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Gorgonids off the southwest coast of India

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Abstract

A survey conducted during 1997 indicated the availability of 15 species of gorgonids belonging to 5 families and 11 genera in the southwest coast off India between Kanyakumari and Vizhinjam. High demand as an export commodity and consequent indiscriminate exploitation using bottom set nets in the past have resulted in partial to near depletion of many gorgonid beds in this region.

Keywords : Gorgonids off southwest coast of India

Introduction

Of the six orders of the subclass Octocorallia, the Alcyonacea (soft corals) and Gorgonacea (sea fans, sea whips, etc) are widely distributed in the coastal areas of the Indo-Pacific. The total number of gorgonids hitherto recorded from the Indo-Australian region is approximately 408, though many species are to be revised taxonomically. A qualitative analysis of the various species from the Indian export market indicated the availability about 15 species belonging to 7 families and 5 genera (Thomas and Rani, 1987). The present study was undertaken during 1997 to document the availability of gorgonids along the southwest coast of India (Lat.8°00' –8°25' N, Long.76° 55' – 77°35'E). The inshore area of this region between Vizhinjam and Kanyakumari has many rocky outcrops, which provide substrate for many benthic organisms. These rocky out-crops are colonized by gorgonids, alcyonarians and sponges.

We are thankful to Dr. P. A. Thomas, Emeritus Scientist, CMFRI, Cochin for identifying the specimens and Dr. Leen Van Ofwegen, Curator, Naturalis, The Netherlands for this critical comments on this paper.

Material and methods

The centres known for rocky bottom such as Kanyakumari, Muttom, Kadiapattanam, Colachel, Thengapattinam and Vizhinjam were selected for the present study and were visited once a month (Fig.1). Specimens got entangled as by-catch in trawl net, bottom set gill net, trammel net and shore seine were hand picked from landing centres. Beach combing was also made for the collection of stranded materials. The specimens were then treated in potassium hydroxide to isolate the spicules and sketches were drawn using Camera Lucida. Measurements of 10 spicules were taken at random. These measurements were taken as per international standards using cali-

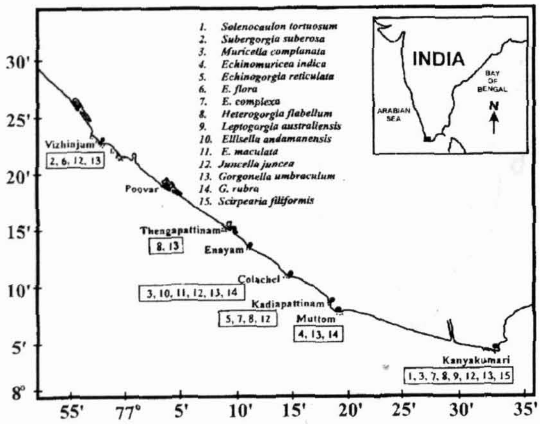

Fig.1. *Map of study area*

brated ocular micrometer and expressed in mm. Spicules from different parts of the polyps (tentacle, collaret, etc) were dissected out and examined to ascertain spicule categories. Specimens were identified following Thomas and Rani (1986).

Results

Fifteen species representing five families were collected from the study area during the period. The names of species collected from each centre are given in the area map.

SYSTEMATICS

Order: GORGONACEA Lmx

Suborder: SCLERAXONIA Studer

Family: Anthothelidae Broch

Genus *Solenocaulon* Gray

Solenocaulon tortuosum Gray
(Figs. 2 & 3)

Material:Two specimens collected off Kanyakumari by trawl net from a depth ranging between 50 and 60 m.

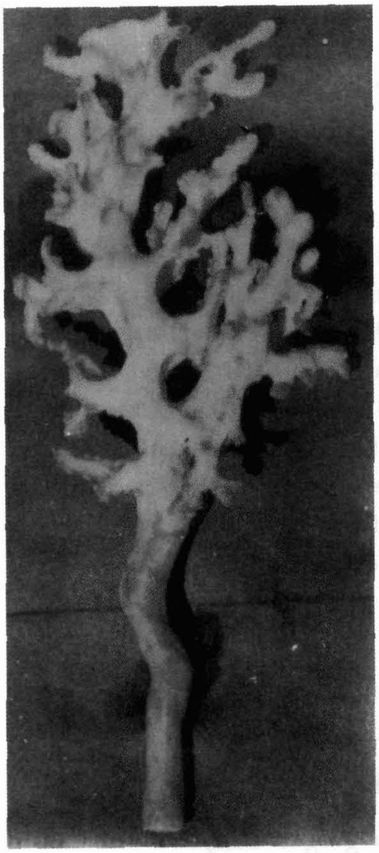

Fig. 2. *Solenocaulon tortuosum* Gray

Description: The total height of the specimens ranged from 10-12 cm and the diameter from 8 to 15 mm. Specimens resemble broken twigs in general appearance. The stem seldom branches and tubular except at its stalk portion, which is circular and the cavity inside communicates with the exterior through open-

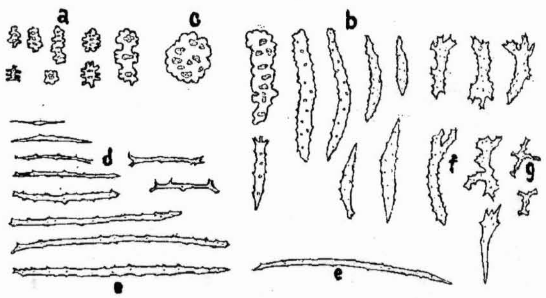

Fig.3. *Solenocaulon tortuosum*

a) Small spindles of branch cortex, b) Large spindles, c) Spheres of stalk cortex d) Needles of branch medulla, e) Slender and spiny needles of stalk medulla, f & g) 'Y' shaped spicules, different types.

ings situated at or near the annular projections on the stem. These may represent 'houses' made by other animals, mainly crustaceans.

Spicules comprise of spindles of branch cortex, smaller – 0.1 mm (Fig. 3a) and larger 0.4 mm (Fig. 3b), spheres of stalk cortex, 0.8 mm (Fig. 3c), needles of branch medulla, 0.1-0.37 x 0.002-0.014 mm (Fig. 3d), slender and spiny needles of stalk medulla 0.3-0.6 x 0.008-0.025 mm (Fig. 3e), and 'Y' shaped spicules at different growth stages found in deeper parts of the cortex with a maximum size of 0.3 mm (Fig. 3 f & g).

Distribution: Widely distributed in the Indo-Pacific (Hickson, 1903 from Maldives; Thomson and Simpson, 1909 from Bay of Bengal). Littoral.

Family: Subergorgiidae Gray

Genus *Subergorgia* Gray

Subergorgia suberosa (Pallas)
(Figs. 4 & 5)

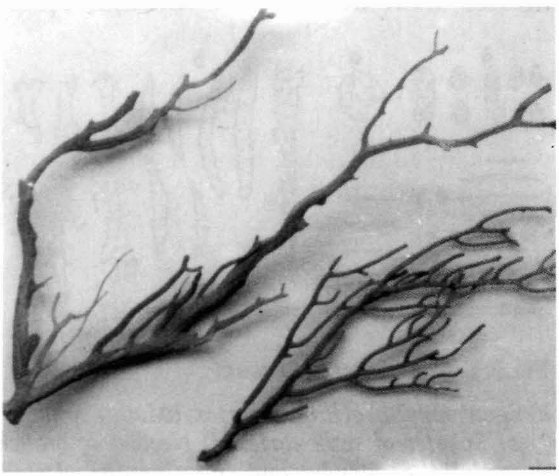

Fig. 4. *Subergorgia suberosa* (Pallas)

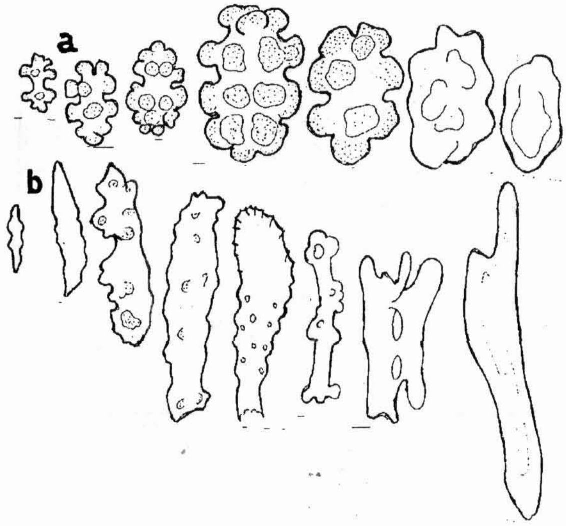

Fig.5. *Subergorgia suberosa*

a) Belted spicules of the cortex, b) Sinuous and tuberculated medullar spicules

Material: Several specimens

Description: Colonies branched in one plane or irregularly and divide dichotomously but rarely fuse. Cortex thin and polyps retractile fully when dry. Cortical spicules 0.012 x 0.068 mm (Fig. 5 a) and medullar spicules are of 2 types – sinuous and tuberculated (Fig. 5b). Colour light brown when alive.

Distribution: Widely distributed in the littoral areas of Indo-Pacific region (Thomas and Rani, 1986).

Suborder: HOLAXONIA Studer

Family: Paramuriceidae Bayer

Genus *Muricella* Verrill

Muricella complanata Wright and Studer (Figs. 6 & 7)

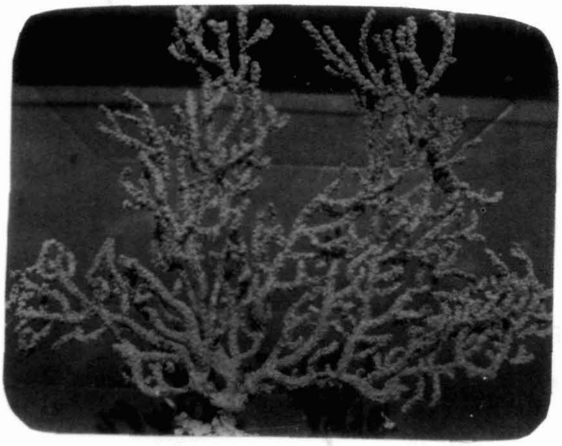

Fig. 6. *Muricella complanata* Wright and Studer

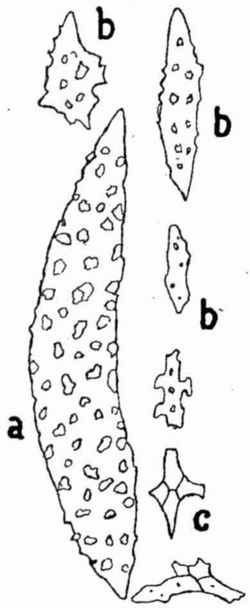

Fig.7. *Muricella complanata*
a) Large spindle, b) Small spindle, c) Multiradiates

Material: Four specimens

Description: Colonies flabellate, often divide in one plane; branches free and the terminal portion devoid of polyps. Spicules are all spindles of different sizes, to which quadriradiates or multiradiates may be added. Larger spicules are common in the coenchyme. Larger spindles are irregular and warty, 1.4 x 0.15mm (Fig. 7a), small spindles, 0.5 x 00.08 mm (Fig. 7b) and multiradiates vary (Fig. 7c). Colour may vary from pink to cream. Axis light violet, large spindles pink, smaller spindles yellow and quadriradiates often colourless.

Distribution: Indo-Pacific, found upto 631 meters (Thomas and Rani, 1986).

Genus *Echinomuricea* Verrill

Echinomuricea indica Thomson and Simpson (Figs. 8 & 9)

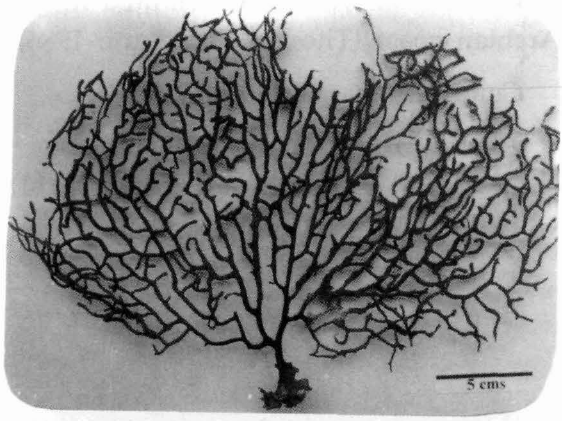

Fig. 8. *Echinomuricea indica* Thomson and Simpson

Material: Several specimens

Description: Colonies flabellate and loosely reticulate; tips of the branches swollen and without terminal polyp. Branches and branchlets flattened in the general plane of the colony. Spicules are thorn scale, 0.39 x 0.39 mm (Fig. 9a), spindles (Fig. 9b) and tri, tetra or

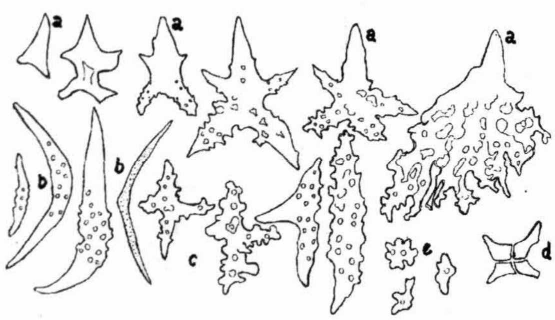

Fig.9. *Echinomuricea indica*

a) Echinomuricea type spicules (6 different growth forms), b) Spindles, c) Triradiates, d) cross, e) Multiradiates

multiradiate spicules (Fig. 9 c, d & e). Cortex brown, axis dark brown and spindles colourless.

Distribution: Widely distributed in the Arabian coast (Thomas and Rani, 1986).

Genus *Echinogorgia* Kolliker

Echinogorgia reticulata (Esper)
(Figs. 10 & 11)

Material: Two specimens

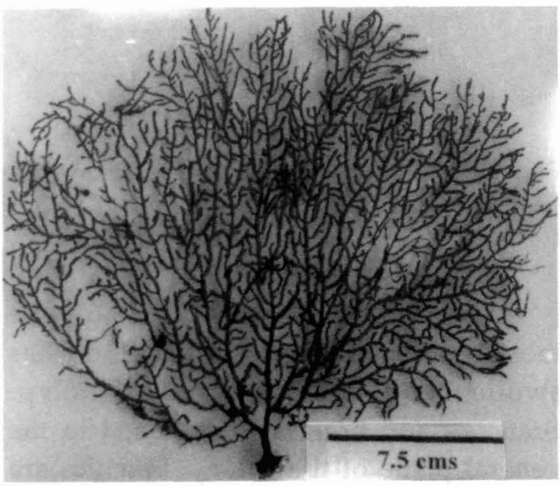

Fig.10. *Echinogorgia reticulata* (Esper)

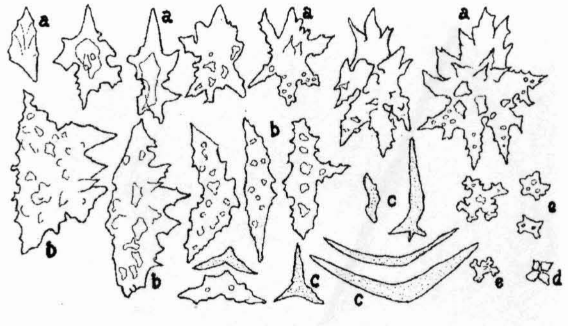

Fig.11. *Echinogorgia reticulata*

a) *Leaf-clubs – different growth forms, b) Spindles, c) Triacts, d) Tetracts, e) Multiradiates*

Description: Colonies reticulate, branches originating from the stalk, traceable upto the middle of the colony and divided to form the main expanse of the lamella. Main branches slightly compressed and tips are club-shaped. Spicules are of leaf clubs with tuberculated root-like structures, 0.42 mm (Fig. 11a), spindles 0.51 mm (Fig. 11b, c, d, e).

Distribution: Widely distributed in the littoral region of Indo-Australian archipelago (Thomas and Rani, 1986).

Echinogorgia flora Nutting (Fig. 12)

Material: Two specimens with *Pteria* sp. as biological associate in one of the specimens.

Description: Colonies bushy and branch in one plane, often irregularly dichotomous pattern. Branches circular in outline, diameter vary from 2 to 3 mm with blunt tips.

Spicules are leaf clubs (Fig. 12a), spindles, 0.25 mm (Fig. 12b) and other spicules include tetraradiates (Fig. 12c). Colony yellow, axis dark brown and spi-

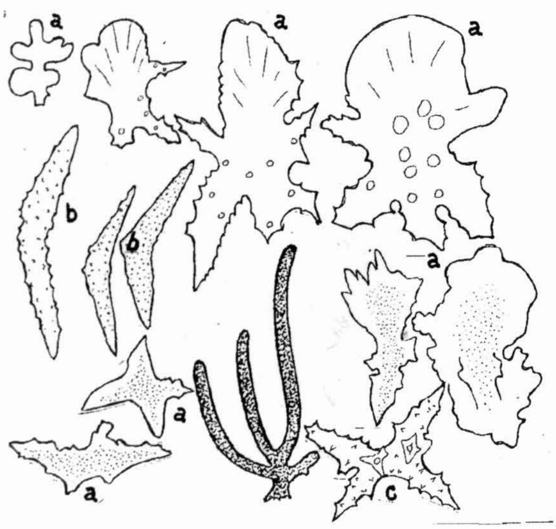

Fig.12. *Echinogorgia flora*

a)Leaf club, growth forms, b) Spindles, c) Tetraradiate

cules colourless.

Distribution: The species was originally reported from the littoral zone of New Guinea (Thomas and Rani, 1986).

Echinogorgia complexa Nutting
(Fig. 13)

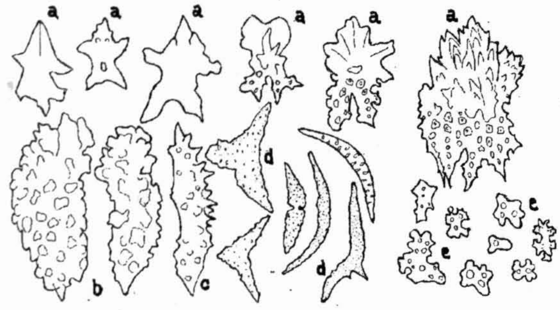

Fig.13. *Echinogorgia complexa*

a) Leaf-club, growth forms, b) Ordinary clubs, c) Toothed spindles d) Granulated spindles, e) Multiradiates

Material: One specimen

Description: Colonies reticulate often forming circular to oval expansions. Stalk robust. Polyps completely contractile but collarets rest above the calyx margin. Spicules are of leaf clubs with root-like and tuberculated process (Fig. 13a), ordinary clubs, 0.33 x 0.126 mm (Fig. 13b), toothed spindles, 0.94 x 0.07 mm (Fig. 13c), granulated spindles (Fig. 13d) and multiradiates (Fig. 13e). Colour brown, axis dark brown as 'd' spicules colourless.

Distribution:Originally reported from New Guinea at a depth of 73 m (Thomas and Rani, 1986).

Genus *Heterogorgia* Verrill

Heterogorgia flabellum (Pallas)
(Figs. 14 & 15)

Material: Several specimens

Description:Colonies flabellate, stalk

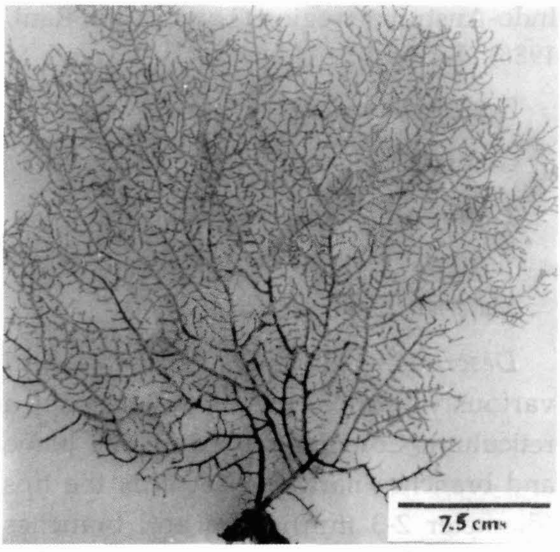

Fig.14. *Heterogorgia flabellum* (Pallas)

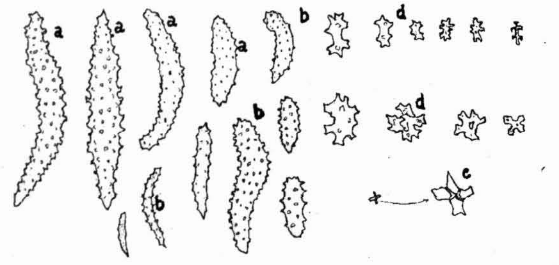

Fig.15. *Heterogorgia flabellum*

a) Large spindles, b) Bent spindles, c) Tetraradiate spicules, d) Multiradiate

robust dividing from main to smaller branches. The main expanse of the colony may be circular, ovate or abovate. Stalk roughly circular or rectangular in cross section. Spicules are of larger spindles, 1.5 x 0.22 mm (Fig. 15a), bent spindles of operculum (Fig. 15b), tetraradiate spicules (Fig. 15c) and multiradiates (Fig. 15d). Colour dull brown when alive and pale white when dry; axis dark brown and spicules colourless.

Distribution: Widely distributed in the Indo-Australian region (Thomas and Rani, 1986). Littoral.

Family: Gorgoniidae Lmx

Genus *Leptogorgia* Milne Edwards

Leptogorgia australiensis Ridley
(Figs. 16 & 17)

Material: Three specimens

Description: Colonies flabellate and variously branched, but never form a reticulum. Colonies divide in one plane and branches narrower towards the tips (diameter 2-3 mm); stem and branches with a median groove on either side (Fig. 17a). Spicules are of spindles which are

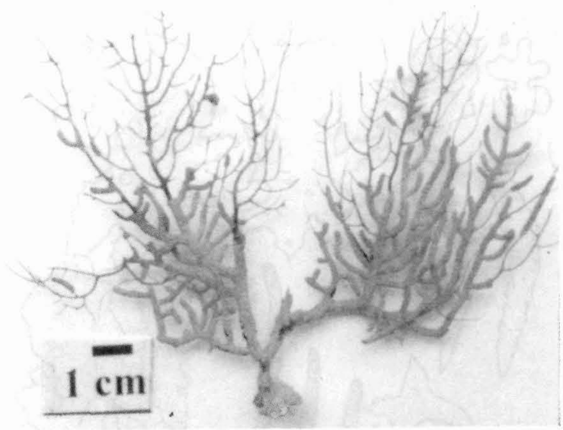

Fig.16. *Leptogorgia australiensis* Ridley

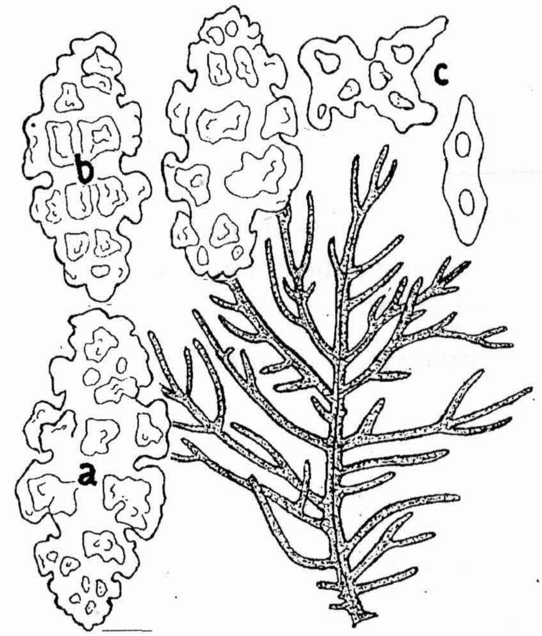

Fig.17. *Leptogorgia australiensis*

a) Straight spindle, b) Curved spindle, c) Cross spindle

of straight (Fig. 17a), curved (Fig. 17b) and crosses, diameter upto 0.075 mm (Fig. 17c). Beautifully coloured; cream, red and orange. Axis brown coloured but this colour may fade off towards the extremities.

Distribution: Widely distributed in the littoral Indo-Australian region (Thomas and Rani, 1986).

Family: Ellisellidae Gray

Genus *Ellisella* Gray

Ellisella andamanensis (Simpson) (Fig. 18)

Material: Several bits from commercial landings.

Description: Colonies subflabellate and often branch dichotomously; branches 4-5mm in diameter. Cortex thin. Spicules are of spindles, 0.063 x 0.025mm (Fig. 18a) and dumb-bells, 0.04 x 0.021 mm (Fig. 18b). Colour reddish brown to yellow when alive; axis pale white. Larger spicules are amber coloured and smaller ones often colourless.

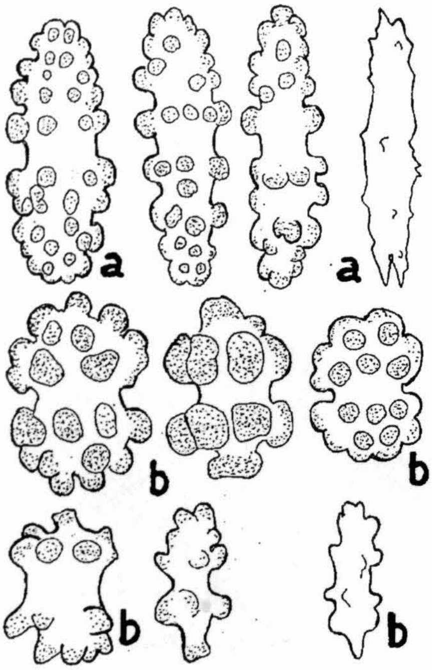

Fig. 18. *Ellisella andamanensis*
a) Spindles, b) Dumb-bells

Distribution: Previously known from the Andamans and Japan and was recorded from the inshore areas of the mainland (Thomas and Rani, 1986). Species distributed upto 75 m.

Ellisella maculata Studer (Fig. 19)

Material: Several bits from commercial landings.

Description: Colonies subflabellate, branches divide dichotomously; diameter

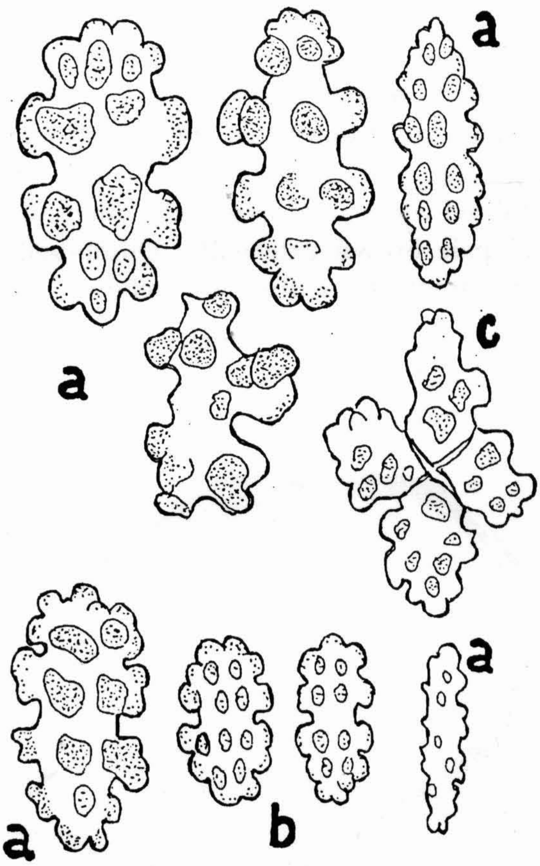

Fig.19. *Ellisella maculata*
a) Spindle, b) Dumb-bell, c) Cross

of branches may vary from 3-4 mm. Polyps retractile, cortex thick and granular; very thin in older parts.

Spicules are of spindles, 0.084 x 0.04mm (Fig. 19a), dumb-bells, 0.063 x 0.04 mm (Fig. 19b) and crosses (Fig. 19c). Colony yellow, axis pale white, spindles light yellow and dumb-bells colourless.

Distribution: Indo-Pacific (Thomas and Rani, 1886). Upto 275 m depth.

Genus *Juncella* Val.

Juncella juncea (Pallas) (Figs. 20 & 21)

Material: Several specimens

Description: Colonies usually unbranched and whip-like; Polyps small. Spicules are dumb-bells, 0.01 x 0.05 mm (Fig. 21a) and clubs (Fig. 21b). Colony coral red when alive; axis white internally and pale brown externally. Dumb-bells transparent and clubs light yellow.

Distribution: Widely distributed in the Indo-Pacific and present abundantly in the southwest and southeast coasts of India (Thomas and Rani, 1986). Littoral.

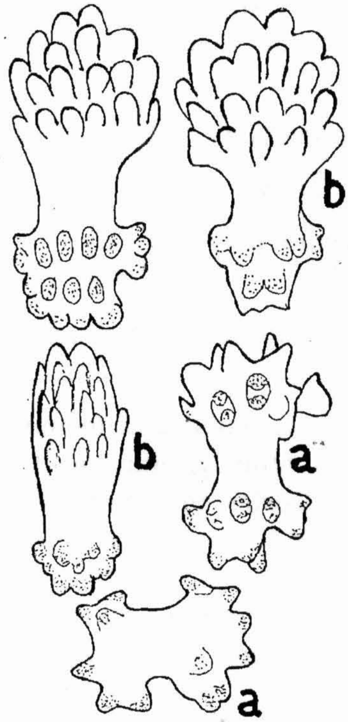

Fig.21. *Juncella juncea*
a) Dumb-bells, b) Clubs

Genus *Gorgonella* Val.

Gorgonella umbraculum (Ellis & Solander) (Figs. 22 & 23)

Material: Several specimens

Description: Colony fan shaped and closely reticulate. Stalk robust, often ridged and usually expanded. Branchlets divide and redivide and get interconnected in a scalariform pattern producing small meshes of 4 x 5

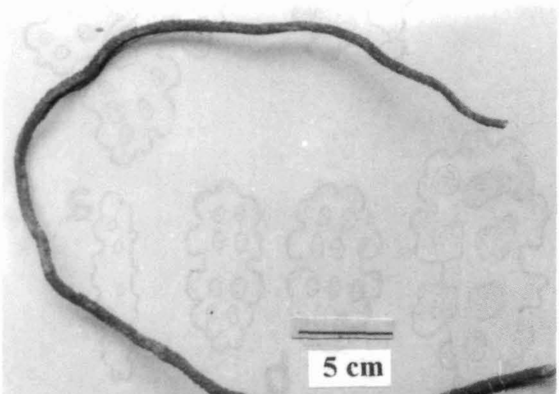

Fig. 20. *Juncella juncea* (Pallas)

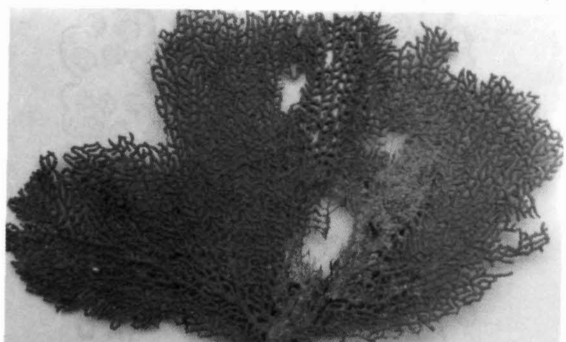

Fig. 22. *Gorgonella umbraculum* (Ellis & Solander)

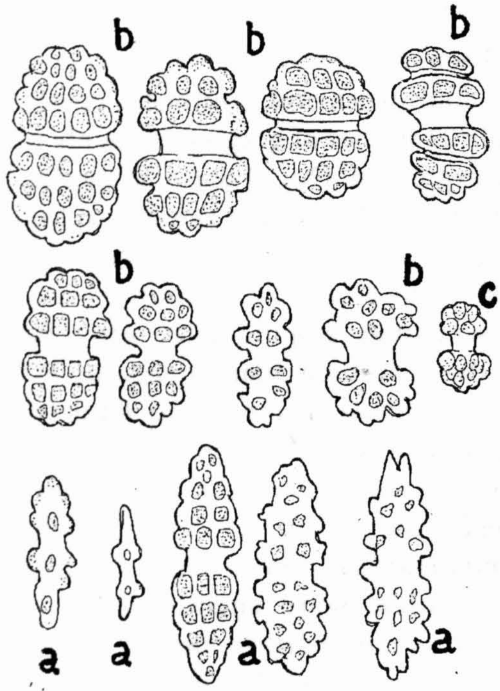

Fig. 23. *Gorgonella umbraculum*

a) Spindles, b) Dumb-bells, c) Small dumb-bell

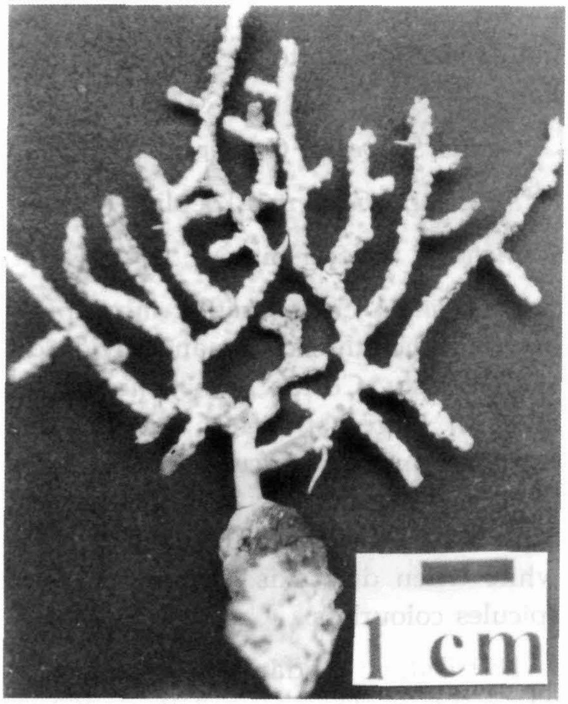

Fig. 24. *Gorgonella rubra* (Thomson & Henderson)

mm on an average. Coenchyme granular. Spicules are spindles, 0.084 x 0.025 mm (Fig. 23a), dumb-bells, 0.063 x 0.033 mm (Fig. 23b) and smaller dumb-bells, 0.025 x 0.021 mm (Fig. 23c). Colour orange when fresh and flesh coloured on drying. Spicules light yellow and axial part pale orange.

Distribution: Indian Ocean and Red Sea, up to a depth of 100 m (Thomas and Rani, 1986).

Gorgonella rubra (Thomson & Henderson) (Figs. 24 & 25)

Material: Three specimens

Description: Colonies feebly reticulate; secondary lamella often in different planes.

Spicules are of spindles, 0.084 x 0.029 mm (Fig. 25a), dumb-bells, 0.44 x 0.021 mm (Fig. 25b) and crosses, dia. 0.052 mm (Fig. 25c). Colour white to pale yellow; axis dark brown turning to pale yellow towards the growing tips. Spicules pale yellow or colourless.

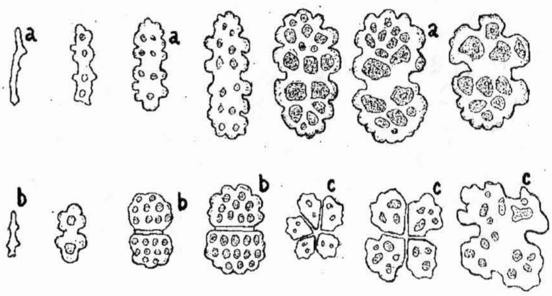

Fig. 25. *Gorgonella rubra*

a) Spindles, b) Dumb-bells, c) Cross

Distribution:Widely distributed in the Indo-Australian, upto 73 m (Thomas and Rani, 1986).

Genus *Scirpearia* Cuvier

Scirpearia filiformis Toeplitz (Fig. 26)

Material: Several bits.

Description: Colony rather inconspicuous, branches thread-like and divide dichotomously. Cortex with a horizontal layer of larger spindles. Spicules are spindles densely tuberculated and irregular, 0.21 x 0.1 mm (Fig. 26 a) crosses (Fig. 26b) and multiradiates (Fig. 26c). Colour white when dry; axis light brown and spicules colourless.

Distribution: Andamans to Australia; 82 to 484 m (Thomas and Rani, 1986).

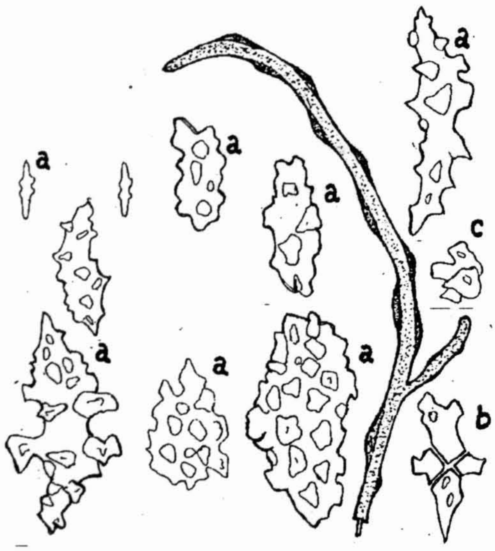

Fig. 26. *Scirpearia filiformis*
a) Spindles, b) Cross, c) Multiradiate

Discussion

Thomas and Rani (1987) reported from the southwest and southeast coasts of India 22 species of gorgonids mainly from the export list. Out of these 22 species, 15 are represented in the present collection from the area between Kanyakumari and Vizhinjam alone. So, resource-wise the present study is quite noteworthy. Based on the collections made onboard FORV *Sagar Sampada*, Thomas and Rani (1989) reported 8 species from off Bombay at depths ranging between 65-130 m. Of these, only two of them such as *Echinomuricea indica* and *Gorgonella umbraculum* were encountered in the present study. Further, during the above cruise *Muricella initida* Verrill was present in the collection while *M. complanata* Wright and Studer was recorded in the present study. Later, Thomas *et al.*(1995) reported 12 species of gorgonids off Orissa (Latitude 16° 00' - 20° 00' N) at depths varying from 37 to 65 m, which are referable to 9 genera, under 4 families. The dominant species were *Heterogorgia flabellum* (Pallas) followed by *Ellisella maculata* Studer and *E. andamanensis* Simpson. Out of the above 12 species, *Subergorgia suberosa, Echinomuricea indica, Heterogorgia flabellum, Ellisella maculata, E. andamanensis, Gorgonella umbraculum* and *Scirpearia filiformis* were encountered in the present study. Here also *H. flabellum* was the dominant species in this area. Thomas *et al.* (1995) have mentioned about the encrustation of the species by fouling organisms such as barnacles, sponges, bryozoans, corals (mainly solitary forms), ascidians and molluscs. It seemed that encrustation is higher in specimens that are occurring at higher depths. But in the present study the encrustation contained only molluscan forms.

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