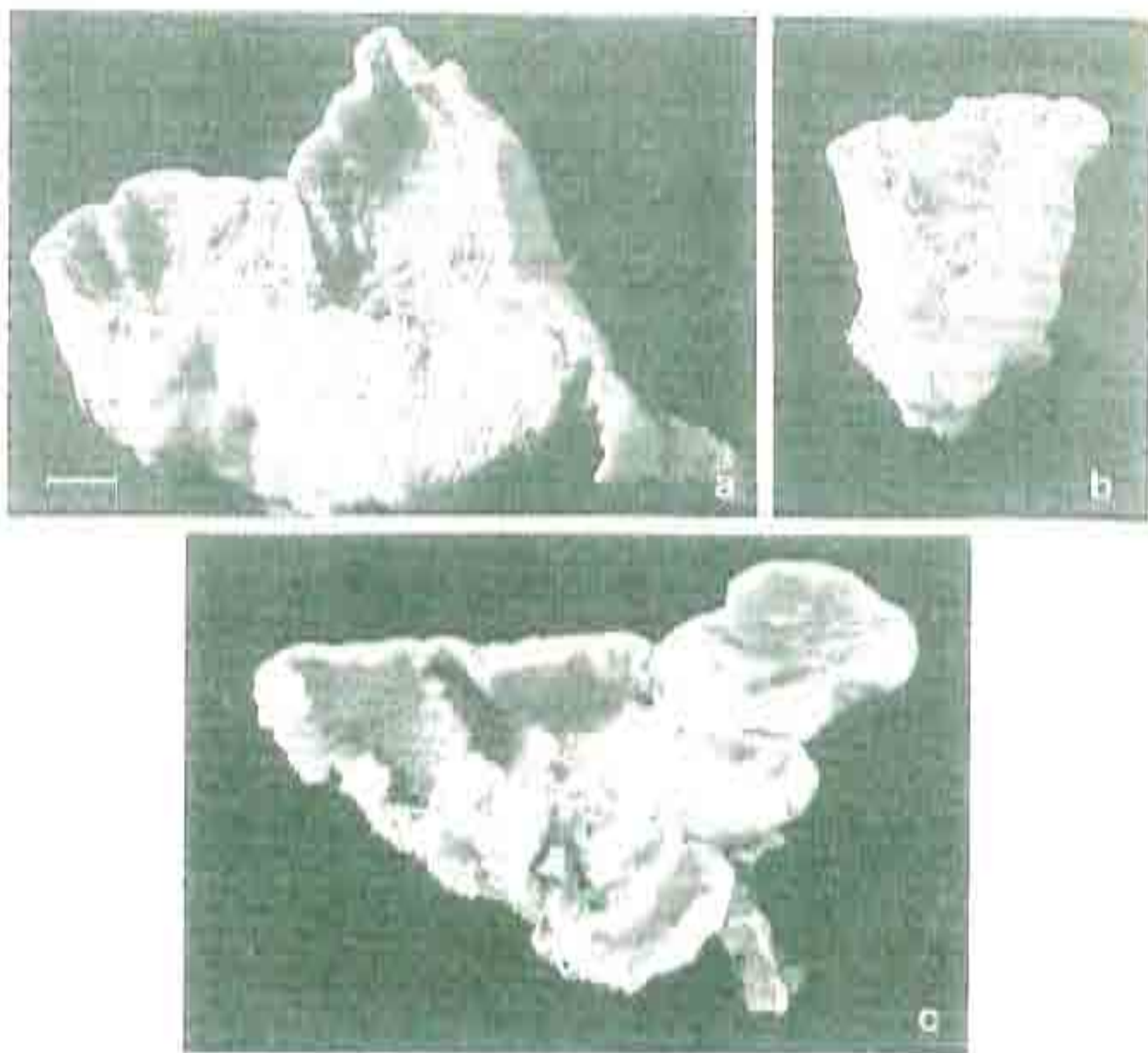


Fig. 2. *Sinularia schleyeri* spec. nov., a, holotype (ZMTAU Co 27900); b-c, paratypes (ZMTAU Co 27931, 27932). Scale at 2a, 10 mm, applies to 2a-c.

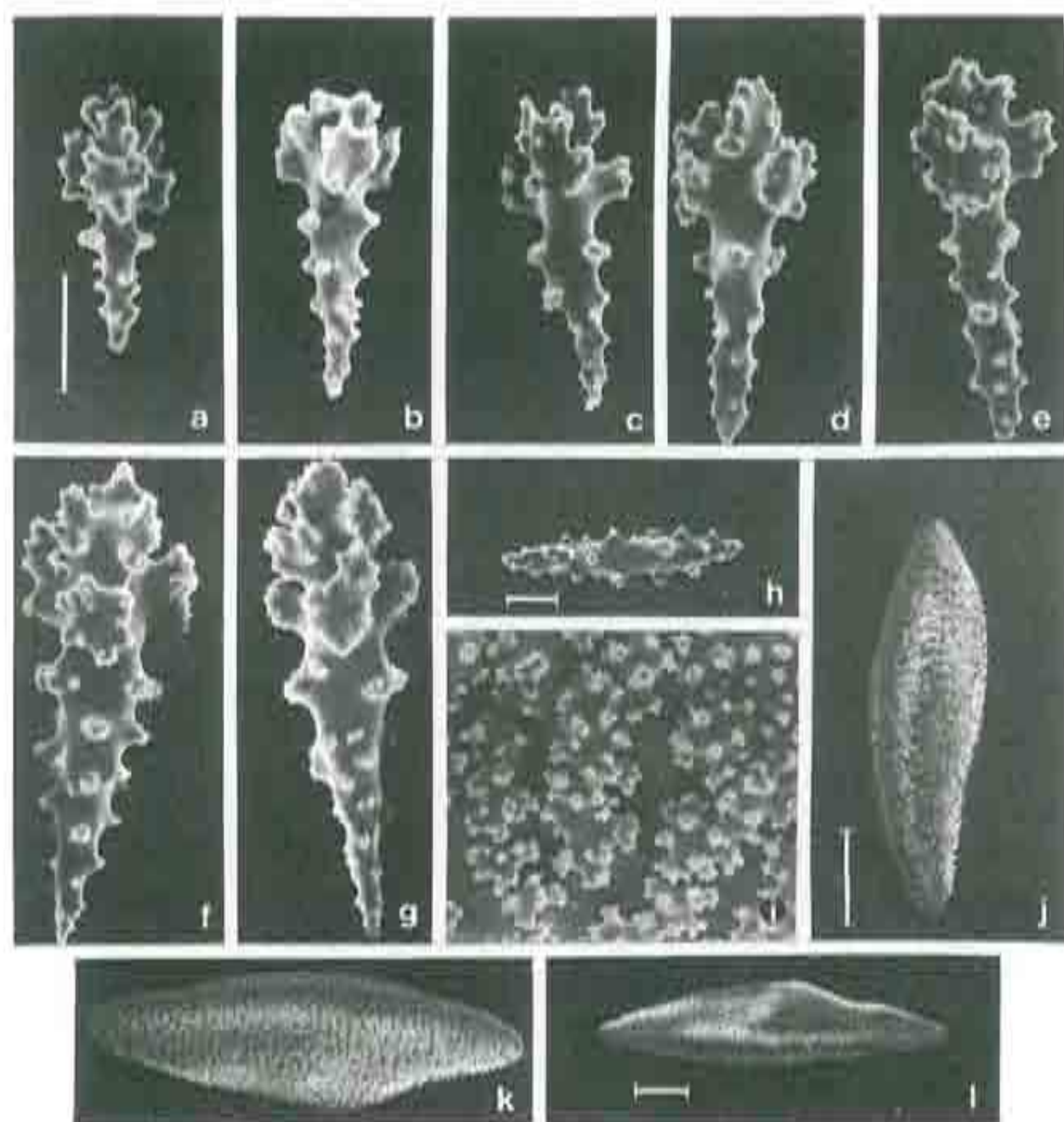


Fig. 3. *Sinularia schleyeri* spec. nov., holotype (ZMTAU Co 27900); a-h, sclerites of surface layer disc; i, surface ornamentation of spindle of interior disc; j-l, sclerites of interior disc. Scale at 3a, 0.05 mm, applies to 3a - g; scale at 3h, 0.05 mm; scale at 3j, 0.5 mm, applies to 3j-k; scale at 3l, 0.5 mm.

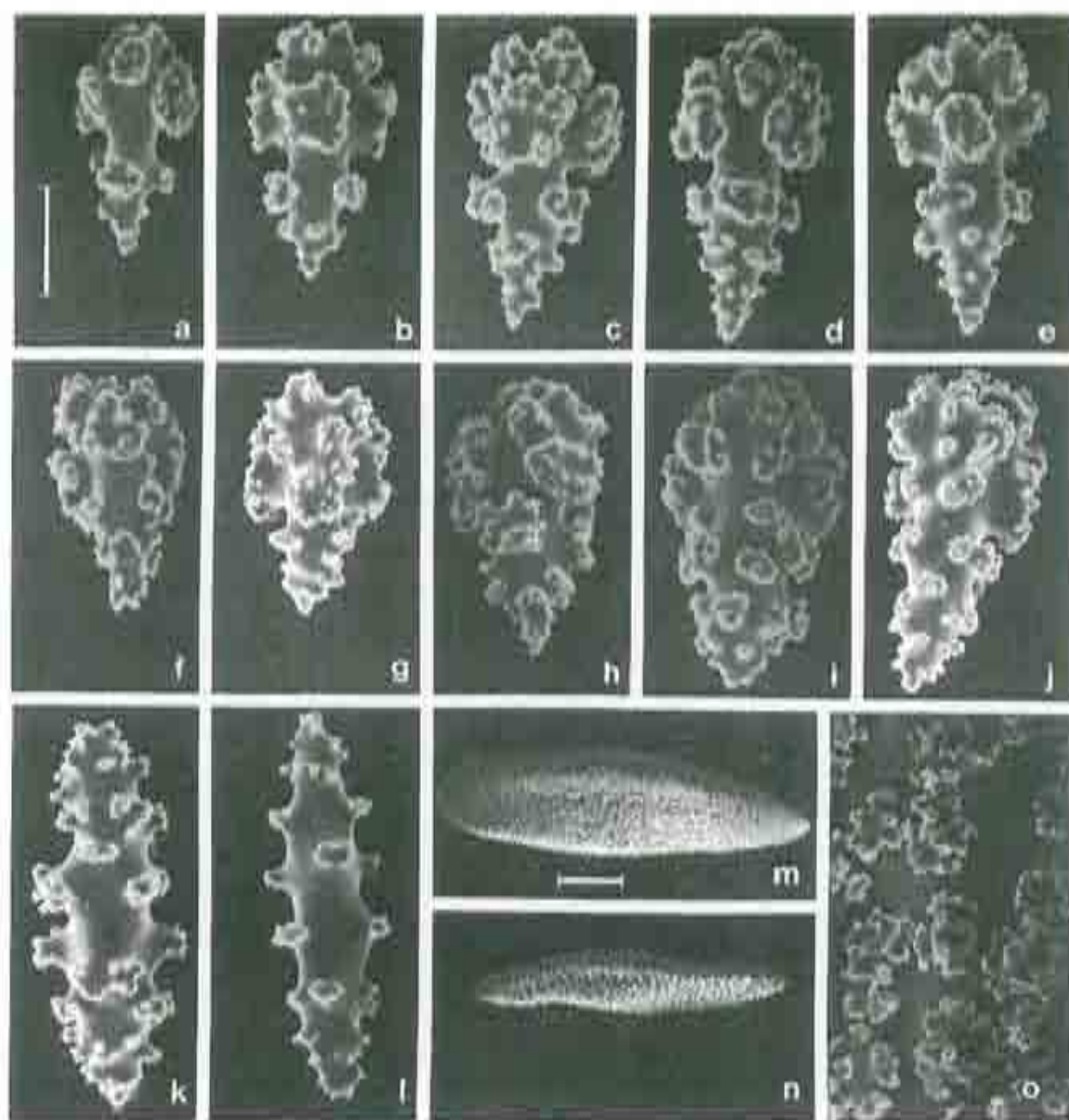


Fig. 4. *Sinularia schleyeri* spec. nov., holotype (ZMTAU Co 27900); a-l, sclerites of surface layer of the base; m-n, sclerites of interior of the base; o, surface ornamentation of spindle of interior stalk. Scale at 4a, 0.05 mm, applies to 4a-l,o; scale at 4m, 0.5 mm, applies to 4m-n.

Remarks

There are several other species of *Sinularia* in which the upper face of the capitulum is more or less free of lobes and resembles a disc (Alderslade & Baxter, 1987). *S. dura* (Pratt, 1903) has cup-shaped colonies similar to *S. schleyeri* spec. nov.; however, these two species have different sclerites. Likewise, all the other *Sinularia* species mentioned by Alderslade & Baxter (1987) differ markedly from *S. schleyeri* spec. nov. It should also be noted that the living colonies have a flat disc surface and a slightly elevated rim; upon collection they contract strongly and become cup-shaped with a high rim.

Efflatounaria sodwanae spec. nov.
(Figs 5-6)

Material

Holotype, Nine-mile Reef, Sodwana Bay, South Africa, depth 16 m, 23 July 1992 (ZMTAU Co 27902); 3 Paratypes, 16m, 22 July 1991 (ZMTAU Co 27933, 27935); 10 m, 19 May 1992, Leg. M.H. Schleyer (ZMTAU Co 27934).

Description

The holotype is a firm low crust, part of which is attached to a calcareous substratum. Its height is 3-5 mm and the maximum cross section is 3 x 6 cm (Fig. 5a). The upper part of the colony is composed of densely set branches arising from the common basal portion. The branches are very short, resembling lobes (Fig. 5b); most of them are unbranched, but a few have knob-like side branches. Obscure material, composed of tough slime and some cellular debris, is found between adjacent branches (Fig. 5b). The basal portion of a branch usually has no polyps, but these are densely packed on the upper regions of the branches. The distance between the centres of the polyps varies from 0.7-1.2 mm. In most polyps the anthocodial wall is more or less retracted and only the tentacles protrude above the surface. Others are in all phases of retraction, with tentacles withdrawn into their mouths. The tentacles are 0.3-0.4 mm long. Each tentacle bears one row of 4-6 pinnules on each side. Platelets of 0.028-0.039 mm in length are found in all parts of the colony (Fig. 6a-f). These have a distinct waist and either single or double pits on their flat surface. When the two pits in a doublet are distinctly separated, the sclerites resemble the number 8 (Fig. 6d); however in most sclerites there is a single median elongated opening (Fig. 6a-c, e-f).

Colour

The colony is greyish white and the polyps are nearly white.

Variability

The paratypes hardly differ from the holotype, except in size. They also have the tough slimy material between their branches.

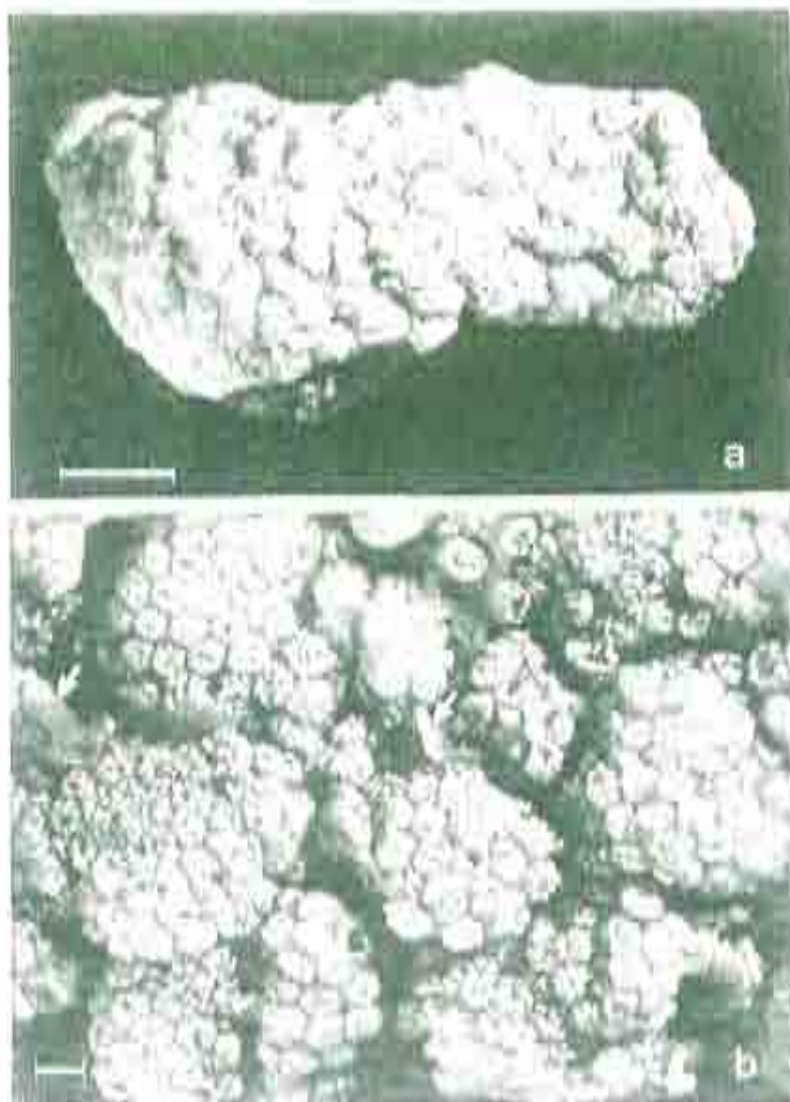


Fig. 5. *Eflatounaria sodwanae* spec. nov., a, holotype (ZMTAU Co 27902); b, close up of group of branches, arrows indicate slime. Scale at 5a, 10mm; scale at 5b, 1mm.

Etymology

This species is named after Sodwana Bay, the type locality of the material.

Remarks

Gohar (1939) established the genus *Eflatounaria*, describing it as a xeniid with branched syndate, from the sides and summits of which retractable polyps arise at different levels. All of the previously described *Eflatounaria* species, viz. *E. tottoni* Gohar, 1939, *E. mantoni* (Hickson, 1931) and *E. alba* (Verseveldt, 1977), have a single row of about 6 pinnules on each side of their tentacles (see Gohar, 1939). Verseveldt (1971:61) described a new species of *Cespitularia*, *C. turgida*, in which there were "zooids in all phases of contraction". His allocation of this species to *Cespitularia* is

thus incorrect as the polyps are non-retractile in this genus. *C. turgida* should therefore be transferred to the genus *Efflatounaria* as *E. turgida* (Verseveldt, 1971); it has the row of 5-6 pinnules on the sides of each tentacle which is a characteristic of the other species.

E. sodwanae spec. nov. also has tentacles with one row of 4-6 pinnules on each side. However, it is characterized by its encrusting form, tough texture and the large size of its sclerites, 0.028-0.039 mm in length, dimensions not found among the other species of this genus.

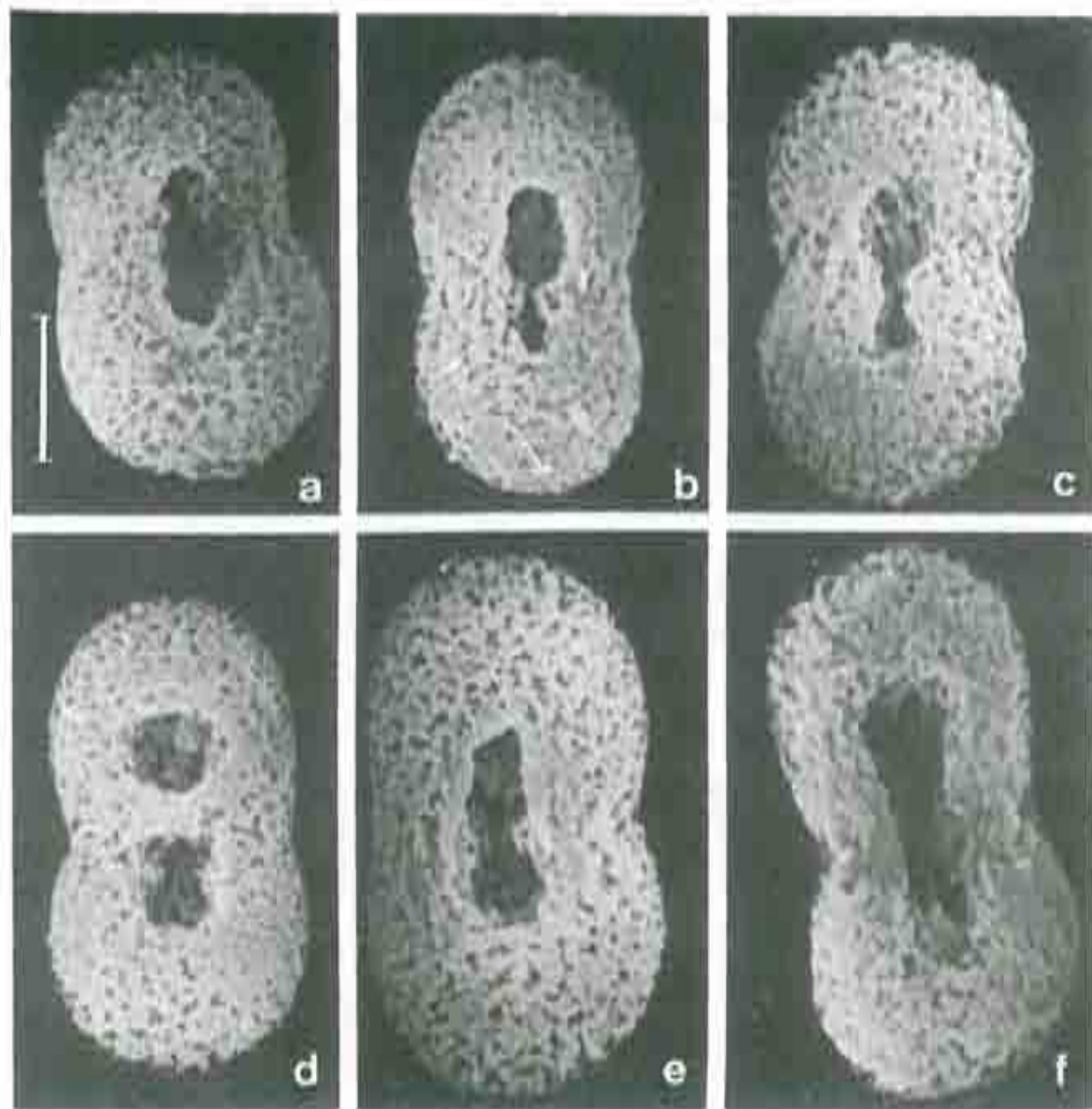


Fig. 6. *Efflatounaria sodwanae* spec. nov., holotype (ZMTAU Co 27902); a-f, sclerites of the colony. Scale at 6a, 0.01 mm, applies to 6a-f.

This is the first description of an *Efflatounaria* species using scanning electron microscopy. The fine structure of the sclerites of *E. sodwanae* spec. nov. (Fig. 6) resembles those of the surface and interior of the lobes of *Cladiella daphnae* van Otwegen & Benayahu, 1992. The taxonomic significance of this similarity in the systematics of Alcyonacea will be studied in the future.

Anthella flava (May, 1899)
(Fig. 7)

For synonymy see Tixier-Durivault, 1956:348.

Material

Holotype, Nine-mile Reef, Sodwana Bay, South Africa, depth 18 m, 21 July 1991 (ZMTAU Co 27901).

Description

A number of small colonies were collected growing on calcareous fragments and sand grains, cemented together by sponges and some algae. The colonies consist of a thin and transparent basal membrane which bears tiny polyps. The anthocodiae are up to 1.8 mm in length, many of them being totally contracted.

The tentacles are up to 0.8 mm long. They bear two or, rarely, three rows of pinnules on each side. The outer rows consist of 7 to 11 minute pinnules, resembling tiny knobs or short cones. The pinnules occupy the whole oral surface of the tentacle, leaving no free space. The basal membrane, the anthocodiae, the tentacles and the pinnules contain numerous sclerites, which are oval platelets of the common xeniid type reaching a maximum diameter of 0.012-0.020mm (Fig. 7a-b). Each sclerite is composed of numerous needle-like structures, whose tips are seen on its surface (Fig. 7c).

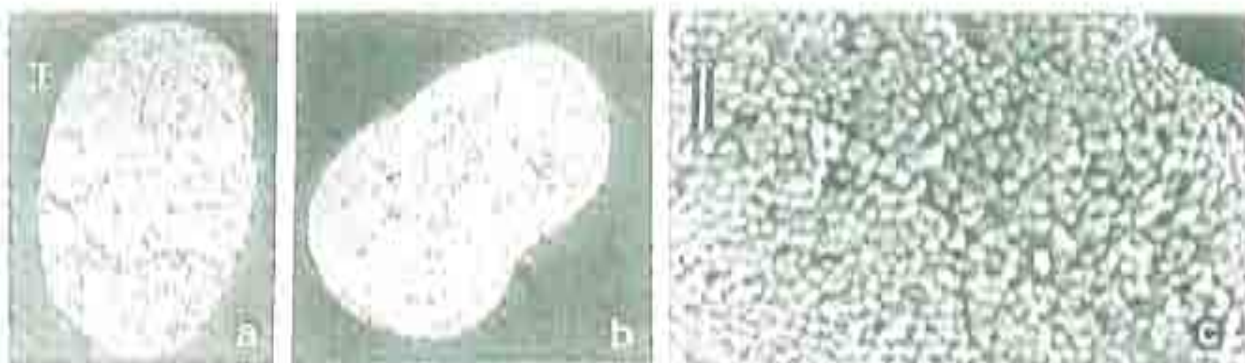


Fig. 7. *Anthella flava* (May, 1899) spec. nov., holotype (ZMTAU Co 27901); a-b, sclerites of the colony; c, surface ornamentation of a sclerite. Scales at 7a and 7c, 0.001 mm; scale at 7a applies to 7a-b.

Colour

In alcohol the holotype is light brown, with bluish-white colouration on some of the tentacles. Living colonies are a distinctive metallic blue.

Living colonies of *A. flava* (May, 1899) are abundant in the reefs studied and are easily recognized underwater, despite their small size, due to the metallic blue colour of the polyps. Many colonies were observed on the tests of living solitary tunicates.

Despite some minor differences between the examined material and the specimens assigned by Tixier-Durivault (1966) to *Anthella flava* (May, 1899), it is concluded that the present material is *A. flava* (May, 1899). The fine structure of the sclerites of this species is noteworthy, these being unique among octocorals.

Distribution - Zanzibar, Mauritius, Philippines and Sodwana Bay, South Africa.

Acknowledgements

I am grateful to Dr M.H. Schleyer whose enthusiasm and inspiration were behind the success of this study and whose endless efforts brought about my visits to South Africa during 1991 and 1992. I would like to express my gratitude to Prof. A.J. de Freitas for his courtesy and kind hospitality during my visits to the Oceanographic Research Institute (ORI), Durban. I thank Dr M.H. Schleyer, Dr P.J. Fielding, T. Kay and B. Riegl for their skilful help and friendship during the field trips and diving. I am indebted to R.P. van der Elst, P.A. Garratt, A. Kruger and all the staff of ORI for their assistance. I wish to thank F. Scanerani for valuable assistance with the scanning electron microscopy and A. Shoob for the photography. Special thanks are also due to the Natal Parks Board for logistic support and co-operation during the study as well as the South African Association for Marine Biological Research and the Foundation for Research Development for financial support. The helpful comments of Drs P. Alderslade and L. van Ofwegen greatly improved the manuscript.

REFERENCES

- ALDERSLADE, P. & BAXTER, J., 1987. A new species of *Sinularia* (Coelenterata: Octocorallia) from Western Australia, *Res. West. Aust. Mus.*, **13**: 203-214.
- BAYER, F.M., 1981. Key to the genera of Octocorallia exclusive of Pennatulacea (Coelenterata: Anthozoa), with diagnoses of new taxa. *Proc. Biol. Soc. Washington*, **94**: 902-947.
- HICKSON, S.J., 1931. The alcyonarian family Xenidae, with a revision of the genera and species. *Sci. Rep. Great Barrier Reef Exped.* **4**: 137-179.
- GOHAR, H.A.F., 1939. On a new xeniid genus *Efflatounaria*. *Ann. Mag. Nat. Hist. S.* **11**, **3**: 32-36

- PRATT, E.M., 1903. The Alcyonaria of the Maldives. II. The genera *Sarcophyton*, *Lobophytum*, *Sclerophytum*, and *Alcyonium*. *Fauna Geogr. Mald. Laccad. Archip.*, 2: 503-539.
- RAMSAY, P.J. & MASON, T.R., 1990. Development of a type zoning model for Zululand coral reef, Sodwana Bay, South Africa. *J. Coast. Res.*, 6: 829-852.
- TIXIER-DURIVAUT, A., 1960. Les octocoralliaires de île Inhaca. *Bull. Mus. Natl. Hist. Nat.*, 32: 359-367.
- TIXIER-DURIVAUT, A., 1966. Octocoralliaires de Madagascar et des îles avoisinantes. *Faune de Madagascar*, 21: 1-456.
- VAN OFWEGEN, L.P. & BENAYAHU, Y., 1992. Notes on Alcyonacea (Octocorallia) from Tanzania. *Zool. Med. Leiden*, 66: 139-154.
- VERSEFELDT, J., 1971. Octocorallia from north-western Madagascar (part II). *Zool. Verhand. Leiden*, 117: 1-73.
- VERSEFELDT, J., 1977. Australian Octocorallia (Coelenterata). *Austr. J. Mar. Freshwater Res.* 28: 171-240.
- WILLIAMS, G.C., 1989. A provisional annotated list of octocorallian coelenterates occurring on the sublittoral coral reefs at Sodwana Bay and Kosi Bay, northern Natal, with a key to the genera. *S. Afr. J. Sci.*, 85: 141-144.
- WILLIAMS, G.C., 1992a. The Alcyonacea of southern Africa. Stoloniferous octocorals and soft corals (Coelenterata, Anthozoa). *Ann. S. Afr. Mus.*, 100: 1-358.
- WILLIAMS, G.C., 1992b. Biogeography of the octocorallian coelenterate fauna of southern Africa. *Biol. J. Linn. Soc.* 46: 351-401.