MELITHAEIDAE (COELENTERATA: ANTHOZOA) FROM THE INDIAN OCEAN AND THE MALAY ARCHIPELAGO

by

L. P. VAN OFWEGEN

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Melithaeidae from the Indian Ocean and the Malay Archipelago are described and figured, including three new species: *Clathraria maldivensis, C. omanensis* and *Acabaria andamanensis*. A lectotype is designated for *Acabaria variabilis* (Hickson).

L.P. van Ofwegen, c/o Rijksmuseum van Natuurlijke Historie, P.O. Box 9517, 2300 RA Leiden.

CONTENTS

INTRODUCTION

The present report is based on the Melithaeidae collected in 1963 and 1964 during cruises of the research vessel "Anton Bruun" in the Indian Ocean. Some additional material, collected in 1964 on the research vessel "The Vega" and in 1975 on the research vessel "Alpha Helix", is included. All material has been deposited in the Rijksmuseum van Natuurlijke Historie, Leiden (RMNH).

MATERIAL AND METHODS

All specimens, apart from the dry fragments of *Acabaria variabilis,* are preserved in 70% alcohol.

Under "Material examined" the names of the research vessels are abbreviated (Anton Bruun = AB, Te Vega = TV, Alpha Helix = AH), followed by the number of the cruise and the number of the station (AB, TV) or the number of the station (AH).

For the technical terms used in the descriptions I refer to Bayer et al., 1983.

I have encountered some problems in establishing the arrangement of the sclerites in the points of the polyps. In *Acabaria* spec. indet. 1, the only species in the present material with some polyps with expanded tentacles, the transition between point and tentacle is clearly visible (fig. 33b). In this species a few rods are present, situated between the normal spindles of the points and the rods of the tentacles. In some points these small rods are easily distinguised from the normal spindles of the points, in others it is difficult to make a decision whether a particular sclerite is such a rod or just a small spindle. In species with polyps with retracted tentacles the transition between point and tentacle is seldomly clearly visible because of the accumulation of sclerites of the points and tentacles. Another interesting phenomenon is the presence of small rods between the normal spindles of the points (in *Clathraria omanensis*; fig. 13d). Although in other species sometimes a small rod is present between the spindles, in *C. omanensis* these rods are more rule than exception. For reasons of comparison I have mentioned in the descriptions the number of spindles of the points and, in those species in which small rods in the points were observed, the maximum number of sclerites of the points (between parentheses).

The following museum abbreviations are used:
BMNH = British Museum (Natural History), London.
RMNH = Rijksmuseum van Natuurlijke Historie, Leiden.
ZMA = Zoologisch Museum, Amsterdam.

CLASSIFICATION

The classification of genera used in this paper is that of Hickson (1937), which is presented below (German terms used by Hickson are translated).

a. Sclerites at the surface mainly long spindles, a few thorn-clubs present in some species ..... *Acabaria.*
b. Sclerites at the surface of the coenenchyme of various kinds. Leaf-clubs and thorn-clubs very rare or absent and when present few in number .. .. *Melitodes* (= *Melithaea*).
c. Sclerites at the surface mainly "birotulate" in form ..... *Melitella.*
d. Numerous leaf-clubs and thorn-clubs at the surface ..... *Mopsella.*
e. Sclerites at the surface foliate spheroids forming a complete pavement-like protection for coenenchyme and calyces ..... *Wrightella.*
f. Coenenchyme comparitively thick, polyps small and capable of complete retraction into the coenenchyme. Internodes of axis solid .. *Clathraria.*

Hickson adds to this "The genus *Clathraria* seems to be of doubtful value. In the Australian species there are numerous Stachelkeulen (thorn-clubs) and Blattkeulen (leaf-clubs), in the Red Sea species there are none. On spicule characters alone the former would be placed in the genus *Mopsella*, the latter in the genus *Melitodes*, but they would be rather aberrant members of each genus". The species in question are *C. atrorubens* (Gray, 1870) from Australia and *C. rubrinodis* Gray, 1859 from the Red Sea.

Bayer (1981) provides some significant contributions to this classification. For *Clathraria* Bayer gives the following sclerite characters: Spindles, clubs and small leafy spheroids. In the same paper Bayer synonymizes *Melitella* Gray, 1859 with *Melithaea*, as both genera have "birotulates". Moreover, in a foot-note Bayer states about *Melithaea, Mopsella, Wrightella* and *Clathraria*: "These nominal genera probably do not merit even subgeneric status".

My own findings, compared with Hickson's classification, are discussed below.

Acabaria Gray, 1859: Coenenchyme of nodes and internodes with rods, spindles and some capstans; a few foliate capstans may be present (because of their small numbers the latter two sclerite forms are not mentioned in my descriptions, although they sometimes have been figured); in the calyces additionally clubs are present. These findings are in agreement with Hickson's classification, although I have also found species with leaf-clubs.

Melithaea Milne Edwards & Haime, 1857: Nodes and internodes with rods,

spindles, capstans, small clubs, double discs and small disc-spindles, the latter two dominating; in the calyces additionally larger clubs. These findings seem to be in agreement with Hickson's "sclerites of the coenenchyme of various kinds". But probably Hickson used this character to incorporate some species in this genus, which actually belong to other genera (e.g. *Acabaria variabilis*; see systematic part). As this character can be used for *Mopsella, Wrightella* and *Clathraria* as well, it is better to use the presence of "birotulates" (= double discs) as a character of *Melithaea*. Bayer (1981) used this character and consequently synonymized *Melitella* Gray, 1859 with *Melithaea*.

Mopsella Gray, 1857: Nodes and internodes with rods, spindles, capstans, small clubs, foliate capstans and foliate spheroids, the foliate capstans and small clubs dominating; in the calyces additionally large leaf-clubs. In agreement with Hickson's classification.

Wrightella Gray, 1870: Nodes and internodes with rods, spindles, capstans, small clubs, foliate capstans and foliate spheroids, the latter dominating; in the calyces additionally larger clubs (based on *Wrightella* spec. discovered in the material of *Melitodes variabilis* Hickson, 1905; see systematic part, *Acabaria variabilis*). In agreement with Hickson's classification.

Clathraria Gray, 1859: Nodes and internodes with rods, spindles, capstans, small clubs, foliate capstans and foliate spheroids, the latter two dominating; in the calyces additionally larger clubs. As Hickson failed to give sclerite characters for this genus I have compared the above-mentioned characters with those given by Bayer (1981), which are: Spindles, clubs and small "leafy spheroids", i.e. capstans modified towards birotulate type. In an accompanying figure of sclerites of *C. rubrinodis* Bayer depicted, among others, a foliate capstan as well as a double disc. So *C. rubrinodis*, the type-species of this genus, seems to be somewhat intermediate between the species I have incorporated in *Clathraria*, and the species of *Melithaea*.

Comparing *Melithaea, Mopsella, Wrightella* and *Clathraria* with each other, all with more or less the same sclerite forms and only separated by different predomination of one or two of these sclerite forms, I can only subscribe Bayer's statement that these genera do not merit even subgeneric status.

Acabaria seems to be a valid genus, but in literature some species have been described as being intermediate between *Acabaria* and *Melithaea*.

From the foregoing it is obvious that the classification of this family is badly in need of revision. Pending such a revision I retain the unsatisfactory classification of Hickson in this paper, merely, because I have studied only a limited number of species and as I have not seen all type-species of the genera concerned.

SYSTEMATIC PART

Melithaea ochracea (Linnaeus, 1758)
(figs. 1-2)

Isis ocracea Linnaeus, 1758: 799 (incorrect original spelling: see Muzik & Bayer, 1980: 228; International Commission on Zoological nomenclature, 1985: 142).
Isis ochracea — Linnaeus, 1767: 1287.
Melitodes ochracea — Hickson, 1937: 97, figs. 5-9; Stiasny, 1940a: 218, fig. E, pl. 9 figs. 12-13, pl. 14 figs. 34-35 (Sulu Archipelago).

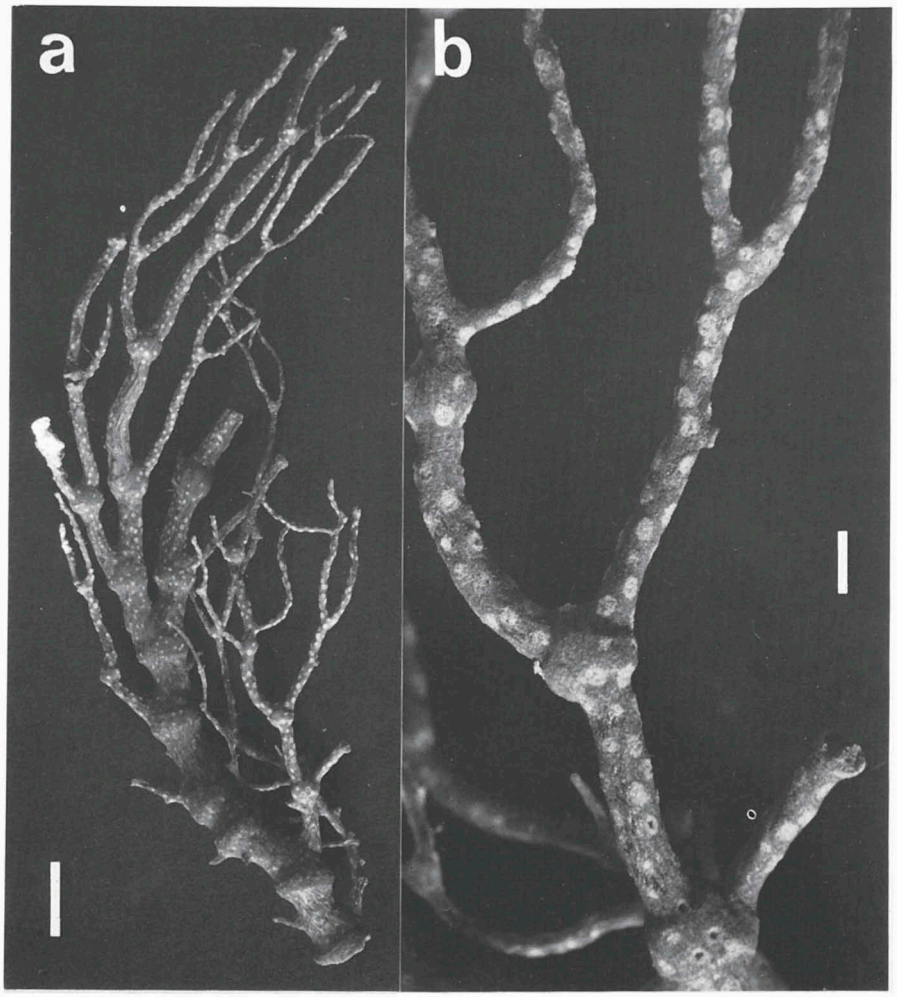

Fig. 1. *Melithaea ochracea* (Linnaeus); a, largest fragment from sta. AH 1930, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

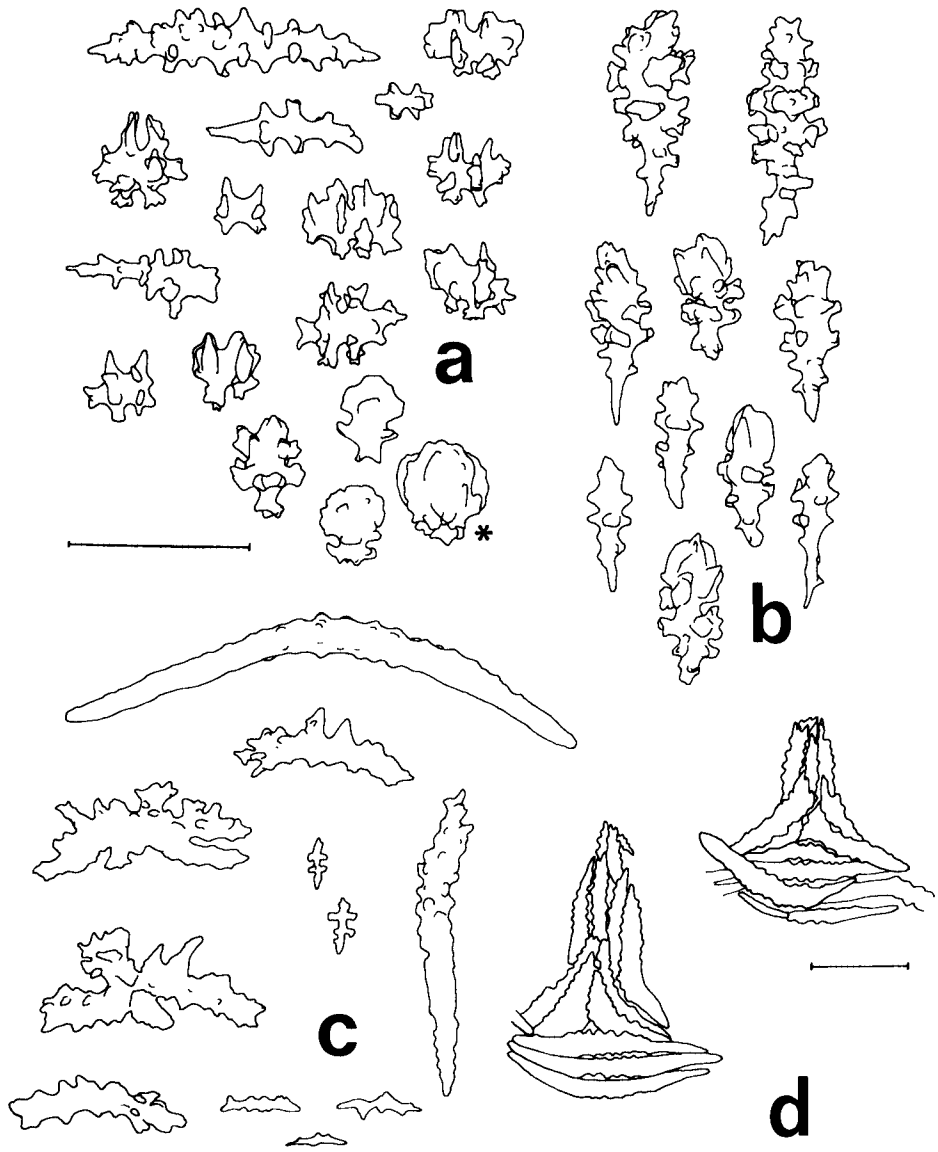

Fig. 2. *Melithaea ochracea* (Linnaeus), sclerites of specimen from sta. AH 1835; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindle of calyces; c, anthocodial sclerites; d, anthocodial armature. Asterisk indicates end view of double disc. Scale lines 0.1 mm.

Melithaea ochracea — Utinomi, 1956: 236, fig. 8 a-k (Palau Islands).
Melithaea cf. *ocracea* — Grasshoff, 1982: 203, fig. 4.72b, pl. 21.1 (Bass Strait).

Material examined. — Sta. AH 1835, 4°31'45''S 129°51'55''E, SW shore of Goenoeng Api, Banda Islands Indonesia, 4.v.1975, 3 m, fragment of colony (RMNH Coel. no. 17442); sta. AH 1930, 3°17'00''S 130°44'48''E, Pulau Parang, eastern Ceram, Indonesia, 23.v.1975, 10 m, fragments of colony (RMNH Coel. no. 17443).

Description. — The largest fragment is 11.5 cm long (fig. 1). Colonies red with yellow calyces and white polyps; axis of internodes red. Branching in one plane or partly in two parallel planes; a few anastomoses are present. Calyces do not project above the surface of the coenenchyme or slightly so; they are situated on three sides of the branches, so that one side of the colony is free of polyps. Internodes up to 17 mm long. Larger nodes dinstinctly swollen.

Coenenchyme with capstans, double discs, disc-spindles, small clubs, rods and spindles (fig. 2a). Disc-spindles up to 0.09 mm long and 0.06 mm wide; spindles up to 0.20 mm long. Calyces with wart- to leaf-clubs (fig. 2b) up to 0.17 mm long and about 0.05 mm wide.

Anthocodiae (fig. 2c-d) with a crown of two to five rows of spindles and eight points of three to eight (eleven) spindles. Crown with slightly bent thorny spindles up to about 0.30 mm long, middle part with more developed thorns, some with a short third leg. Points with slightly bent thorny spindles up to about 0.20 mm long, distal end with more developed thorns, some with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.12 mm long, the smallest almost smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight spiny rods up to 0.04 mm long and 0.015 mm wide.

Coenenchyme of the nodes and internodes with orange sclerites. Calyces predominantly with yellow sclerites; some partly yellow and partly orange. Crown with yellow and colourless sclerites, other anthocodial sclerites colourless.

Remarks. — I have compared micro-slide preparations of the present specimens with those of a specimen described by Stiasny (1940a: 218) as *Melitodes ochracea* (Linnaeus) (RMNH Coel. no. 6503). Apart from the double discs and the leaf-clubs, which are more developed in the present specimens, the sclerites agree rather well.

Distribution. — Indo-Pacific; extending north to Japan, east to Fiji, south to Bass Strait, west to Singapore.

Melithaea squamata (Nutting, 1911)
(figs. 3-5)

Melitodes squamata Nutting, 1911: 41, pl. 7 figs. 1, 1a, pl. 12 fig. 1 (Timor); Hickson, 1937: 120.
Melithaea squamata — Utinomi, 1956: 238, fig. 8 l-z (Palau Islands); Mai-Bao-Thu & Domantay, 1970: 45, pl. 12 fig. 62, pl. 13 figs. 64-65, pl. 14 figs. 80-98 (Basilan Strait).

Material examined. — Sta. AH 1995, 1°50′00′′S 127°30′45′′E, Pulau Gomunu, south of Obi, Moluccas, Indonesia, 30.v.1975, 10 m, fragments of colony (RMNH Coel. no. 17444).

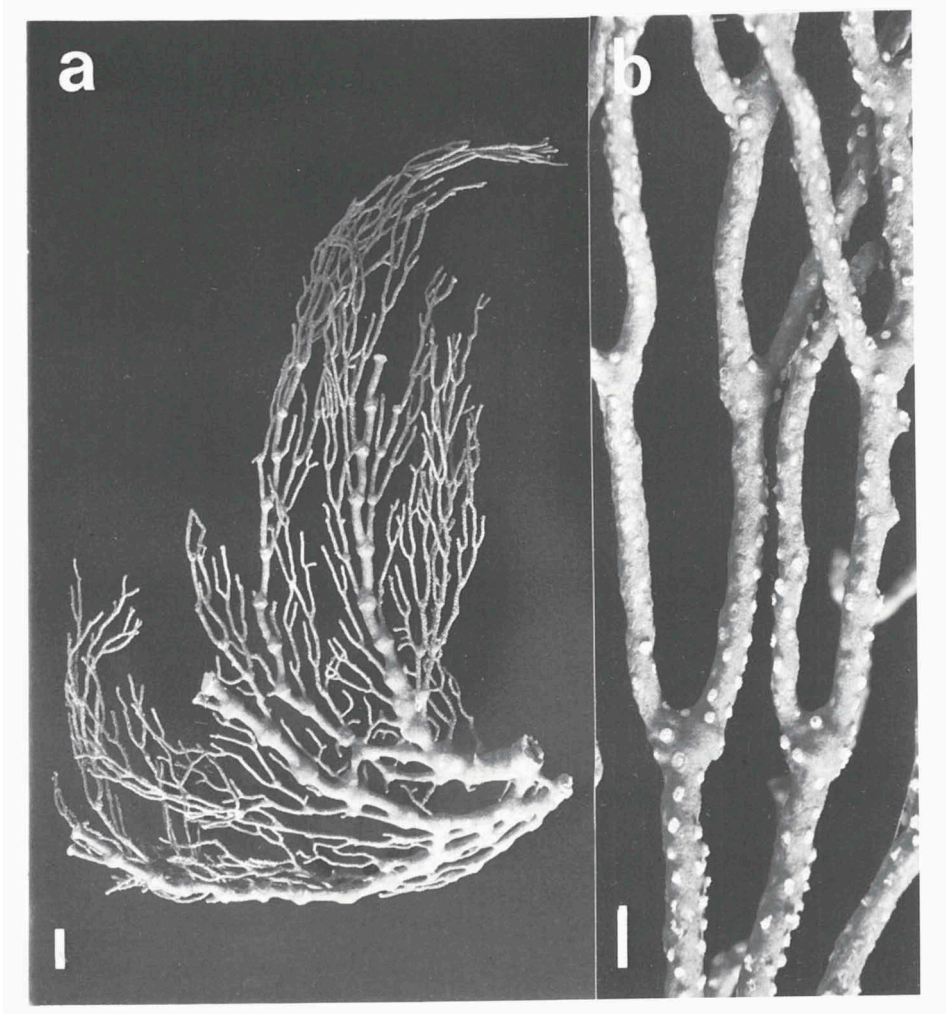

Fig. 3. *Melithaea squamata* (Nutting); a, largest fragment from sta. AH 1995, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

Description. — The largest fragment is 23 cm long (fig. 3). Colony orange with white polyps; axis of internodes white. Branching more or less in one plane and anastomoses confined to the lower part of the colony. Calyces do not project above the surface of the coenenchyme or slightly so; they are situated biserially on the smaller branches and on three sides on the larger branches, so that one side of the colony is free of polyps. Internodes up to about 15 mm long. Larger nodes distinctly swollen.

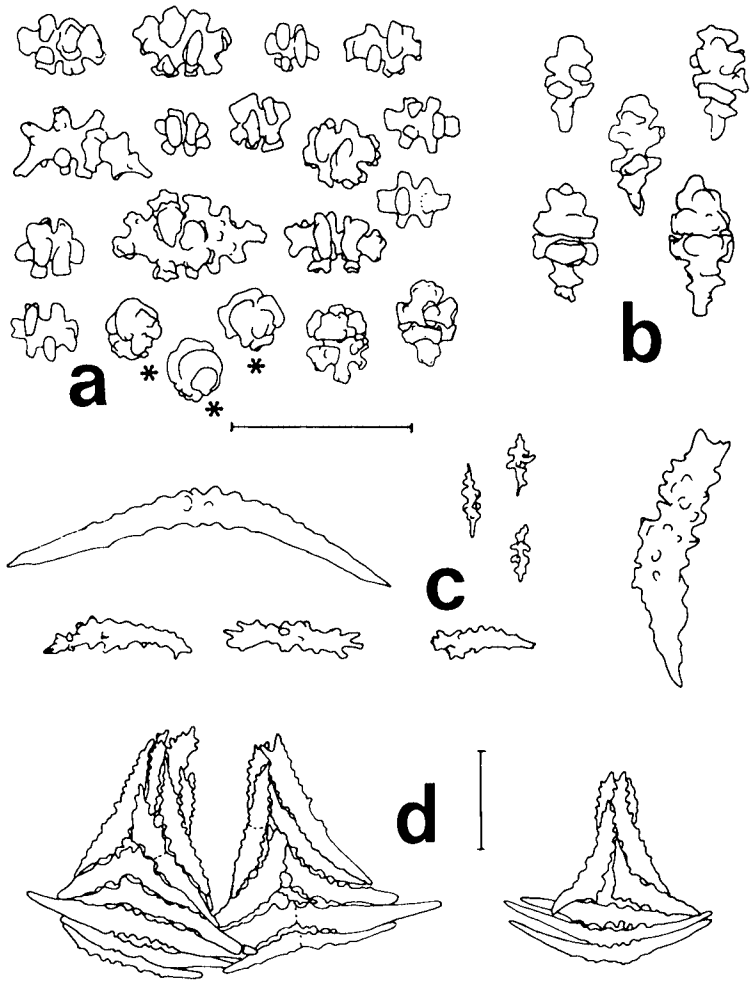

Fig. 4. *Melithaea squamata* (Nutting), sclerites of specimen from sta. AH 1995; a, sclerites of coenenchyme of nodes and internodes; b, clubs of calyces; c, anthocodial sclerites; d, anthocodial armature. Asterisk indicates end view of double disc. Scale lines 0.1 mm.

Coenenchyme with capstans, double discs, disc-spindles, small clubs, rods and spindles (fig. 4a). Disc-spindles up to 0.08 mm long and 0.05 mm wide; spindles up to 0.17 mm long. Calyces with wart-clubs (fig. 4b) up to 0.09 mm long and about 0.04 mm wide.

Anthocodiae (fig. 4c-d) with a crown of one to six rows of spindles and eight points of three to nine spindles. Crown with slightly bent thorny spindles up to about 0.30 mm long, middle part with more developed thorns, some with a short third leg. Points with slightly bent thorny spindles up to about 0.20 mm long, distal end with more developed thorns, some with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.12 mm long, the smallest almost smooth, the largest crescent-shaped with spines. Pharynx with straight spiny rods up to 0.05 mm long and 0.02 mm wide.

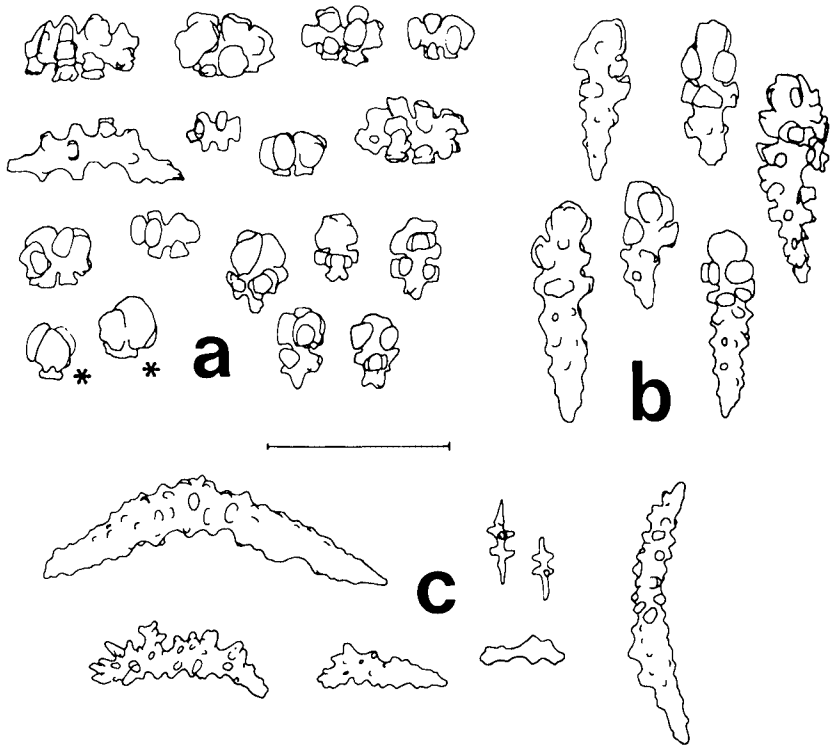

Fig. 5. *Melithaea squamata* (Nutting), sclerites of holotype; a, sclerites of coenenchyme of nodes and internodes; b, clubs of calyces; c, anthocodial sclerites. Asterisk indicates end view of double disc; scale line 0.1 mm.

Coenenchyme with colourless and orange sclerites; anthocodial sclerites colourless.

Remarks. — I have compared the present specimen with the holotypes of *Melitodes squamata* Nutting (ZMA 2867) and *Melitodes ochracea* (Linnaeus) var. *decipiens* Hickson, 1937 (ZMA 1649) and I have made drawings of the sclerites of both types (figs. 5-6).

The sclerites of the present specimen differ somewhat from those of the holotype of *M. squamata*. The double discs are less rounded, the clubs of the calyces are shorter and there are fewer small clubs (fig. 4a-b). In spite of these differences I consider the present specimen as representative of *M. squamata*.

Utinomi (1956), who examined specimens of *M. ochracea* as well as *M. squamata*, found little difference between the sclerites of these two species. The well-developed sclerites of the present specimen of *M. ochracea* (fig. 2)

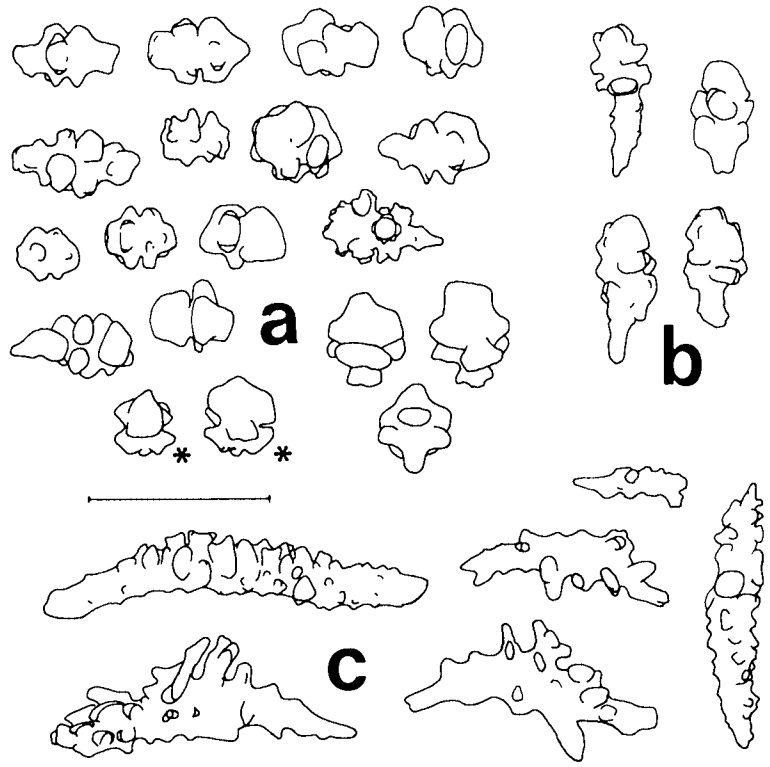

Fig. 6. *Melithaea ochracea* (Linnaeus) var. *decipiens* Hickson, sclerites of holotype; a, sclerites of coenenchyme of nodes and internodes; b, clubs of calyces; c, anthocodial sclerites. Asterisk indicates end view of double disc. Scale line 0.1 mm.

differ considerably from those of *M. squamata* (figs. 4-5). As this difference is chiefly the result of the roundness of the discs and tubercles of the sclerites of *M. squamata* and a similar phenomenon is also present in *Clathraria maldivensis* (figs. 10-11) and *Acabaria andamanensis* (figs. 18-19), I assume that it is possible that we are dealing here with one variable species instead of two different species. Utinomi (1956: 238) gives as difference between *M. ochracea* and *M. squamata* the lesser number of sclerites in the points of the latter species, a difference I have not seen in the specimens available to me. As my knowledge of *M. ochracea* is based on only a few specimens I do treat them here as different species.

The sclerites of *M. ochracea* var. *decipiens* (fig. 6) are quite different from those of *M. squamata*. Moreover, they also differ considerably from those of *M. ochracea*. I therefore doubt whether this variety belongs to *M. ochracea* at all.

Distribution. — Indonesia (Timor, Moluccas); Phillippines (Basilan Strait); Palau Islands.

Mopsella singularis Thomson, 1916
(figs. 7-8)

Mopsella singularis Thomson, 1916: 10, fig. 3, pl. 2 fig. 4 (Cape Morgan); Hickson, 1937: 145, 209.

Material examined. — Sta. AB8.393A, 29°32'S 31°17'E, off Durban, Natal, South-Africa, 25.ix.1964, GMT, 50-53 m, fragments of colony (RMNH Coel. no. 17445).

Description. — The largest fragment is 12 cm long (fig. 7). The branches are flattened in a plane perpendicular to the plane of branching. Flattened sides of internodes pink, other sides more orange. Nodes yellowish, calyces red and polyps white; axis of internodes pink. Branching in one plane and a few anastomoses are present. Calyces dome-like, situated biserially on the smallest branches and on three sides on the larger branches, so that one side of the colony is free of polyps. Internodes up to 25 mm long. Larger nodes distinctly swollen.

Coenenchyme with capstans, foliate capstans, unilaterally foliate spheroids, leaf-clubs, rods, spindles and leaf-spindles (fig. 8a). Largest unilaterally foliate spheroid 0.19 mm long and 0.17 mm wide, largest leaf-club 0.15 mm long and 0.13 mm wide. Calyces with wart- to leaf-clubs (fig. 8b) up to 0.32 mm long and 0.12 mm wide.

Anthocodiae (fig. 8c-d) with a crown of three to four rows of spindles and

eight points of about ten spindles (insufficient points were good visible to give exact numbers). Crown with slightly bent thorny spindles up to about 0.30 mm long, middle part with more developed thorns. Points with slightly bent thorny spindles up to about 0.20 mm long, distal end with more developed thorns. Tentacles with irregularly formed rods up to 0.15 mm long, the smallest almost smooth, the largest crescent-shaped with spines. Pharynx with sraight spiny rods up to 0.05 mm long and 0.02 mm wide.

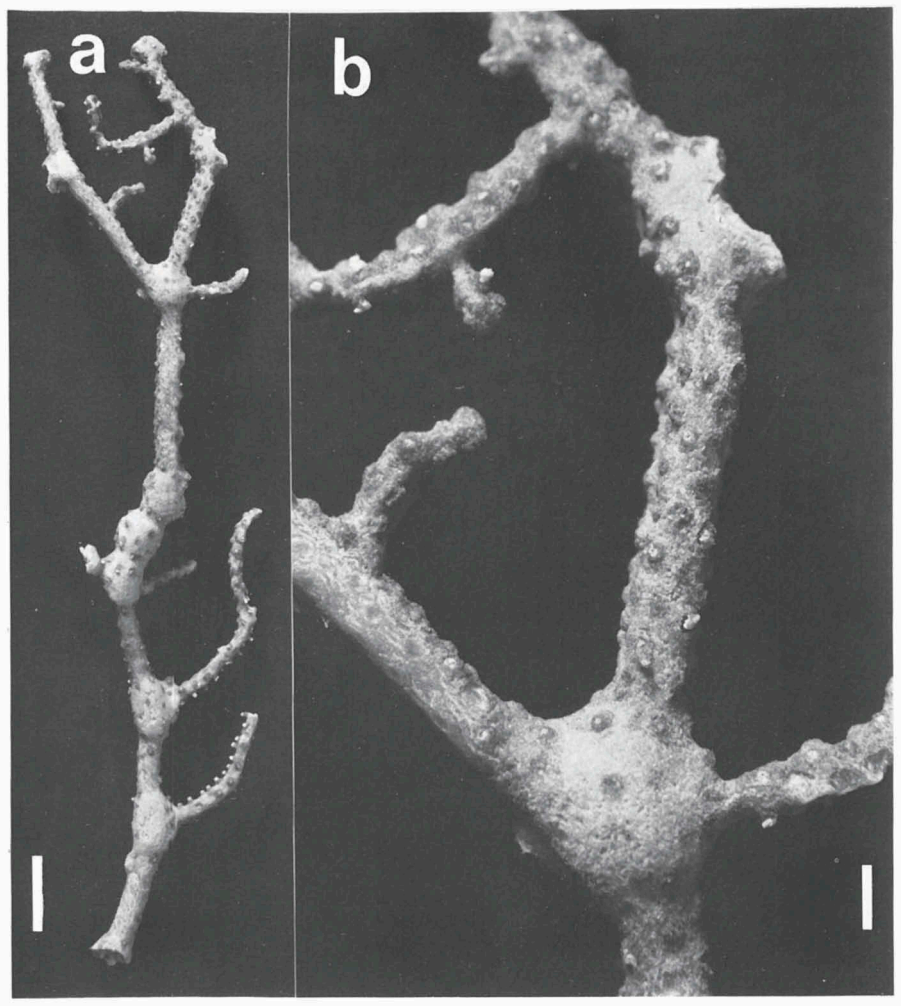

Fig. 7. *Mopsella singularis* Thomson; a, largest fragment from sta. AB8.393A, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

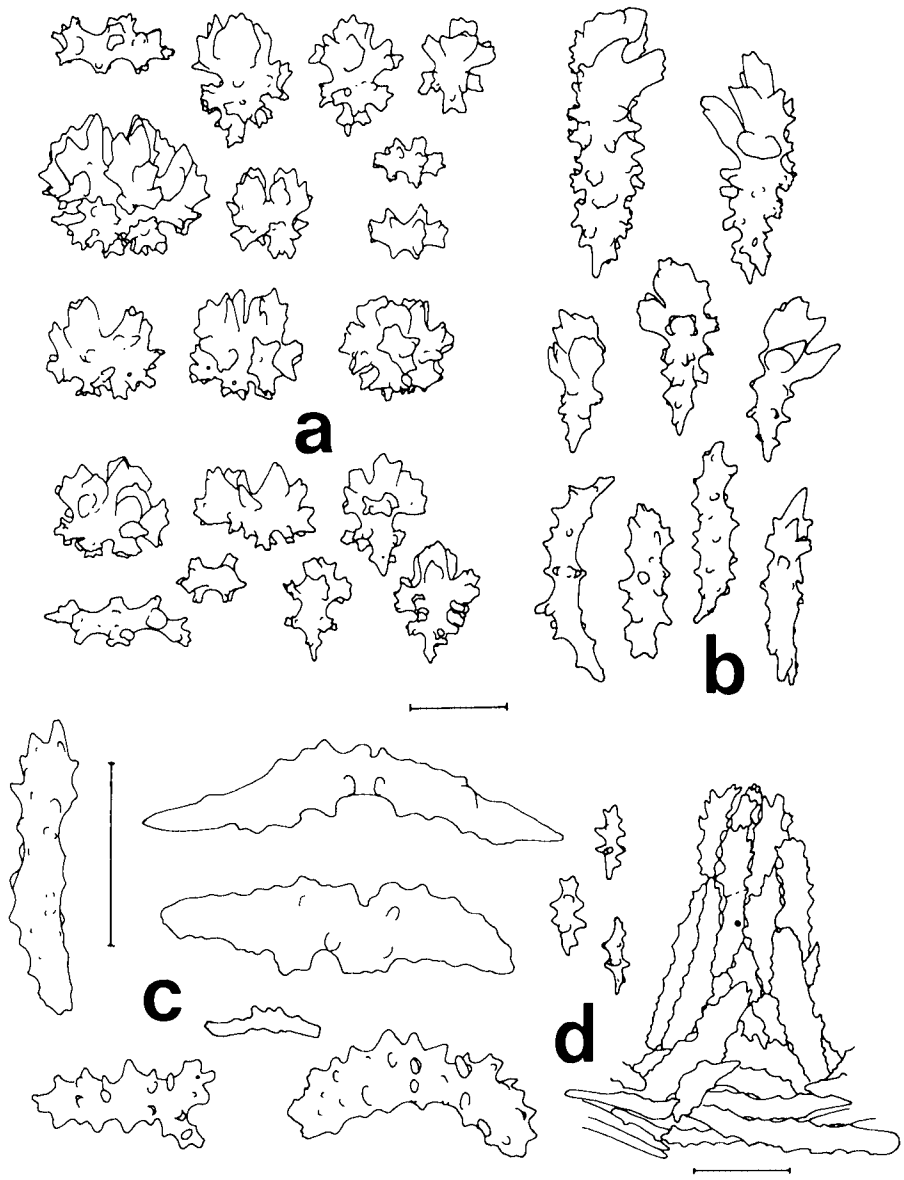

Fig. 8. *Mopsella singularis* Thomson, sclerites of specimen from sta. AB8.393A; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1 mm.

Coenenchyme predominantly with yellow sclerites; some orange or partly orange and partly yellow. Calyces with pink sclerites, crown and points with colourless and faintly pink sclerites; other anthocodial sclerites colourless.

Remarks. — The material examined agrees rather well with the description of *Mopsella singularis* Thomson. Although the holotype shows a different colour-pattern, the drawings of the sclerites, as given by Thomson, do not differ much from mine. Because the colour of many species in this family is very variable, I refer the present specimen to *M. singularis*. Moreover, Thomson also mentioned the flattening of the branches in a plane perpendicular to that of the branching, a character which seems to be uncommon in this family.

Unfortunately Thomson did not depict the leaf-clubs of the calyces and probably therefore Hickson (1937: 145), basing himself on the description of Thomson, hesitated to include this species in *Mopsella*.

Distribution. — South Africa.

Clathraria maldivensis spec. nov.
(figs. 9-11)

Melitodes variabilis (in part) Hickson, 1905: 809, pl. 67 fig. 11 (Maldives).

Holotype. — RMNH Coel. no. 17446, Sta. TV3.119, 04°19'N 73°34'E, 21.iii.1964, macrobenthos, collected on outer reef to surf zone, Imma Island, Maldives.

Description. — The holotype consists mainly of brânches, the largest fragment being five cm long (fig. 9). Colour of internodes orange or reddish, axis of internodes pink (orange internodes) or red (reddish internodes). Nodes yellow and polyps reddish. Branching in one plane. The branches tend to be slightly flattened in the plane of branching and a few anastomoses are present. Calyces do not project or slightly so; they are situated biserially on the smallest branches and on three sides on the larger branches. Internodes up to 28 mm long. Nodes slightly swollen.

Coenenchyme with capstans, foliate capstans, unilaterally foliate spheroids, leaf-clubs, rods, spindles and leaf-spindles (fig. 10a); leaves of leaf-sclerites rounded. Largest unilaterally foliate spheroid 0.11 mm long and 0.09 mm wide, largest leaf-club had the same dimensions. Calyces with wart- to leaf-clubs (fig. 10b) up to about 0.20 mm long and up to about 0.07 mm wide.

Anthocodiae (fig. 10c-d) with a crown of one to three rows of spindles and eight points of three to six spindles. Crown with slightly bent thorny spindles, middle part with more developed thorns, some with a short third leg. Points with slightly bent thorny spindles; distal end with more developed thorns,

some with irregular projections on the convex side. Length of the spindles of both crown and points up to about 0.25 mm. Tentacles with irregularly formed rods up to 0.17 mm long, the smallest almost smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight spiny rods up to 0.06 mm long and 0.02 mm wide.

Coenenchyme of nodes with colourless, yellowish and partly coloured sclerites. Coenenchyme of internodes with yellow, orange (predominant in

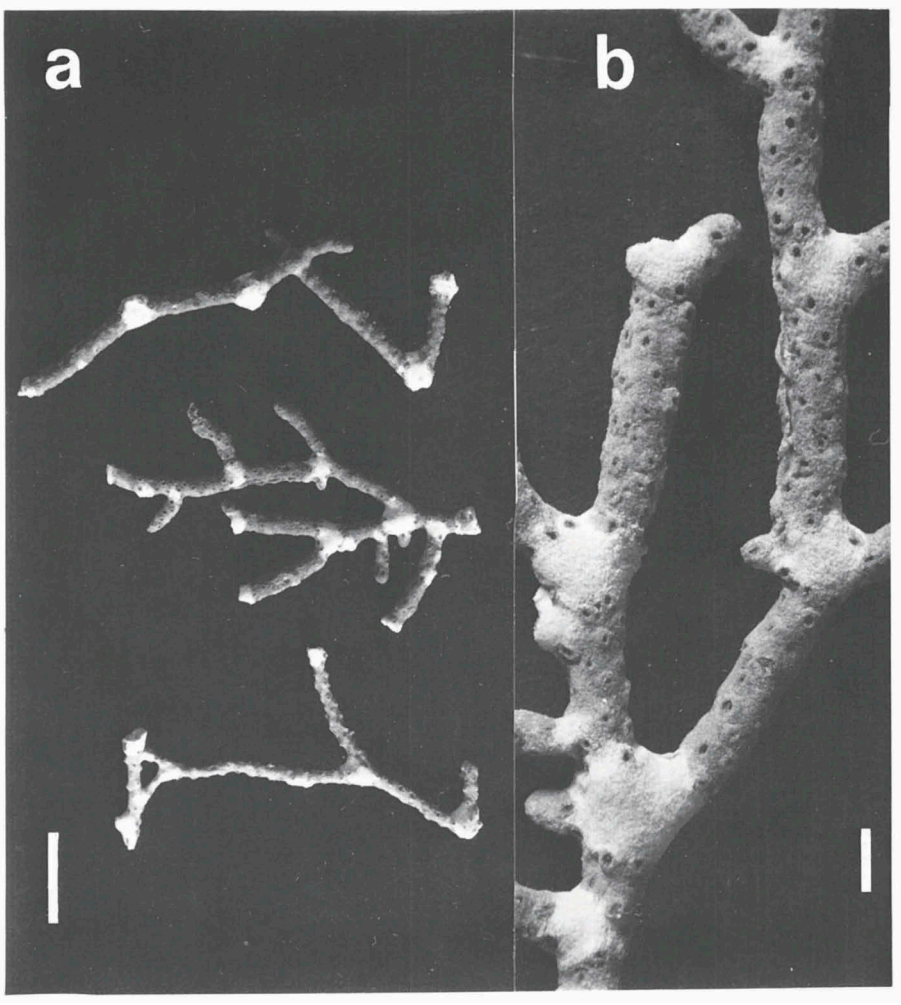

Fig. 9. *Clathraria maldivensis* spec. nov.; a, largest fragments of holotype, from sta. TV3.119, scale bar 10 mm; b, detail of branches of middle fragment of a, scale bar 2 mm.

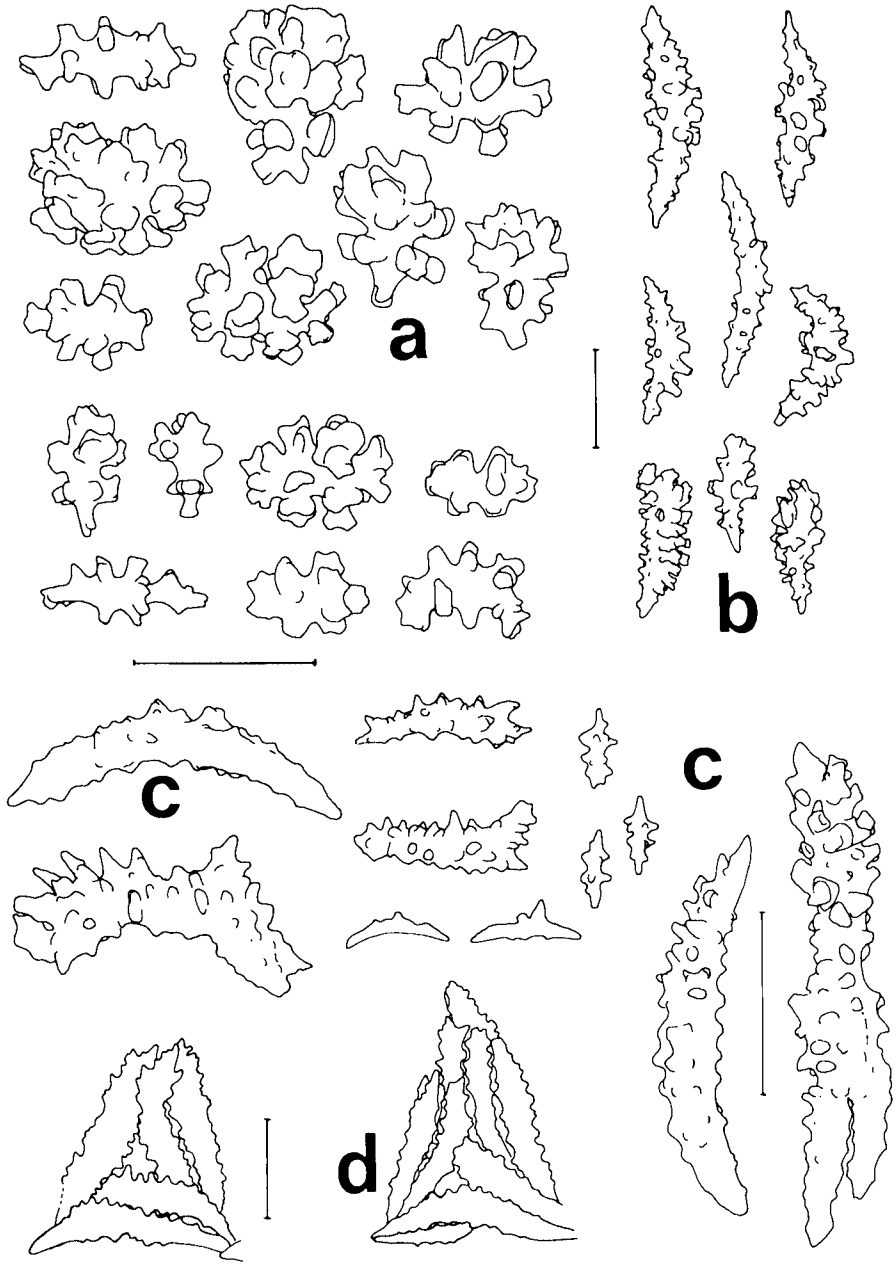

Fig. 10. *Clathraria maldivensis* spec. nov., sclerites of holotype, from sta. TV3.119; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1 mm.

reddish internodes) and partly orange and partly yellow sclerites. Anthocodial sclerites orange to pink (smaller ones), in several fragments with reddish internodes orange to yellow.

Remarks. — On examining the type-series of *Melitodes variabilis* Hickson, present in BMNH, I discovered that this material in fact represents a mixture of three species (see also *Acabaria variabilis*), some specimens belonging to *C. maldivensis* spec. nov. These are: BMNH 1962.7.20.106, Hulule, Male Atoll, 15-20 fms, reddish-yellow and white fragments; BMNH 1962.7.20.107, Addu Atoll, 12 fms, orange-yellow, orange and white fragments; BMNH 1983.3.2.1, Hulule, Male Atoll, reddish-yellow and white fragments (all paratypes).

The specimens with orange or reddish internodes and yellow nodes (some fragments orange with darkened nodes) show similar sclerites as the holotype of *C. maldivensis*, but the specimens with white internodes and somewhat darkened nodes (the axis of the nodes contains yellow rods) show different sclerites (fig. 11). Although the same forms are present, they have leaves more developed and pointed. Therefore the leaf-clubs and the larger leaf-spindles of the calyces, which are hardly recognized as such in the holotype of *C. maldivensis*, are quite conspicuous in these specimens.

Distribution. — Maldives.

Etymology. — The species is named after the type locality.

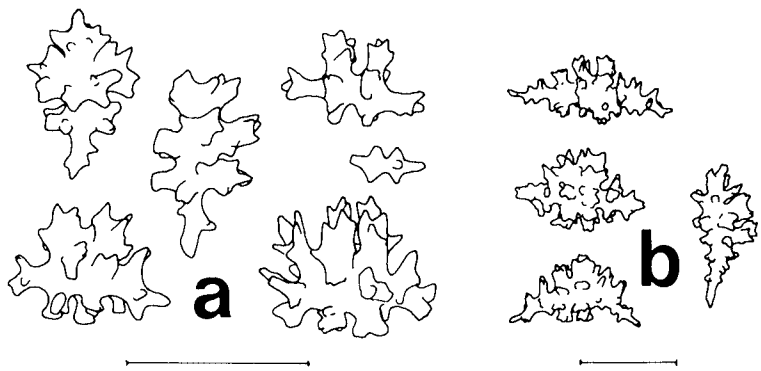

Fig. 11. *Clathraria maldivensis* spec. nov., sclerites of one of the syntypes of *Melitodes variabilis* Hickson from Hulule, Male Atoll (BMNH 1983.3.2.1.); a, capstan, foliate capstans and clubs; b, leaf-spindles and large club. Scale lines 0.1 mm (origin of sclerites unknown; those of b probably of calyces).

Clathraria omanensis spec. nov.
(figs. 12-13)

Holotype. — RMNH Coel. no. 17447, Sta. AB4B.273A, 20°50'N 59°10'E — 20°52'N 59°10'E, Oman, 4.xii.1963, GMT, sediment type coarse sand, shell, 73-69 m.

Description. — The holotype is a colony-fragment, 12 cm long and 8 cm wide, of which the base is missing (fig. 12). The lowest two cm of the colony

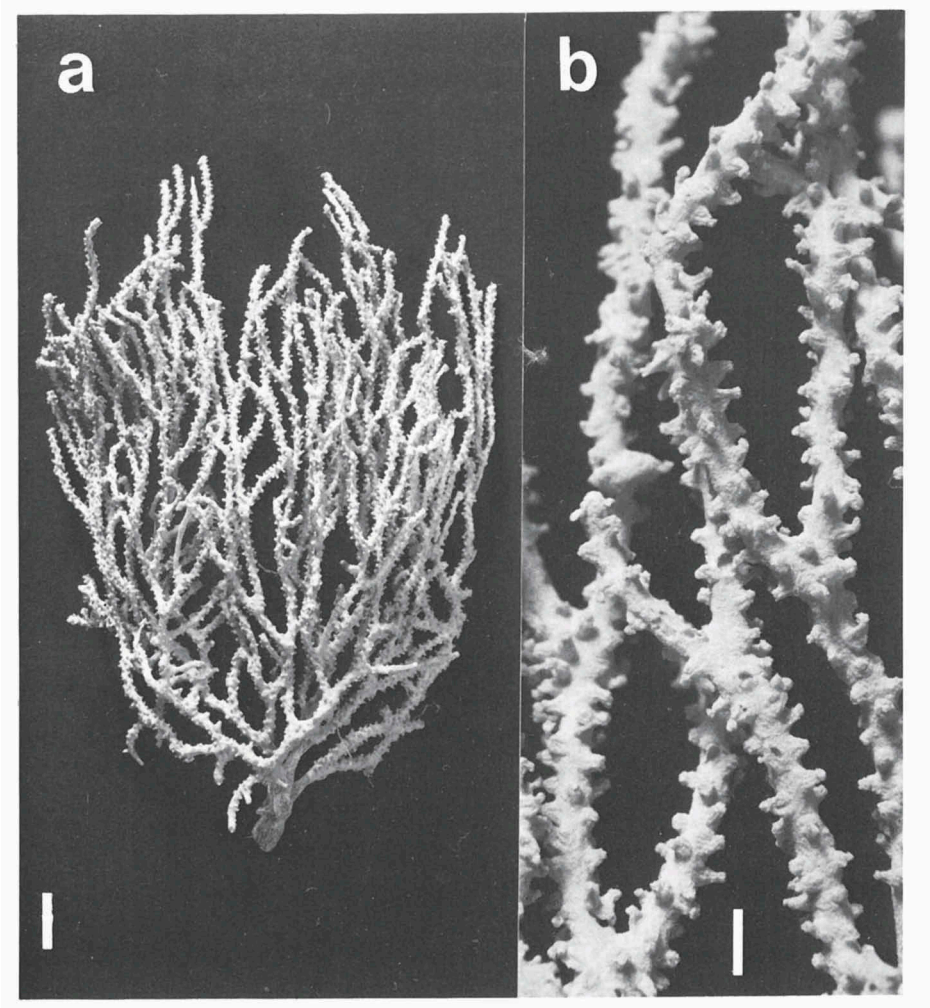

Fig. 12. *Clathraria omanensis* spec. nov.; a, holotype, from sta. AB4B.273A, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

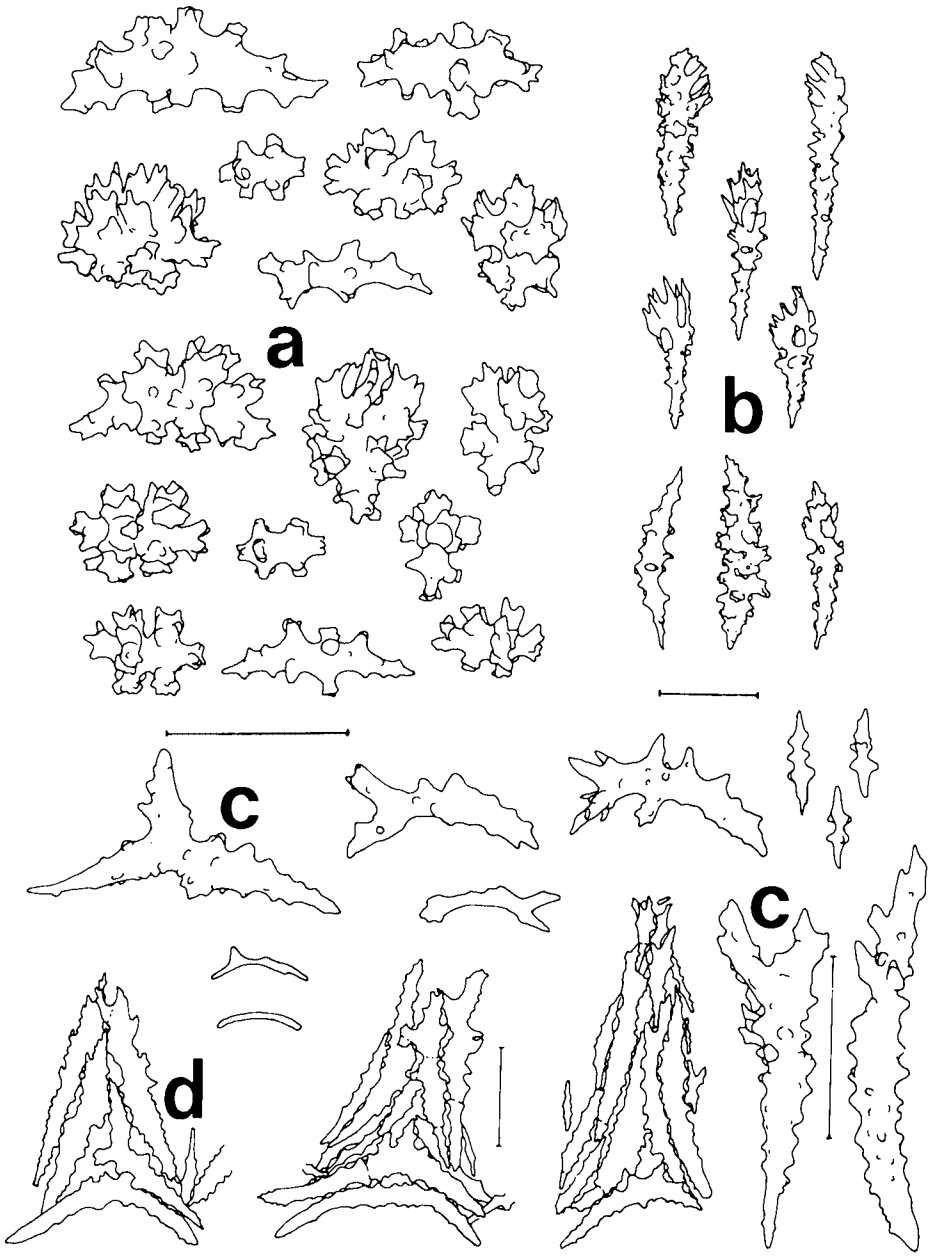

Fig. 13. *Clathraria omanensis* spec. nov., sclerites of holotype, from sta. AB4B.273A; a, sclerites of coenenchyme of nodes and internodes; b, spindles and clubs of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1 mm.

are deprived of coenenchyme, showing the orange axis of the internodes and the brown axis of the nodes. Colour of colony orange, somewhat darkened on the larger nodes; polyps white. Colony branched in several parallel planes and some anastomoses are present. Calyces dome-like, situated on three sides or all around the branches. Internodes in the lower part of the colony up to 15 mm long (because the nodes are hardly visible in the upper part of the colony measurements were made in the lower part).

Coenenchyme with capstans, foliate capstans, unilaterally foliate spheroids, leaf-clubs, rods, spindles and leaf-spindles (fig. 13a); leaves of leaf-sclerites pointed. Largest unilaterally foliate spheroid 0.12 mm long and 0.09 mm wide, largest leaf-club 0.10 mm long and 0.07 mm wide. Calyces with wart- to thorn-clubs (fig. 13b) up to 0.25 mm long and 0.08 mm wide.

Anthocodiae (fig. 13c-d) with a crown of one to four rows of spindles and eight points of two to six (14) spindles. Crown with slightly bent thorny spindles, middle part with more developed thorns, irregular projections or a third leg. Points with slightly bent thorny spindles, distal end with more developed thorns or irregular projections, some with irregular projections on the convex side. Length of the spindles of both crown and points up to about 0.25 mm. Tentacles with irregularly formed rods up to 0.15 mm long, the smallest smooth, the largest crescent-shaped with spines. Pharynx with straight spiny rods up to 0.06 mm long and 0.02 mm wide.

All sclerites yellowish, with the exception of the smaller rods of the tentacles and points, which are colourless.

Distribution. — Oman.

Etymology. — The species is named after the type locality.

Acabaria rubeola (Wright & Studer, 1889) comb. nov.
(figs. 14-16)

Melitodes rubeola Wright & Studer, 1889: 175, pl. 40 figs. 6, 7 (Arafura Sea).
Mopsella spinosa Kükenthal, 1909: 52 (Aru Islands).
Suberogorgia muriceoides Stiasny, 1937: 111, fig. KK, pl. 8 fig. 54 (Timor).
Mopsella rubeola — Hickson, 1937: 135, fig. 16, pl. 14 fig. 3 (Saibai Channel); Stiasny, 1940a: 231, fig. 1, pl. 10 figs. 18-19 (Sulu Archipelago); Stiasny, 1941: 69.

Material examined. — Sta. AH.F1, 10°17.9'N 124°10.9'E, Bohol I., Philippine Is., 22.ix.1975, 40 m, fragments (RMNH Coel. no. 17448); sta. AH.F4, idem, fragments (RMNH Coel. no. 17449); sta. AH.F16, idem, 21.viii.1975, 30 m, fragments (RMNH Coel. no. 17450); sta AH.F11, idem, 21.viii.1975, 40 m, one colony broken in two fragments, and one fragment (RMNH Coel. no. 17451); sta. AH.X2, 10°15.88'N 124°08.61'E, Bohol I., Philippine Is., 18.viii.1975, 7-10 m, incomplete colony, lacking basal part (RMNH Coel. no. 17452); sta. AH.X3, idem, one colony (RMNH Coel. no. 17453); sta. AH.X4, idem, one colony (RMNH Coel. no. (17454).

Description. — Colonies branched in several parallel planes, forming flattened bushes (fig. 14). Colour of colonies variable. Largest branches flattened perpendicular to the plane of branching. Anastomoses are present. In the two complete colonies there is no real main stem but a composite structure of several stems fused together, the broken colony has a short main stem. Calyces dome-like, placed on three sides of the branches; smaller branches can show a biserial arrangement. One side of the colony always free of polyps. Internodes up to about 20 mm long. Larger nodes distinctly swollen.

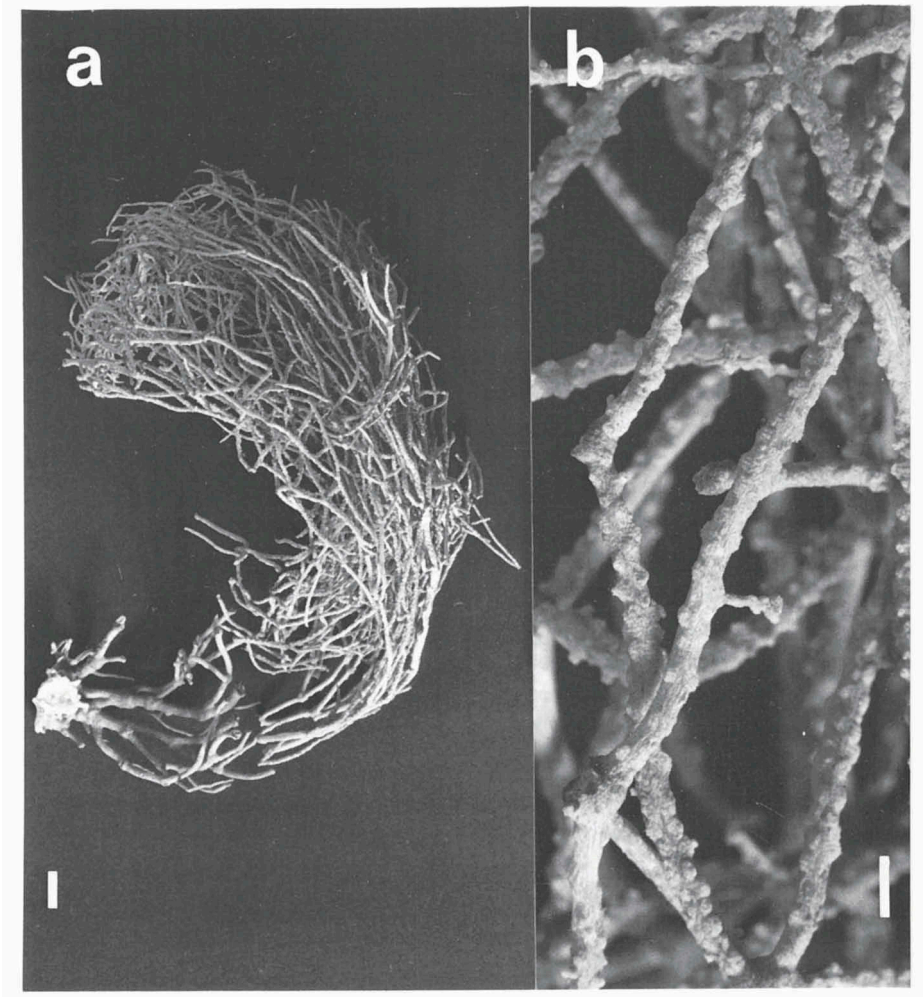

Fig. 14. *Acabaria rubeola* (Wright & Studer); a, specimen from sta. AH.X3, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

Coenenchyme with rods, spindles and unilaterally spinose spindles (fig. 15a), the latter up to about 0.25 mm long and up to 0.10 mm wide. Calyces with wart-, thorn- and leaf-clubs (fig. 15b) up to about 0.25 mm long and up to 0.07 mm wide. Most clubs possess thorns as well as some terminal leaves.

Anthocodiae (fig. 15c-d) with a crown of one to three rows of spindles and eight points of one to two pair of spindles. Crown with slightly bent thorny spindles, middle part with more developed thorns, several with irregular pro-

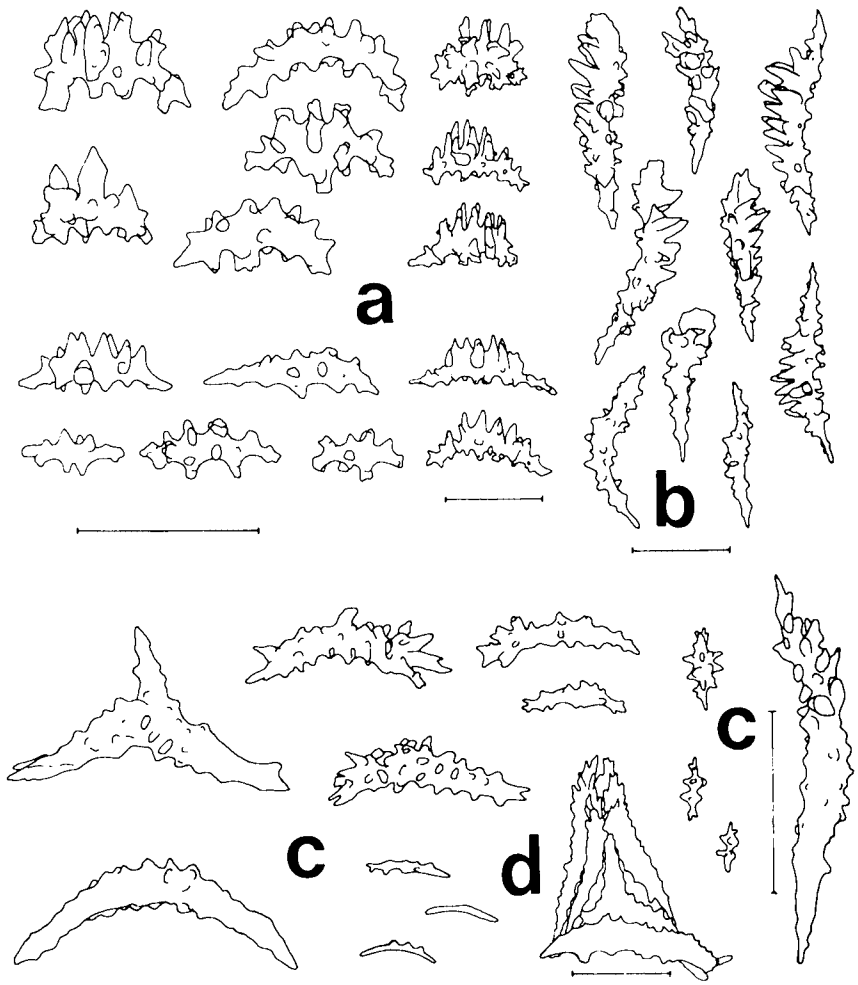

Fig. 15. *Acabaria rubeola* (Wright & Studer), sclerites of specimen from sta. AH.F1; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1 mm.

jections or a third leg. Points with slightly bent thorny spindles, distal end with more developed thorns, some with irregular projections on the convex side. Length of the spindles of both crown and points up to about 0.25 mm. Tentacles with irregularly formed rods up to 0.12 mm long, the smallest smooth, the largest crescent-shaped with spines. Pharynx with straight spiny rods up to 0.06 mm long and 0.02 mm wide.

Variability. — The colour of the axis and sclerites, and therefore the colour of the colony, varies in the various specimens or even within one specimen. Firstly there are dull red colonies with yellowish calyces and red axis of internodes. Sclerites of coenenchyme of nodes, internodes and calyces predominantly faintly yellow, furthermore colourless and pink sclerites occur

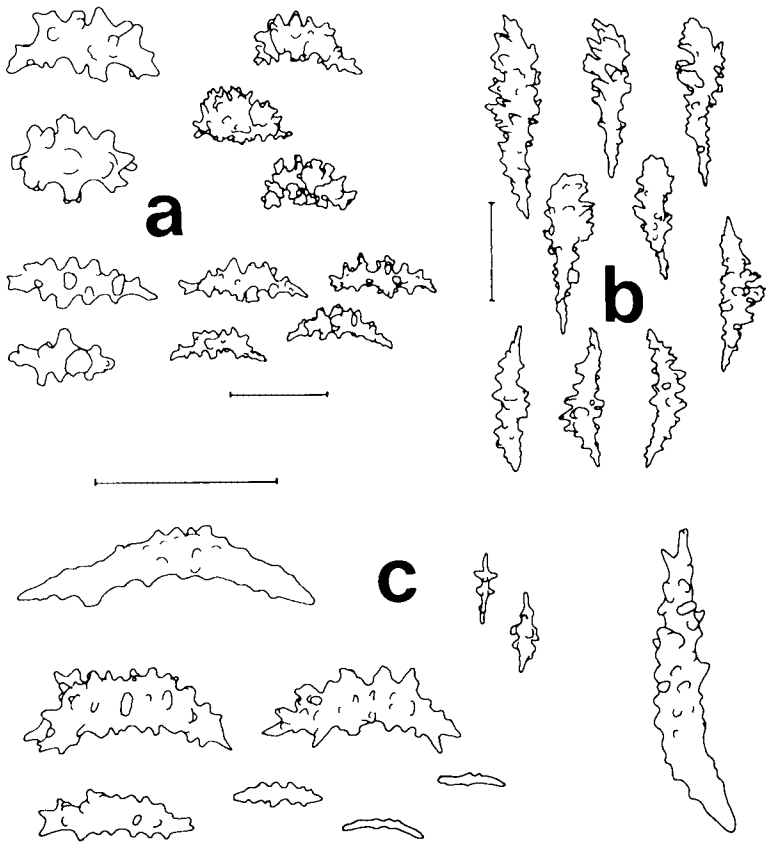

Fig. 16. *Acabaria rubeola* (Wright & Studer), sclerites of specimen from sta. AH.X3; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites. Scale lines 0.1 mm.

(sta. F1, F4) or the sclerites are predominantly pink, in the calyces also yellowish sclerites occur (sta. F16). Secondly pink colonies with yellow calyces, red nodes and pink axis of internodes occur (sta. X2, X3, X4). Sclerites of nodes and internodes pink, sclerites of calyces yellow, some pink. Finally the material from sta. F11 has dull red parts as well as pink parts with red nodes.

The sclerites also vary to some degree, especially the unilaterally spinose spindles are less well developed in the specimens (parts) with pink axis (fig. 16).

Remarks. — Former authors placed this species in *Mopsella* because of the presence of leaf-clubs. However, the majority of the sclerites are spindles and therefore this species belongs in *Acabaria*.

Suberogorgia muriceoides Stiasny undoubtedly belongs to *Acabaria rubeola* (Wright & Studer). Stiasny corrected this mistake in a later paper (Stiasny 1941: 69).

Distribution. — Malay Archipelago, extending north to the Philippines, east to Torres Strait, south to the Arafura Sea, west to the Sulu Archipelago.

Acabaria andamanensis spec. nov.
(figs. 17-19)

? *Melitodes variabilis* — Thomson & Simpson, 1909: 169, fig. 73 (Gulf of Martaban, Andamans).
not *Melitodes variabilis* Hickson, 1905: 809, pl. 67 fig. 11 (Maldives).

Material examined. — Sta. AB1.18A, 07°34'N 98°00'E, Andaman Sea, West of South Thailand, 21.iii.1963, GMT, 77 m, holotype (RMNH Coel. no. 17455). From the same station three basal parts of additional colonies and many fragments (paratypes) (RMNH Coel. no. 17456).

Description. — The holotype (fig. 17) is a colony, 19 cm long and 17 cm wide, of which the base is missing. The colour varies throughout the colony. The internodes show different shades of pink, some are whitish; the axis has a similar variation in colour. The nodes have a somewhat lighter colour than the internodes; many of them are white. The polyps are always white. Colony branched in several parallel planes and many anastomoses form a complex network. Calyces dome-like, mostly placed biserially, sometimes on three sides, but leaving one side of the colony free of polyps. Internodes up to 10 mm long. Nodes in the lower part of the colony distinctly swollen.

Coenenchyme with rods, spindles and unilaterally spinose spindles (fig. 18a), the latter up to 0.21 mm long and 0.10 mm wide. Calyces with wart- to

thorn-clubs (fig. 18b) up to 0.22 mm long and 0.11 mm wide. Unilaterally spinose spindles as well as thorn-clubs often with some pointed leaves and even some leaf-spindles but the overall character is spiny.

Anthocodiae (fig. 18c) with a crown of one to four rows of spindles and eight points of one to two pair of spindles. Crown with slightly bent thorny spindles up to about 0.30 mm long, although some extreme long ones are present (up to 0.48 mm long), middle part with more developed thorns. Points with slightly bent thorny spindles up to about 0.25 mm long, distal end with

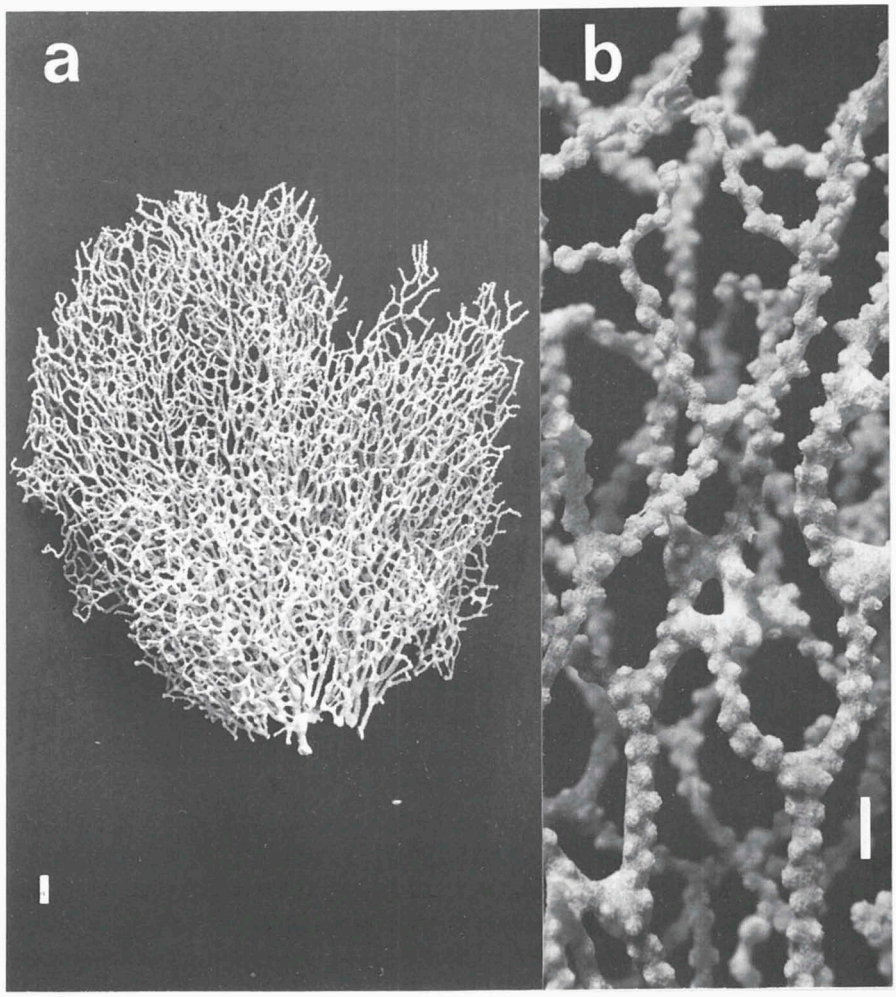

Fig. 17. *Acabaria andamanensis* spec. nov.; a, holotype, from sta. AB1.18A, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

more developed thorns. Tentacles with irregularly formed rods up to 0.15 mm long, the smallest almost smooth, the largest crescent-shaped with spines. Pharynx with straight spiny rods up to 0.06 mm long and 0.03 mm wide.

Coenenchyme predominantly with pink sclerites, furthermore partly pink and partly faintly yellow, partly coloured, faintly yellow and colourless

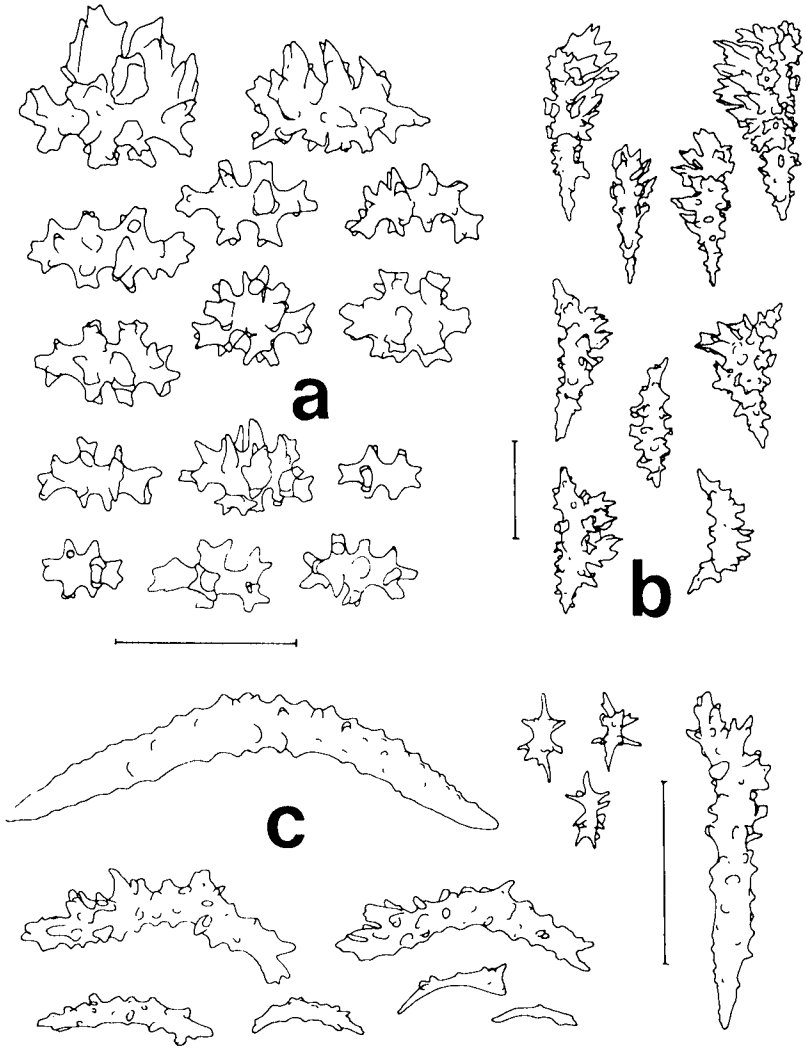

Fig. 18. *Acabaria andamanensis* spec. nov., sclerites of holotype, from sta. AB1.18A; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites. Scale lines 0.1 mm.

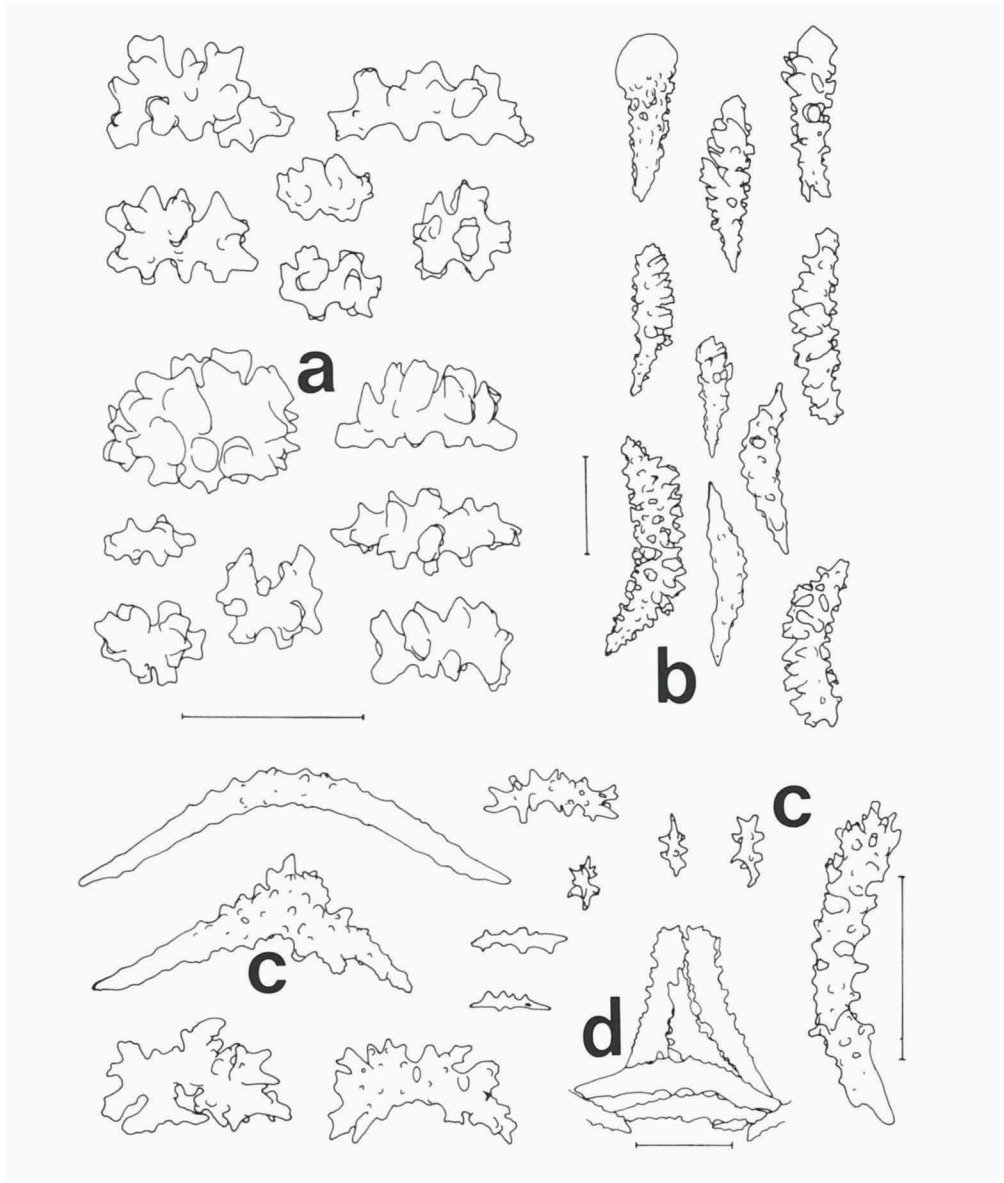

Fig. 19. *Acabaria andamanensis* spec. nov., sclerites of paratype from sta. AB1.18A; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1. mm.

sclerites are present. Larger anthocodial sclerites faintly yellow, smaller ones colourless.

Variability. — The rest of the material differs from the holotype in the following respects: Colour of colonies orange with yellowish polyps and axis of internodes; colonies branched in one plane; larger branches flattened perpendicular to the plane of branching; calyces placed on three sides of the branches. The main difference, however, concerns the sclerites (fig. 19). The spines of the clubs and unilaterally spinose spindles are truncate, some sclerites even show irregular foliaceous projections. Furthermore several spindles of the points have irregular projections on the convex side and the crescent-shape rods of the tentacles are more irregularly formed. Instead of pink the majority of the sclerites are orange. Larger anthocodial sclerites yellow, smaller ones colourless.

I have selected RMNH Coel. no. 17455 as the holotype because of the completeness of the specimen and its relatively well developed sclerites.

Remarks. — This species resembles the specimens identified by Thomson & Simpson (1909: 169) as *Melitodes variabilis* Hickson. Especially the similarity between the holotype of *A. andamanensis* spec. nov. and their figure (fig. 73) is striking. Unfortunately they did not give figures of the sclerites, so re-examination of their material is necessary to obtain certainty about this matter.

Distribution. — Andaman Sea.

Etymology. — The species is named after the Andaman Sea.

Acabaria variabilis (Hickson, 1905) comb. nov.
(figs. 20-21)

Melitodes variabilis (in part) Hickson, 1905: 809, pl. 67 fig. 11 (Maldives); Hickson, 1937: 121.
? *Melitodes variabilis* — Thomson & Mackinnon, 1910: 198, pl. 13 fig. 13 (Providence); Thomson & Dean, 1931: 196 (Malay Archipelago).
not *Melitodes variabilis* — Thomson & Simpson, 1909: 169, fig. 73 (Gulf of Martaban, Andamans); Nutting, 1911: 40 (Malay Archipelago).

Material examined. — Sta. TV3.120, 04°33'N 73°34'E, 22.iii.1964, macro-benthos, collected from lagoon of Male Atoll, Maldives, 55-60 m, fragments (dry material) (RMNH Coel. no. 17457).

Description. — The largest fragment is nine cm long (fig. 20). Colour of nodes red, internodes and polyps white. Branching more or less in one plane; anastomoses present. Calyces dome-like, placed irregularly all around the branches. Internodes up to 38 mm long. Nodes somewhat swollen.

Coenenchyme with rods and spindles, many with tubercles more strongly developed on one side (fig. 21a), those of the nodes for the greater part with rounded tubercles. Length of the spindles up to about 0.25 mm, width up to 0.07 mm. Calyces with wart- to leaf-clubs (fig. 21b) up to 0.20 mm long and 0.06 mm wide.

Crown with slightly bent thorny spindles, middle part with more developed thorns. Points with slightly bent thorny spindles, distal end with more developed thorns. Length of spindles of both crown and points up to about

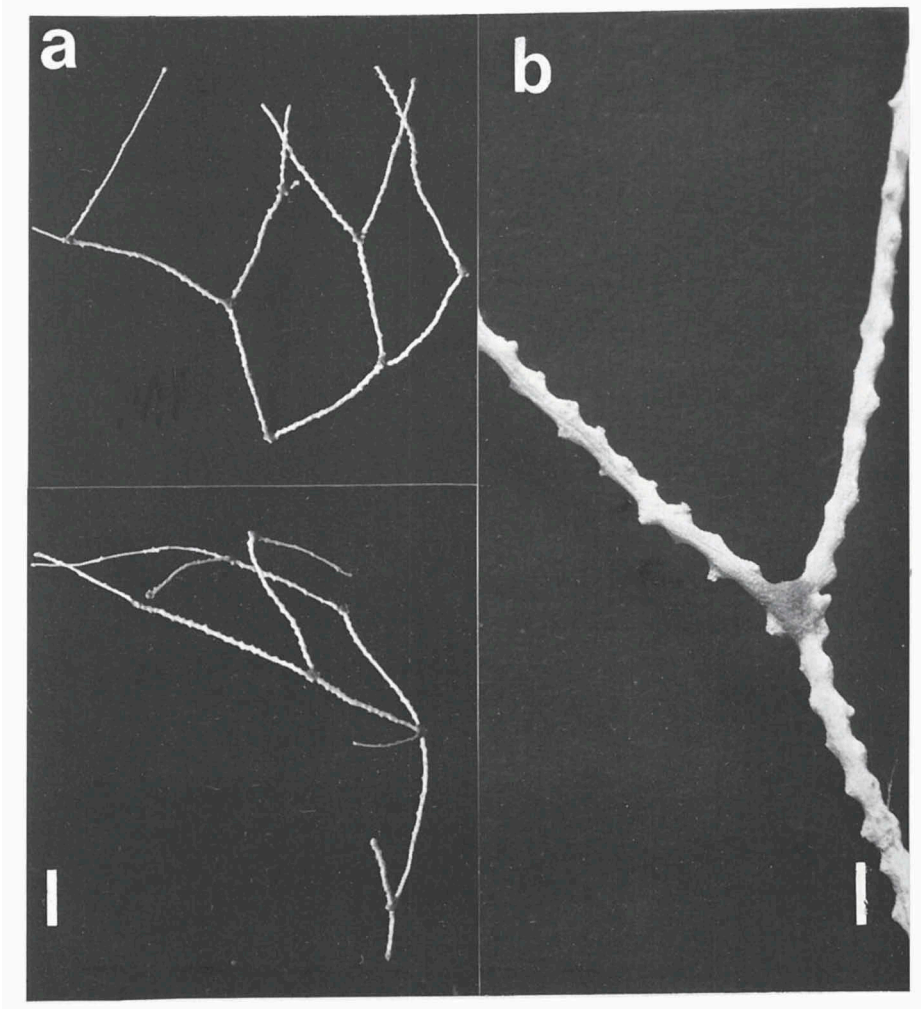

Fig. 20. *Acabaria variabilis* (Hickson); a , largest fragments, from sta. TV3.120, scale bar 10 mm; b, detail of branches of above fragment of a, scale bar 2 mm.

0.25 mm. Tentacles with irregularly formed rods up to 0.13 mm long, the smalles almost smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight, spiny rods up to 0.04 mm long and 0.02 mm wide.

Coenenchyme of the nodes predominantly with pink and orange sclerites, some colourless or partly coloured. Coenenchyme of the internodes predominantly with colourless sclerites, some pink, orange or partly coloured (near nodes). Calyces and polyps with colourless sclerites.

Remarks. — Because of the dry condition of the material I was unable to examine the exact arrangement of the sclerites of the crown and points.

I have re-examined type material of *Melitodes variabilis* Hickson, 1905 from the British Museum as well as some micro-slide preparations of sclerites. Although I have not seen Hickson's entire type-series (1905: 811), it is obviously a mixture of several species. Firstly, there are several specimens which clearly belong to a new species here described as *Clathraria maldivensis* (see p. 17). Secondly, one of Hickson's preparations contains sclerites which correspond with *Subergorgia* Gray, 1857, a genus which does not belong to the Melithaeidae at all. I have not found fragments of a species of this genus in the material re-examined. Thirdly, two completely red fragments from Hulule, Male Atoll (BMNH 1962.7.20.105) have characters of the genus *Wrightella*. Finally, there are many specimens which do belong to a species of *Acabaria*. These are: BMNH 1962.7.20.103, Miladumadulu Atoll, 24 fms, fragments with white internodes, red nodes and white polyps; and one fragment with pink internodes, yellow nodes and pink polyps; BMNH 1962.7.20.104, North Male, 24 fms, fragments with white internodes, red nodes and white polyps; BMNH 1962.7.20.105, Hulule, Male Atoll, under dead coral masses close to W. Reef, fragments (one with holdfast) with white internodes; fragments with yellow internodes; fragments with orange internodes (all with red nodes and yellow polyps); fragments with orange internodes and nodes and yellow polyps; and fragments with orange internodes and red nodes and polyps; BMNH 1962.7.20.106, Hulule, Male Atoll, 15-20 fms, fragments with white internodes and red nodes; one fragment with white internodes and orange nodes; fragments with yellow internodes and red nodes; fragments (one with holdfast) with orange internodes and red nodes; and fragments with orange internodes and nodes (all with yellow polyps); BMNH 1962.7.20.107, Addu Atoll, 12 fms, fragments with yellow internodes, orange nodes and yellow polyps; one fragment with orange internodes and red nodes and polyps; and one fragment with pink internodes, orange nodes and yellow polyps.

Hickson placed his species in the genus *Melitodes,* possibly because he

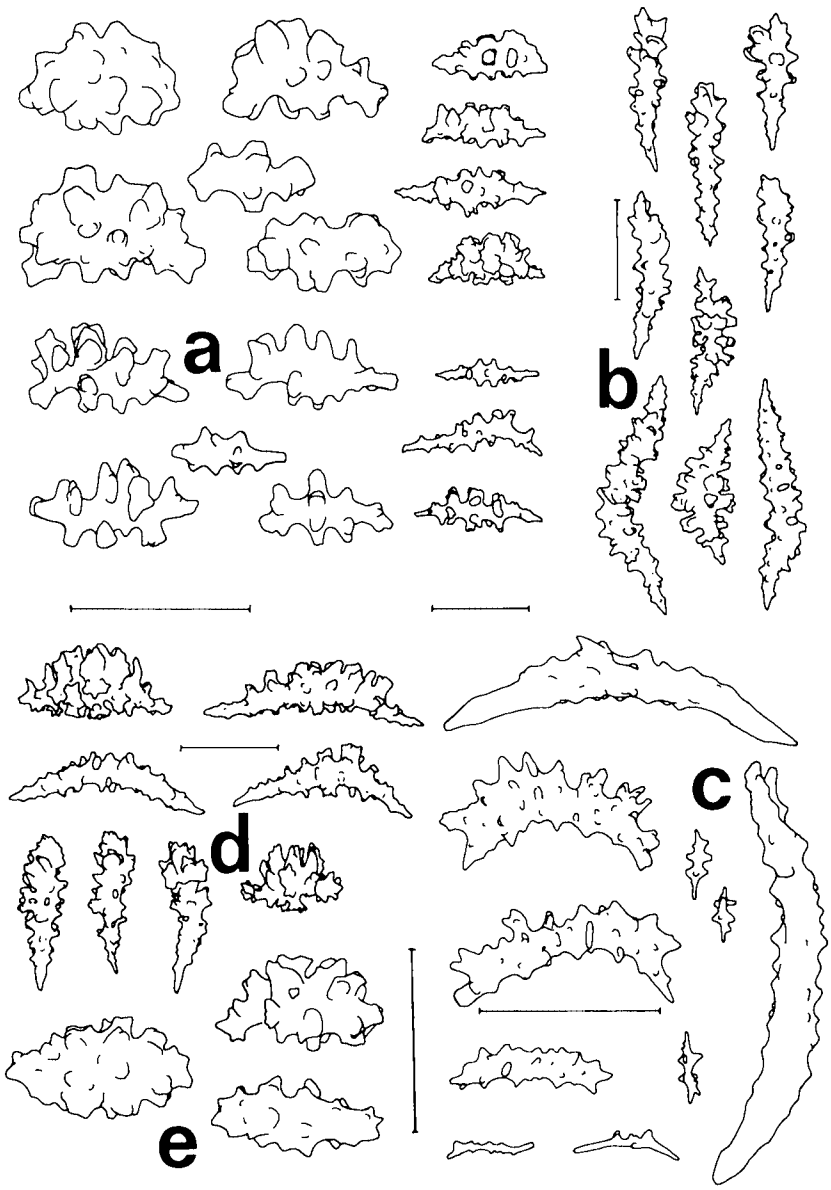

Fig. 21. *Acabaria variabilis* (Hickson), sclerites of specimen from sta. TV3.120 (a-c) and of *Melitodes variabilis* Hickson (d-e; micro-slide preparation of the British Museum, no. 1961.2.6.230); a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, clubs and spindles (clubs of calyces; origin of spindles unknown); e, sclerites of coenenchyme of nodes. Scale lines 0.1 mm.

observed sclerites of *Clathraria maldivensis* and *Wrightella* spec. in some of his micro-slide preparations. In the description of the species, however, he mentioned spindles as the most abundant sclerites (1905: 810; 1937: 121), a character of the genus *Acabaria*. Therefore I here designate one of the syntypes of *Melitodes variabilis* with characters of *Acabaria* as lectotype of *Acabaria variabilis*. The lectotype is labelled as follows: "Melitodes variabilis Hickson; reg. no. 1962.7.20.104; status syntype; loc. N. Male, Maldives, 24 fms; coll. J.S. Gardiner; det. Hickson". It consists of fragments, the largest being four cm long, with red nodes and white internodes.

Even after removal of the above-mentioned species, *A. variabilis* remains a very variable species so far as the colour of the colony is concerned, but generally the nodes are red or orange and contrast with the internodes.

The lectotype and the fragments from Miladumadulu Atoll (BMNH reg. no. 1962.7.20.103) are very similar to the material from sta. TV3.120. They have the same colour and also show rather long internodes (up to 17 mm long), although several fragments show a bilateral arrangement of the polyps, others have the polyps irregularly arranged around the branches. There are, however, also specimens in Hickson's material with short internodes, possibly young colonies.

Apart from the slightly larger spindles (up to about 0.30 mm long) and the occurrence of some leaf-spindles (fig. 21d), the sclerites in Hickson's micro-slide preparations do not differ much from those of the material from sta. TV3.120. A striking character, not mentioned by Hickson, is the presence in the nodes of rods and spindles with rounded tubercles, which are also present in Hickson's micro-slide preparations.

The specimens identified by Thomson & Simpson (1909: 169) as *Melitodes variabilis* probably belong to another species (see page 31, *Acabaria andamanensis*).

The two specimens identified by Nutting (1911: 40) as *Melitodes variabilis* (with question-mark) were re-examined during the present study. The specimen from Siboga station 274 (ZMA 2869) belongs to *Acabaria rubeola* (Wright & Studer). The specimen from Siboga station 60 (ZMA 2871) is another species of *Acabaria* but certainly not *A. variabilis*.

Finally, Thomson and Dean (1931: 196) identified "unsatisfactory fragments" from Siboga stations 164 and 105 as *M. variabilis*. I have seen a micro-slide preparation of sclerites of the specimen from station 105, unfortunately the quality of this preparation is too poor to ascertain whether it is really *A. variabilis*.

Distribution. — Maldives; Providence Island ? (NNE of Madagascar); Malay Archipelago?

Acabaria biserialis Kükenthal, 1908
(figs. 22-23)

Acabaria biserialis Kükenthal, 1908: 195 (Red Sea); Grasshoff, 1976: 160, figs. 3, 4, 5c-d (Red Sea).

Material examined. — Sta. AB8.420A, 02°42'S 40°53'E, off Kenia, 6.xi.1964, Shrimp Tr., 140 m, fragments of colony (RMNH Coel. no. 17458).

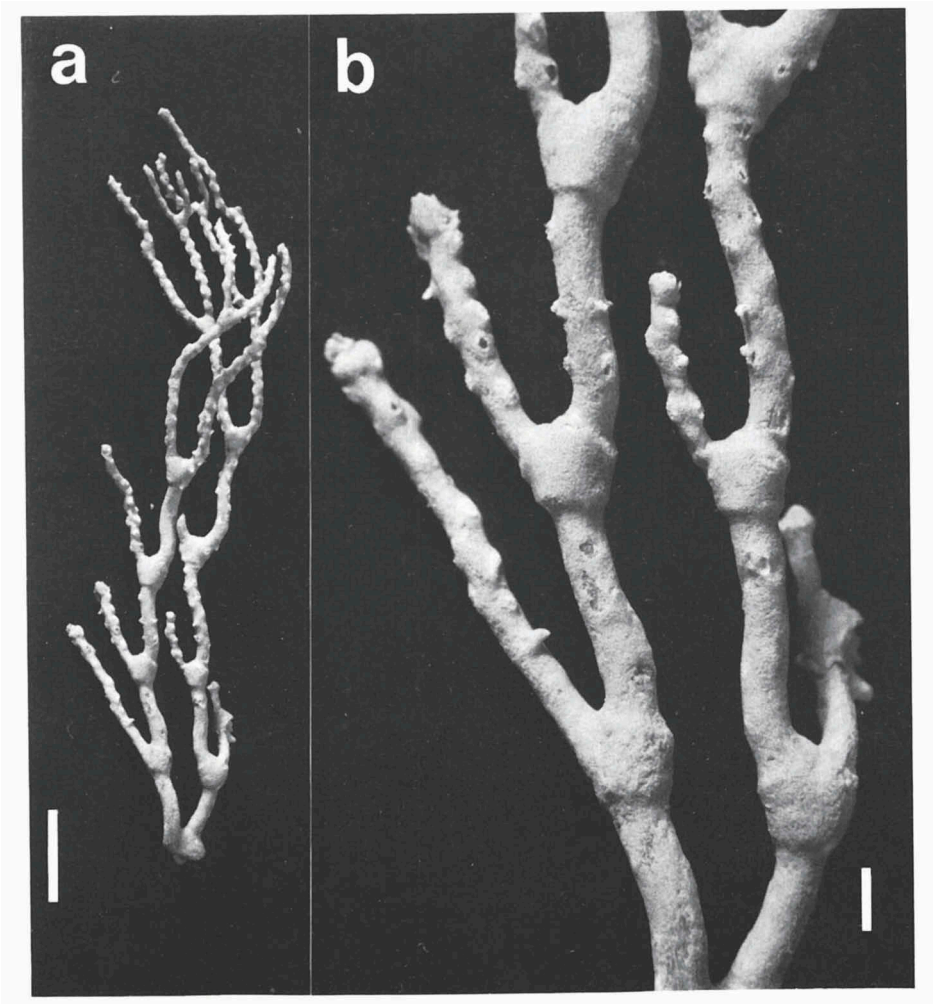

Fig. 22. *Acabaria biserialis* Kükenthal; a, largest fragment from sta. AB8.420A, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

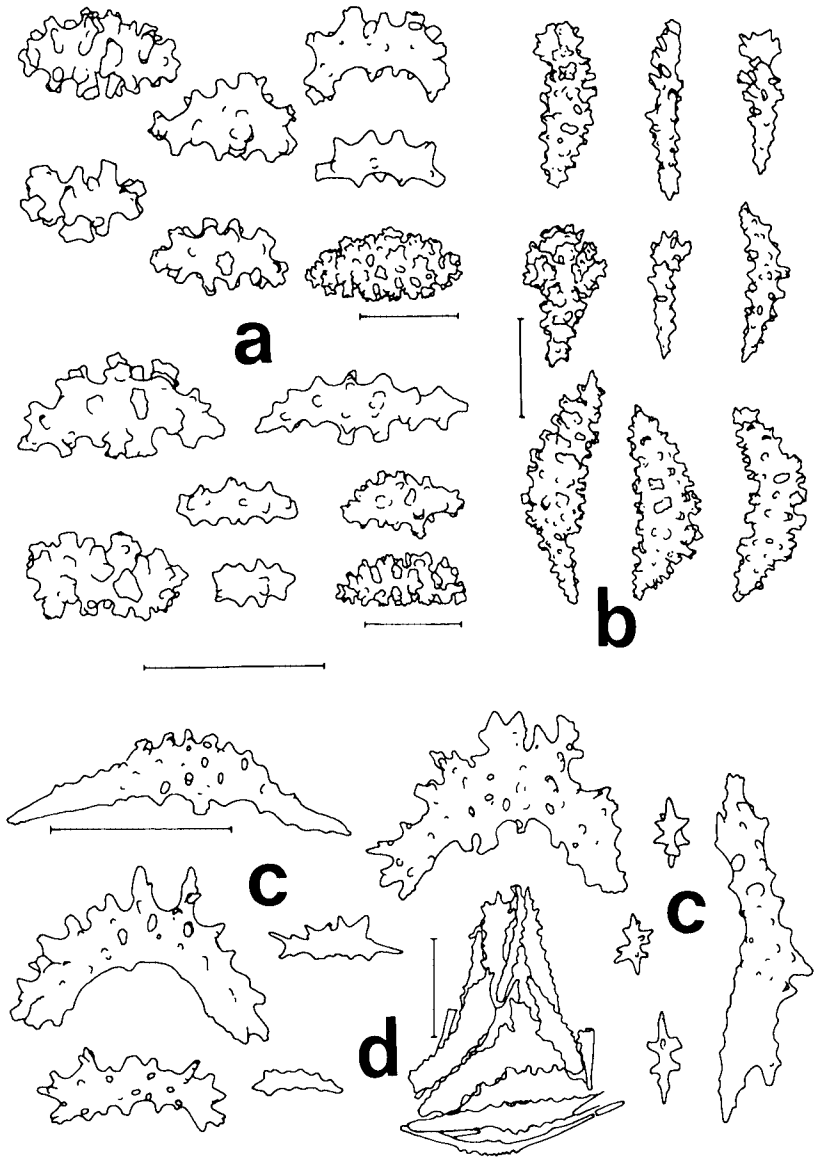

Fig. 23. *Acabaria biserialis* Kükenthal, sclerites of specimen from sta. AB8.420A; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1 mm.

Description. — The largest fragment is eight cm long (fig. 22). Colour of fragments orange with white polyps, the larger nodes darkened; axis of internodes light orange. Branching more or less in one plane; a few anastomoses are present. Largest branches somewhat flattened perpendicular to the plane of branching. Calyces dome-like, placed biserially on the smaller branches and on three sides on the larger branches but one side of the colony free of polyps. Internodes up to 20 mm long. Larger nodes distinctly swollen.

Coenenchyme with rods and spindles (fig. 23a), the latter up to 0.29 mm long and 0.10 mm wide. Calyces with wart- to leaf-clubs (fig. 23b) up to 0.22 mm long and 0.09 mm wide.

Anthocodiae (fig. 23c-d) with a crown of two to four rows of spindles and eight points of three to seven spindles. Crown with slightly bent thorny spindles up to about 0.30 mm long, middle part with more developed thorns, irregular projections or a third leg. Points with slightly bent thorny spindles up to about 0.25 mm long, distal end with more developed thorns, several with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.15 mm long, the smallest almost smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight spiny rods up to 0.06 mm long and 0.03 mm wide.

Spindles and rods of coenenchyme orange, clubs of calyces orange, colourless or partly coloured; anthocodial sclerites colourless, with the exception of the pharyngeal rods, the majority of which are pink.

Distribution. — Red Sea; Kenia; Madagascar.

Acabaria spec. aff. **delicata** Hickson, 1940
(figs. 24-25)

? *Acabaria delicata* Hickson, 1940: 16, fig. 6, pl. 1 fig. 3 (Red Sea).
? *Acabaria gracillima* — Stiasny, 1940b: 147, pl. 1 figs. 3, 4, pl. 10 fig. G (Red Sea).

Material examined. — Sta. AB8.420A, 02°42'S 40°53'E off Kenia, 6.xi.1964, Shrimp Tr., 140 m, six specimens (of four of these only the lower part of the colony is left) and many fragments (RMNH Coel. no. 17459).

Description. — The largest colony is 13 cm long and 8 cm wide (fig. 24). Most of the material with pink nodes and internodes; calyces pink or white with white polyps or yellow with yellow polyps; axis of internodes pink. Some fragments creamy with white polyps and cream axis of internodes. In all of the material larger nodes darkened. Colonies branched in several parallel planes and many anastomoses form a complex network. There is no real main

stem but always a composite structure of several stems fused together (fig. 24). Calyces dome-like, situated biserially. Internodes up to about 15 mm long. Larger nodes somewhat swollen.

Coenenchyme with rods and spindles, many with better developed tubercles on one side (fig. 25a). Calyces with wart- to thorn-clubs (fig. 25b). Spindles and clubs up to about 0.30 mm long and up to 0.05 mm wide.

Anthocodiae (fig. 25c-d) with a crown of two to five rows of spindles and

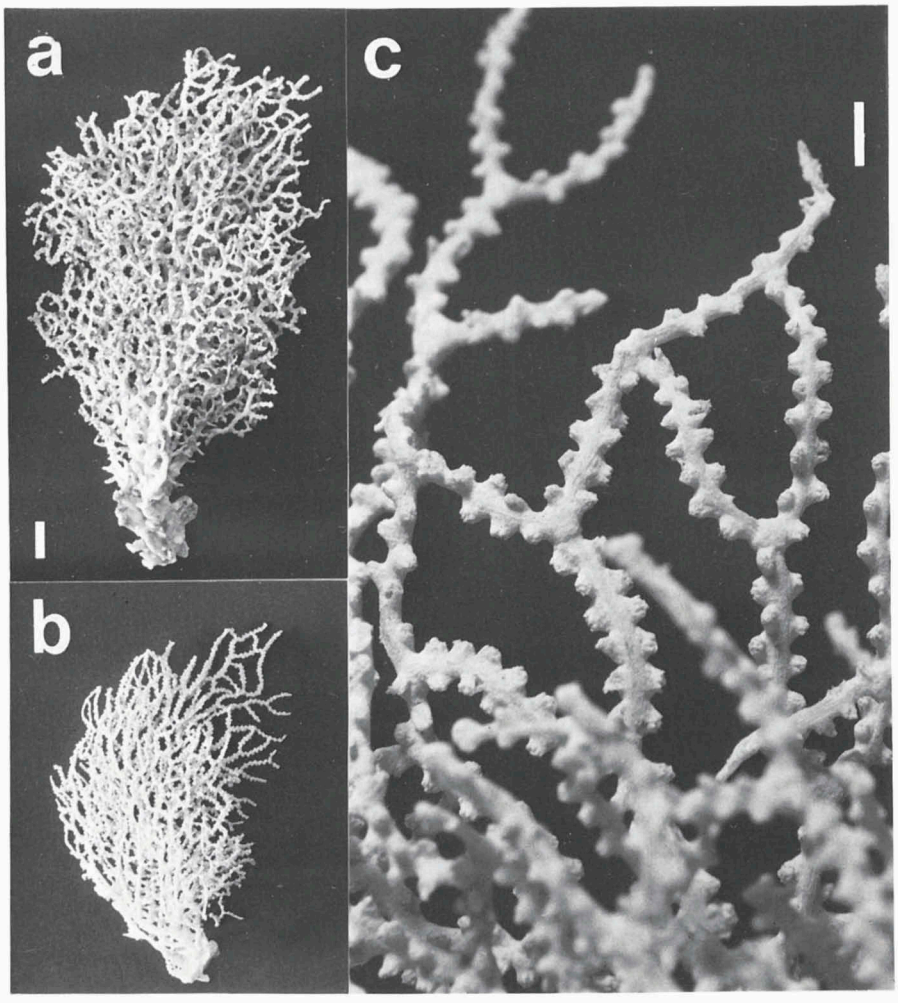

Fig. 24. *Acabaria* spec. aff. *delicata* Hickson; a, largest colony from sta. AB8.420A, scale bar 10 mm; b, another colony from sta. AB8.420A, same scales as a; c, detail of branches of b, scale bar 2 mm.

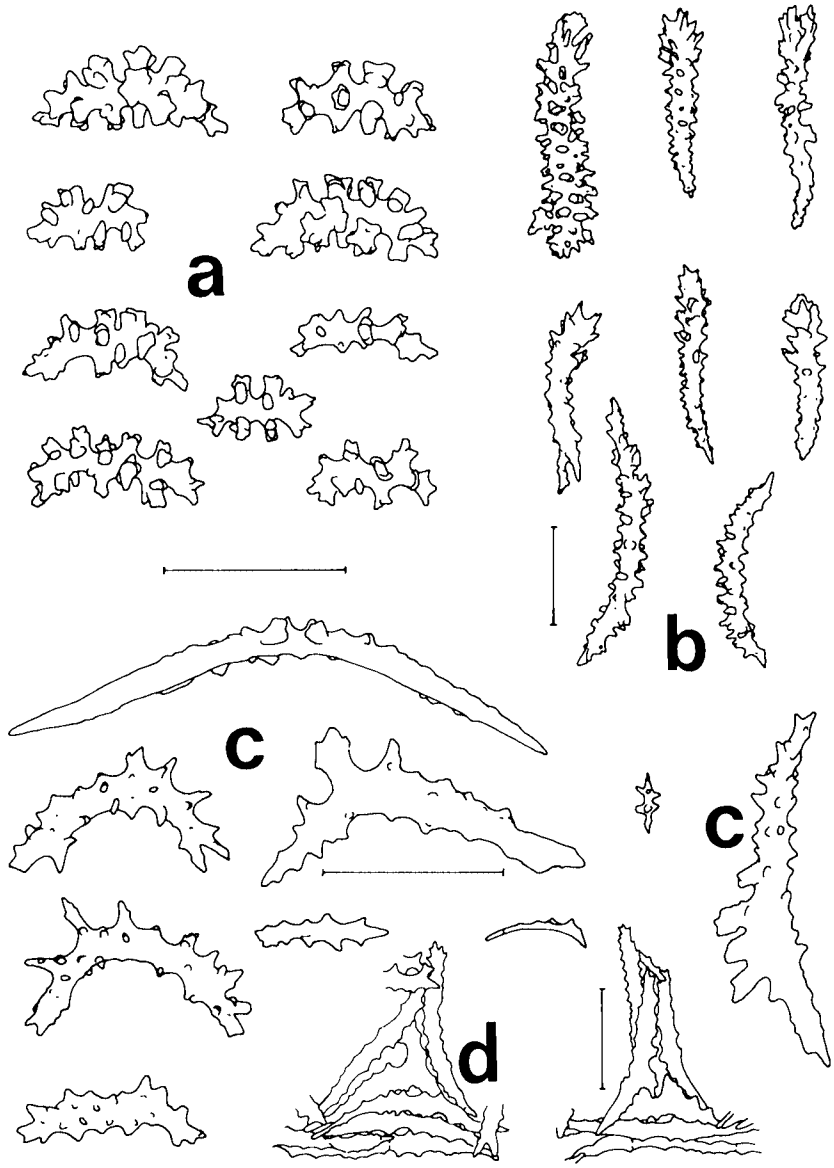

Fig. 25. *Acabaria* spec. aff. *delicata* Hickson, sclerites of specimen from sta. AB8.420A; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1 mm.

eight points of two to four spindles. Crown with slightly bent thorny spindles up to about 0.30 mm long, middle part with more developed thorns, irregular projections or a third leg. Points with slightly bent thorny spindles up to about 0.20 mm long, distal end with more developed thorns, several with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.14 mm long, the smallest almost smooth, the largest crescent-shaped with spines. Pharynx with straight spiny rods up to 0.06 mm long and 0.02 mm wide.

Coenenchyme of the nodes and internodes with colourless and pink sclerites (pink nodes and internodes; white or pink calyces), colourless and yellow

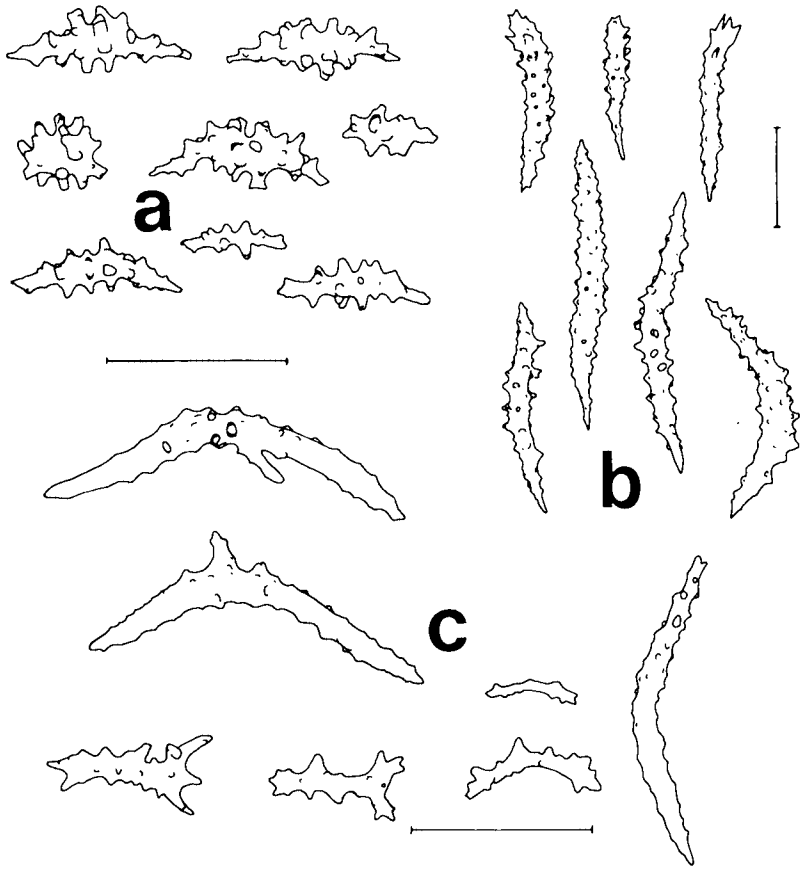

Fig. 26. *Acabaria delicata* Hickson, sclerites of specimen identified by Stiasny as *A. gracillima* (Ridley) (RMNH Coel. no. 6055); a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites. Scale lines 0.1 mm.

sclerites (creamy nodes and internodes) or pink and yellow sclerites (pink nodes and internodes; yellow calyces). Coenenchyme of calyces with yellow sclerites (yellow calyces), colourless sclerites (white calyces), colourless and pink sclerites (pink calyces) or colourless and yellow sclerites (creamy calyces). Colour of sclerites of polyps corresponds with colour of polyps.

Remarks. — I have compared micro-slide preparations of sclerites of *Acabaria delicata* Hickson (BMNH 1961.6.16.179; 181) with those made of the present specimens and found them in close agreement. Although the sclerites of the present specimens (fig. 25) are somewhat more coarsely sculptured, the same sclerite forms are present in *A. delicata* (fig. 26). However, the general characters of the colony of *A. delicata* are quite different from those of the present specimens. Hickson reported, with some doubts because of the fragmentary material, that there are few anastomoses, while the present specimens show many anastomoses. The colour-pattern of *A. delicata*, white terminal branches becoming, through shades of pink, red on the thickest branch or stem, differs from that of the present specimens. Although the above-mentioned colour-patterns of the present specimens represent only the general picture (e.g. some fragments have pink calyces with white polyps as well as yellow calyces with yellow polyps and the pink colour of the nodes and internodes fades away on the composite structure of the main stems), white terminal branches are completely absent. Because of the different colour-pattern, the many anastomoses and the slightly different sclerites, I have found it most suitable to place the present specimens in the vicinity of *A. delicata*.

I have compared micro-slide preparations of the specimen identified by Stiasny (1940b: 147) as *Acabaria gracillima* (Ridley, 1884) (RMNH Coel. no. 6055) with those of *A. delicata* and found the sclerites identical.

Distribution. — Red Sea; Kenya.

Acabaria flabellum (Thomson & Mackinnon, 1910) comb. nov.
(figs. 27-28)

Melitodes flabellum Thomson & Mackinnon, 1910: 198, pl. 10 figs. 6, 7, pl. 13 fig. 8 (Providence); Hickson, 1937: 116.
not *Melitodes flabellum* — Nutting, 1911: 39 (Malay Archipelago).

Material examined. — Sta. AB9.437, 09°25'N 50°54'E, off Somalia, 16.xii.1964, benthic: trawl, 90 m ± 5, fragments, (RMNH Coel. no. 17460); sta. AB9.444, 09°36'N 51°01'E, — 09°40'N 51°03'E, off Somalia, 16.xii.1964, benthic: trawl, 80 m, two specimens (RMNH Coel. no. 17461); sta AB9.445 09°41'N 51°03'E, off Somalia, 16.xii.1964, benthic: trawl, fragments (RMNH Coel. no. 17462); sta. AB9.447, 10°00'N 51°15'E, off Somalia, 16.xii.1964, benthic: trawl, fragments (RMNH Coel. no. 17463).

Description. — The largest colony is 13 cm long and 10 cm wide (fig. 27). Colour of colonies white or yellow with several calyces and/or polyps brownish or brown with yellowish polyps; larger nodes always darkened. White specimens with white axis of internodes, yellow specimens with yellow axis and brown specimens with pink axis. Branching is in one plane and the anastomosing branches form a network. Larger branches flattened in a plane perpendicular to the plane of branching. Calyces dome-like, situated ir-

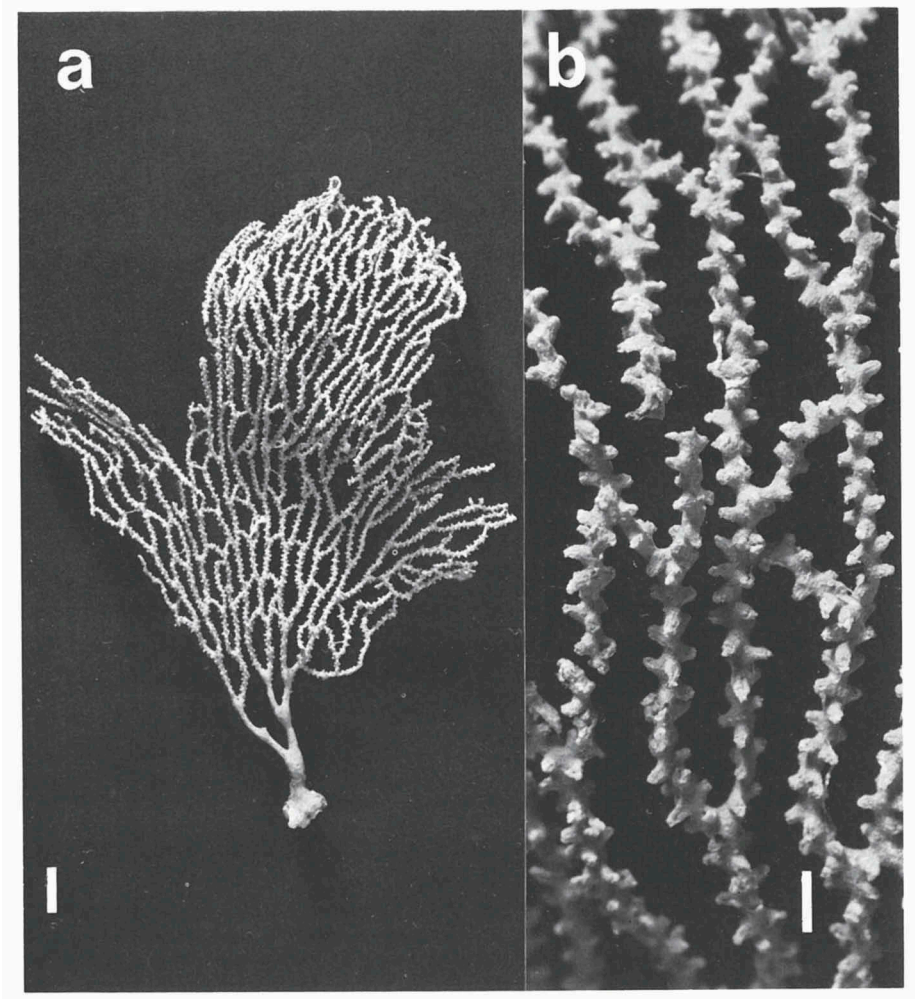

Fig. 27. *Acabaria flabellum* (Thomson & Mackinnon); a, largest colony from sta. AB9.444, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

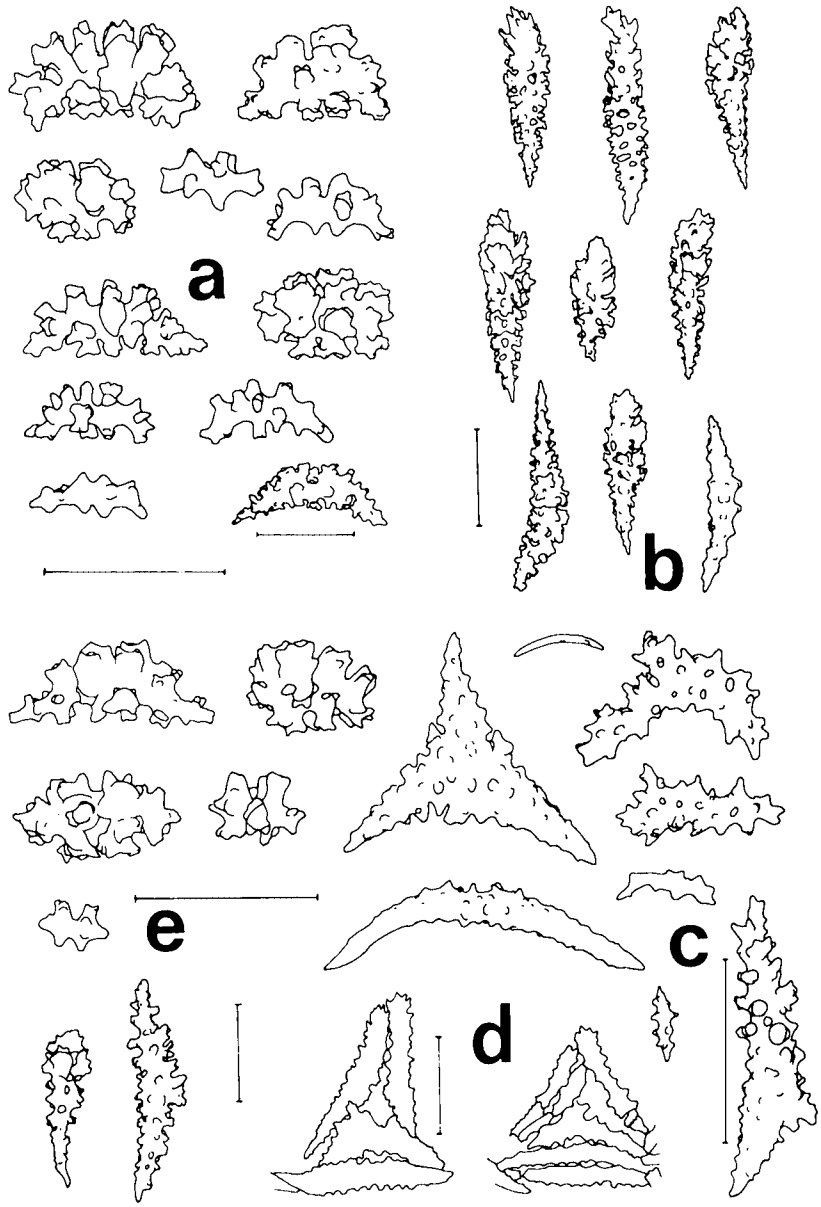

Fig. 28. *Acabaria flabellum* (Thomson & Mackinnon), sclerites of specimen from sta. AB9.447 (a-c), of specimen from AB9.437 (d) and of *Melitodes flabellum* Thomson & Mackinnon (e; micro-slide preparations of the British Museum, no. 1961.4.27.201; 202); a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature; e, foliate capstans, spindles and club of holotype (club of calyx; origin of other sclerites unknown). Scale lines 0.1 mm.

regularly around the branches or on three sides, in some fragments biserially. Internodes up to about 10 mm long. Larger nodes somewhat swollen.

Coenenchyme with rods and spindles, many with more developed tubercles on one side (fig. 28a). Spindles up to 0.29 mm long and 0.07 mm wide. Calyces with wart- to leaf-clubs up to 0.24 mm long and 0.06 mm wide (fig. 28b).

Anthocodiae (fig. 28c-d) with a crown of two of five rows of spindles and eight points of two to four spindles. Crown with slightly bent thorny spindles up to about 0.25 mm long, middle part with more developed thorns, irregular projections or a third leg. Points with slightly bent thorny spindles up to about 0.20 mm long, distal end with more developed thorns, several with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.13 mm long, the smallest smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight spiny rods up to 0.06 mm long and 0.02 mm wide.

Sclerites colourless (white colonies), yellow (yellow colonies) or ochreous (brown colonies); the latter with yellow anthocodial sclerites.

Remarks. — I have compared micro-slide preparations of sclerites of *Melitodes flabellum* Thomson & Mackinnon (BMNH 1961.4.27.201; 202) with those made of the present specimens. Although the preparations of *M. flabellum* are of rather poor quality, I was able to make some drawings of sclerites (fig. 28e), which are very similar to those made of the present specimens (fig. 28a-d). Therefore, and because of similar external appearance I consider the present specimens to be identical with *M. flabellum*.

This is one of the species considered by Hickson (1937: 116) as being intermediate between *Melithaea* and *Acabaria*. It is certainly true that there are many foliate capstans in the micro-slide preparations of *M. flabellum*, more than in the present specimens, but as the rods and spindles outnumber them by far this species belongs in *Acabaria*.

Distribution. — Providence Island (NNE of Madagascar); Somalia.

Acabaria furcata (Thomson, 1916) comb. nov.
(figs. 29-30)

Wrightella furcata Thomson, 1916: 17, fig. 4, pl. 2 fig. 1 (South Africa).

Material examined. — Sta. AB7.371D, 24°46'S 35°20'E, off Mozambique, 18.viii.1964, Agassiz Trawl (net ripped), 165 m, many fragments (RMNH Coel. no. 17464); sta. AB7.371G, 24°49'S 35°13'E, off Mozambique, 18.viii.1964, Rock dredge, 73 m, five specimens, three "specimens" with more than one holdfast, and fragments (RMNH Coel. no. 17465); sta.

AB7.392K, 29°19'S 31°26'E, off Natal, South Africa, 10.ix.1964, Agassiz Trawl, label for sta. 391C also found in sample, 38 m, one branch (RMNH Coel. no. 17466).

Description. — The specimens from sta. AB7.371G are rather small, the largest is 3.5 cm long (fig. 29); some specimens are fused together (fig. 29). Colour of colonies white, with pink, yellow or ochreous nodes, mostly with white polyps but several fragments with yellow or pink nodes have yellow

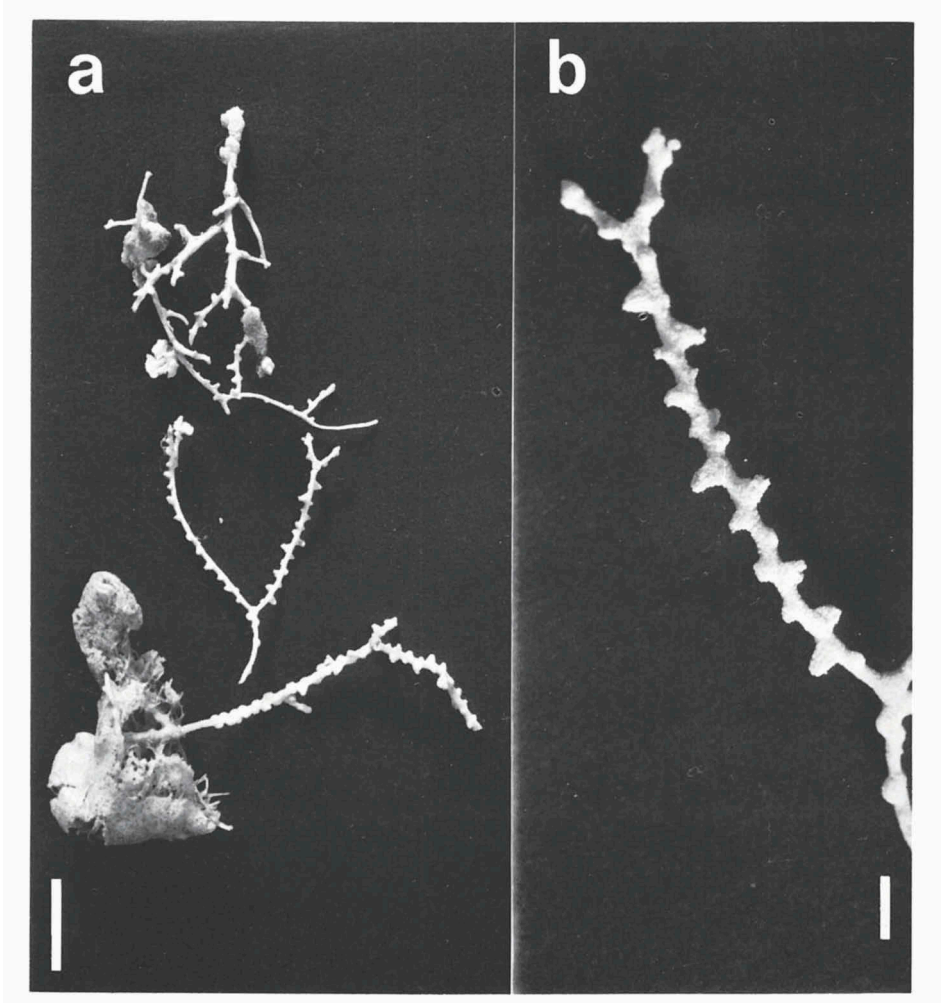

Fig. 29. *Acabaria furcata* (Thomson); a, largest colony (below), fragment (middle) and fused specimens (above), from sta. AB7.371G, scale bar 10 mm; b, detail of branch of middle fragment of a, scale bar 2 mm.

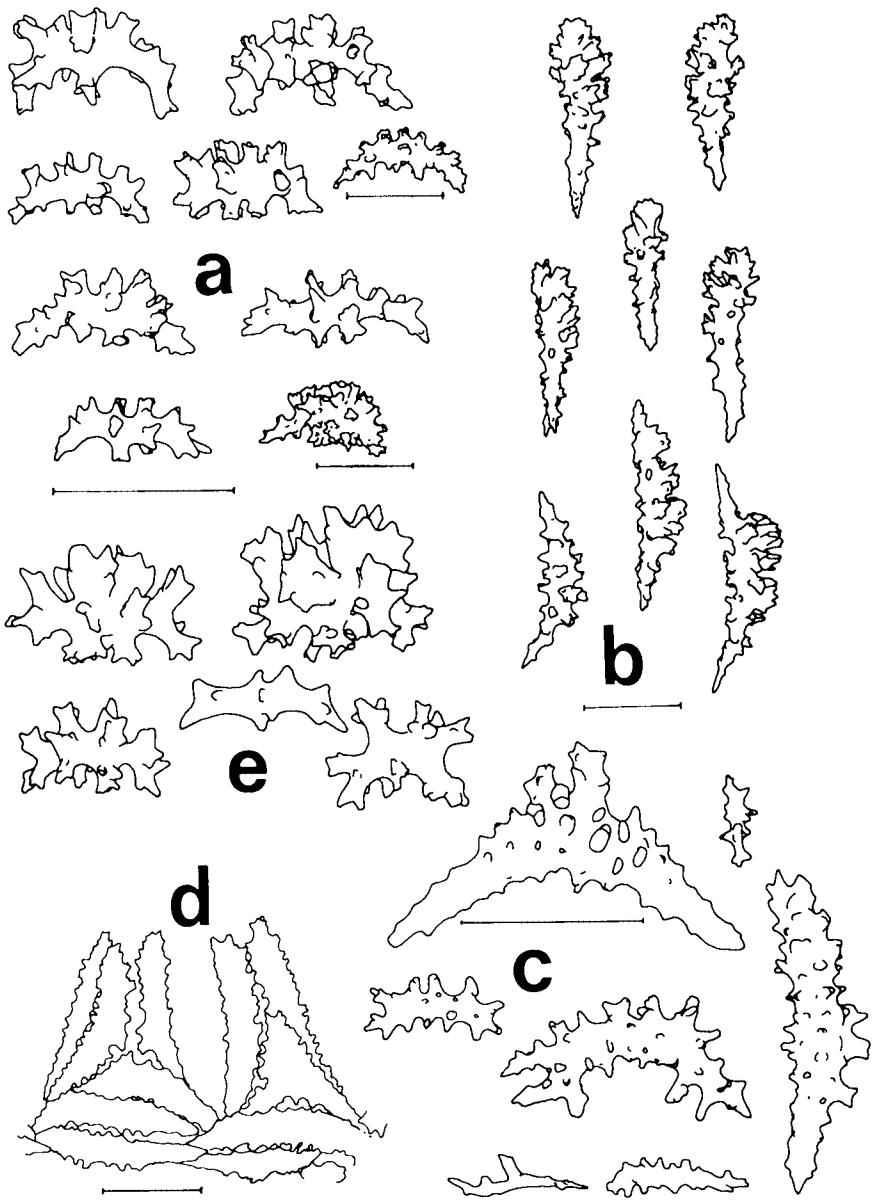

Fig. 30. *Acabaria furcata* (Thomson), sclerites of specimen from sta. AB7.371D (a-d) and of specimen from sta. AB7.371G (e); a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature; e, sclerites of coenenchyme of nodes. Scale lines 0.1 mm.

polyps; axis of internodes white. Furthermore some completely yellow fragments. Branching more or less in one plane. Apart from the fused specimens no anastomoses are present. Calyces dome-like, placed all around the branches but mostly on the two sides. Internodes up to 17 mm long.

Coenenchyme with rods and spindles (fig. 30a, e), many with more developed tubercles on one side; some leaf-spindles. Spindles up to 0.33 mm long. Calyces with wart- to leaf-clubs (fig. 30b) up to 0.28 mm long. Width of clubs and spindles variable.

Anthocodiae (fig. 30c-d) with a crown of one to three rows of spindles and eight points of two to four spindles. Crown with slightly bent thorny spindles up to about 0.30 mm long, middle part with more developed thorns, irregular projections or a third leg. Points with slightly bent thorny spindles up to about 0.25 mm long, distal end with more developed thorns, several with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.15 mm long, the smallest almost smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight spiny rods up to 0.05 mm long and 0.02 mm wide.

Sclerites of internodes and polyps colourless (white internodes and polyps) or yellow (yellow internodes and polyps). Colour of the sclerites of the nodes corresponds with the colour of the nodes.

Variability. — In the fragments of sta. AB7.371D the leaf-sclerites are up to about 0.07 mm wide, in those of sta. AB7.371G they are up to 0.10 mm wide and consequently the leaves are more developed (fig. 30e).

Remarks. — The specimens resemble rather well the original figure of *Wrightella furcata* Thomson (1916). I have, however, not observed the red polyps, mentioned by Thomson. The sclerites also show great resemblance, though I have found much larger ones.

The majority of the sclerites are spindles and therefore this species belongs in *Acabaria*.

Distribution. — South Africa; Mozambique.

Acabaria spec. indet. 1
(figs. 31-33)

? *Wrightella variabilis* Thomson & Henderson, 1906: 431, pl. 28 figs. 3-9 (Zanzibar Island); Thomson & Mackinnon, 1910: 200, pl. 13 fig. 14.

Material examined. — Sta. AB8.420A, 02°42'S 40°53'E, off Kenia, 6.xi.1964, Shrimp Tr., 140 m, seven specimens and many fragments (RMNH Coel. no. 17467); sta. AB9.437, 09°25'N 50°54'E, off Somalia, 16.xii.1964, benthic: trawl, 90 m ± 5, fragment of colony (RMNH Coel.

no. 17468); sta. AB9.442, 09°33′N 50°59′E — 09°36′N 51°01′E, off Somalia, 16.xii.1964, benthic: trawl, 75 m, three specimens and many fragments (RMNH Coel. no. 17469); sta. AB9.444 09°36′N 51°01′E — 09°40′N 51°03′E, off Somalia, 16.xii.1964, benthic: trawl, 80 m, one specimen and many fragments (RMNH Coel. no. 17470); sta. AB9.445, 09°41′N 51°03′E, off Somalia, 16.xii.1964, benthic: trawl, many fragments (RMNH Coel. no. 17471); sta. AB9.447, 10°00′N 51°15′E, off Somalia, 16.xii.1964, benthic: trawl, two fragments (RMNH Coel. no. 17472).

Description. — The largest specimen is 13.5 cm long and 4 cm wide (fig. 31). Colour of colonies very variable (see table 1). Colonies branched in

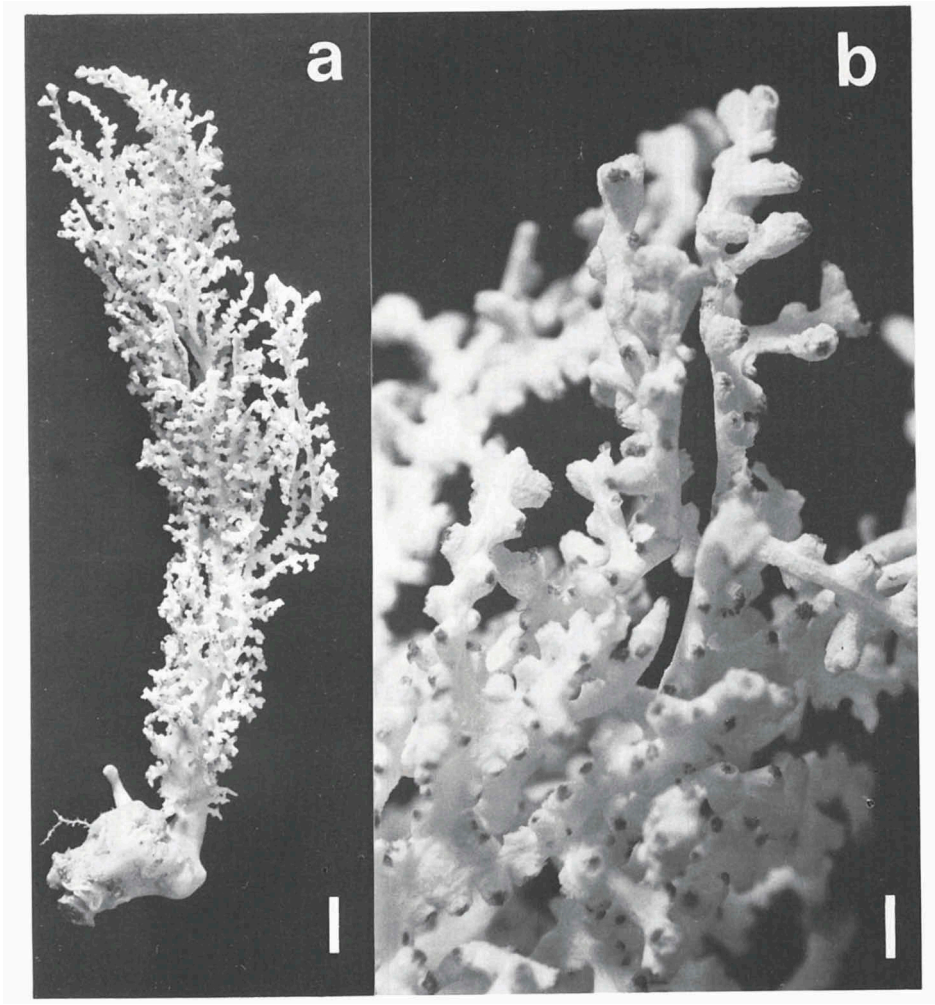

Fig. 31. *Acabaria* spec. indet. 1; a, largest colony, from sta. AB9.442, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

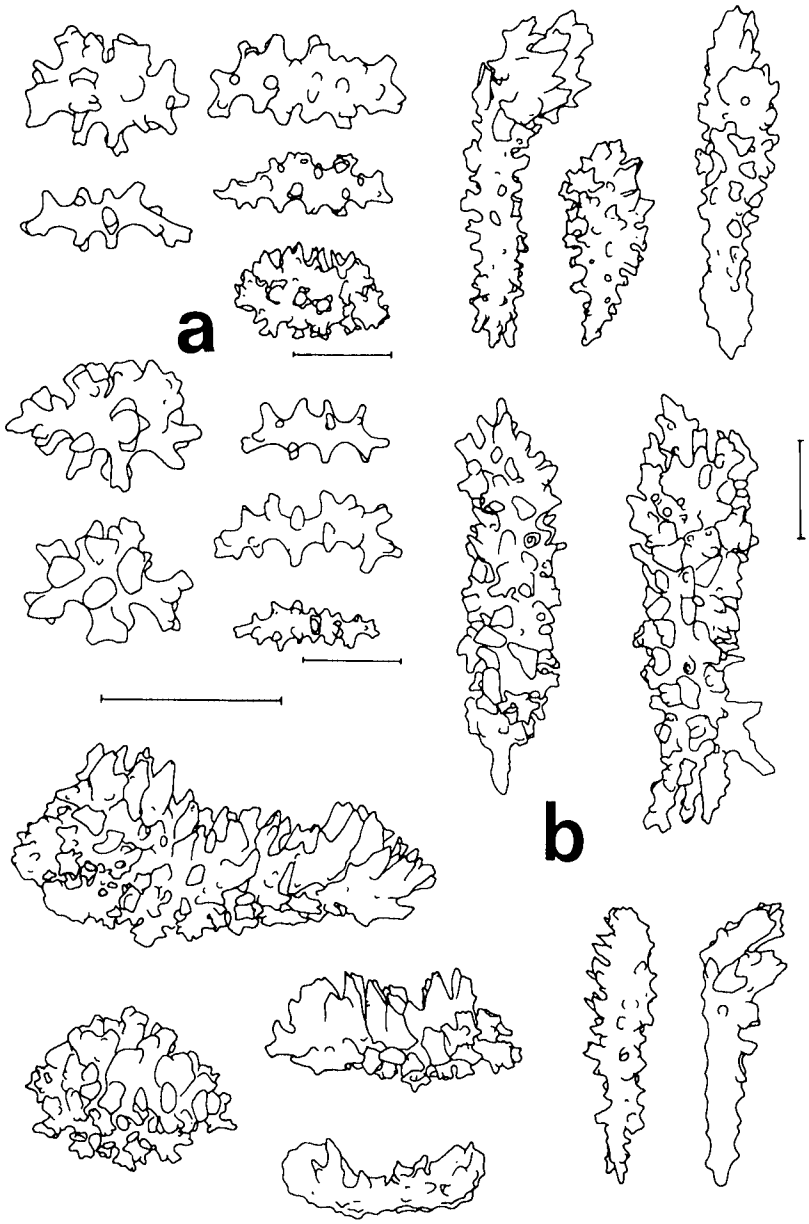

Fig. 32. *Acabaria* spec. indet. 1, sclerites of specimen from sta. AB9.442; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces. Scale lines 0.1 mm.

several parallel planes, forming flattened bushes. Branches flattened in the plane of branching. Although this flattening is hardly visible in the terminal branches, it becomes extreme in the main branches, where adjacent branches can form tube-like structures. Many branches do not originate from the nodes. Calyces dome-like to tubular, situated biserially. Anastomoses present. Internodes up to about 15 mm long. Larger nodes somewhat swollen.

Coenenchyme with rods, spindles and leaf-spindles (fig. 32a), the latter up to 0.46 mm long and 0.21 mm wide. Calyces with wart- to leaf-clubs (fig. 32b) up to 0.47 mm long. Many sclerites of the calyces are branched, some extreme forming branched bodies, the largest 0.60 mm long and 0.20 mm wide.

Anthocodiae (fig. 33a-b) with a crown of two to eight rows of spindles and eight points of four to eight (15) spindles. Crown with slightly bent thorny spindles up to about 0.45 mm long, middle part often with irregular projections. Points with slightly bent thorny spindles up to about 0.35 mm long, distal end with more developed thorns, several with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.23 mm long, the smallest almost smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight spiny rods up to 0.09 mm long and 0.04 mm wide.

Variability. — The colour of this species shows a wide variation. The main patterns found in the material at hand are presented in table 1.

Internodes	*Calyces*	*Polyps*
White	white	white; yellow; ochreous; pink; red.
White	yellow	yellow; red.
White	ochreous	white; yellow; ochreous.
White	orange	white; yellow; red.
White	red	yellow; red.
Yellowish	ochreous	white.
Yellowish	orange	red.
Ochreous	yellow	yellow.
Pink	pink	pink.
Orange	orange	white.
Red	red	yellow.

Table 1. Main colour-patterns of *Acabaria* spec. indet. 1 (in specimens with white internodes the brown axis of the nodes shines through the coenenchyme, by which the larger nodes appear to be brown).

Remarks. — This species is possibly identical with *Wrightella variabilis* Thomson & Henderson; the description they provide, unfortunately, is too incomplete for reliable identification. The figure of the sclerites of *W. variabilis*

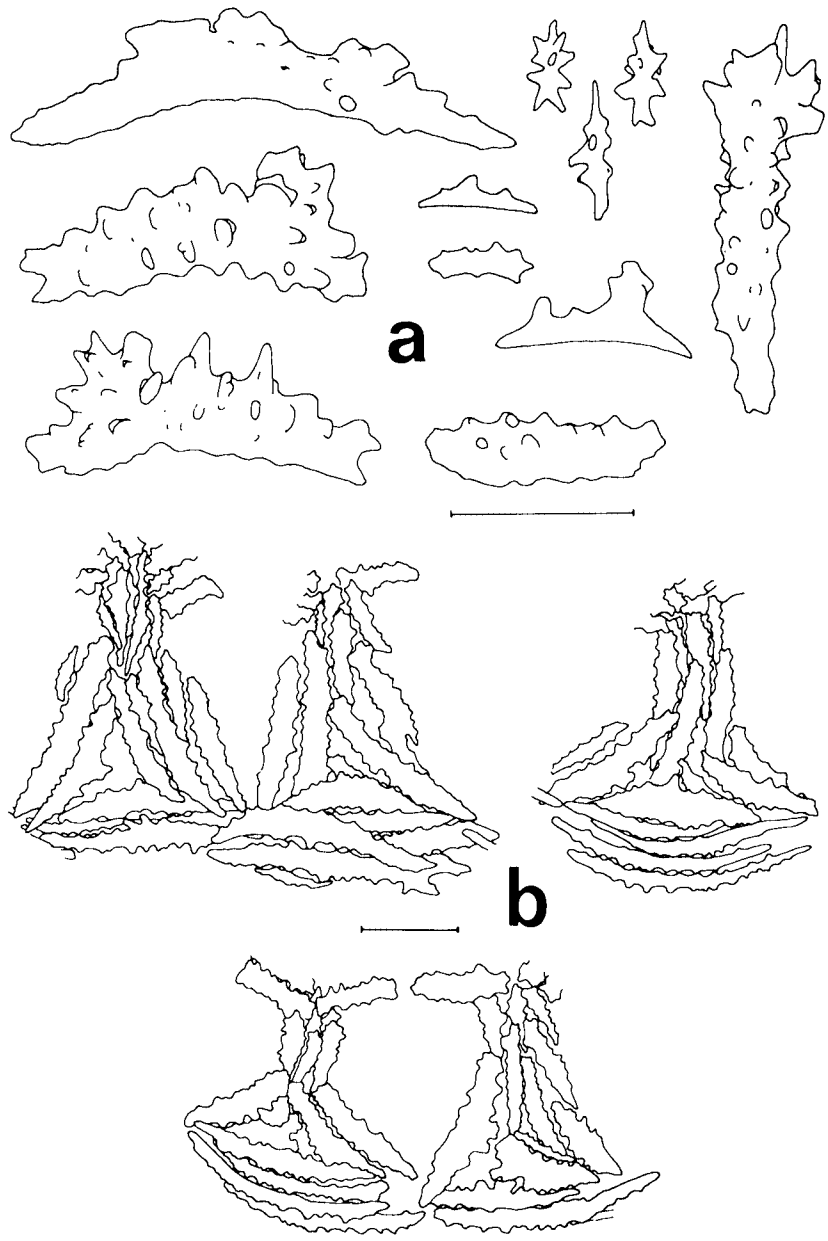

Fig. 33. *Acabaria* spec. indet. 1, sclerites of specimen from sta. AB9.442; a, anthocodial sclerites; b, anthocodial armature. Scale lines 0.1 mm.

given by Thomson & Mackinnon, 1910, however, clearly shows that Thomson & Henderson actually described a species of *Acabaria*.

On several specimens crustaceans were found (apparently commensals), mostly in the tube-like structures of the main branches. The crustaceans found belong to two species: *Thor paschalis* (Heller, 1862) (Hippolytidae; 1 specimen) and *Synalpheus albatrossi* Coutière, 1909 (Alpheidae; 14 specimens) (identification: Dr. L.B. Holthuis, RMNH). *T. paschalis* has a wide distribution; Red Sea, East-Africa to Indonesia, Marianas, *S. albatrossi*

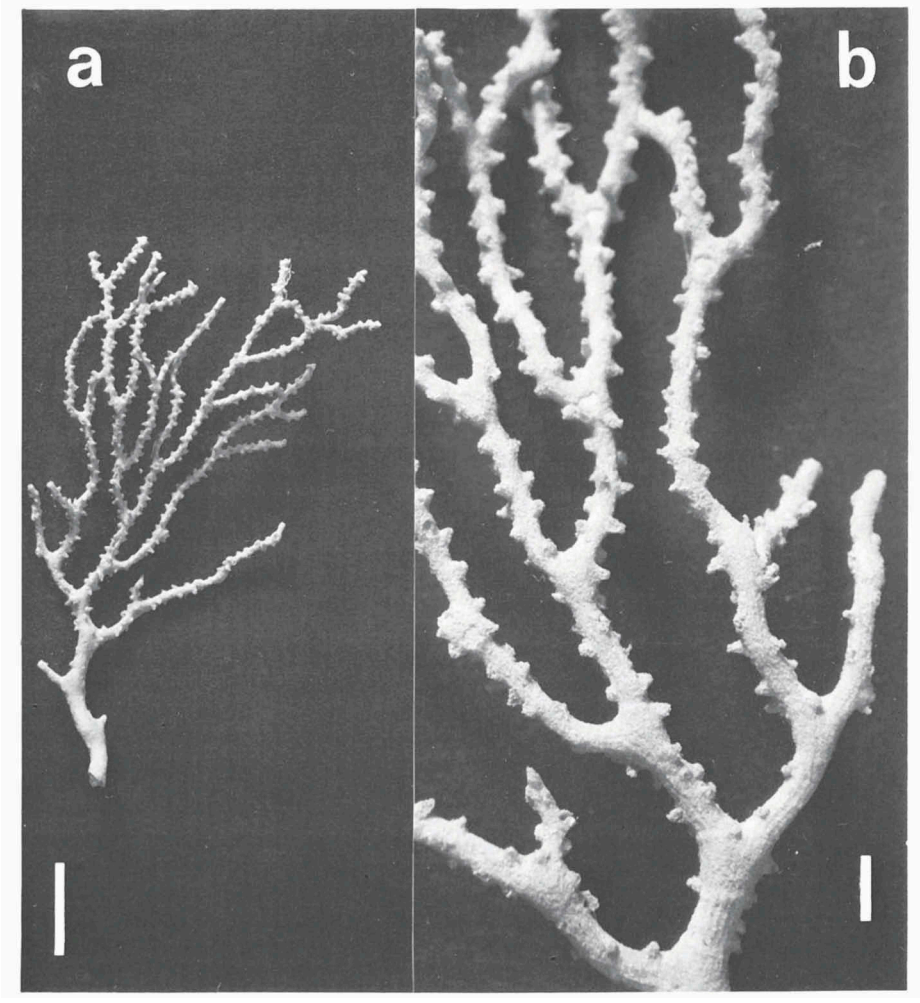

Fig. 34. *Acabaria* spec. indet. 2; a, largest fragment, from sta. AB4B.221A, scale bar 10 mm; b, the same, detail of branches, scale bar 2 mm.

is known from Hawaii, Philippines and the Islands Réunion and Mauritius. Related species of the latter are known to be commensals of crinoids, not, however *S. albatrossi*.

Distribution. — Somalia; Kenia.

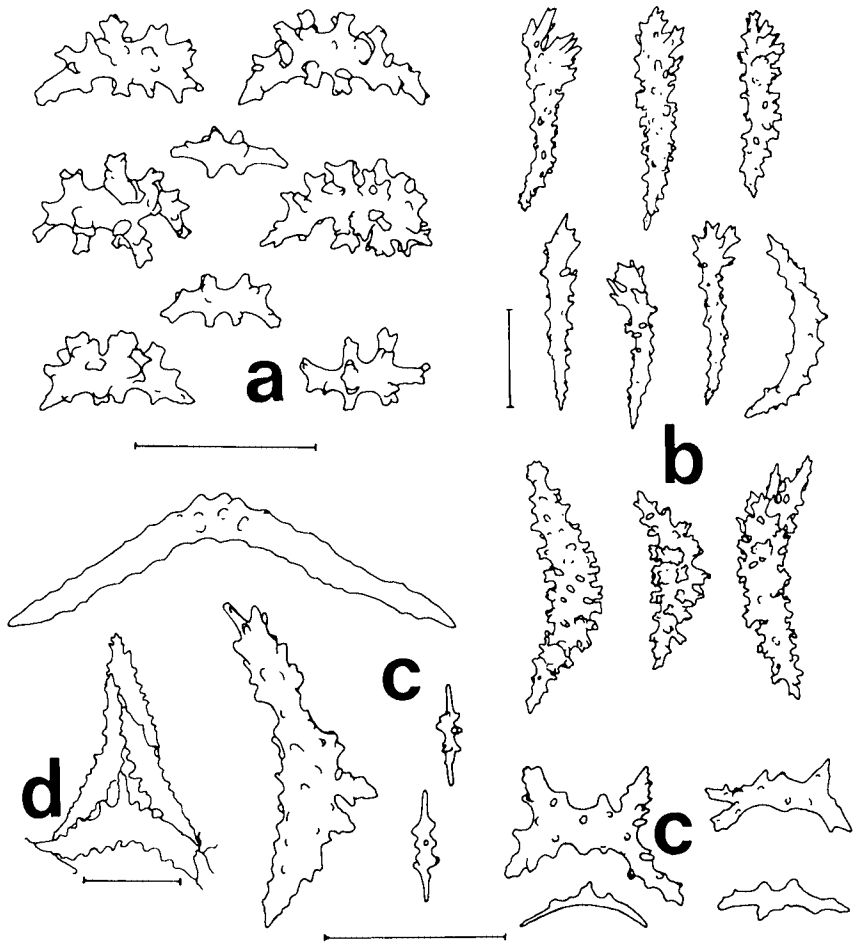

Fig. 35. *Acabaria* spec. indet. 2, sclerites of specimen from sta. AB4B.221A; a, sclerites of coenenchyme of nodes and internodes; b, clubs and spindles of calyces; c, anthocodial sclerites; d, anthocodial armature. Scale lines 0.1 mm.

Acabaria spec. indet. 2
(figs. 34-35)

Material examined. — Sta. AB4B. 206A, 20°23'N 70°00'E — 20°20'N 69°55'E, Arabian Sea, West India, off Gujarat, 15.xi.1963, GMT, sediment type green clay, shells, sand, 71-79 m, fragments (RMNH Coel. no. 17473); sta. AB4B.221A, 22°32'N 68°07'E — 22°31'N 68°05'E, Arabian Sea, West India, off Gujarat, 18.xi.1963, GMT, sediment type sandy green clay (mud), 57 m, the lower part of a colony with holdfast and fragments (RMNH Coel. no. 17474).

Description. — Largest fragment is 6 cm long and 3.5 cm wide (fig. 34). Most fragments completely pink, with the larger nodes somewhat darkened, some fragments with white polyps; the fragments from sta. 206 are completely white. Branching is in one plane and the anastomosing branches form a network. Calyces dome-like, situated irregularly around the branches or on three sides. Internodes up to about 10 mm long. Larger nodes somewhat swollen.

Coenenchyme with rods and spindles, many with more developed tubercles on one side (fig. 35a). Calyces with wart- to thorn-clubs (fig. 35b). Both spindles and clubs up to about 0.30 mm long and 0.08 mm wide.

Anthocodiae (fig. 35c-d) with a crown of one to two rows of spindles and eight points of two to four spindles. Crown with slightly bent thorny spindles up to about 0.30 mm long, middle part with more developed thorns or irregular projections. Points with slightly bent thorny spindles up to about 0.20 mm long, distal end with more developed thorns, several with irregular projections on the convex side. Tentacles with irregularly formed rods up to 0.13 mm long, the smallest almost smooth, the largest crescent-shaped with spines and irregular projections. Pharynx with straight spiny rods up to 0.07 mm long and 0.02 mm wide.

Pink fragments with pink sclerites, in the completely pink fragments the smallest anthocodial sclerites colourless, in those fragments with white polyps all anthocodial sclerites colourless. White fragments with colourless sclerites.

Remarks. — Although the examined material is not referable to any species described in literature, I find the available material not sufficient to describe it as a new species.

ACKNOWLEDGEMENTS

I wish to thank the following persons: R.W.M. van Soest (Zoologisch Museum, Amsterdam) and P.F.S. Cornelius (British Museum (Natural History), London), for loans of specimens; W. Vervoort, J.C. den Hartog (both RMNH) and F.M. Bayer (National Museum of Natural History, Washington, D.C.), for reading and commenting upon the manuscript; M. Slierings, for making several micro-slide preparations and E.L.M. van Esch, for preparing the photographs.

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