Morphology and Molecular Taxonomic studies of Marine Sponges of Lakshadweep

Abstract

Knowledge about the sponge fauna from the Lakshadweep is scanty in recent years, but most of these modern taxonomic studies have been focused on. The aim of this study was to contribute to the knowledge of the sponge and its distribution in Lakshadweep. At present, forty-three species of sponges have been recorded from the Arabian Sea from the two surveys.

A total of 45 species of sponges belonging to 9 orders, 12 families and 32 genera from class Demospongiae were recorded. Out of which one new species *(Scalarispongia sp.)* recorded first time in India and four new records such as *Axinella minor, Haliclona cymaeformis, Callyspongia subarmigera, Luffariella* sp, were recorded from Lakshadweep region.

Keywords: Arabian sea, Diversity. India, Island. New record.

Introduction

Lakshadweep islands located between 08°00'N and 12°30'N latitudes and 7.00'E and 74°C0'E longitudes at a distance ranging from 200 Kms (111 nautical miles) to 400 Kms (222 nautical miles) from mainland. It is the largest atoll system in the world (Jones 1986). It consists of 12 atolls, 27 islands, 3 reefs and 5 submerged banks and total area of 32 sq.km coastline of 132 m and lagoon area.10 are inhabited and rest of the islands are uninhabited.Studies on marine resources of this island system includes Corals, fishes, mainly tuna, sharks, food fishes, bait fishes and ornamental fishes. Other than fishes there was numerous diversity in crustaceans like crabs, shrimp and sponges. Sponges are most primitive among multicelled animals that existed for 700- 800 million years. It is worldwide in their distribution, which are mostly marine and very abundant in all seas, ranging from intertidal

rock to very great depths. Most species encrust hard rocky substrate, but many are embedded in sandy muddy sediments with a root-like structure.It is usually dominates cryptofauna in coral reefs.

They constitute an abundant and functionally important component of coral reef systems that perform many important functional roles. Sponges also provide microhabitats for various invertebrate species as well as some fishes enhancing biodiversity and harbors microbial symbionts that can contribute to reef productivity'

So far scientific publications have identified about 9000 poriferans species, of which about 400 are glass sponges about 500 are calcareous and the rest of the species are demosponges. The composition size and shape of spicules are one of the largest determining factors in taxonomic identification of sponges. Demospongiae is the largest and most diverse class of the Porifera. The calcarea and demospongiae are strictly shallow water forms, while the hexactinellida are typically deep-water inhabitants. A total of 275 species of sponges have been identified in India (Thomas, 1998). In the Gulf of Mannar and Palk Bay, a maximum of 219 species of sponges recorded followed by Andaman and Nicobar Islands (95 species), Lakshadweep (91 species) and Gulf of Kachchh (25 species) (Venkataraman and Wafar, 2005b). The distribution of sponges in other area is in the Gulf of Kutch – 25 species; and the Orissa coast – 54 species (Thomas, 1998).

Materials and methods

Underwater surveys were conducted by SCUBA diving in five different locations (Fig. 1) where patchy coral growths are presentin various islandsviz., Kavaratti, Agatti Androth, Kadamath and Kalpeni, Bangaram, Amini & Kadmat were carried out from 15.10.2019 to 8.11.2019 and 14.2.2020 to 25.2.2020depth ranging from 10 to 30 m. The samples were placed in polythene bags and preserved in 90 % ethanol for identification. Underwater photographs of the reef area and the associated sponge fauna were also taken. The samples were brought to the laboratory in clean polythene bags; one sample per bag. The specimens were photographed immediately after they were brought to the laboratory. The morphological characteristics of each specimen including size, shape, colour, texture, total length, and breadth and oscule diameter were noted. For identification, samples from different portions of the sponge specimen were carefully removed using a fine razor blade and digested separately using concentrated nitric acid for extraction of sclerites. The specimens were identified following the taxonomic keys described by de Laubenfels (1936; 1948).

Review of Literature

India has a rich history of detailed sponge studies from the Gulf of Mannar, Andaman and Nicobar Islands, and Lakshadweep. The first scientific documentation of sponge fauna of Lakshadweep was made by Gardiner during 1903–1906, followed by Thomas (1979–1986), who particularly materialized the special interest of Dr. Jones in documenting the sponge fauna of Lakshadweep, culminating in several publications (Thomas, 1973; 1979; 1989; 1989). More than 90 sponges were reported from his exploratory surveys at various locations in Lakshadweep. In addition, he reported a total of 41 Demospongiae distributed among 23 families and 32 genera from Minicoy Island, and 18 species of boring sponges from various atolls. After a long research gap, Gopi and Ajith Kumar (2012) reported 21 species from Agatti of which 19 were new records. Prabhakaran *et al*. (2013) reported 22 species from Minicoy Island seagrass meadows followed by Das *et al*. (2019), who reported a new record from Bangaram and Thinnakara island. Few reports during the past years included knowledge about the sponge diversity of Lakshadweep (Venkataraman *et al*., 2004; George et al., 2020).

More recently, studies on secondary metabolites and bacteria associated with the sponges of Lakshadweep were also carried out.Species checklists of type collections were made in ZSI, Kolkata by Pattanayak during 1999–2009. Substantial contributions on the sponge fauna of the west coast were made by Dendy 1916–1922, while Burton (1930; 1937) and Thomas (1979; 1980; 1986; 1989) contributed significantly to the sponges of the east coast. Thomas (1986) published a sponge species inventory from the Gulf of Mannar and Palk Bay, wherein brief taxonomic descriptions of 275 sponges were provided.Out of the 555 sponges reported from India, the World Porifera Database could reflect only a total of 138 species as valid taxa (George *et al*., 2020). The present study is intended to provide an outline of the sponge species composition of Lakshadweep islands based on literature review and exploratory survey

Table 1. Sampling sites

Point No.	Date	Locality	State	Coordinates (GPS)	Specimens Details
1	18-10-19	Kavaratti	Lakshadweep	Lat. N 10° 32.995' Long. E 72° 37.448'	
2	19-10-19	Kavaratti	Lakshadweep	Lat. N 10° 32.924' Long. E 72° 37.567'	
3	20.10.19	Kavaratti	Lakshadweep	Lat. N 10° 34.021' Long. E 72° 38.112'	
4	22.10.19	Androth	Lakshadweep	Lat. N 10° 49.931' Long. E 73° 41.235'	Marine sponges
5	22-10-19	Androth	Lakshadweep	Lat. N 10° 52.589' Long. E 73° 41.157'	Marine sponges
6	23-10-19	Androth	Lakshadweep	Lat. N 10° 48.462' Long. E 73° 41.906'	Marine sponges
7	23-10-19	Androth	Lakshadweep	Lat. N 10° 49.236' Long. E 73° 40.736'	Marine sponges
8	24-10-19	Androth	Lakshadweep	Lat. N 10° 48.486' Long. E 73° 39.765'	Marine sponges
9	27-10-19	Kalpeni	Lakshadweep	Lat. N 10° 05.551' Long. E 73° 38.673'	Marine sponges
10	27-10-19	Kalpeni	Lakshadweep	Lat. N 10° 05.480' Long. E 73° 37.424'	Marine sponges
11	28-10-19	Kalpeni	Lakshadweep	Lat. N 10° 04.655' Long. E 73° 38.675'	
12	30-10-19	**Kavaratti Island** Passanger Jetty	Lakshadweep	Lat. N 10° 34.302' Long. E 72° 38.236'	Marine Sponges
13	31-10-19	Light House Jetty	Lakshadweep	Lat. N 10° 33.638' Long. E 72° 38.782'	Marine sponges
14	1.11.19	Shipwreck side	Lakshadweep	Lat. N 10° 32.841' Long. E 72° 37.446'	Marine sponges
15	02.11.19	Kavaratti	Lakshadweep	Lat. N 10° 34.970' Long. E 72° 38.263'	Marine sponges
16	02.11.19	Kavaratti	Lakshadweep	Lat. N 10° 34.849' Long. E 73° 37.901'	Marine sponges
17	04.11.19	Agatti	Lakshadweep	Lat. N 10° 50.240' Long. E 72° 11.295'	Marine sponges
18	04.11.19	Agatti	Lakshadweep	Lat. N 10° 52.403' Long. E 72° 12.563'	Marine sponges
19	05.11.19	**Tinnikara Island**	Lakshadweep	Lat. N 10° 55.071' Long. E 72° 18.493'	Marine sponges
20	05.11.19	Bangaram island	Lakshadweep	Lat. N 10° 57.966' Long. E 72° 17.233'	Marine sponges

Second survey

Date	Study sites	Coordinates	Maximum Depth
16.02.20	Kadmat Island	Lat. N 11° 13.457' Long. E 72° 46.725'	Inter-tidal
17.02.20	Kadmat Island	Lat. N 11° 11.142' Long. E 72° 46.013'	40 m
18.02.20	Amini Island	Lat. N 11° 08.634' Long. E 72° 43.676'	35 m
19.02.20	Kiltan Island	Lat. N 11° 28.538' Long. E 72° 59.821'	25 m
20.02.20	Kadmat Island	Lat. N 11° 14.102' Long. E 72° 45.579' 25 m Lat. N 11° 15.204' Long. E 72° 47.495'	25 m 22m
22.02.20	Agatti Island	Lat. N 10° 51.105' Long. E 72° 11.793' Lat. N 10° 49.552' Long. E 72° 10.996'	30 m 28 m

23.02.20	Bangaram Island	Lat. N 10° 55.193' Long. E 72° 16.128' Lat. N 10° 55.332' Long. E 72° 16.881'	28 m 25 m
24.02.20	Bangaram Island	Lat. N 10° 57.904' Long. E 72° 17.513' Lat. N 10° 58.036' Long. E 72° 16.857'	30 m 35 m
25.02.20	Dinnakara Island	Lat. N 10° 57.268' Long. E 72° 20.117'	40m
26.02.20	Agatti Island	Lat. N 10° 52.023' Long. E 72° 11.568' Lat. N 10° 50.048' Long. E 72° 10.860'	Intertidal Intertidal

Results

A total of 45 species of sponges belonging to 9 orders, 12 families and 32 genera from class Demospongiae were recorded. Out of which one new species (Scalarispongia) recorded first time in India and three new records such as Axinella minor, Haliclona cymaeformis, Callyspongia subarmigera, *Luffariella* sp, were recorded from Lakshadweep region List as below

1. ***Stylissa carteri*** **(Dendy 1889)**

1889. *Acanthella carteri* Dendy. *Annals and Magazine of Natural History.* (6) 3: 73-99, pls III-V.page(s): 93-94.

Material Examined:3exs. Reg.No. Sta: Agatti: Reg.No.S.420,Kadmat; Reg.No. S.339.; Bangaram,Reg.No S.359, Pitty island; Reg.No S.453; Date: 3.11.2019, 20.2.2020, 3.11.2019, 6.2.2022. Coll: Marimuthu & Party.

Description: Section showing the choanosomal skeleton with plumose tracts running up the sponge. Ectosomal skeleton showing protruding spicule tracts making the surface velvety.

Spicules- Styles are in two forms.A.Short stout gradually sharp pointed styles. b. long slender curved styles. 0.4-0.021mm.

Distribution: India. Continental shelf of southwestern Bay of Bengal (Ansari *et al*., 2012

Elsewhere: India, Indonesia, Kenya, Madagascar, Mozambique channel

2. ***Axinella donnani*** **(Bowerbank, 1873)**

1873. *Axinella* (*Stylissa*) *donnani* Bowerbank. *Proceedings of the Zoological Society of London.* 1873: 25-32, pls V-VII. 28-29.

Material Examined:3 exs, S.453. Kalpeni, 29.10.2019

Description: Sponge lamellar. Surface minutely hispid.Colour yellow.Oscules scattered.Axial fibers arranged plumosely.Fibers are cored.Styles. 0.12-0.283x0.002mm, Oxeas: 0.213-0.42mmx 0.002mm.

Distribution: India Gulf of Mannar Thomas, 1986

Elsewhere: East African Coral Coast and South India & Western India.

3. ***Axinella manus*** **Dendy, 1905**

1905. *Axinella manus*. Dendy. *(Royal Society: London). (Supplement 18).* Pp. 57-246, pls I-XVI. 188-189.

Material Examined:1ex, S.432, Sta: Agatti , Date: 4.11.2019, Coll: Dr.Marimuthu & Party

Description: Sponge palmately branched with conical tips. Skeleton without axial and extra axial specialization.Spicules are plumosely arranged. Spicules: Styles: 0.2-0.012mm. @. Oxeas: 0.2- 0.012mm

Distribution: India India Gulf of Mannar Thomas, 1986

Elsewhere: India, Maldives, South India, Western India & Sri Lanka.

4. ***Dragmacidondurissimum*** **(Dendy 1905)**

1905. *Dragmacidon durissima*. Dendy. *Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar. 3 (Supplement 18). (Royal Society: London).* Pp. 57-246, pls I-XVI. 187-188.

Material Examined: 2exs,S.373, Sta: Kalpeni, Date: 28.10.2019.

Description: Sponge massive, tuberous. Colour orange texture compact. Oscules numerous, compound. Pores minute. Main skeleton composed of plumose colums of megascelres . Spicules: Oxeas: 0.297x0. 01mm.Styles: 0.0217x0.01mm.

Distribution: India: Gulf of Mannar Thomas, 1986

Elsewhere: Banda Sea, Gulf of Thailand, Seychelles, South India, Sri Lanka, Southern Red Sea & West Arabian Sea.

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5. ***Phakellia*****.sp**.

2009. *Phakellia* Alvarez and Hooper. *The Beagle, Records of the Museums and Art Galleries of the Northern Territory*. 25: 17-42. page(s): 29

Material Examined:1ex.342, Sta: Kadmat, Date: 20.2. 2020.Coll: Marimuthu & Party.

Description: Surface cartilaginous Orange in colour while in alive. Styles straight slightly curved, 422.51 – 524.93 – 650.41 × 8.82 – 14.87 – 18.71 μm

Distribution: India.

Elsewhere: Red Sea.

6. ***Tethya robusta*(Bowerbank, 1873)**

1873. *Tethya robusta* Bowerbank. Part IV. *Proceedings of the Zoological Society of London.* 1873: 3-25, pls I-IV.pp: 10-11

Material Examined: 1ex, Reg.No.S.338, Sta: Kalpeni, Date: 27.10.2019;Reg.No. S.344, Kadmat, Date: 20.2.2020.

Description:Sponge sphaerical surface tuberculated. Yellowish brown in colour.Consistency fleshy. Oscules slit like.Pores minute. Skeleton in radial pattern Strongylaxeas: 0.217-1.2x0.002mm Sphaerasters: 0.031, Oxyasters: 0.025-0.03mm, Chiasters: 0.012mm.

Distribution: India:Gulf of Mannar and Palk Bay Thomas, 1986..

Elsewhere: South india, Sri Lanka, South eastern Brazil, South Caribbean. Western & Northern Madgascar & Fiji Islands

Remarks:These samples fit with *T.robusta* Thomas, 1986 from Gulf of Mannar in external morphology, skeleton structure, and spicule shape and size.

7. ***Stelletta clavosa* Ridley, 1884**

1884. *Myriaster clavosa* Ridley. (*British Museum (Natural History): London).* 366-482, pls 39-43; 582-630, pls 53-54. page(s): 474-476.

Material Examined:1ex, S.352, Sta: Kalpeni, Date: 27.10.2019.

Description: Sponge spherical in shape.ht grey in colour. Consistency hard.surface hispid due to the presence of spicules. Spicules: Dichotriaenes: 0.074mm, Protriaenes: 0.02mm, Anatriaenes: 0.1mm, Asters: 0.012mm

Distribution: India:. Andaman & Nicobar islands, Pattanayak, 2006.

Elsewhere: Andaman & Nicobar Islands, Banda Sea, Malacca Strait, South India, Sri Lanka& North great Barrier reef.

8. **A*gelas dispar*Duchassasing & Michelotti, 1864**

1883. *Agelas clavaeformis* Carter. *Natuurkundige verhandelingen van de Hollandsche maatschappij der wetenschappen te Haarlem.* 21(2): 1-124, pls I-XXV.
page(s): 76-77; pl XV fig 1

Material Examined: 1ex.Reg.No.334; Androth; 362, Androth: Date: 22.10.2019

Description: Sponge globular with cavernous interior. Dark brown in clour. Consistency fibrous and resilient. Skeleton with spined acanthostyles . Acanthostyles: 0.13- 0.001mm

Distribution: India: Gulf of Mannar, Thomas, 1986.

Elsewhere: Maldives, Marshall islands, South India, Sri Lanka Madgascar & Seychelles

9. ***Agelas mauritiana* (Carter, 1883)**

1883. *Ectyon ma*uritiana Carter. *Annals and Magazine of Natural History.* (5) 12 (71): 308-329, pls XI-XIV. page(s): 310-311; pl XII fig 3a-b.

Material examined: 2exs. Reg.No.S.401. Kavaratti, 2.11.2019.

Description: Sponge tubular with cavernous interior. Colour dark brown . Consistency fibrous and resilient . skeleton reticulated with acanthostyles. Acanthostyles 0.134x 0.012mm.

Distribution: India, Gulf of MannarThomas, 1986

Elsewhere: Red Sea to West pacific.

10. ***Cliona orientalis Thiele, 1900***

1900 *Anthosigmella orientalis* Thiele. *Frankfurt.* 25: 19-80.

Material Examined:3 exs, Reg.No.S.335, Sta: Kalpeni;. Date: 28.10.2019

Description: This species common on corals . Oscules scattered. Surface minutely hispid. Tylostyles: 0.127- 0.0012mm.

Distribution: India: Andaman & Nicobar islands, Pattanayak, 2006 & Gulf of Mannar Thomas, 1986

Elsewhere: South India Sri Lanka Southern Red Sea

Remarks: This species was recorded from Gulf of Mannar by Thomas.

11. ***Clathria (Thalysias) procera* (Ridley, 1884)**

1884. *Clathria (Thalysias) procera* Ridley. *(British Museum (Natural History): London).* 366-482, pls 39-43; 582-630, pls 53-54. page(s): 451-452.

Material Examined:3exs, S.504, Sta: Pitty Island, Date:6.2.2022.

Description: Sponge a clathrous mass. Textre compressible. Surface uneven, Oscules scattered, slit like. Skeleton is an irreugular reticulation of fibres cored by subtylostyles. Subtylostyles; 0.21-0.331X0.005.

Isochelas: 0.015mm

Distribution: South India Gulf of Mannar (Thomas, 1886) & Sri Lanka.

Elsewhere:Hawaii, India, Natal, Seychelles, South India and Sri Lanka, Southe Red Sea, Torres Strait Northern Great Barrier Reef, Western India

12. ***Callyspongia fistularis*** **(Topsent, 1892)**

1892. *Sclerochalina fistularis* Topsent. *Mémoires de la Société Zoologique de France.* 5: 21-29, pl. page(s): 25-26

Material Examined:3 exs.S.463. Sta: Androth, Date 22.10.2019.

Description: Sponge surface spinous or tuberculated. Oscules terminal.Skeleton composed of multispicular fibres, primaries & connectives.

Oxeas: 0.06-0.07mm

Distribution: South India (Gulf of Mannar) by Thomas, 1986 & Sri Lanka

Elsewhere: Marshall islands, Red Sea

13. ***Callyspongia (Cladochalina) diffusa*** **(Ridley, 1884)**

1884. Cladochalina diffusa Ridley *Annals and Magazine of Natural History.* (5) 14(81): 183-187.page(s): 183-184.

Material Examined: 1ex, 341; Bangaram, 23.2.2020.

Description: Sponge flabellate.Oscules scattered. Pore min ute. Surface reticulated and hispid. Main fiberes are coarse.

Oxeas: 0.031x 0.001mm.

Distribution: South India (Gulf of Mannar) by Thomas, 1986 &Srilanka.

Elsewhere: Great Barrier reef, East African Coast, Eastern India, Hawaii, India, Maldives, New Zealand, Singapore, Archipelago

14. ***Callyspongia (Cladochalina) fibrosa*** **(Ridley & Dendy, 1886)**

1886. *Dasychalina fibrosa* Ridley & Dendy. *Annals and Magazine of Natural History.* 18: 325-351, 470-493. page(s): 330.

Material Examined:2exs.Reg.No.S.502.Sta: Pitty island; Date 7.2.2022

Description: Sponge composed of finger shaped branches. Surface with strong conules. Oscules distributed terminal. Dermal skeleton reticulate meshes triangular. Primaries of 0.12mm and connectives 0.03mm in diameter. Oxeas: slightly curved tips pointed.).056-0.11x 0.002mm.

Distribution: South india (Gulf of Mannar) by Thomas, 1986 & Sri Lanka

Elsewhere: Brazil, Great Barrier Reef, Eastern Phillipines, Malacca strait, Northern Bay of Bengal, Seychelles, Vietnam & Western Arabian Sea.

Remarks

15. ***Haliclona (Gellius) cymaeformis*** **(Esper, 1806)**

1806.*Spongia cymaeformis* Esper.ZweyterTheil. (Raspe: Nürnberg): 25-48, pls LXV-LXX page(s): 43, plate LXIX figs 1-2.

Material Examined: 2exs.Reg.No.S.399. Kavaratti, 2.10.2019

Description:Sponge irreugular cluster of tubes in different diameter. Colour pale yellow when dry. Texture hard. Oscules in linear series. Pores minute. Surface minutely hispid. Skeleton compoised of triangular meshes.Spicule: Oxeas: .102-0.142x 0.002mm.

Distribution: India.

Elsewhere:Madagascar, Singapore and Indian Ocean.

Remarks:

16. ***Haliclona (Haliclona) oculata*** **(Linnaeus, 1759)**

1759. *Axinella occulata* Linnaeus**.** *Hagae.* pp. 451. *available online at* https://doi.org/10.5962/bhl.title.6595. pp: 390-391

Material Examined:3exs, S.438. Sta: Kavaratti island, Date: 19.10.2019.

Description: Sponge consist of several tubes. Texture soft and compressible. Surface hispid oscules terminal. Skeleton consist of cored fibres and connectives. Spicules: Oxeas: 0.047-0.12x 0.002mm.

Distribution: India: (Gulf of Mannar) by Thomas, 1986

Elsewhere: Kara Sea, North Atlatic Ocean, White Sea & Belgium.

17. ***Gelliodes pumila*** **(Lendenfeld, 1887)**

1887. *Adocia pumila* Lendenfeld.*Zoologische Jahrbücher, Jena.* 2: 723-828, pls XVIII-XXVII. page(s): 806.

Material Examined:2 exs,S.346; Sta: Agatti, Date: 4.11.2019.

Description: Sponge tubular. Conules at the tip. Short oxeas with less frequent sigmas pointed by arrows. Skeleton reticulated with oxeas in isodityal pattern. Oxeas: 0.10-0.22x 0.001mm.

Distribution: India: (Gulf of Mannar) by Thomas, 1986

Elsewhere: Red Sea.

18. ***Halichondria (Halichondria) panicea*** **(Pallas, 1766)**

1766. *Alcyonium panicium* Pallas. *Fransiscum Varrentrapp, Hagae.* pp. 451., *available online at* https://doi.org/10.5962/bhl.title.6595. page(s): 388

Material Examined:1ex,S.462, Sta: Androth, Date: 24.10.2019.

Description: Sponge is tubular cushion shaped. Skeleton composed of halichondroid pattern. Microscleres absent.

Oxeas: 0.66x0.021mm.

Distribution: India (Gulf of Mannar) by Thomas, 1986

Elsewhere: Adriatic Sea, Baltic Sea, Black Sea, North Atlantic Ocean, North Sea, Western Mediterranean , White Sea, Belgium

19. ***Plakinastrella schulzi*** **Dendy, 1905**

1905. *Penares schulze*Dendy. *Zeitschrift für wissenschaftliche Zoologie.* 34(2): 407-451. page(s): 13.

Material Examined: 1ex.Reg.No.S.380, Sta: Kalpeni: Date: 27.10.2019.

Description: The specimen is petaloid branches.Pores are scattered. Skeleton contains numerous short shafted triaenes. Spicules- Short shafted triaenes arys are pointed. Diamter-0.4mm thick.

Distribution: India (Gulf of Mannar) by Thomas, 1986

Elsewhere: Adriatic Sea, Aegean Sea, Celtic Seas, Great Barrier Reef, Eastern Brazil, Eastern Carribean, Eastern Phillipines, Maldives, New Caledonia, North Atlantic Ocean, Red Sea, Madagascar, belgium

20. ***Cliona celata*** **Grant, 1826**

1826. *Halichondria celata* Grant. *Edinburgh New Philosophical Journal.* 1: 78-81., *available online at* https://www.biodiversitylibrary.org/page/2471191, page(s): 81

Material Examined: 1ex,Reg. No.S.481, Sta: Kalpeni, Date28.10.2019.

Description: This is boring sponge. Massive and cushion shaped. Pores scattered. Spicules: Tylostyles: 0.150-0.33x0.002mm.

Distribution: India (Gulf of Mannar) by Thomas, 1986

Elsewhere: Argentina, Namibia, North Atlantic Ocea, Red Sea, Belgium Canada & Netherlands

21. ***Dysidea granulosa*** **Bergquist, 1962**

1814. *Dysidea granulosa*Montagu. The Palau Archipelago. *Pacific Science*. 19 (2): 123-204. page(s): 144

Material examined: 3exs, Reg.No. 352, Sta: Agatti, Date: 4.11.2019.

Description: Section showing conulose surface that is heavily charged with sand. - Choanosomal skeletal fibres forming a regular reticulating that is heavily cored by debris and sand

Distribution: India (Gulf of Mannar) by Thomas, 1986

Elsewhere: Adriatic Sea, Aegean Sea, Bermuda, Black Sea, Carribean Sea, Eastern brazil, Chatham Island, Japan Sea, New Zealand, North Atlantic Ocean, North Sea.

22. ***Fasciospongia cavernosa*** **(Schmidt, 1862)**

1862. *Cacospongia cavernosa* Schmidt. Leipzig): i-viii, 1-88, pls 1-7. page(s): 28

Material Examined: 4 exs,Reg.No.S.416. Sta: Androth, 22.10.2019.

Description: Sponge thickly fistular. Oscules scattered. Texture hard and incompressible.Surface conulose. Primary fibres 0.12mmthick nd cored.connectives are 0.012mm thick.

Distribution: South India, (Gulf of Mannar) by Thomas, 1986 &Sri Lanka

Elsewhere: Adriatic Sea, Aegean Sea, North Atlantic Ocean, Red Sea,

Remarks:

23. ***Leucetta chagosensis*** **Dendy, 1913**

1931. *Leucetta expansa* Row and Hozawa. *Science Reports of the Tôhoku Imperial University*. (4) 6(1): 727-809, pls XIX-XXI. page(s): 749-751

Material Examined:2exs. Reg.No.355,Sta,Kadmat, Date: 20.02.2020

Description: The skeleton is composed mainly of small triactines, which are present everywhere, while colossal triactines are present only on the cortex and very rare small tetractines can be found only in the atrium.

Large triactines with conical equiradiate actines measuring 427.27 – 516.47 – 635.63 × 32.48 - 42.38 50.01 μm. Small, extremely rare equiangular actines measuring 34.17 – 44.75 - 56.03 × 5.79 - 5.45 - 7.06 μm.

Distribution: India: Lakshadweep (Anita mary, 2020)

Elsewhere: Banda, Great Barrier Reef, Phillipnes, Fiji Isl;and, Indonesia, Maldives, New Caledonia, Saudi Arabia Papua new guinea, Madagascar, Northern Red Sea, Japan (Okinawa), Indonesia, Australia (Queensland and Fremantle), New Caledonia and French Polynesia (Dendy, 1913; Wörheide & Hooper, 1999; 2008; Borojevic & Klautau, 2000).

24. ***Hyattella sp***

1766. *Spongia sinuosa* Pallas. Fransiscum Varrentrapp, Hagae., *available online at* https://www.biodiversitylibrary.org/page/6019361. pp. 451, page(s): 394;

Material Examined: 1ex. Reg.No.S. S.456., Androth, 4.11.2019.

Description: Choanosomal skeleton with anastomosed fibers.Primary fibers are thic and secondary fibers are very thinner.

Distribution: India Lakshadweep

Elsewhere: Banda Sea, Seychelles, Sri Lanka.

25. ***Spongia* (*Spongia) ceylonensis* (Dendy, 1905)**

1905. *Euspongia officinalis var ceylonenensis* Dendy. *(Royal Society: London).* Pp. 57-246, pls I-XVI.page(s): 211-213

Material Examined: 6exs. Reg.No.S. 7262, Kadmat, 20.02.2020

Description: Sponge sub-globularbearing oscules. Surface minutely conulose.Colour yellow when dry. Main fibers running vertically towards surface. It is connected with secondaries.

Distribution: India

Elsewhere: Central New Zealand

26.***Dragmacidon agariciforme* (Dendy, 1905)**

1905. *Axinella agariciformis* Dendy. *(Royal Society: London).* Pp. 57-246, pls I-XVI. page(s): 186-187 .

Material Examined: 1ex.S.358. Sta: Bangaram. Date 6.11.2019.

Description: Section showing the choanosomal skeleton with thick plurispicular columns running parallel to each other approaching the surface to form the characteristic conules. The primary tracts contain single spicules protruding making the surface velvety

Distribution: India, South India, Lakshadweep (Anita Mary, 2020) Srilanka

Elsewhere: Delagoa, Maldives, Western Arabian Sea, Western India

Remarks: This species was recorded in Lakshadweep (Anita mary), 2020.

27. ***Hyrtios erectus* (Keller, 1889)**

1889. *Heteronema erecta* Keller. *Z. wiss. Zool.* 48: 311-405,pls XX-XXV. page(s): 340-341/

Material Examined: 4exs. Reg.No.S.425, Androth, Date: 22.10.2019

Description: Anastomosing choanosomal skeletal fibres heavily cored by sand and debris

Distribution: Indian Ocean. (Thomas, 1986)

Elsewhere: Eastern Phillipines, Gulf of Thailand, New Caledonia, North Atlantic Ocean,

28. ***Mycale (Mycale) crassissima* (Dendy, 1905)**

1905. *Esprella crassissima* Dendy. *(Royal Society: London).* Pp. 57-246, pls I-XVI. page(s): 160-161.

Material Examined Reg.No. 6 exs,S.505. Pitty island. Date: 12.2.2022.

Description: Sponge finger shaped branches. Consistency hard but compressible.Surface reticulated..Oscules 3mm in diameter.Spicules: Subtylostyles: 0.25x0.02mm. Sigmas: 0.026mm.

Distribution: South India Gulf of Mannar, Thomas, 1986.Srilanka

Elsewhere: Brazil, east African Coral Coast, Floridian, Gulf of Aden, Malacca strait, Papua, Archipelago, Madagascar, Kenya, Mozanbique

29. ***Suberites carnosus* (Johnston, 1842)**

1842) *Halichondria carnosa* Johnston. A History of British Sponges and Lithophytes. *(W.H. Lizars: Edinburgh).* i-xii, 1-264, pls I-XXV., *available online at* https://biodiversitylibrary.org/page/35290582page(s): 146-147.

Material Examined: 2exs,S.506, Pitty island, 6.2.2022.

Description: Sponge ramose & club shaped. Consistency flaeshy. Oscules terminal. Skeleton composed of tylostyles.

Tylostyles: 0.2-0.46x 0.003mm.

Distribution: South India, Gulf of Mannar, Thomas, 1986.Sri Lanka

Elsewhere: Adriatic Sea, Aegean Sea, Black Sea, Maldives, Mozambique, NewZealand, North Atlantic Ocean, North Sea, Red Sea, Seychelles,

30. ***Stylissa massa*** **(Carter, 1887)**

1887. *Axinella virgultosa var massa* Carter. *Journal of the Linnean Society, Zoology.* 21(127-128): 61-84, pls 5-7.page(s): 68

Material Examined: 1ex,Reg.No.373. Kalpeni, 29.10.2019

Discussion: Sponge lobate. Consistency firm. Brown in colour. Skeleton plumose and spicules are oxeas.
Distribution: India

Elsewhere: Maldives, Western India

31. ***Aplysinopsis elegans*** **Lendenfeld, 1888**

1888. *Aplysinopsis elegans* Lendenfeld. (Taylor & Francis: London). i-xiv, 1-260, pls 1-12. page(s): 149-150.

Material Examined: 1ex, Reg.No.378, Kavaratti, 2.11.2019.

Description: The sponge consists cylindrical. The oscules are downside.; the skeleton is light chestnut-brown, stiff, but compressible. The main fibres of the skeleton are 0-18 millim. thick, and cored. The connecting-fibres are slightly ramified, The mess are rectangular.

Distribution: India

Elsewhere: Madagasgar, Rad Sea.

32. *Semitaspongia* sp Cook and Bergquist, 2000

2000. *Semitaspongia bactriana* Cook and bergquist

Material Examined: 1 ex. Reg.No.S.510. Kavaratti, 2.11.2019.

Description: A The sponge is soft and massive species, forming fibre network. The surface has numerous, fine to coarse conules, with long dendritic emergent terminal fibres. Colour is brown. The primary fibers are cored. The secondary fibers are uncored.

Dsitribution: India. Not reported so far.

Elsewhere: Polynesia, Archipelago.

33. ***Callyspongia (Cladochalina) subarmigera* (Duchassaing & Michelotti, 1864)**

1864. Tuba armigera Duchassaing & Michelotti. *Natuurkundige verhandelingen van de Hollandsche maatschappij der wetenschappen te Haarlem.* 21(2): 1-124, pls I-XXV. page(s): 48-49; pl VIII fig 3

Material examined: 1ex,Reg.No.S.439, Sta: Agatti, Date: 4.11.2019.

Description: Sponge surface conules. Oscules distributed terminal. Dermal skeleton reticulate meshes triangular. Ectosomal skeleton large. Primaries of 0.12mm and connectives 0.03mm in diameter. Oxeas: slightly curved tips pointed. 43-n69-70 mm x 0.153mm in diameter.

Distribution: First time reported in Lakshadweep.

Elsewhere: West Indies, Florida, jamaika.

34. ***Hyattella intestinalis* (Lamarck, 1814)**

1814. *Spongia intestinalis* Lamarck. *Annales du Museum national d'Histoire naturelle.* 20: 294-312; 370-386; 432-458.

Materials Examined: 4exs. Banagaram, 23.2.2020.

Description: Surface minutely conulose. Oscules terminal, Pores numerous. Texture hard with poor resiliency. Skeleton consist of amber coloured spongin fibers. Primaries are cored by objects 0.14mm thickness. The secondaries are much slender 0.006 mm thickness. The mesges are polygonal.

Distribution: India: Gulf of Mannar (Thomas, 1986) Sri Lanka.

Elsewhere: Atlantic Ocean, Mediterranean Sea.

35. *Hyattella sp*

Material Examined: 1 ex, Reg.No.456, Bangaram, 23.2.2020

Description: Sponge body is soft. Oscules are numerous. Minutely conulose.Skeleton is reticulated primaries and connectives. Primaries are cored and secondaries are uncored.
Distribution: India and Sri Lanka.
Elsewhere: Mediterranean Sea.

36. ***Scalarispongia* n. sp** Cook and Bergquist, 2000

2000. *Cacospongia scalaries* Cook and Bergquist.Leipzig): i-viii, 1-88, pls 1-7.
page(s): 27-28; pl II fig 4.
Material Examined: 1ex. 397, Sta: Androth, Date:22.11.2019.
Description: Sponge tubular, surface conulose,Oscules are rare. Colou yellow. Primaries are cored inseparable from the connectives diameter 0.12 mm. Connectives are free from uncored.This has ladder -like skeletal pattern arranged throughout body and has pseudo-tertiary fibers.
Distribution: India. Not reported so far.
Elsewhere: Mediterranean Sea.

37. ***Acarnus sp* Ridley, 1884.**

1884. *(British Museum (Natural History): London).* 366-482, pls 39-43; 582-630, pls 53-54.
page(s): 453 & 615 .
Material Examined: S.443, Androth, Date: 22.11.2019.
Description: Sponge finger shaped colour pale yellow. Surface hispid. Skeleton well developed reticutaion of spongin fibers cored by styles and tylotes. Main fibers are not demarcated with connctives. Spicules styles: 0.31- 0.42mm, Tylotes: 0.204x0.002mmToxas: long one are 0.155x 0.003 mm and small one are 0.062-0.21mm, Isochelas: 0.003-0.01mm.
Distribution: India; Gulf of Mannar, Thomas, 1986.
Elsewhere: Red Sea, Australina region.

38. ***Axinella minor* Thomas, 1981**.

1981. *Axinella minor* Thomas. s, 1973, p. 43, pl. II, fig. 17
Material Examined: 5 exs, Reg.No.340, Androth, 22.10.19
Description: : Body finger shapped, tips blunt, Colour:Orange when alive brown after dry..
Consistency : Compressible with good resiliency.Skeleon consist of primaries and connectives.

Spicules: Styles. Slightly curved and sharply pointed; head conspicuous in younger forms.

Size, 0.183 - 0.245 mm x 0.002 - mm.

Distribution : Indian Ocean.Thomas,1981.(Mahe island). First time reported from Lakshadweep.

Elsewhere: Indian Ocean.

39. ***Phakettia ridleyi*(Dendy, 1887)**

1887. *Phakellia ridleyi* Dendy. *Annals and Magazine of Natural History.* (5) 20(117):153-165, pls IX-XII.page(s): 159-160 .

Material Examined: 4exs, Reg.No.S.447, Kavaratti, 22.11.2019.

Description: Body lamellar and ridged. Colour blood red when alive yellow in dry condition. Texture rough and cartilaginous. Oscules and pores not traceable.Skeleton axial and extra axial spicules in plumosed manner. Styles: 0.213-0.267x 0.003mm.

Distribution: India; Andaman, gulf of Mannar (Thomas, 1986)

Elsewhere: Cosmoplitan.

40. ***Callysponga spinosissima*(Dendy, 1887)**

1887. *Pachychalina spinosissima* Dendy. Proceedings of the Zoological Society, London,35: 524-526.

Material Examined: 2exs, Reg.No.2 exs, S.463. Androth, 22.11.2019.

Desription: Sponge repent cylindrical branches. Colour yellow. Oscules scattered, pore sminute. The main skeleton is coarse and composed of primaries and connectives.

Oxeas: 0.21-0.2x 00.3-0.01mm.

Distribution: India; Gulf of Mannar Thomas, 1986.

Elsewhere: Indian Ocean.

41. ***Spheciospongia inconstans margaritifera* Dendy, 1887**

1887. Suberites inconstans Dendy.*Annals and Magazine of Natural History.* (5) 20(117):153-165, pls IX-XII. page(s): 154

Material Examined: 1ex,Reg.No.S.511. Kavaratti, 2.11.2019.

Description:This is boring sponge in oyster.Cavities formed inside the shell. Tylostyles: 0.21-0.002mm, Spirasters:0.0012mm.

Distribution: India. Tamilnadu, Thomas, 1986.

42. ***Ectyodorys lissostyla*Thomas, 1970**.

1970. Lissodendoryx (Ectyodoryx) lissostyla (Thomas 1970). *Journal of the Marine Biological Association of India.* 12(1): 202-209.page(s): 203.

Material Examined:s. 1ex, Reg.No.512.Androth, 2.11.2019.

Description: Sponge encrusting. Colour pale yellow. Consistency hard. Surface conulose. Oscules small. Dermal skeletons consist of styles. Styles: 0.318-0.003mm, Sigmas:).023-0.01mm.

Distribution: India. Gul of Mannar

Elsewhere: Cosmopolitan.

43. ***Chondrilla australiensis*Carter, 1873**

1873. *Chondrilla australiensis* Carter. *Annals and Magazine of Natural History.* (4)12(67): 17-30, pl. I. page(s): 23-24; pl I fig 10-14 & 16.

Material Examined: 1ex. Reg.No.513, Kavaratti, 2.11.2019.

Description: Sponge lobose. Colour brown with dark specks. Consisitency tough and cartilaginous. Surface smooth. Cortex well developed. Spherasters and oxyasters in the cortex. Sphaerasters. 0.016-0.23mm, Oxyasters: 0.0012-0.020mm.

Distribution: Gulf od mannar.

Elsewhere: Indo Pacific.

Discussion: A total of 43 species of sponges belonging to 9 orders, 12 families and 32 genera from class Demospongiae were recorded. Out of which one new species (*Scalarispongia*) recorded first time in India and three new records such as *Axinella minor*, *Haliclona cymaeformis, Callyspongia subarmigera*and one rare calcareous sponges were recorded from Lakshadweep region.Axinella minor species was not described from these before. But it is a common species from other areas. Twenty four species of sponges were found to be most common and abundant in Agatti, Kadmat & Pitti silands. They are Clathria procera, Stylissa carteri, Agelas dispar, Dysidea granulosa, etc.Cliona celata, Cliona orientalis, Cliona margarifera are the boring sponges from Lakshadweep. Earlier (Thomas (1989) published a checklist of 91species of sponges from Lakshadweep. George et al (2020) listed 21 new records from Lakshadweep.Scalarispongia species of sponges distributed in Kora and brazil earlier. Now it is recorded from Lakshadweep. This report will be helpful for protection and conservation of diversity of Lakshadweep. DNA barcoding of one calcarean species of Leucetta chagosensis was submitted in NCBI as a part of the study of molecular taxonomy. Species voucher number GenBank (ITS): *Leucetta chagosensis* QMG313774 AM850505

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Plates

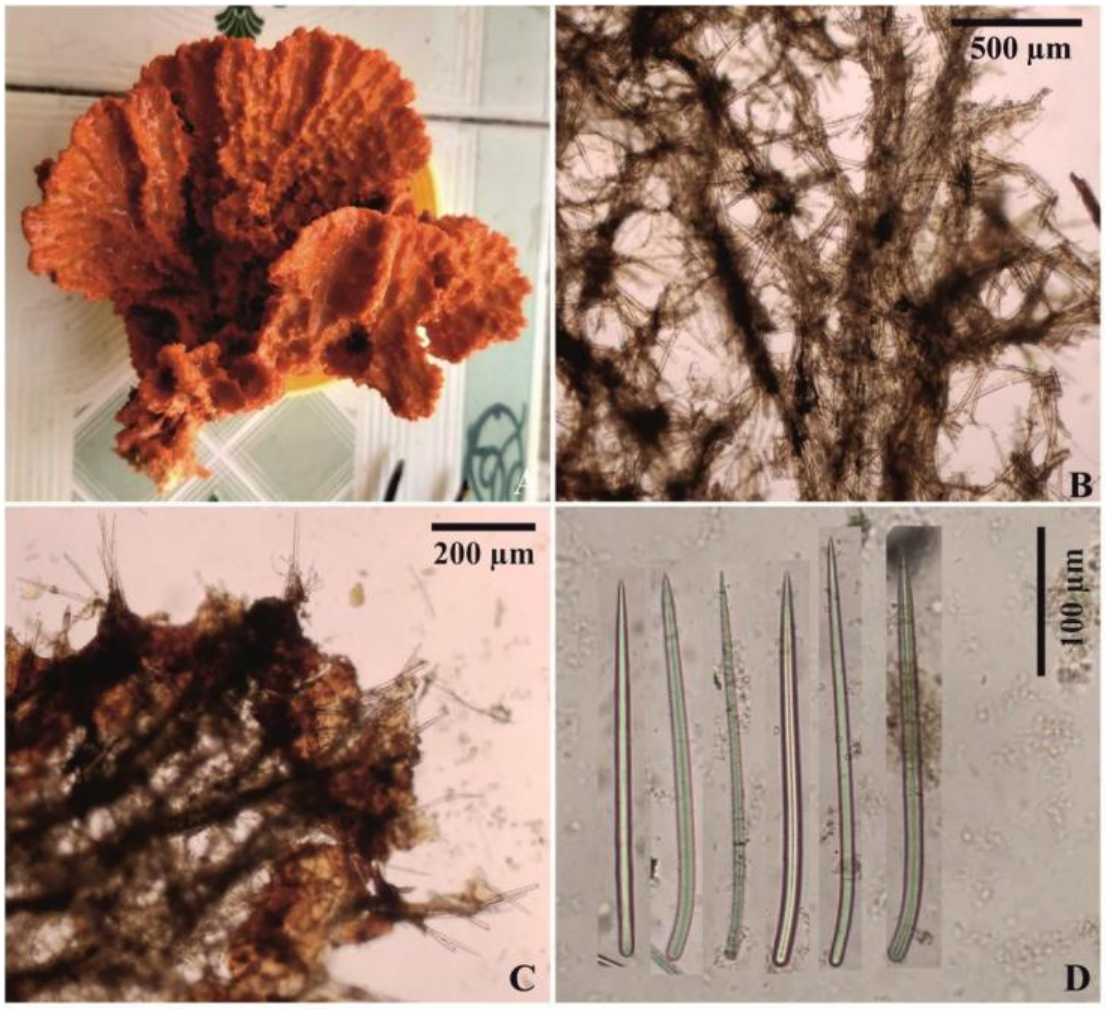

Plate 1: *Stylissa carteri* (Dendy, 1889). A-Freshly collected specimen; B- Section showing the choanosomal skeleton with plumose tracts running up the sponge (scale= 500 µm); C- Ectosomal skeleton showing protruding spicule tracts making the surface velvety (scale= 200 µm); D- Styles (scale= 100 µm).

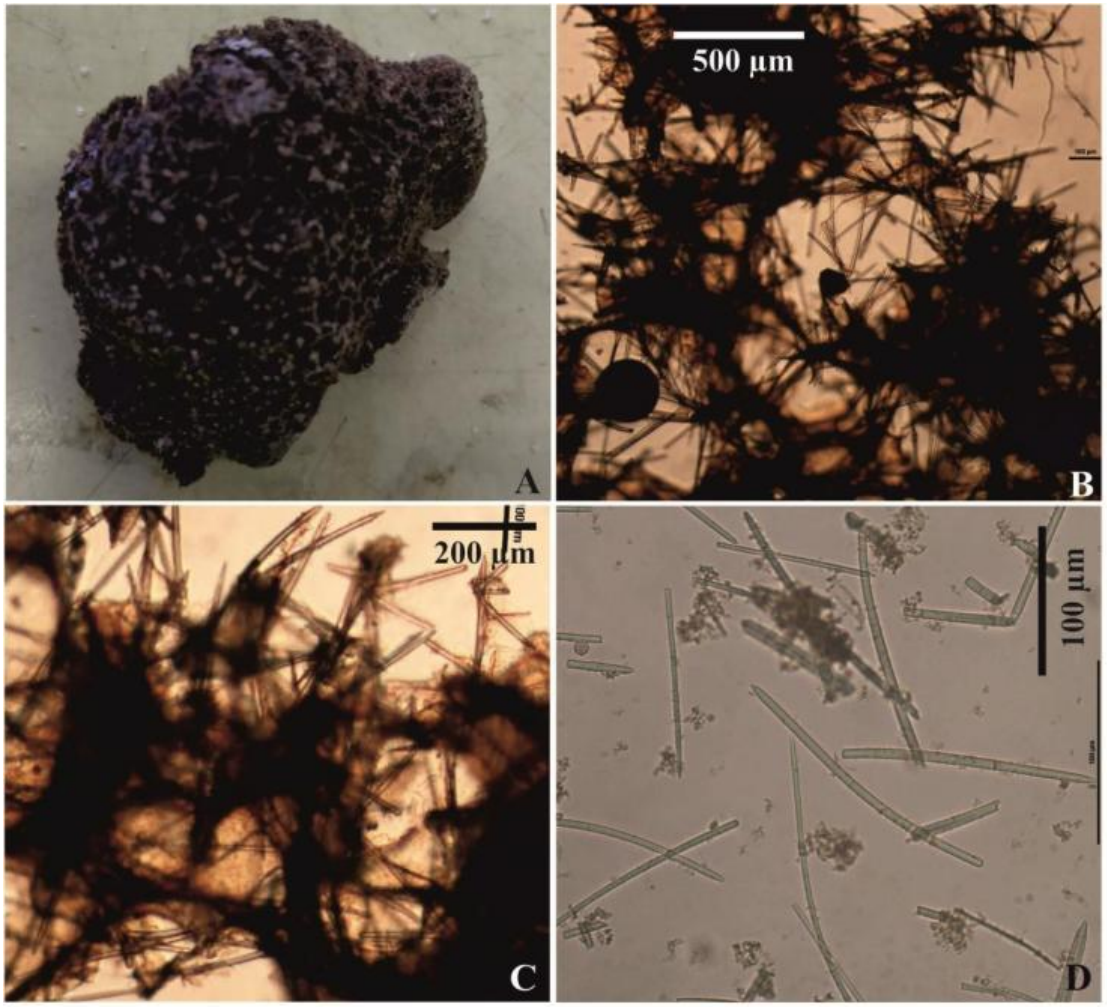

Plate 2: *Axinella donnani* (Bowerbank, 1873) A- Preserved specimen (Dry preservation); B- Section showing overall skeletal architecture with paucispicular primary fibres running toward the surface; C- Close-up of the choanosomal tracts (scale= 200 µm); D- Styles (scale= 100 µm).

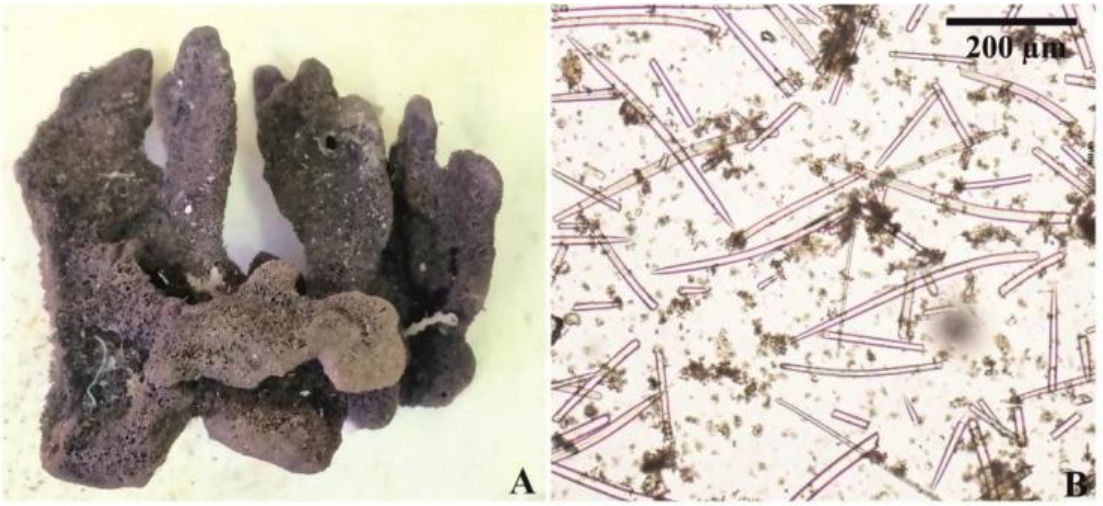

Plate 3: *Axinella manus* (Lendenfeld,1887) . A- Preserved specimen (Dry preservation); B- Oxeas and styles of a varying size range (scale= 200 µm).

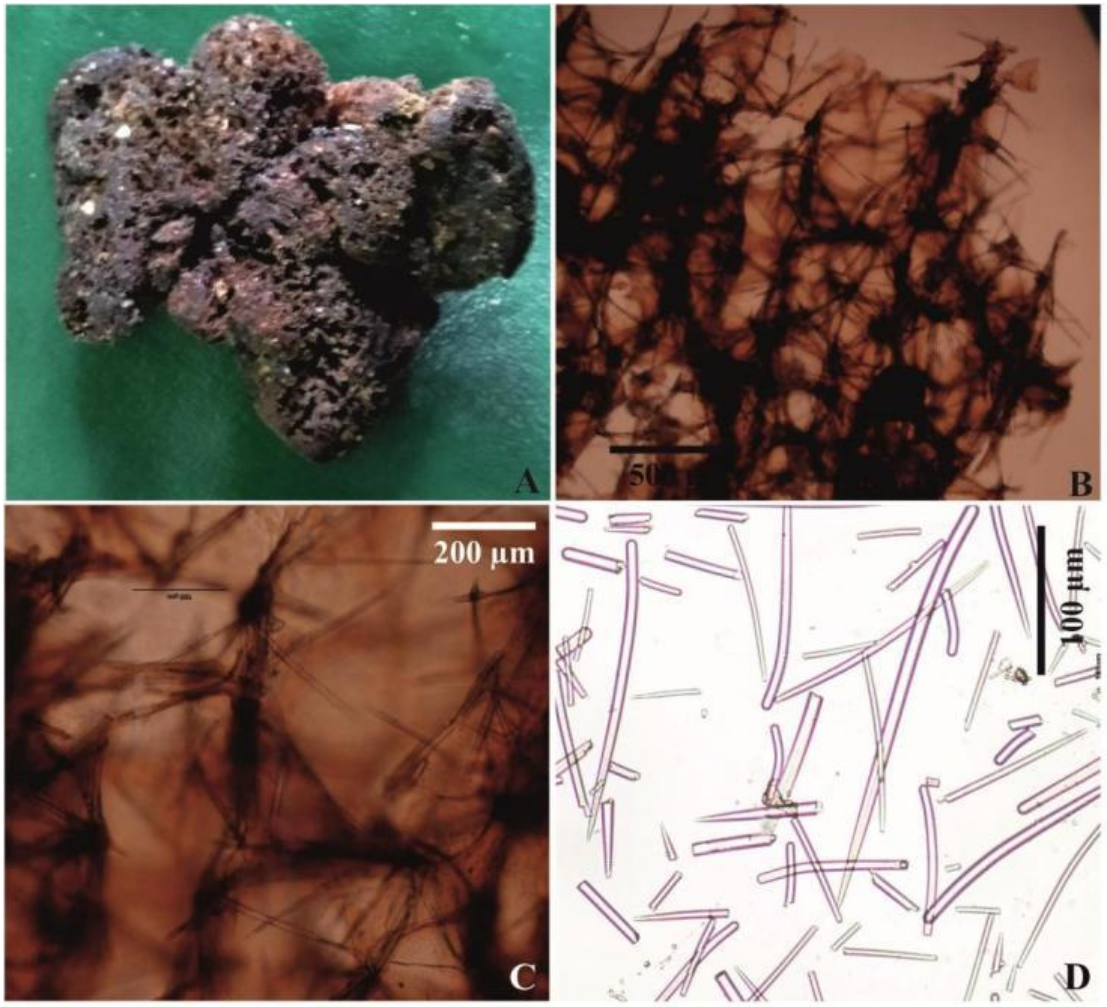

Plate 4: *Dragmacidon durissimum* (Dendy, 1905) A- Preserved specimen (Dry preservation); B- Section showing the thick paucispicular tracts rising to the surface forming conules (scale= 500 µm); C- Close-up of choanocyte chambers (scale= 200 µm); D-Styles (scale= 100 µm).

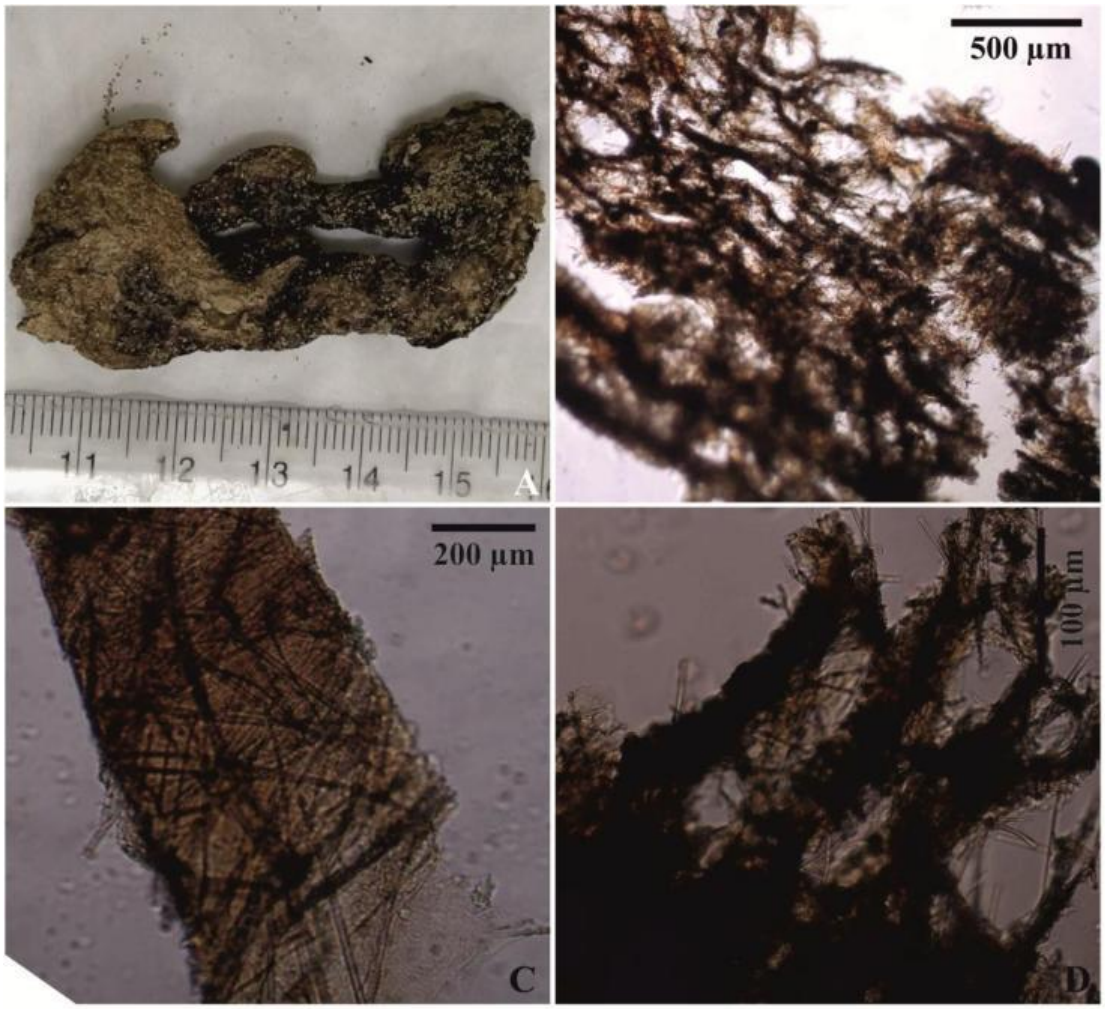

Plate 5: *Phakellia sp*. A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with plumose tracts running up the sponge (scale= 500 µm); C- Tangential surface skeleton (scale= 200 µm); D- Close-up of choanosomal tracts (scale= 100 µm).

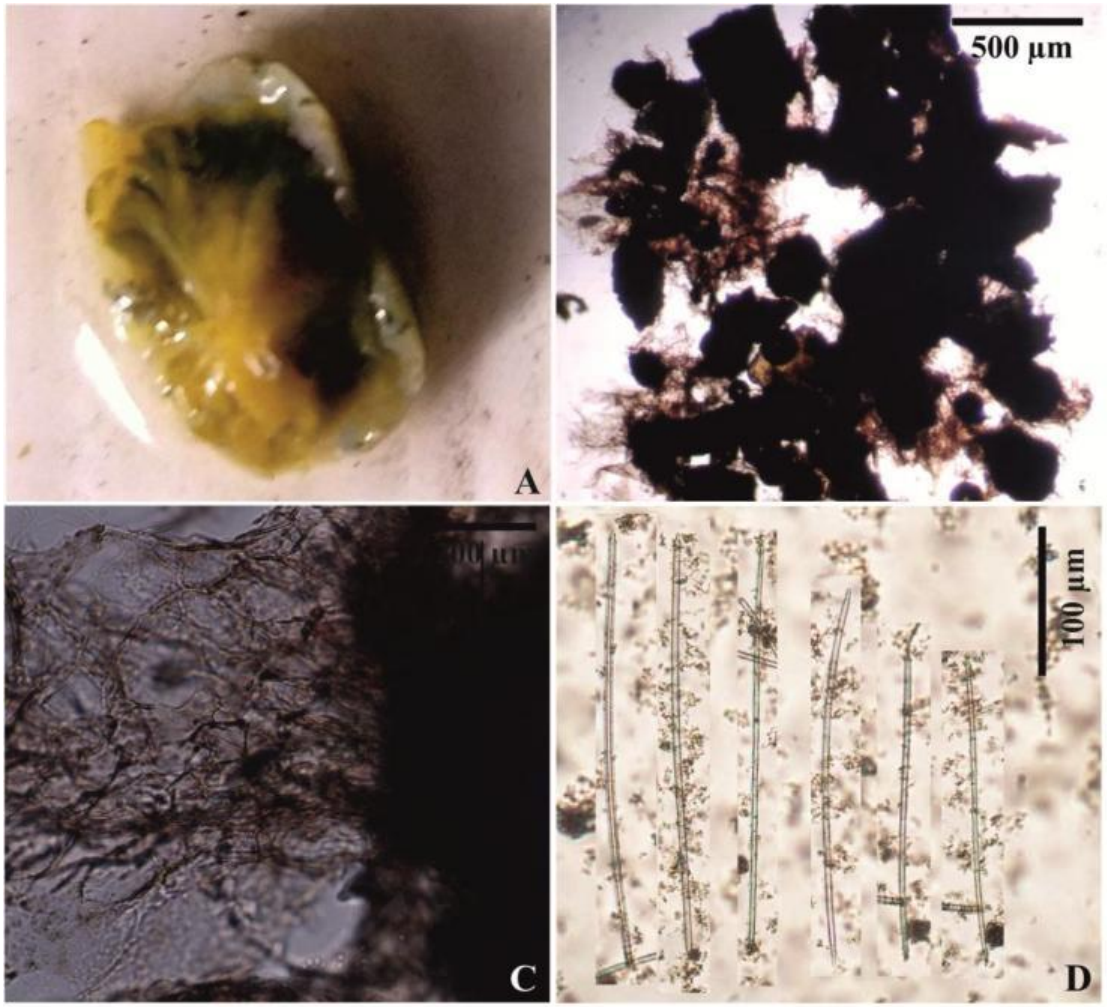

Plate 6: *Tethya robusta* (Bowerbank,1873). A-Freshly collected specimen; B- Section showing the choanosomal skeleton with thick plurispicular columns running parallel to each other approaching the surface to form the characteristic conules (scale= 500 µm); C- The primary tracts contain single spicules protruding making the surface velvety (scale= 200 µm); D- Strongyloxeas (scale= 100 µm).

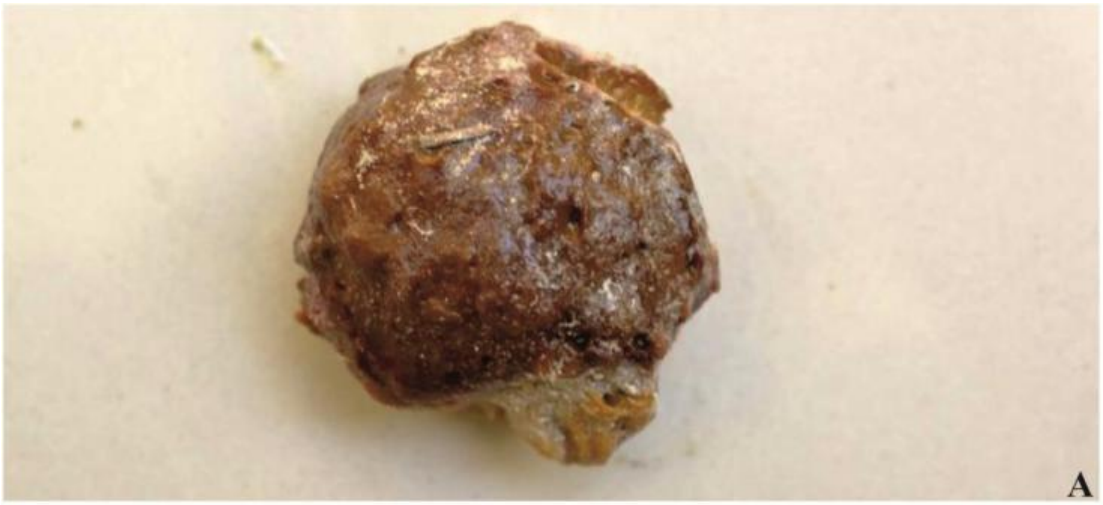

Plate 7: *Stelletta clavosa* Ridley, 1884. A- Freshly colleceted specimen; B- Section showing the radiating spicutes that protrude through the surface (scale= 500 μm).

Plate 8: *Agelas dispar* Duchassaing & Michelotti, 1864. A- Preserved specimen (Dry preservation); B- Section showing overall skeletal architecture with choanosomal fibres forming adense reticultion of rounded meshes; C- Close-up of the choanasomal reticulation(scale= 200 µm); D- Close-up showing echinating verticillate spined styles on fibres (scale= 100 µm).

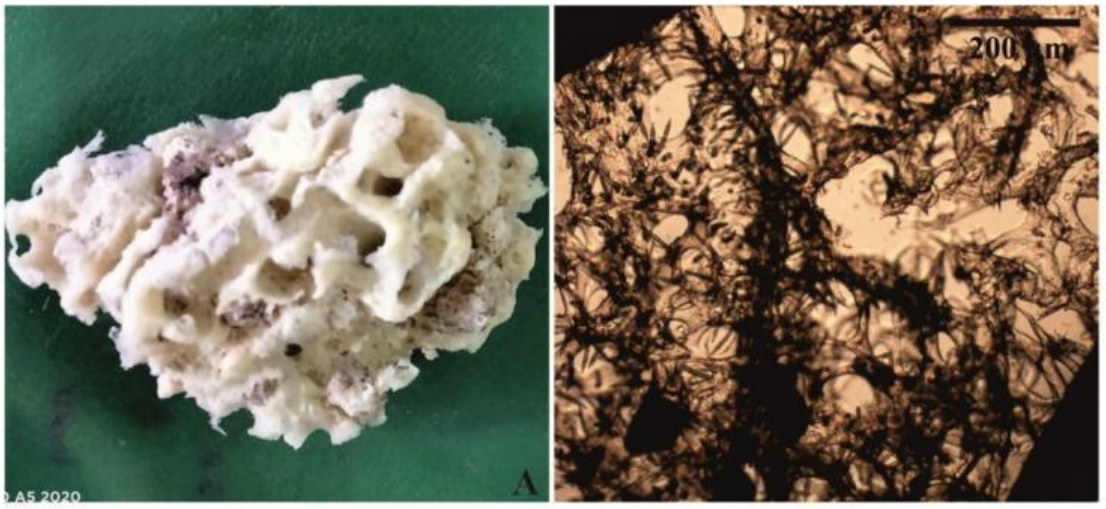

Plate 9: *Agelas mauritiana* (Lendenfeld,1887) . A- Preserved specimen (Dry preservation); B- Thick fibres that are echinated by verticillate spined styles (scale= 200 µm).

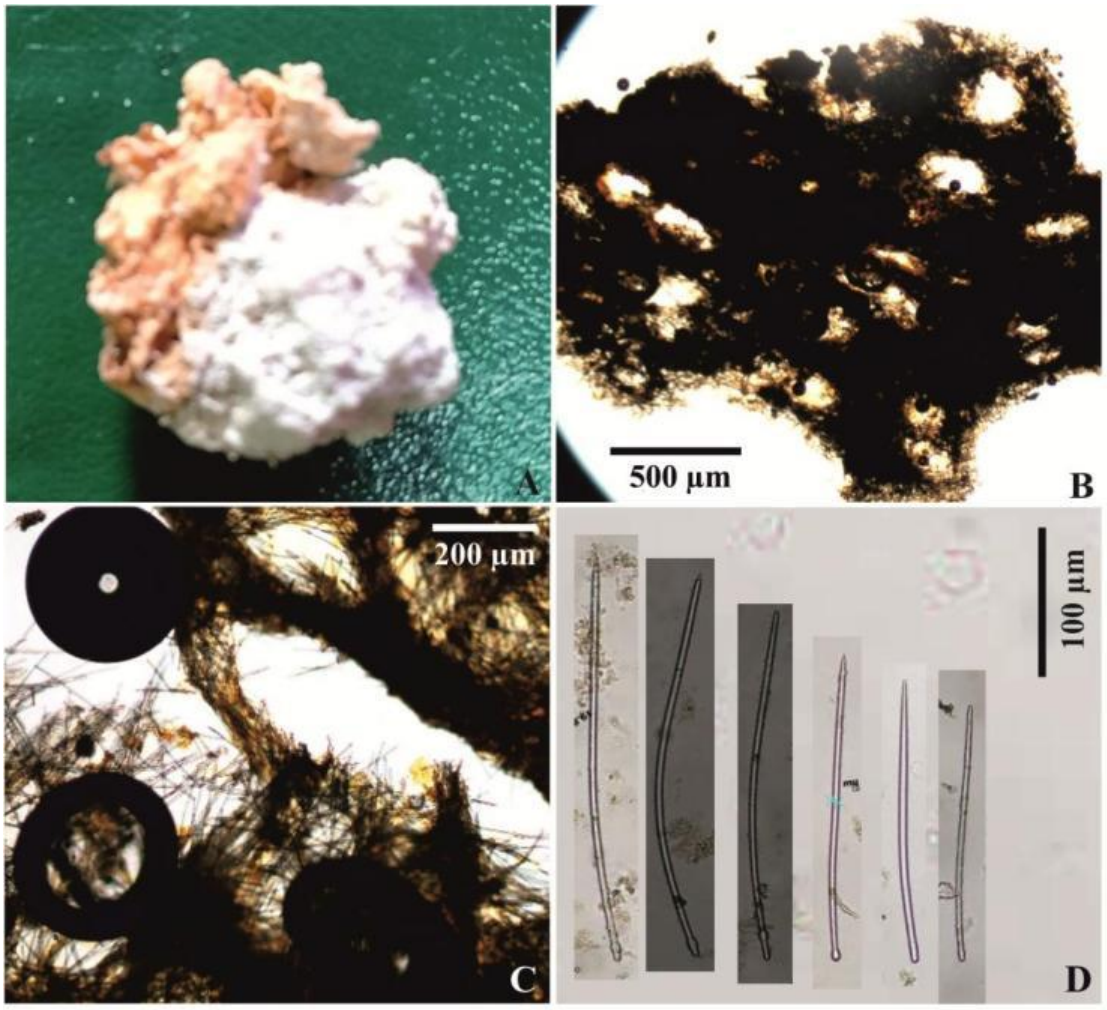

Plate 10: *Cliona orientalis* Thiele, 1900. A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with free spicules arranged in a confused irregular manner (scale= 500 µm); C- Close-up of spicules arranged around choanocyte chambers (scale= 200 µm); D- Tylostyles (scale= 100 µm).

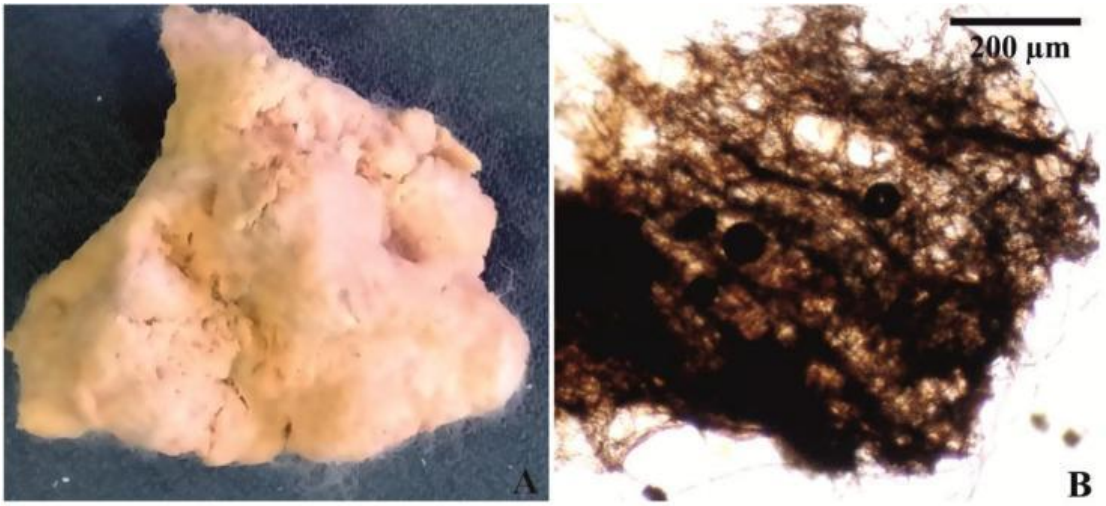

Plate 11: *Clathria (Thalysias) procera* (Ridley, 1884) . A- Preserved specimen (Dry preservation); B- Thick fibres that are echinated by acanthostyles and cored by structural smooth styles (scale= 200 µm).

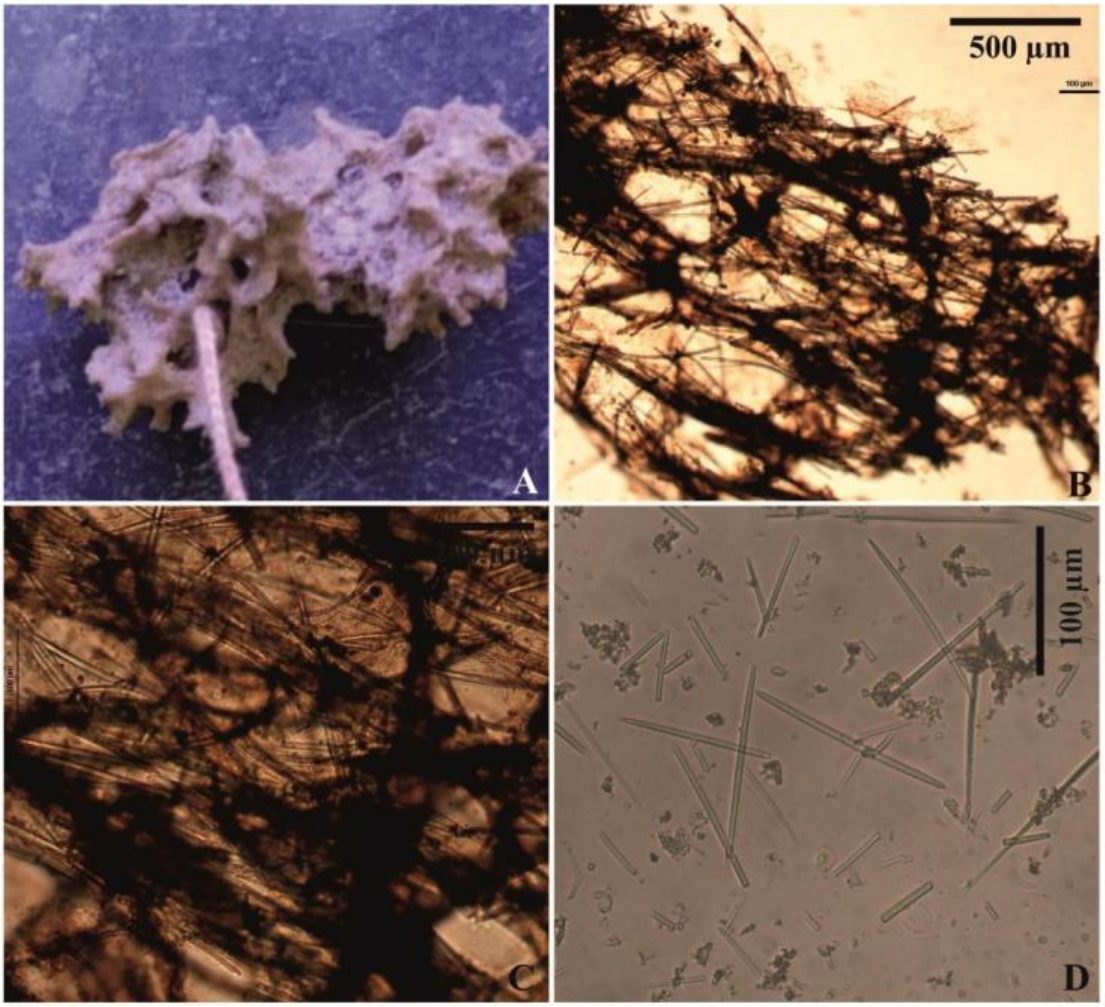

Plate 12: *Callyspongia fistularis* (Topsent, 1892). A- Preserved specimen (Dry preservation); B- Section showing plumose multispicular tracts running toward the surface (scale= 500 µm); C- Close up of the choanosomal skeleton showing the multispicular primary tracts connected by loosly formed connecting tracts; D- Small thin oxeas (scale= 100 µm).

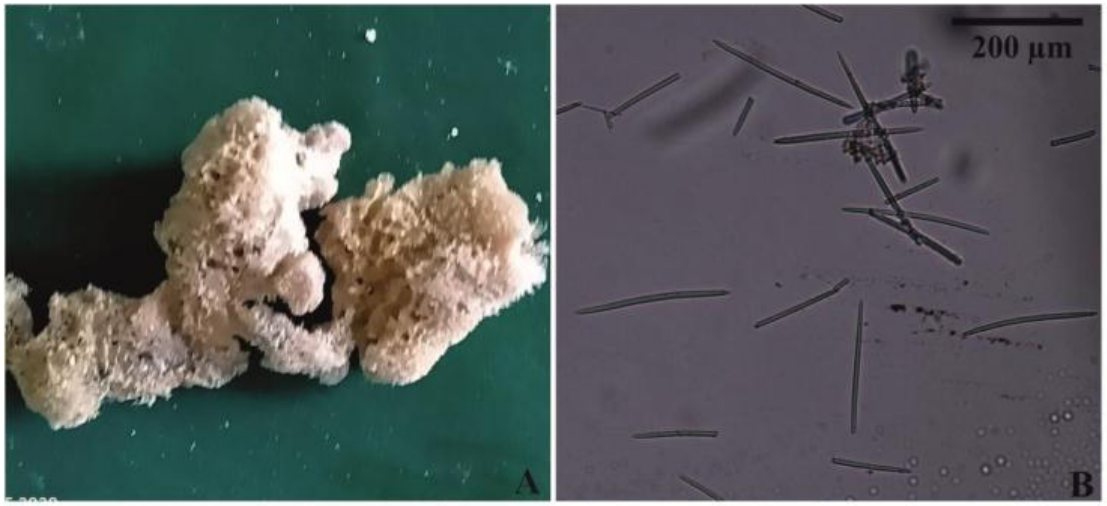

Plate 13: *Callyspongia (Cladochalina) diffusa* (Ridley, 1884) . A- Preserved specimen (Dry preservation); B- Oxeas of a single size class (scale= 200 µm).

Plate 14: *Callyspongia (Cladochalina) fibrosa* (Ridley & Dendy, 1886). A- Preserved specimen (Dry preservation); B- Oxeas of a single size class (scale= 200 µm).

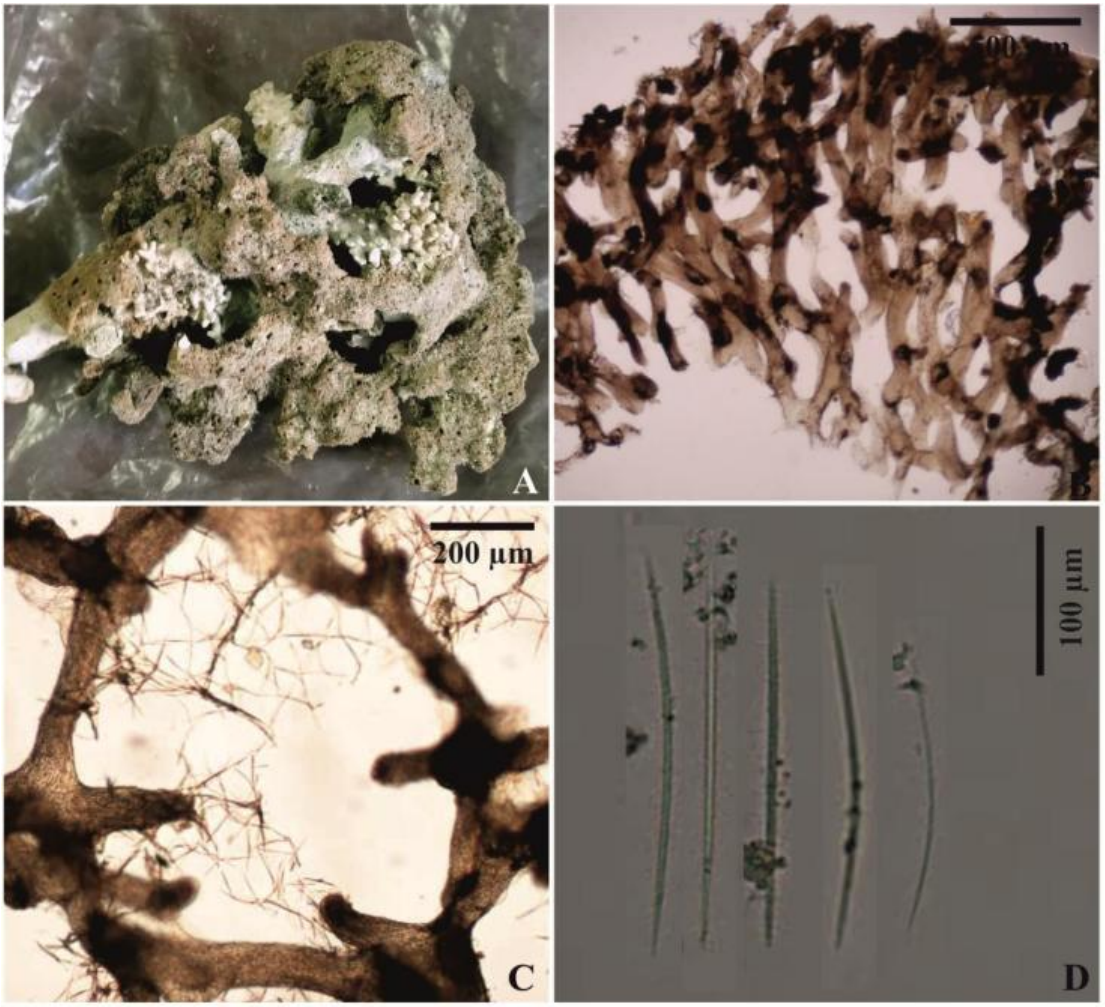

Plate 15: *Haliclona (Gellius) cymaeformis* (Esper, 1794) . A- Preserved specimen (Dry preservation); B- Section showing the general arrangement of the sponge and the symbiotic algae (scale= 500 µm); C- Close up of the choanosomal skeleton showing the isodictyal reticulation of the sponge skeleton in between the algal fibre network; Small thin oxeas (scale= 100 µm).

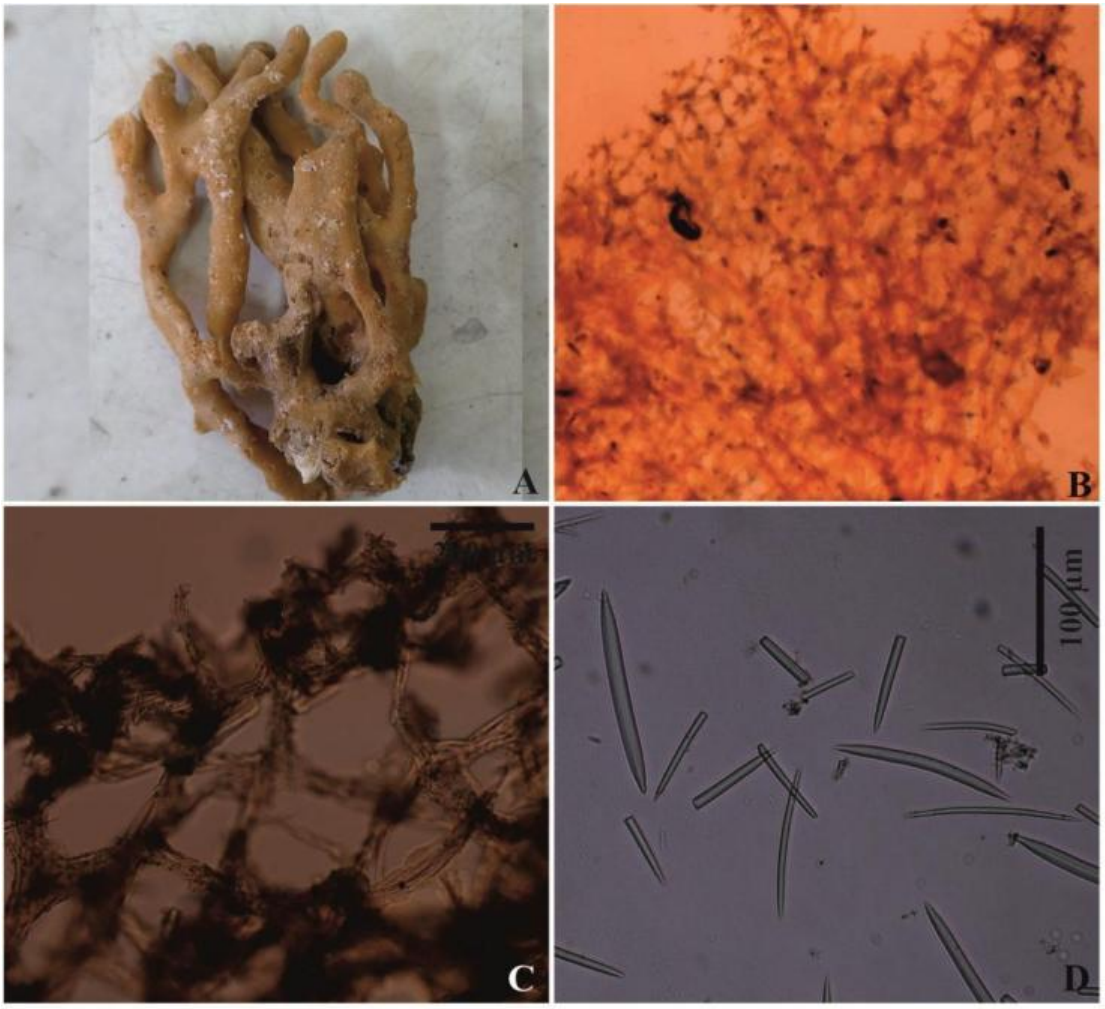

Plate 16: *Haliclona cf. oculata* (Linnaeus, 1759). A- Preserved specimen (Dry preservation); B- Choanosomal skeleton showing irregular reticulation of paucispicular cores fibres, primaries and connectives distinct; C- Close-up of the rectangular meshes formed in the choanosomal region (scale= 200 µm); D- Oxeas (scale= 100 µm).

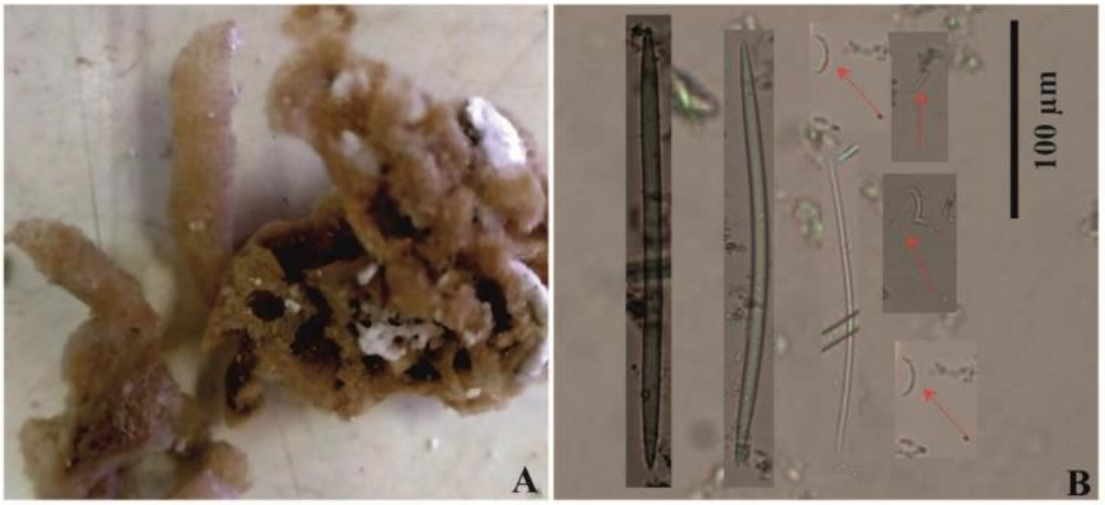

Plate 17: *Gelliodes pumila* (Lendenfeld,1887). A- Preserved specimen (Dry preservation); B- Short oxeas with less frequent sigmas pointed by arrows (scale= 100 µm).

Plate 18: *Halichondria (Halichondria) panicea* (Pallas, 1766). A- Preserved specimen (Dry preservation); B- Section showing the halichondroid arrangement of the choanosomal skeleton (scale= 500 μm).

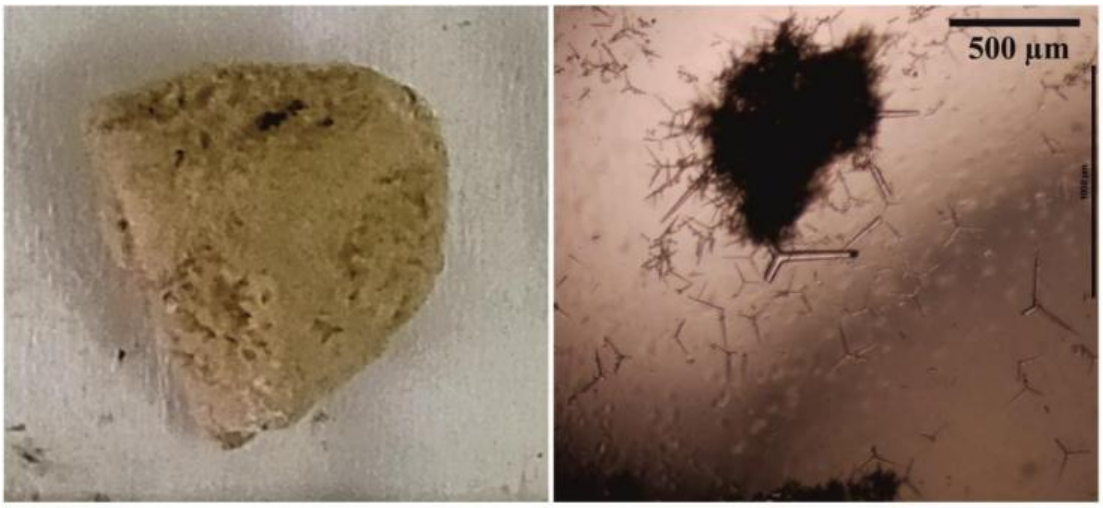

Plate 19: *Plakinastrella schulzi* Dendy, 1905. A- Preserved specimen (Dry preservation); B- Short shafted triaenes (scale= 500 µm).

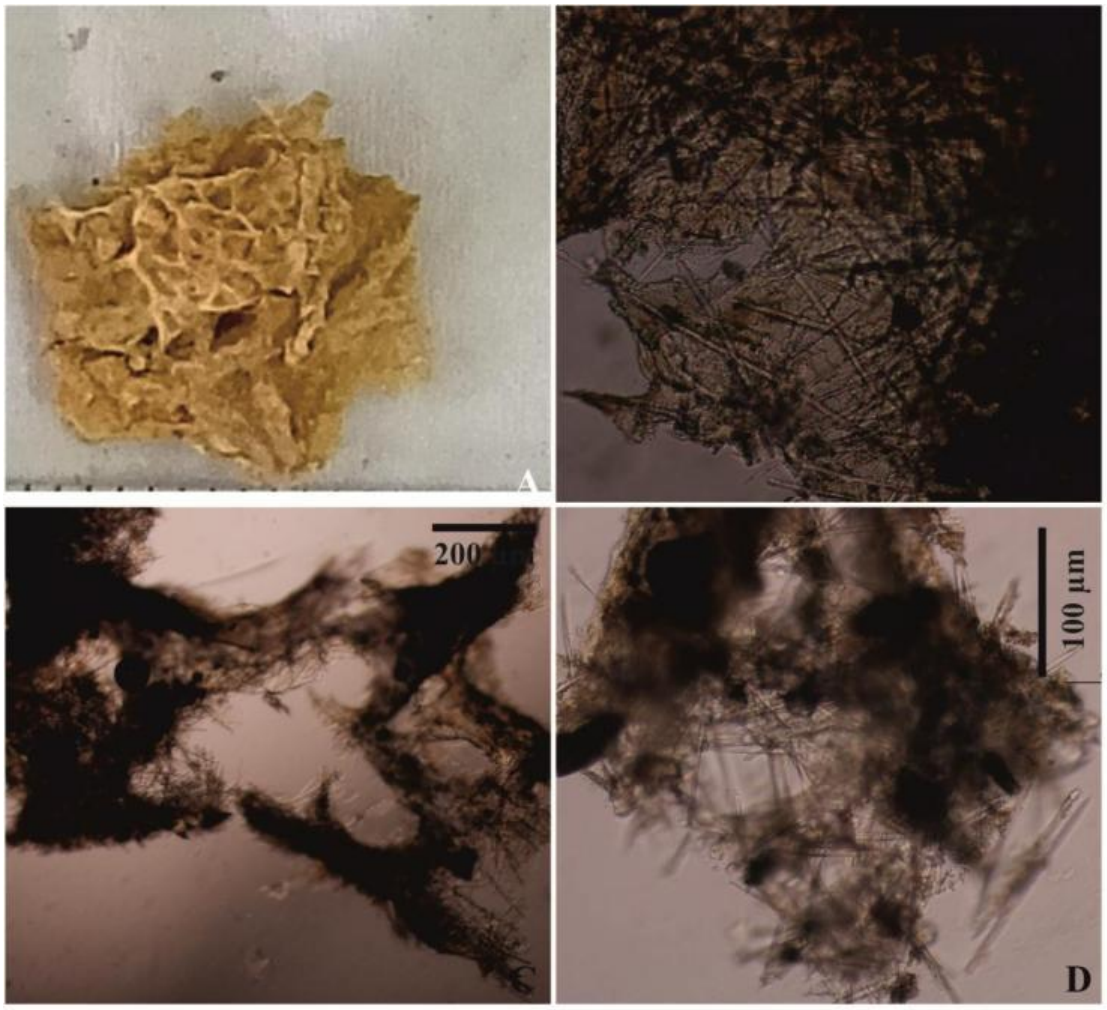

Plate 20: *Cliona cf. celata* Grant, 1826. A- Preserved specimen (Dry preservation); B-D Sections showing the irregular confused manner in which the free spicules are arranged around the choanocye chambers in the choanosomal region.

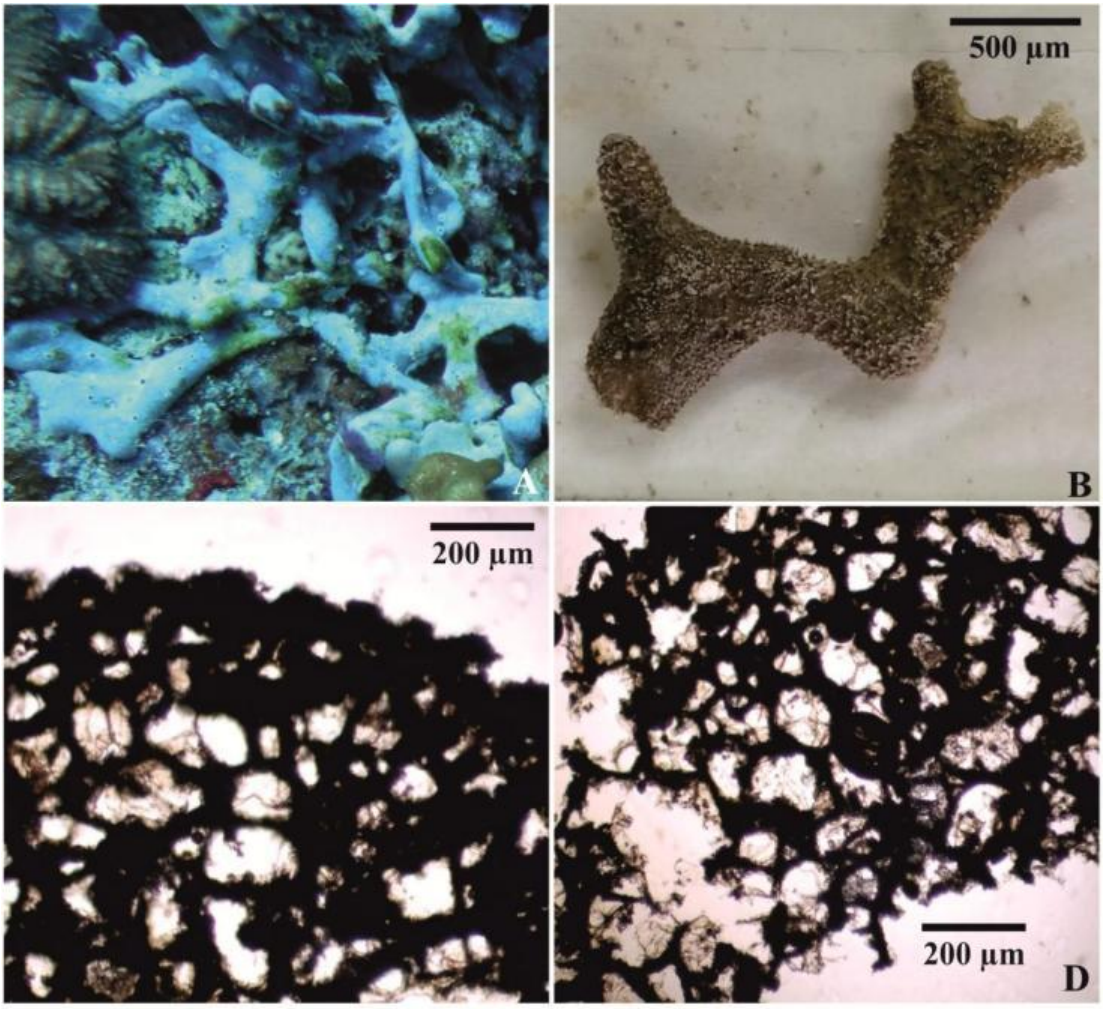

Plate 21: *Dysidea granulosa* Bergquist, 1965. A- In-situ; B- Preserved specimen (Dry preservation); C- Section showing conulose surface that is heavily charged with sand (scale= 200 µm); D- Choanosomal skeletal fibres forming a regular reticulating that is heavily cored by debris and sand (scale= 200 µm).

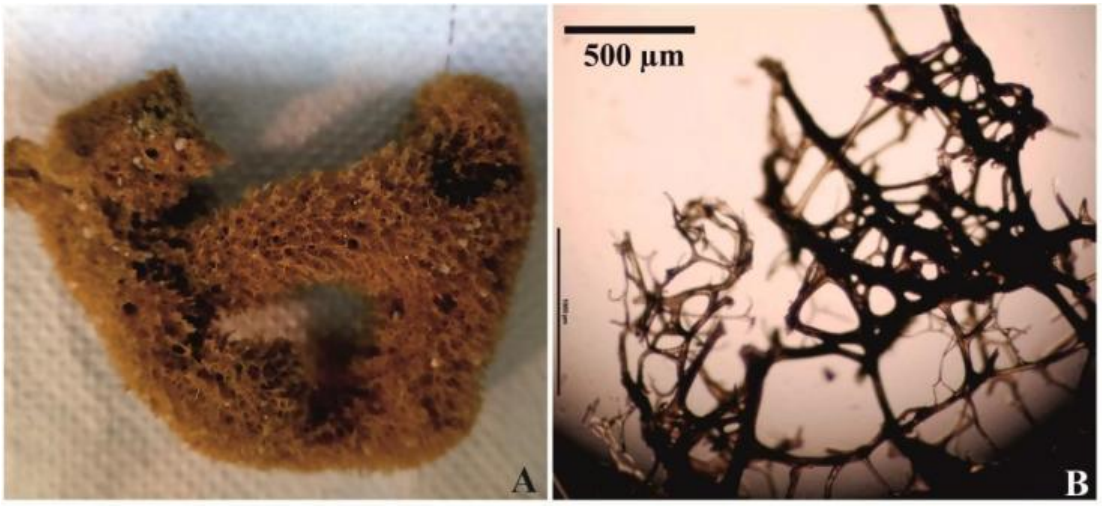

Plate 22: *Fasciospongia cavernosa* (Schmidt, 1862). A- Preserved specimen (Dry preservation); B- Primary fibres centrally cored (scale= 500 µm).

Plate 23: *Leucetta chagosensis* Dendy, 1913. A- Preserved specimen (Dry preservation); B- Oxeas of a single size class (scale= 200 µm).

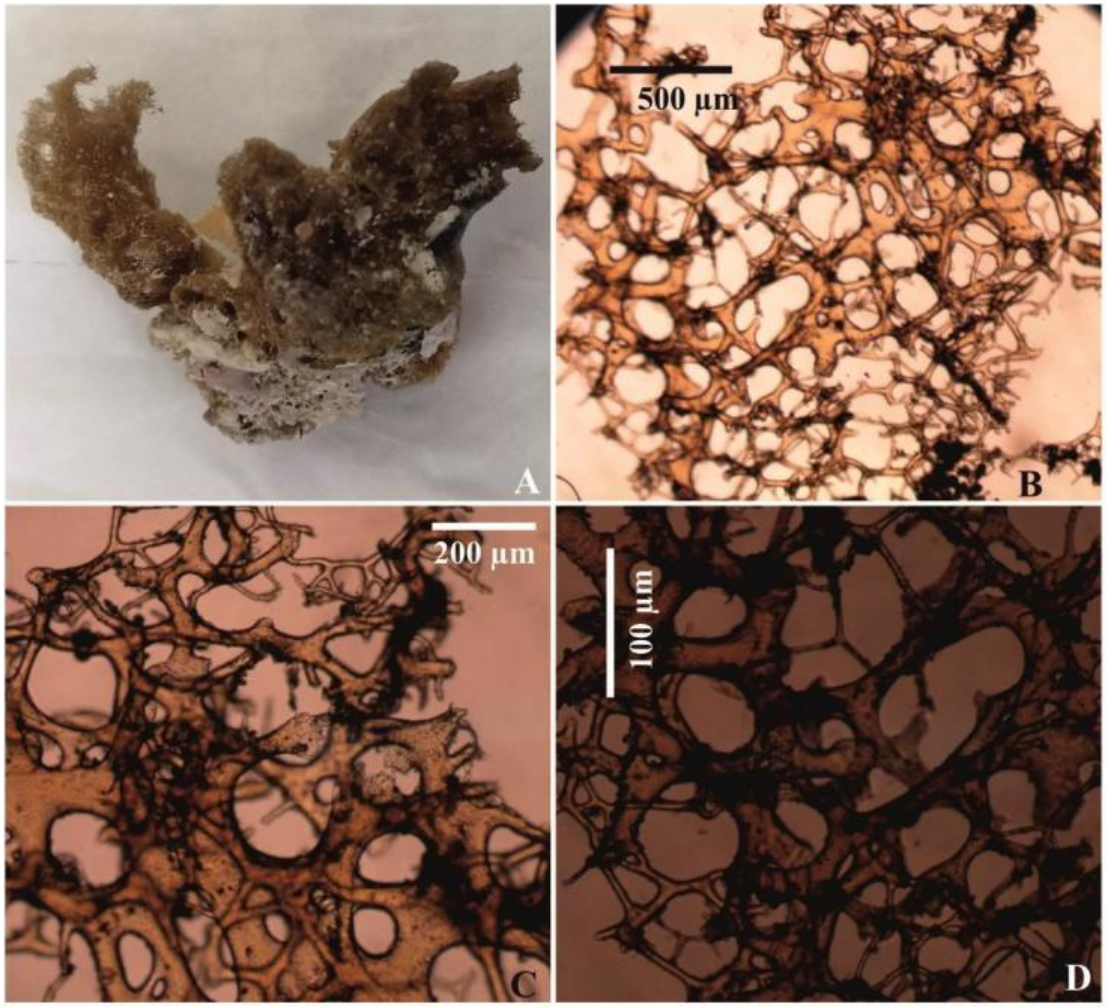

Plate 24: *Hyatella* sp. . A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with anastomosed tracts (scale= 500 µm); C & D- Close-up of thick primary fibres and thinner secondary fibres (100 µm).

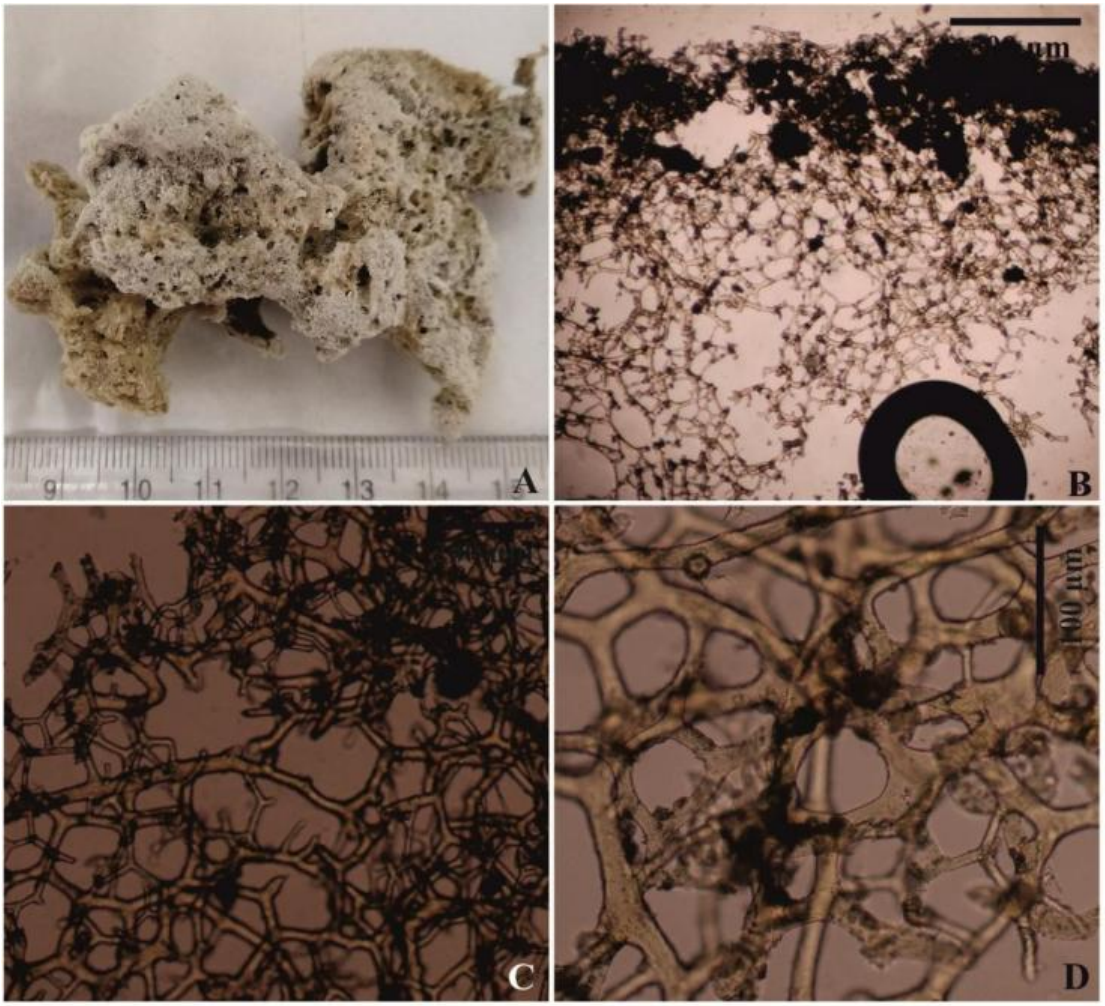

Plate 25: *Spongia (Spongia) ceylonensis* (Dendy, 1905).. A- Preserved specimen (Dry preservation); B- Section showing the dermal region heavily charged with sand partices (scale= 500 µm); C- Choanosomal skeleton showing a regular reticulation of polygonal meshes (scale= 200 µm); D- Close-up of polygonal meshes of the choanosomal region (scale= 100 µm).

Plate 26: *Dragmacidon agariciforme* (Dendy, 1905). A-Freshly collected specimen; B-Section showing the choanosomal skeleton with thick plurispicular columns running parallel to each other approaching the surface to form the characteristic conules (scale= 500 µm); C-The primary tracts contain single spicules protruding making the surface velvety (scale= 200 µm); D- Oxeas and styles in 2 size classes (scale= 100 µm).

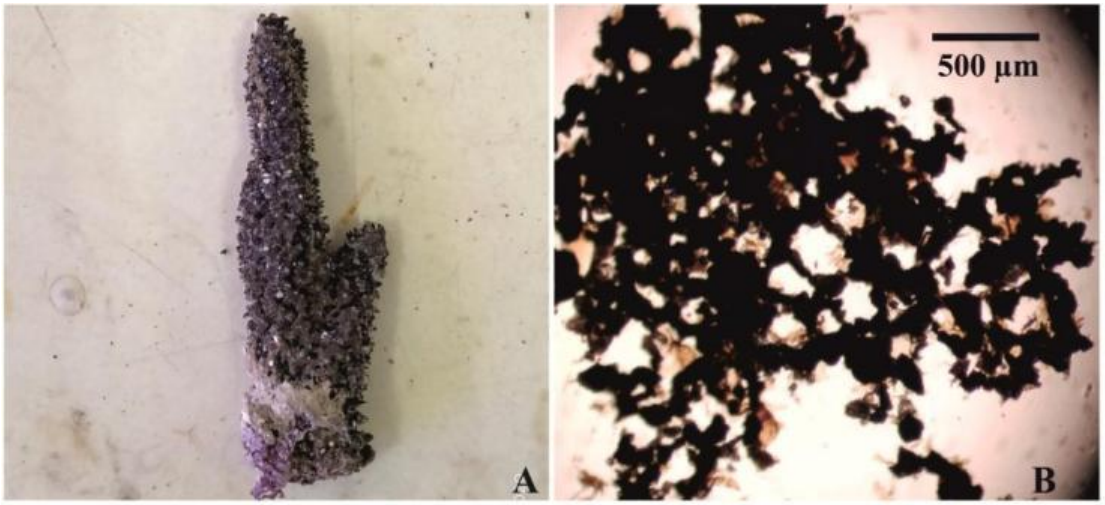

Plate 27: *Hyrtios erectus (*Lendenfeld,1887) . A- Preserved specimen (Dry preservation); B- Anastomosing choanosomal skeletal fibres heavily cored by sand and debris (scale= 500 µm).

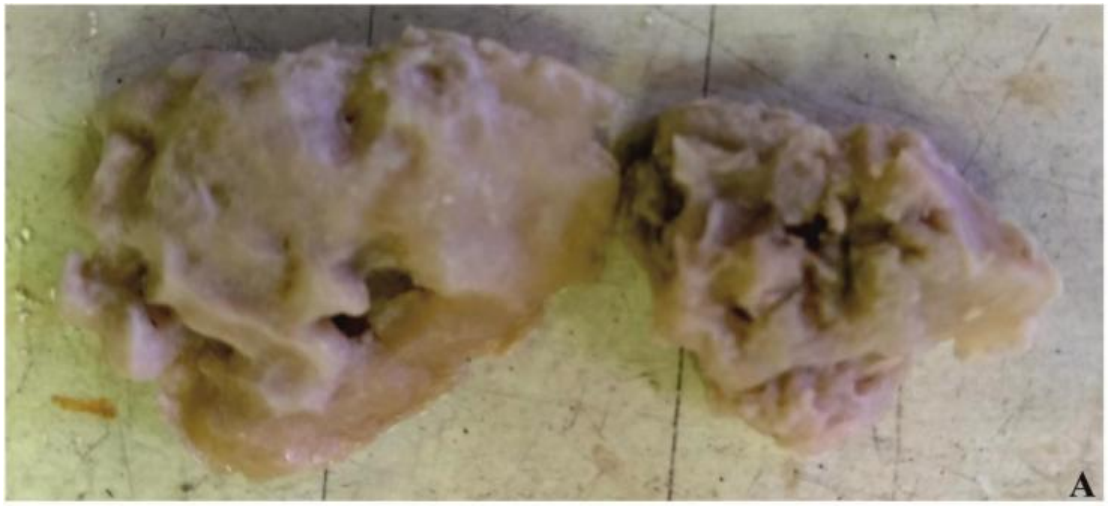

Plate 28: *Mycale (Aegogropila) crassissima* (Dendy, 1905). A- Preserved specimen (Dry preservation).

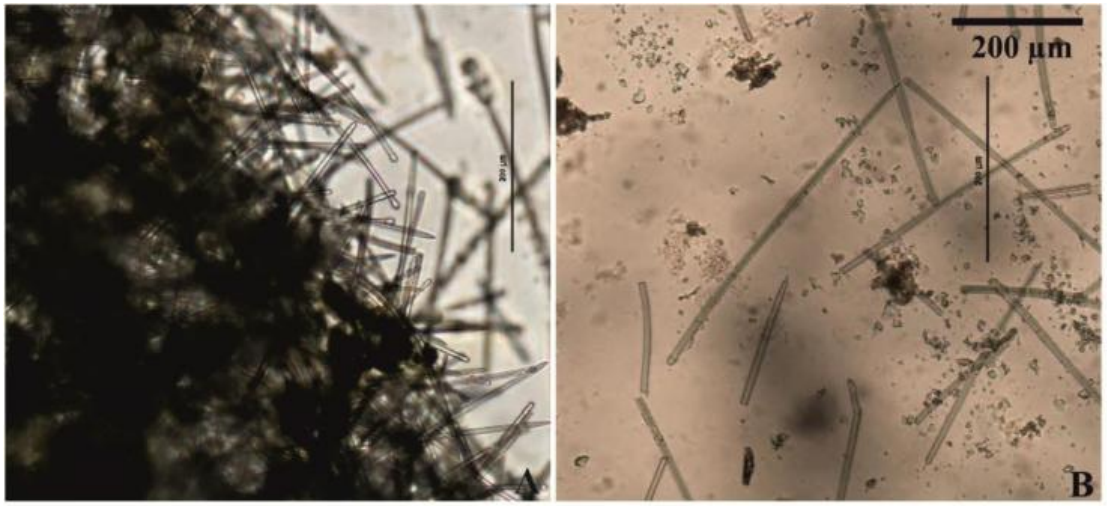

Plate 29: *Suberites carnosus* (Johnston, 1842). A- Confused arrangement of long slender; B- Tylostyles (scale= 200 µm).

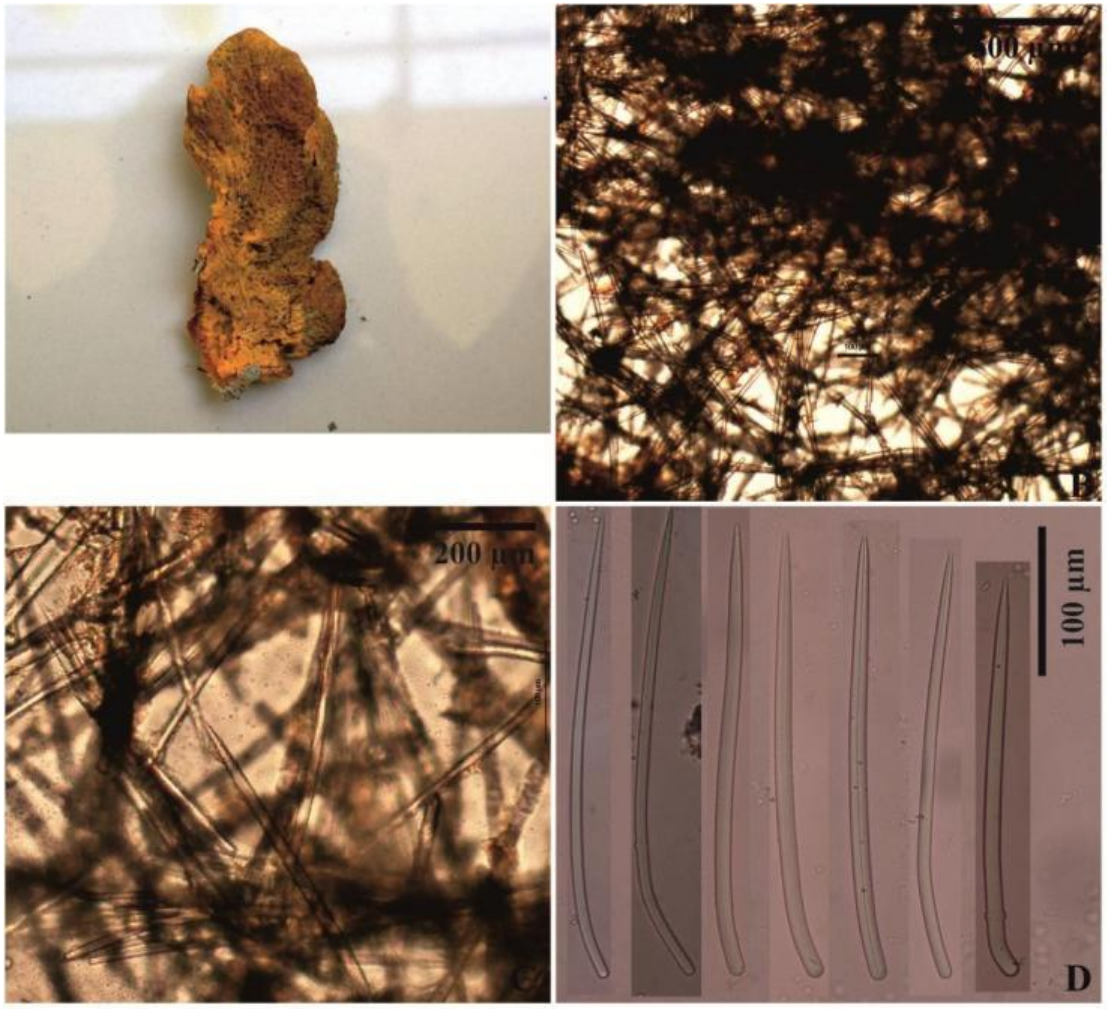

Plate 30: *Stylissa massa* (Carter, 1887). A-Freshly collected specimen; B- Section showing the choanosomal skeleton with confused halichondroid skeletal networks (scale= 500 µm); C- Close-up of choanosomal skeleton (scale= 200 µm); D- Styles of a single size class (scale= 100 µm).

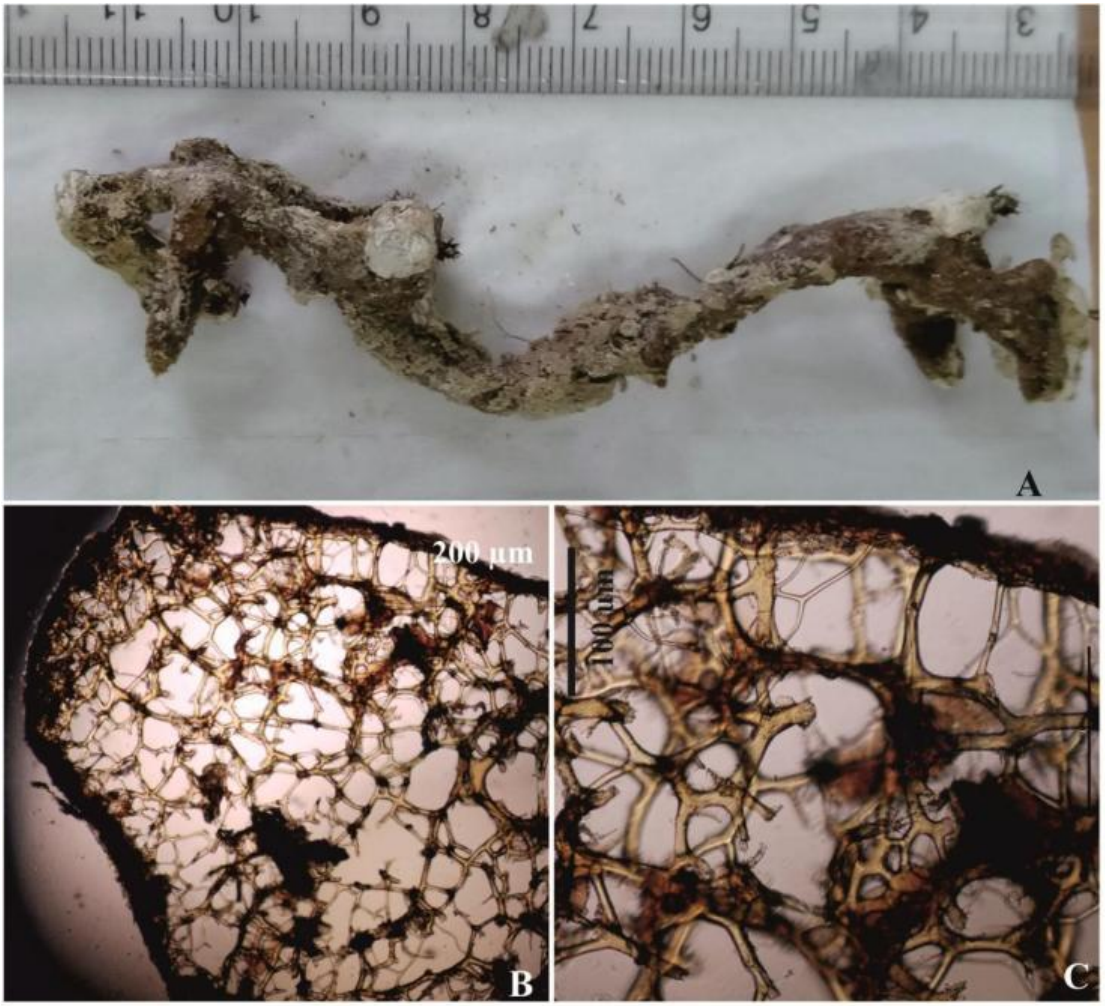

Plate 31: *Aplysinopsis elegans* Lendenfeld, 1888 A- Preserved specimen (Dry preservation); B- Section showing the over all skeletal arrangement (scale= 500 µm); C- Close-up of ectosomal skeleton (100 µm)

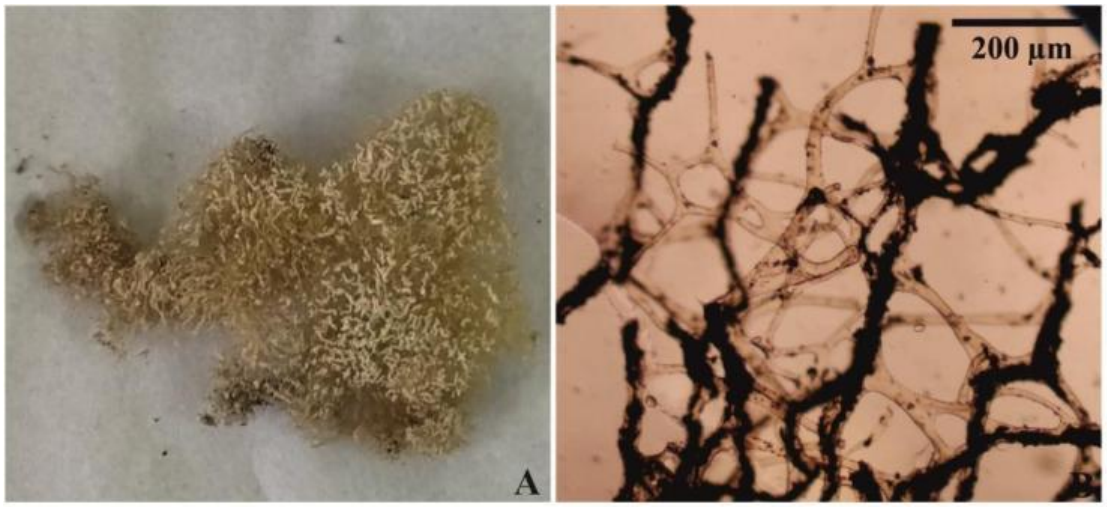

Plate 32: *Semitaspongia* sp. A- Preserved specimen (Dry preservation); B- Primary fibres are cored with debris and the secondary fibres are clear (scale= 200 µm).

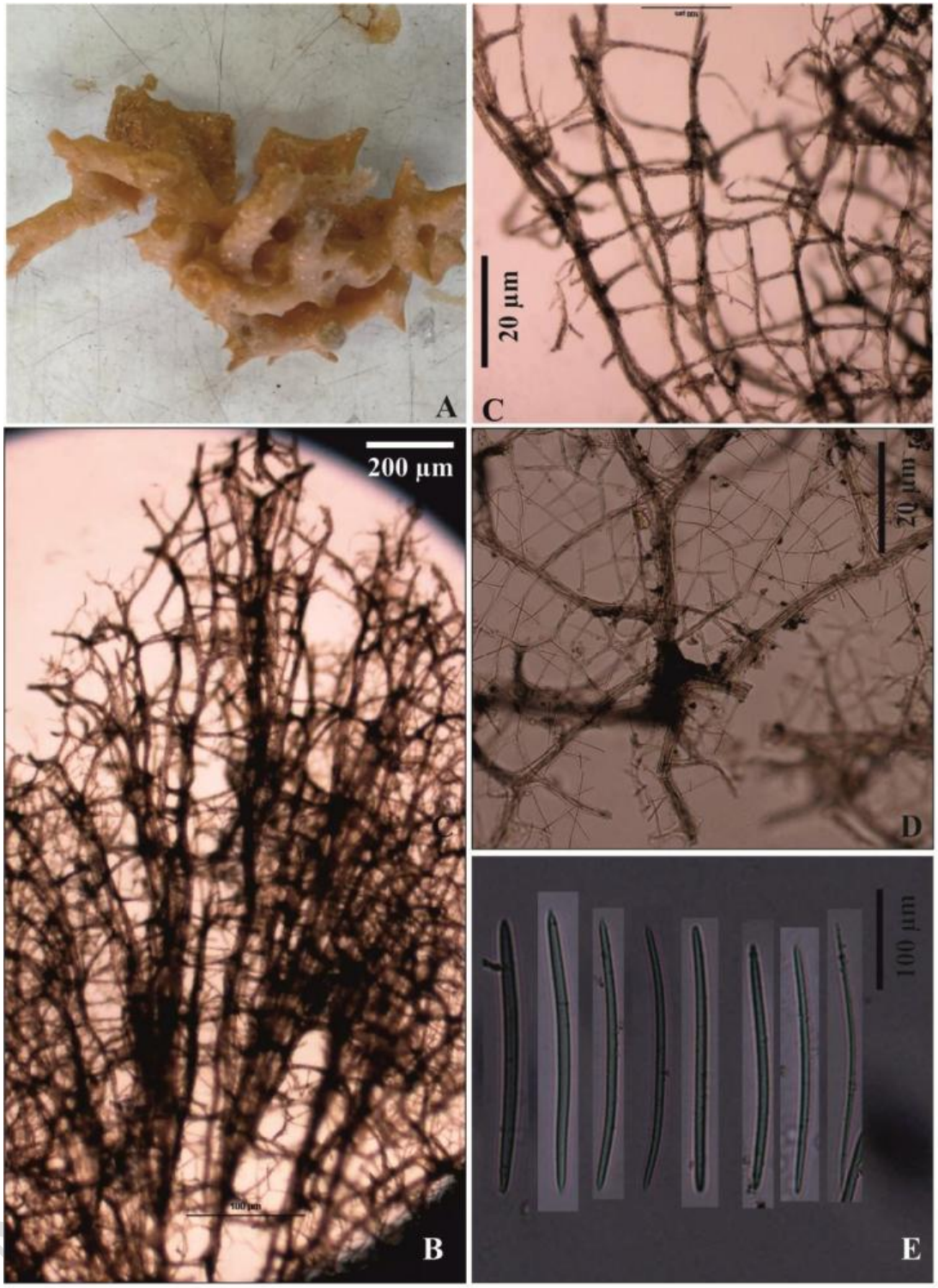

Plate 33: *Callyspongia (Cladochalina) subarmigera* (Ridley, 1884) . A-Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with plumose tracts running up the sponge (scale= 500 µm); C- Close-up of ladder like choanosomal tracts; D- Tangential ectosomal skeleton (scale= 200 µm); E- Small slender oxeas (scale= 100 µm).

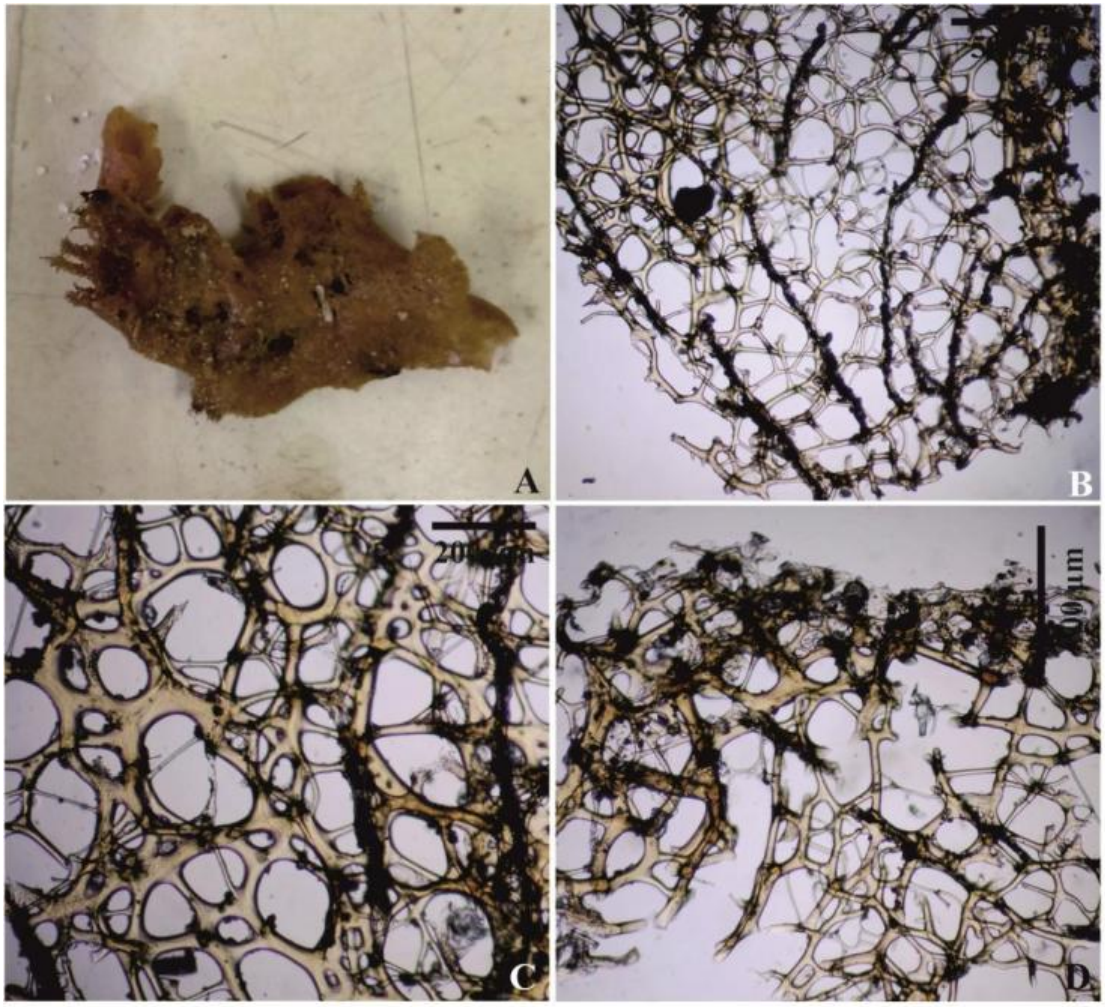

Plate 34: *Hyattella intestinalis* (Lamarck, 1814). A- Preserved specimen (Dry preservation); B- Section showing overall skeletal architecture with cored primary fibres running toward the surface; C- Close-up of the some fibres forming fascicles as they approach the surface (scale= 200 μm); D- Close-up showing the tertiary fibres supporting the surface region (scale= 100 μm).

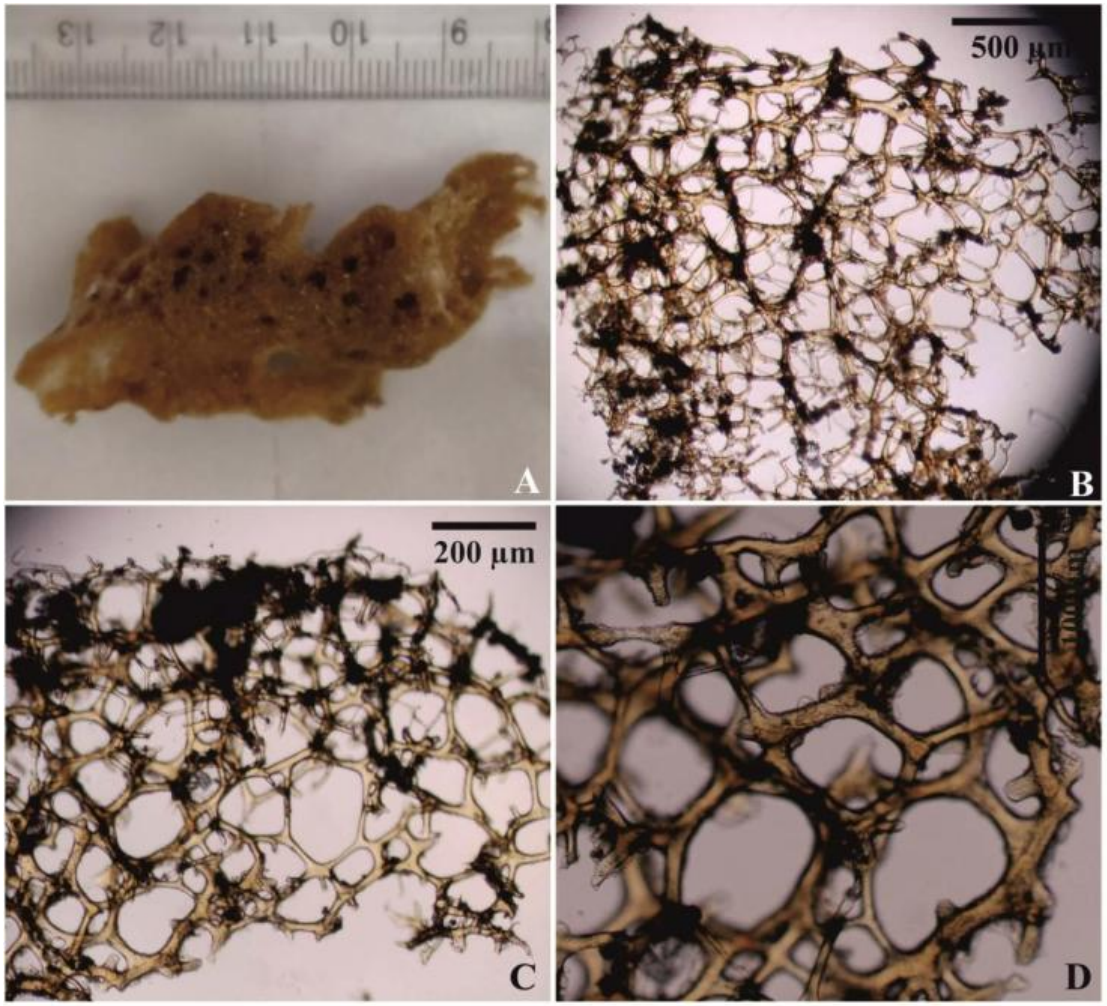

Plate 35: *Hyatella* sp. A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with plumose tracts running up the sponge (scale= 500 µm); C- Tangential surface skeleton (scale= 200 µm); D- Close-up of choanosomal tracts (scale= 100 µm).

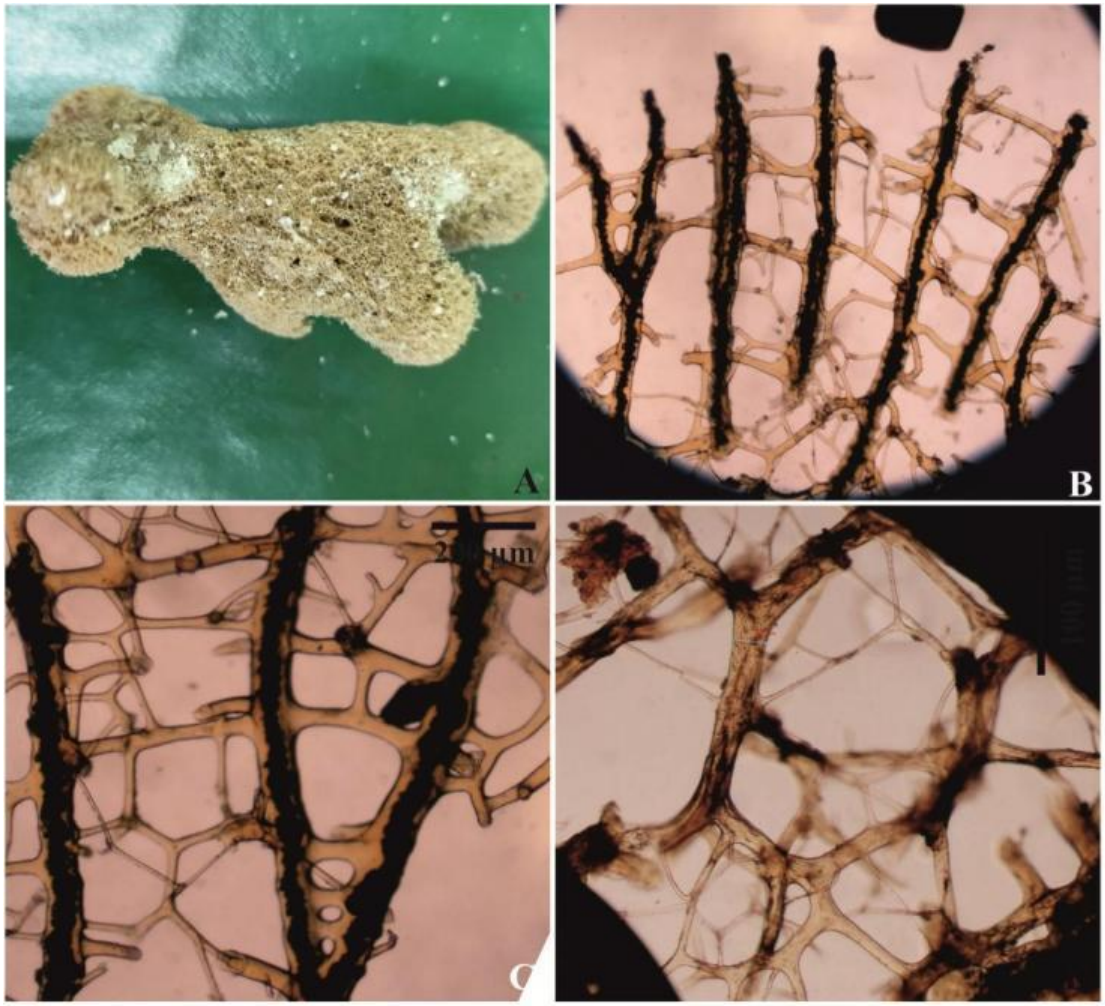

Plate 36: *Scalarispongia* sp. A- Preserved specimen (Dry preservation); B- Section showing overall skeletal architecture with cored primary fibres running parallel to each other and perpendicular to the surface connected by uncored secondary fibres; C- Close-up of the secondary fibres forming the rectangular meshes (scale= 200 μm); D- Close-up showing the secondary and tertiary fibres (scale= 100 μm).

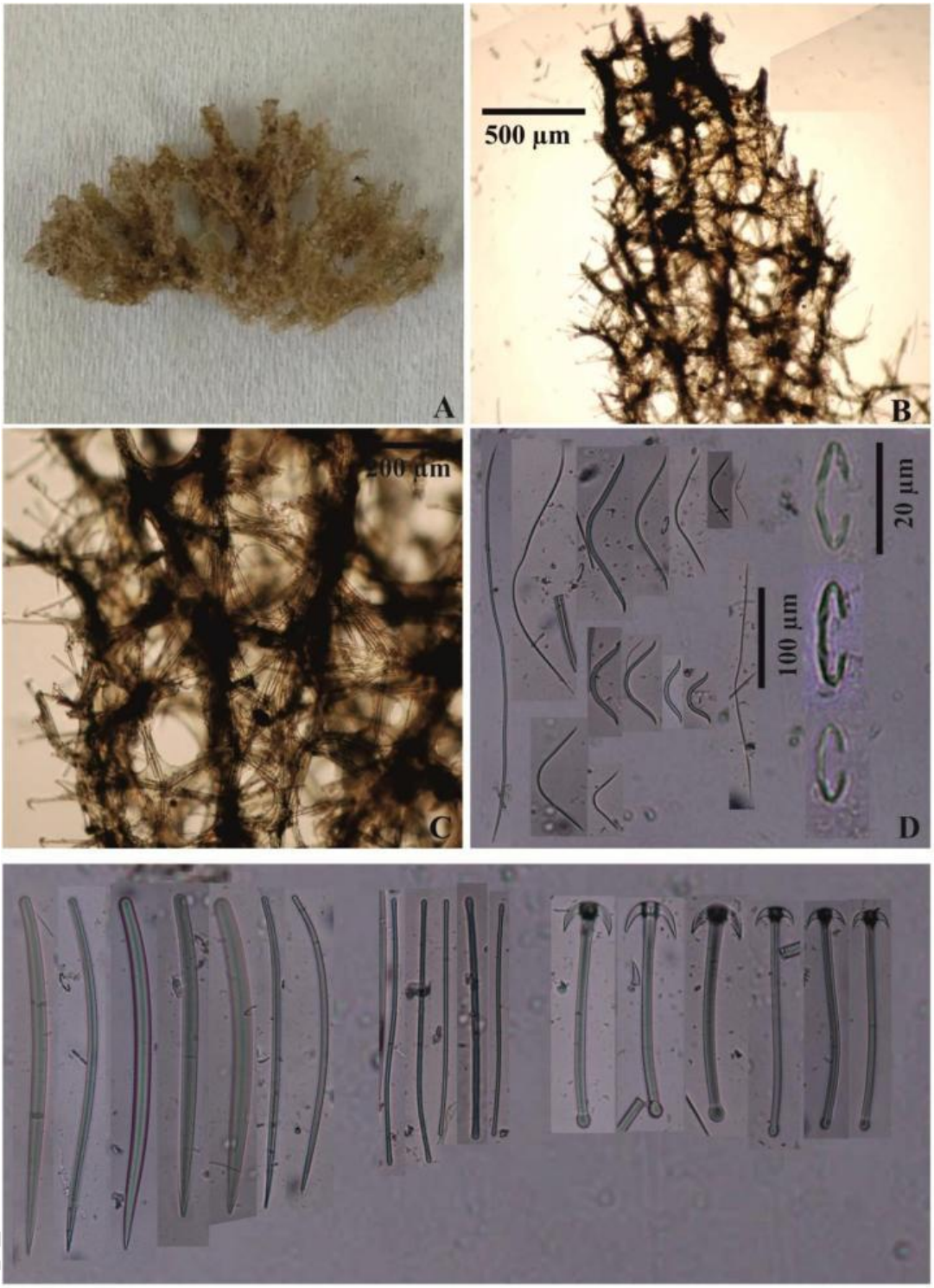

Plate 37: *Acarnus* sp. A-Preserved specimen (Dry preservation); B- Section showing choanosomal skeleton with plumose tracts ascending to surface interconnected by renieroid isotropic tracts, both cored by choanosomal styles and echinated by cladotylotes (scale= 500 µm); C- Close-up of choanosomal tracts showing the cladotylotes echinating the tracts (scale= 200 µm); D- Different types of toxas and isochelae (scale= 100 µm); E- Styles, tylotes and two types of cladotylotes.

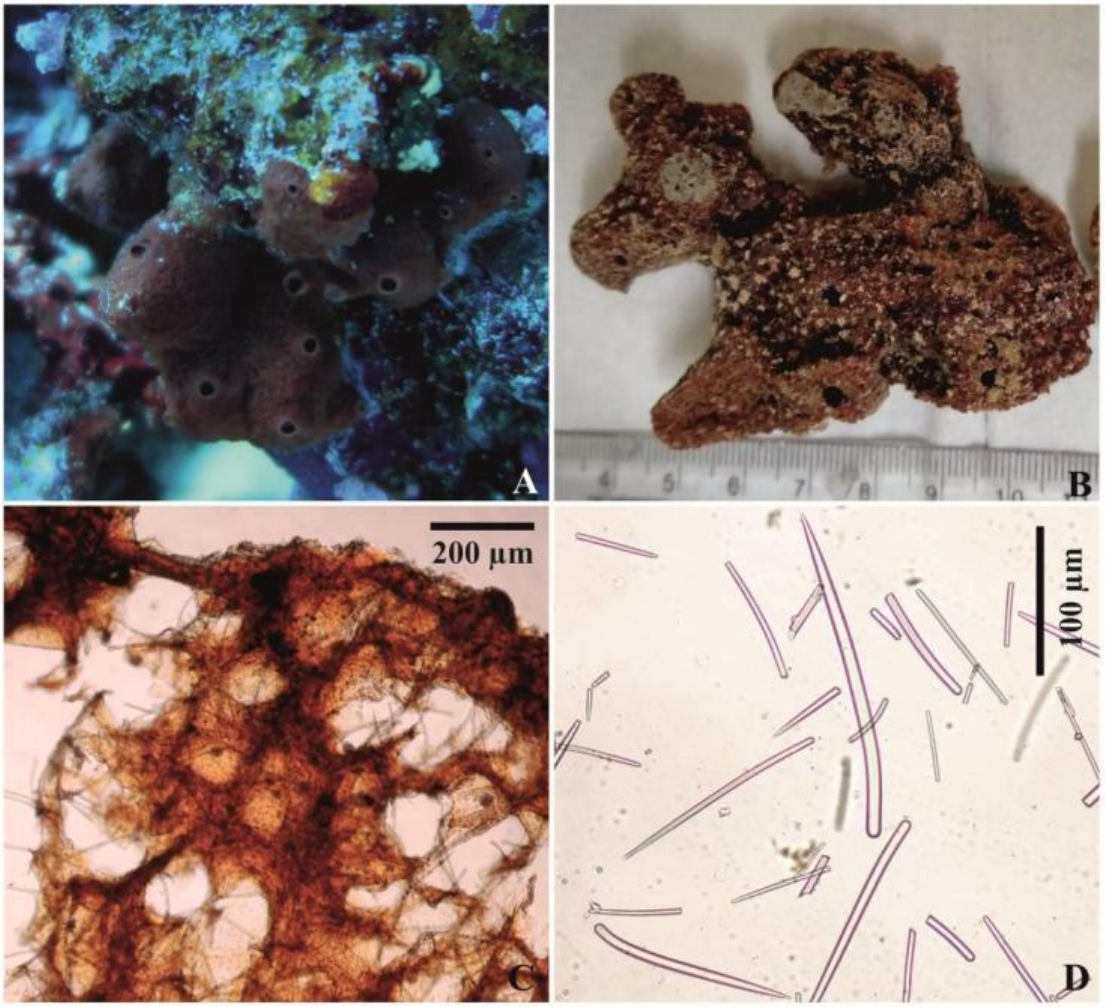

Plate 38: *Axinella minor* Thomas, 1981. A- In-situ; B- Preserved specimen (Dry preservation); C- Choanosomal skeleton showing plumose tracts running toward the surface (scale= 200 µm); D- Styles in a single size class (scale= 100 µm).

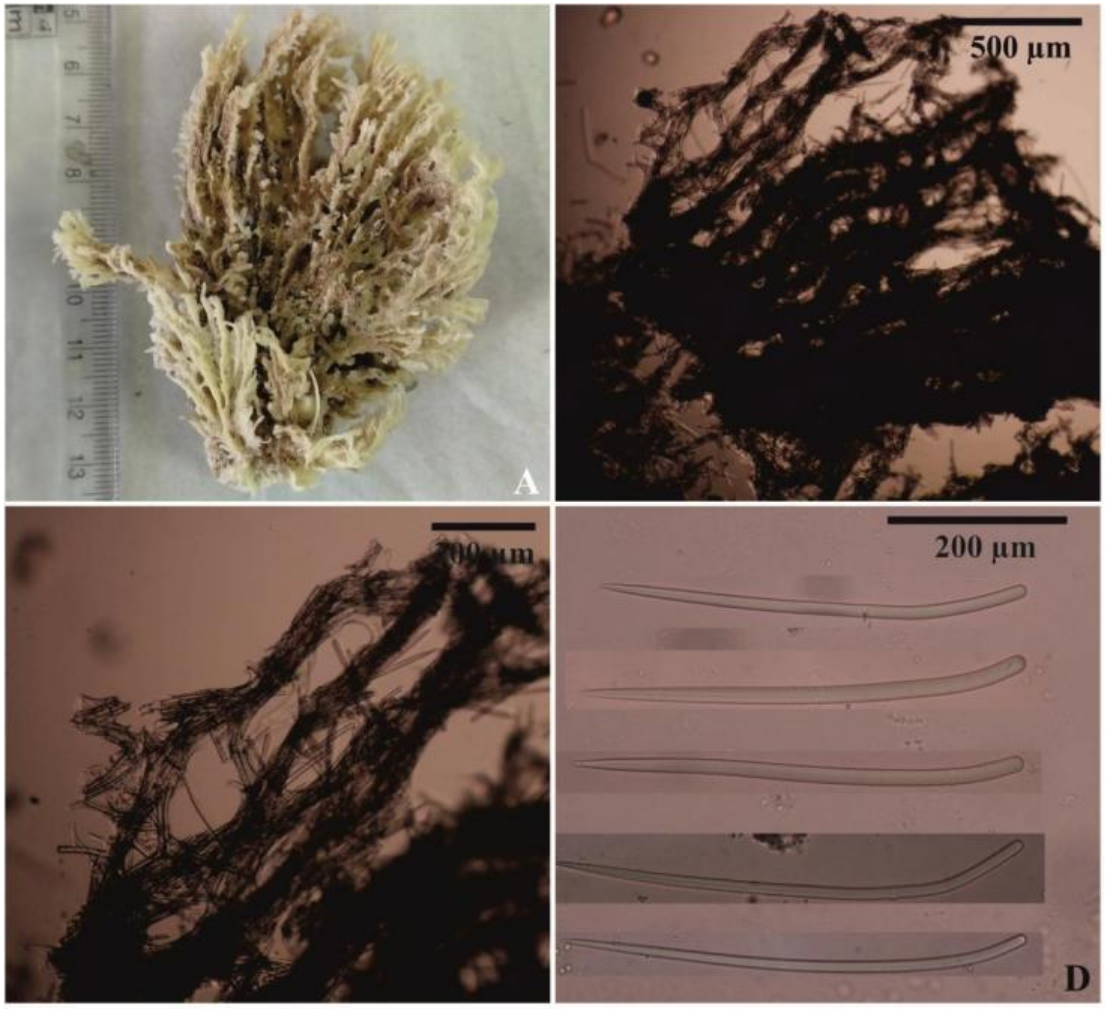

Plate 39: *Phakettia ridleyi* (Dendy, 1887). A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with plumose tracts running up the sponge (scale= 500 µm); C- Close-up of plumose tracts running up toward the surface (scale= 200 µm); D- Styles (scale= 100 µm).

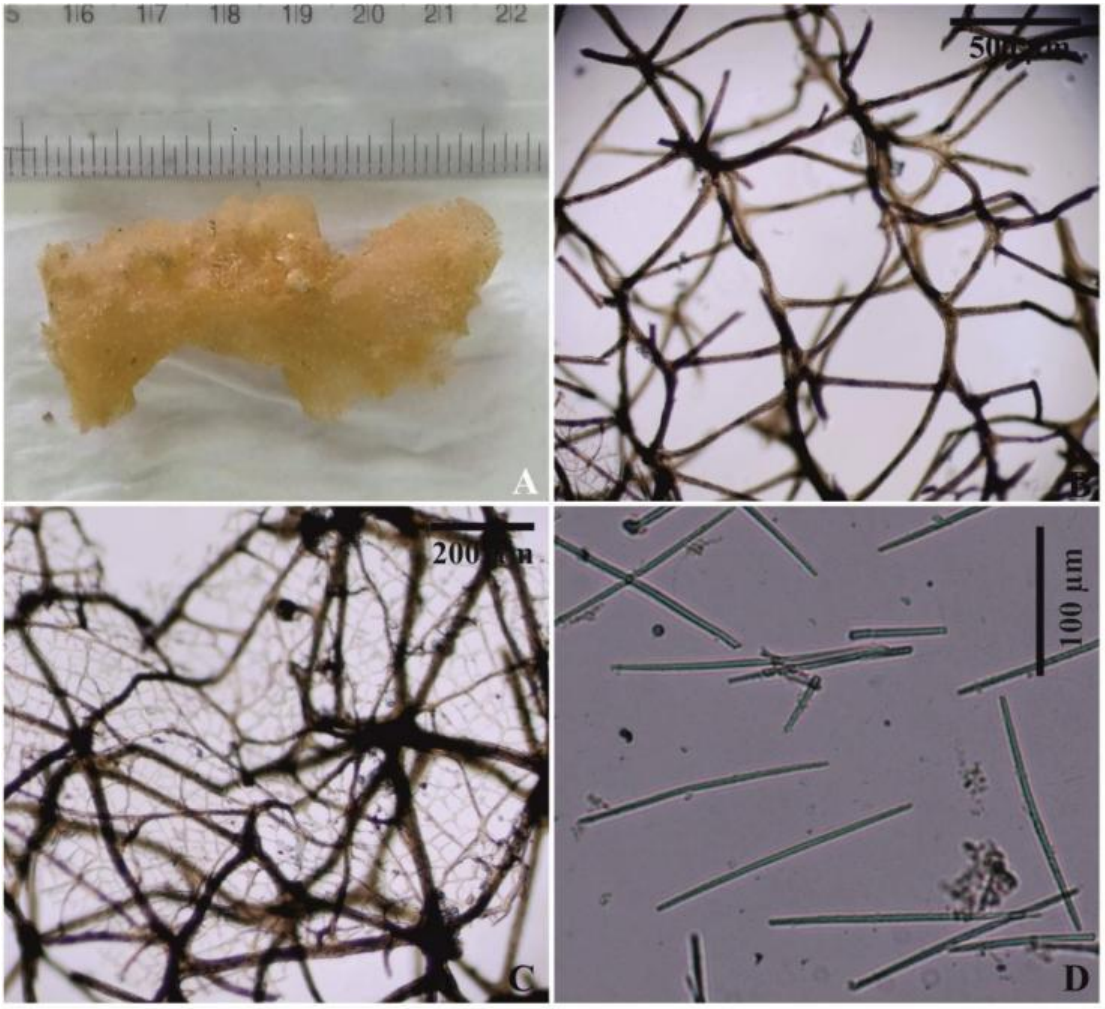

Plate 40: *Callyspongia (Cladochalina) spinnosissima* (Dendy, 1887) . A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with plumose tracts running up the sponge (scale= 500 µm); C- Ectosomal skeleton showing protruding spicule tracts making the surface velvety (scale= 200 µm); D- single size class of oxeas (scale= 100 µm).

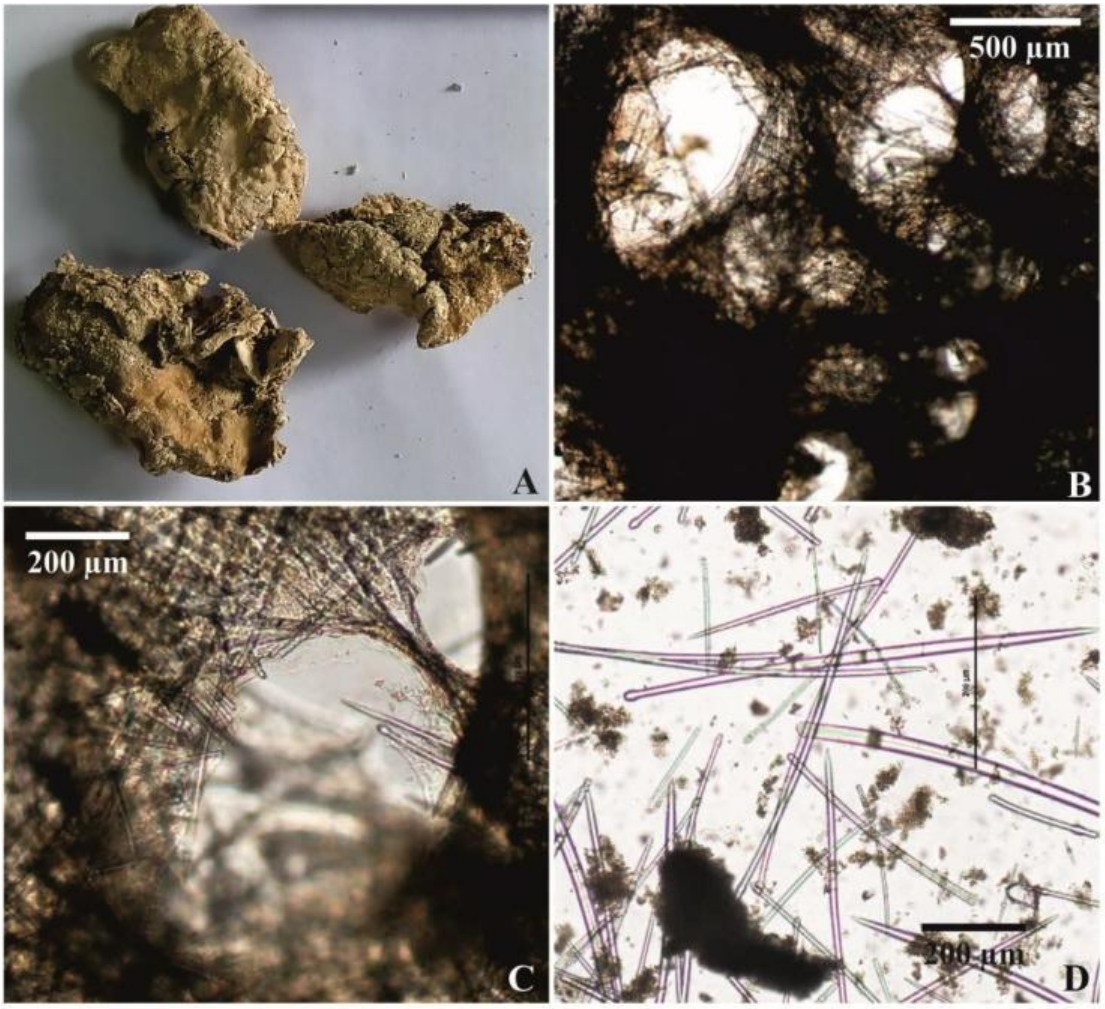

Plate 41: *Spheciospongia inconstans* (Dendy, 1887). A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with free spicules arranged in a confused irregular manner; C- Close-up of spicules arranged around choanocyte chambers (scale= 200 µm); D- Tylostyles (scale= 200 µm).

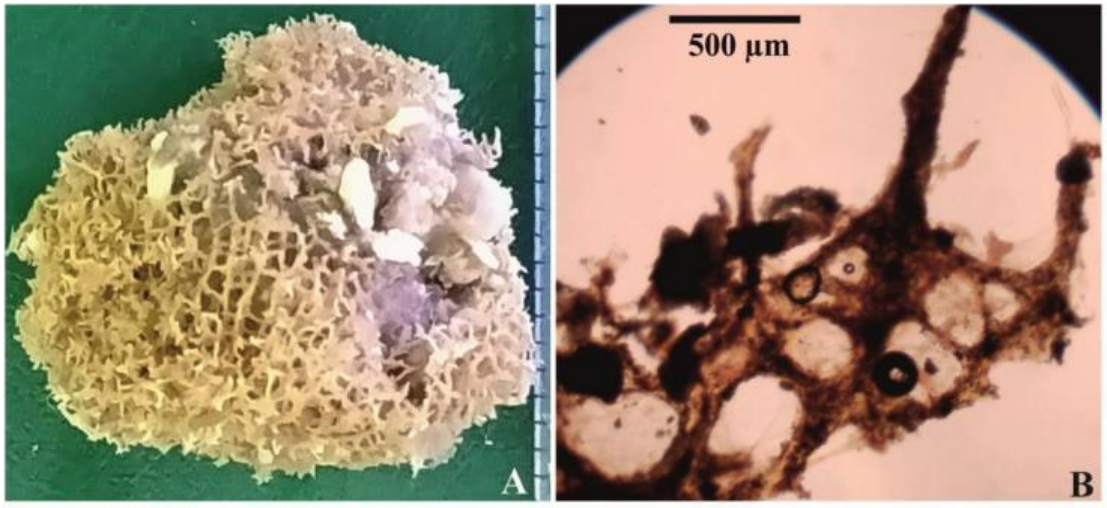

Plate 42: *Ectyodoryx lissostyla* Thomas, 1970. A- Preserved specimen (Dry preservation); B- Primary and secondary fibres are completely cored by detritus and sand (scale= 500 µm).

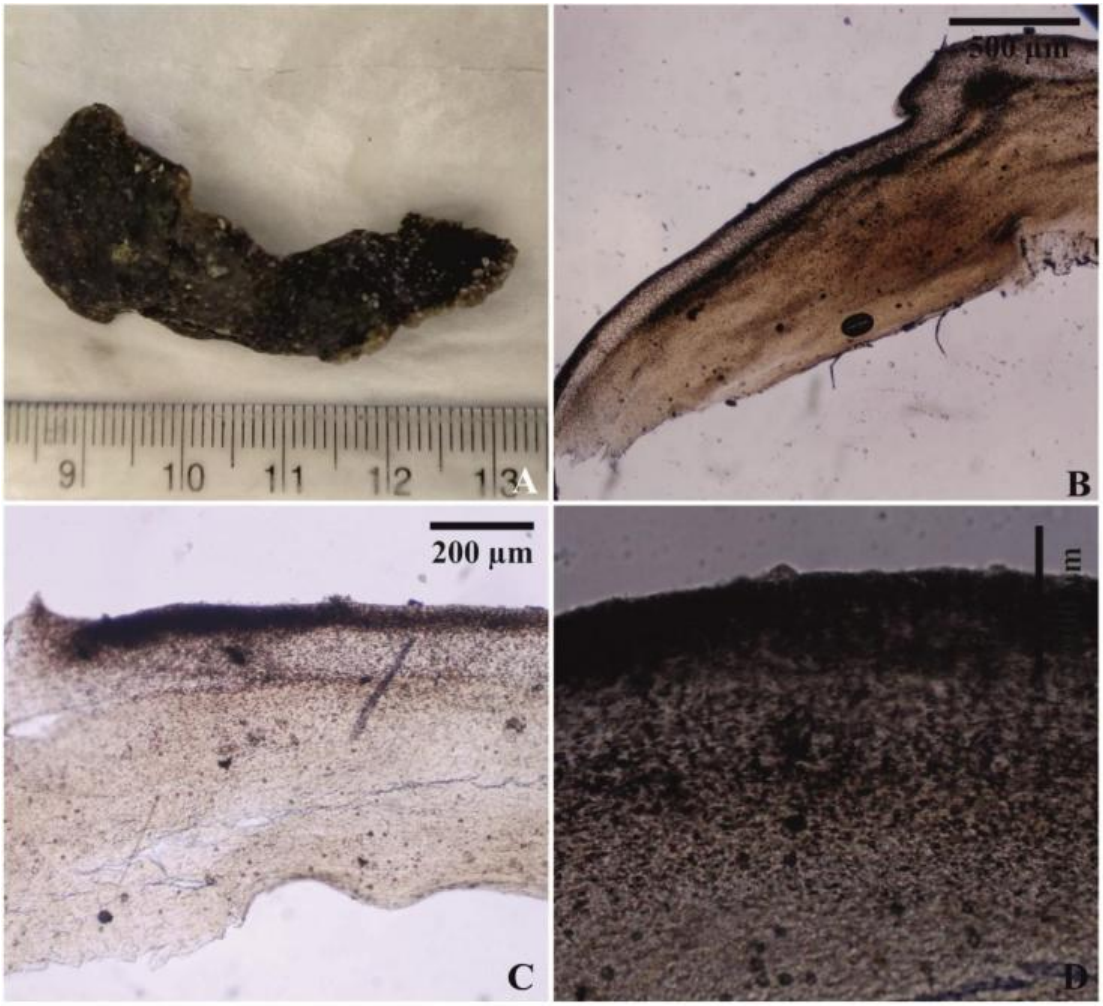

Plate 43: *Chondrilla australiensis* Carter, 1873. A- Preserved specimen (Dry preservation); B- Section showing the overall body organisation (scale= 500 µm); C- Close- up of the paler choanosomal region (scale= 200 µm); D- Close-up of the darker pigmented cortex (scale= 100 µm).

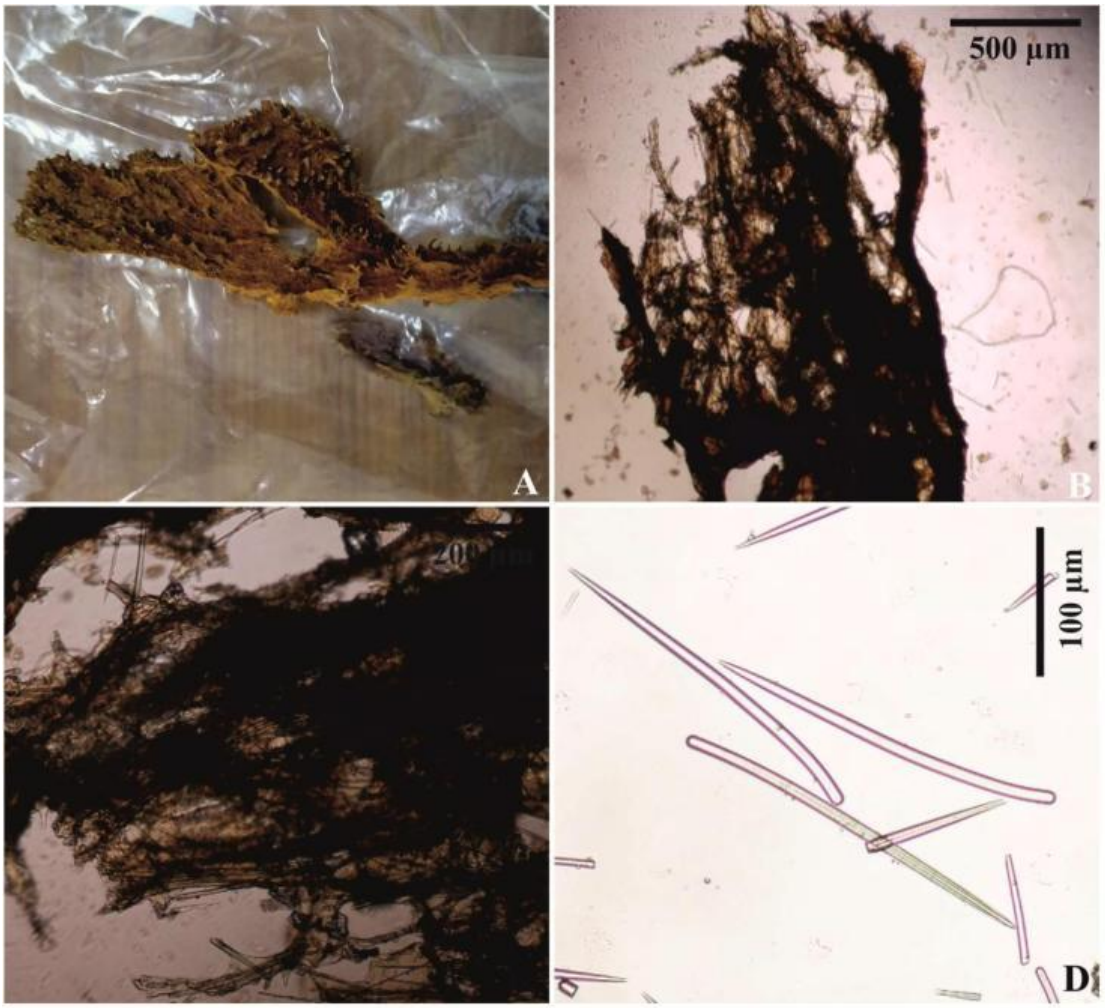

Figure 1: *Phakettia palmata* (Row, 1911) . A- Preserved specimen (Dry preservation); B- Section showing the choanosomal skeleton with plumose tracts running up the sponge (scale= 500 µm); C- Close-up of choanosomal skeletal tracts (scale= 200 µm); D- Styles (scale= 100 µm).