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Marine bryozoans of Gujarat and Maharashtra

C. Venkatraman[1*], P. Padmanaban[2], Soja Louis[3], and S. Shrinivaasu[4]

[1]Zoological Survey of India, M- Block, New Alipore, Kolkata – 700053, West Bengal, India; cvramanmbs@gmail.com
[2]Zoological Survey of India, 130, Santhome High Road, Chennai – 600028, Tamil Nadu, India
[3]St. Theresa College for Women, Ernakulam, Kochi – 682011, Kerala, India
[4]National Centre for Sustainable Coastal Management, Anna University Campus, Chennai – 600 025, Tamil Nadu, India

Abstract

Extensive field survey was conducted along the coast of Gujarat and in Maharashtra states during November 2015, 2016 and February 2016 respectively in selected reef localities. A total of 24 species of bryozoans belonging to 18 families were collected and identified. Of which eight species of bryozoans were recorded for first time in Indian coastal waters. More research should be encouraged in reef areas to throw more light on the marine bryozoan diversity in India.

Keywords: Gujarat, Maharashtra, Marine bryozoans, West Coast

Introduction

Bryozoans are ancient, aberrant and microscopic animals. These groups of animals inhabit both fresh water as well as marine ecosystems. This group is belongs to the Phylum Bryozoa or Phylum Ectoprocta. It is considered as a minor-phylum and placed in between the phylum Mollusca and phylum Echinodermata. A total of 5869 species of bryozoans recorded worldwide so far (Bock and Gordon, 2013). Of which, 257 species has been reported (Shrinivaasu *et al*., 2015) from India.

A Monograph on the taxonomy of bryozoan deals with 128 species of bryozoans from the Indian EEZ, is a pioneering work on this group in India by Menon and Menon (2006). The notable works on bryozoan of West Coast of India are by Menon (1967), Menon and Nair (1967), Unnikrishnan Nair (1973), Pillai (1978, 1981), Swami and Karande (1987; 1994), Raveendran *et al*., (1990), Geetha (1994), Swami and Udayakumar (2010), Soja (2006), Mankeshwar, and Apte, (2015). The present study reports an account of the bryozoans collected over a period of two years in selected localities (April 2015-March 2017) along the coast of Gujarat and Maharashtra states.

Study Area

Gujarat Coast

Gujarat has a coastline of length 1650 km, which is the lengthiest in India. It is shallow, the continental shelf is wider and there are vast stretches of saline and tidal mudflats. The coast is bordered by the Arabian Sea and the gulfs of Khambat and Kachchh. The coastline exhibits a wide diversity of geo-morphological features including mudflats, sandy beaches, coral reefs, rocky cliffs, estuaries and offshore islands. The beaches of Gasabara and Madhavpur are important Olive Ridley and Green sea turtle nesting sites. The Sabarmati, Narmada, Mahi and Tapi are the four major river systems that form an estuarine environment at their mouths. These entire lie within the Gulf of Khambat, and their course in south Gujarat is shaped by the muddy substratum. The Gulf of Kachchh is the only area in Gujarat where corals exist. Gulf of Kachchh marine national park and Khijadia bird

* *Author for correspondence*

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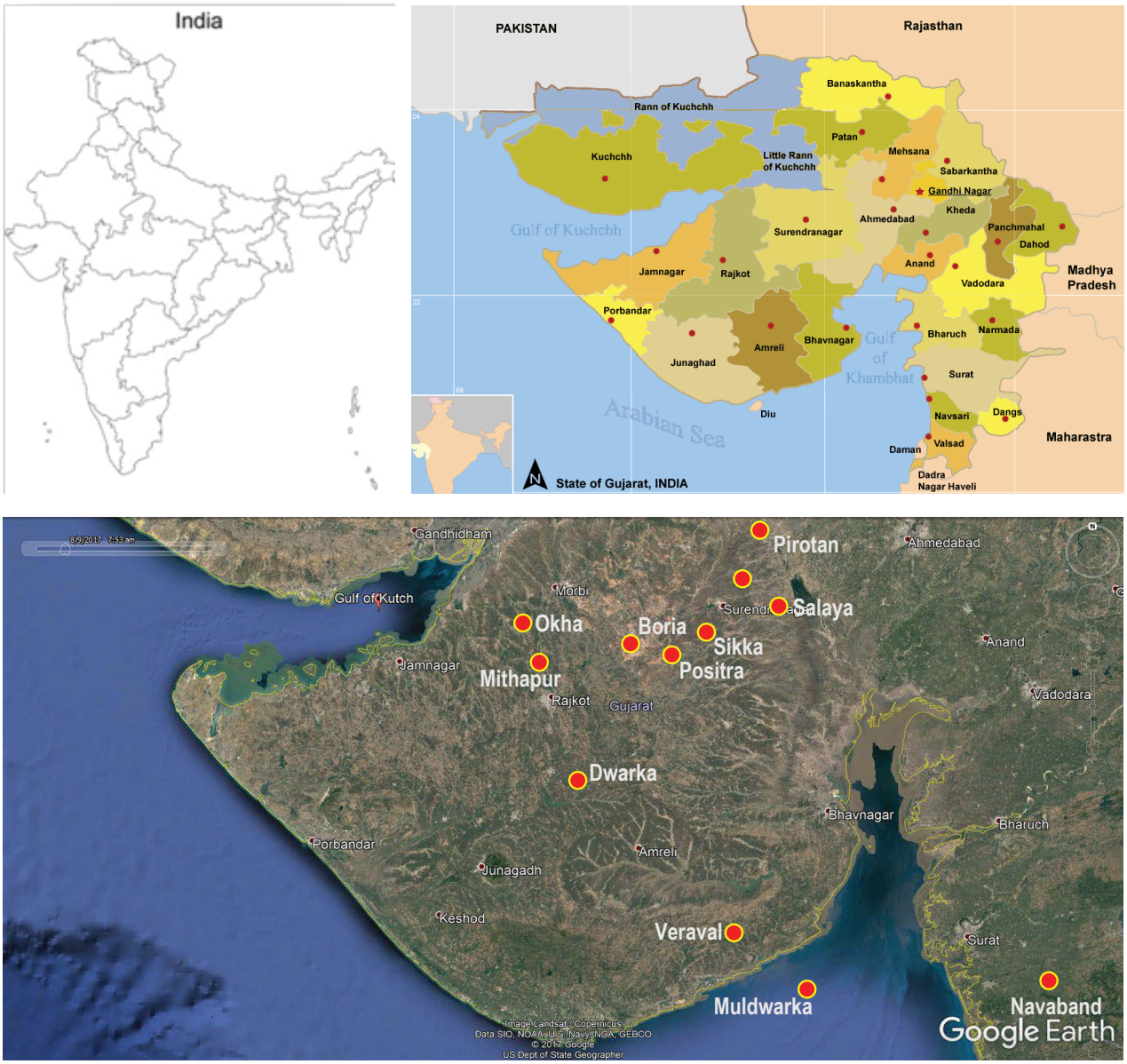
sanctuary are the two protected areas found along the Gujarat coast.

Maharashtra Coast

Maharashtra lies between latitudes 15°43' and 20°10' N and longitudes 72°39' and 73°30' E. It is the third largest State in the country, with a total geographic area of 3, 07,748km, which is nearly 10% of the total geographical area of India. The coastal region is a narrow plain, barely 30 km wide, lying between the Sahyadri Range, in the East, and the Arabian Sea, in the West. It is 720 km long.

Materials and Methods

Various substrates, such as corals, small rocks, stationed boats and floating plastics were examined for attached bryozoan. Sampling was carried out in intertidal region, exposed rocks and reefs till 5m depth for examination of bryozoa facilitated by hand picking, Scuba diving and snorkeling.



Maps shows the survey localities along Gujarat coast

Maps shows the survey localities along Maharashtra coast

The specimens were scraped off the substratum using a surgical blade. The scraped specimens were soaked with Sodium hypochlorite (0.5%) for four to eight hours to remove organic tissue then rinsed with water and dried. For identification, colonies were observed under Leica microscope. Then the zooecial dimensions were observed through SEM. The specimens were deposited in the collections of National Zoological Collection of Marine Biology Regional Centre, Zoological Survey of India, Chennai.

Results and Discussion

A total of 24 species of bryozoans belonging to 18 families were collected and identified from the coast of Gujarat and Maharashtra. Of which eight species such as *Catenicella uberrima*, *Microporella pectinata, Robertsonidra praecipua*, *Smittipora abyssicola*, *Smittipora cordiformis*, *Trypostega henrychaneyi*, *Watersipora souleorum* and *Triphyllozoon philippinense* were recorded for the first time in Indian coastal waters. The bryozoans are listed below in taxonomic order. For each species, information on locality, substratum, description and distribution is given. It has also been observed from the available literature, there are 162 species of bryozoans were recorded from the West coast of India. Of which 53 species were recorded from the Maharashtra and 36 species recorded from Gujarat coast (Shrinivaasu *et al.,* 2015). Lesser number of species recorded during the present study due to restricted areas surveyed and seasonality related to environmental conditions. Hence more research should be focused on reef areas to throw more light on the bryozoan diversity in India.

Phylum BRYOZOA
Class GYMNOLAEMATA Allman, 1856
Order CHEILOSTOMATIDA Busk, 1852
Family ANTROPORIDAE Vigneaux, 1949
Genus ***Antropora*** Norman, 1903

1. *Antropora erecta* Silén, 1941 (Plate 1a)

Locality: Sikka, Jamnagar, Gujarat (22° 27' 57.4 N)
Substratum: Encrusting on molluscan shell.

Description: Zooecia were broadest. Gymnocyst absent. Opesia depressed, broader basally and tapering distally. Vicarious avicularia present and rare. Large vicarious avicularia noticed in one with an extensive circular area, to lodge the avicularian mandible. The lateral portion of this is pointed at the loci where it merges with the zooecial margin. The cryptocyst of vicarious avicularium less developed. Adventitious avicularia common positioned at the proximal end of the zooecia directed distally. The distal portion is slightly elevated and crowding of zooids gives the impression of placement of this avicularia laterally at the distal portion of the preceding zooecia (Menon and Menon, 2006).

Records from Indian waters: Cochin, West coast of India

Distribution: Bonin Island, Pacific and Indian waters.

Family CATENICELLIDAE Busk, 1852
Genus ***Catenicella*** de Blainville, 1830

2. *Catenicella uberrima* (Harmer, 1957) (Plate 4a)

Locality: Sikka, Jamnagar, Gujarat (22° 27' 57.4 N).
Substratum: Dead coral rubble.

Description: Colony delicate, branched and arborescent. Orifice semicircular with very shallow sinus and two small sclerites. Scapular chamber well developed; a small avariculam with triangular mandible, present between the infra and suprascapular chambers; Ooecium slightly longer than wide, overlapping the distal zooid up to half of its length; base of the distal border beaded wide and almost reaching the scapular chamber, median frontal windows present.

Remarks: Recorded for the first time in India.

Distribution: Indonesia, Western Atlantic, Caribbean and Gulf of Mexico, Western Africa and Brazil.

Family: CELLEPORIDAE Johnston, 1838
Genus: ***Celleporina*** Gray, 1848

3. *Celleporina costazii* (Audouin, 1826) (Plate 1b)

Locality: Narara, Jamnagar, 22° 28' 49.9 N
Substratum: Dead coral rubble.

Description: Colony multilaminar; autozooids small; recumbent; convex, separated by deep grooves. Frontal shield smoothly calcified, Avicularia resting on either side on peristome rim, rostrum acute, triangular, slightly hooked and raised from rim distally, complete crossbar, distally directed. Vicarious avicularia large, sporadic, elevated on inflated cystid, the proximal portion at a angle to the widely spatualte rostrum, small rostral palate, large oval rostral opesia, proximal opesia D-shaped, randomly orientated. Ovicells not observed. Circular primary orifice; Small, paired, distally directed triangular ovicularia.

Distribution: Indo-Pacific

Family CRIBRILINIDAE Hincks, 1879
Genus ***Cribrilaria*** Canu and Bassler, 1929

4. *Cribrilaria radiata* (Moll, 1803) (Plate 1c)

Locality: Piroton Island, Gujarat, 22° 39' 991 N
Substratum: Dead coral rubble.

Description: Colony encrusting, multiserial, Zooids almost long and wide. Orifice D shaped. Avaricularia large, interzooidal, paired, long, Ovicells not seen. Zoaria encrusting. Zooecia oval with semi lunar aperture. Frontal wall consists of 6–8 pair of costae with very narrow lateral costal fusions. Median lamella not developed. Aperture semilunar. Oral spines sometimes missing or developed.

Distribution: Hybica and Strba, Western Carpathians, Slovakia

Family MICROPORELLIDAE Hincks, 1879
Genus ***Microporella*** Hincks, 1877

5. *Microporella ciliata* (Pallas, 1766) (Plate 1d)

Locality: Piroton Island, Gujarat, 22° 39' 991 N
Substratum: Dead coral rubble.

Description: Colonies are encrusting with developing extensive unilaminar sheets. Frontal shield with numerous small pseudopores, slightly inflated and smooth. Umbo

not noticed. Orifice is smaller relatively with the zooid size, wider than long and nearly semicircular with evenly rounded front and straight proximal border with fine teeths between the condyles. Peristome slightly developed. Oral spines not observed might hidden. Ascopore is moderately large in the midline a little proximal to the aperture and set within a reniform smooth depression. Ovicells are hyperstomial, prominent and moderately large with frontal surface pustulose. Avicularium larger, adventious and upaired usually located on one side a little proximal to the ascopore, mandible long triangular to setose.

Records from Indian waters: Andamans, Gopalpore, Orissa, Chavra, and Cochin, Kerala.

*Distribution***:** American pacific coast, British Columbia waters, Panama, Galapagos Islands, Mediterranean, Naples, Mexico and Brazil.

6. *Microporella pectinata* Tilbrook, 2006 (Plate 4c)

Locality: Piroton Island, Gujarat, 22° 39' 991 N
Substratum: Dead coral rubble.

*Description***:** Colony encrusting; autozooids relatively small; roughly hexagonal, convex, frontal shield nodular. Primary orifice smooth, no condyles visible. Six equally spaced spines, four remaining in ovicellate zooids; ascopore half of orifice length proximal to the orifice, raised, cute to frontal shield, surrounded by a thick rim, its median process small, triangular, opening reniform. Avicularia single or more commonly paired, relatively small, above the lateral walls and surrounded by the lateral wall calcification derived from marginal areolae, positioned slightly distolateral to the ascopore, distally or distolaterally directed, the rostrum abruptly tapered, crossbar complete, mandible setiform, no lateral laminae or basal processes. Ovicell imperforate, not personate, globular, prominent, resting on frontal shield of distal zooid, nodular, a series of ribs and grooves basally, giving a scalloped edge.Ten spines around opesia. Six oral spines; Raised ascopore and positioning of the relatively small avicularia on the lateral walls.

Remarks: Recorded for the first time in India.

Distribution: Solomon Islands, Mbanika Islands, Russel Islands, Anuha Reefs (Florida Islands) and the seas around the China coast.

Family HIPPALIOSINIDAE Winston, 2005
Genus ***Hippaliosina*** Canu, 1919

7. *Hippaliosina acutirostris* Canu &Bassler, 1929 (Plate 1e)

Locality: Mithapore, Gujarat, 23° 09' 01.2 N
Substratum: Encrusting on rocks

Description: Colony encrusting; Gonoecia elliptical; elongated; pleurocysts granualar with small pores; avicularia two; small; arranged symmetrically on the sides of the opening. Spicules present within the zoeci.

Distribution: Indo-Pacific, Philippines, Indonesia, Sri Lanka, Papua New Guinea and Australia.

Family: HIPPOPODINIDAE Levinsen, 1909
Genus: ***Hippopodina*** Levinsen, 1909

8. *Hippopodina feegeensis* (Busk, 1884) (Plate 1f)

Locality: Poshitra, Dwaraka, Gujarat,22° 24' 50.3 N
*Substratum***:** Dead coral rubble

Description: Colony is encrusting, often very extensive, unilamilar or multilamilar. Autozooids generally rectangular, slightly inflated when superposed, arranged in longitudinal rows, and separated by well-defined calcareous lines. The Primary orifice is hoof-shaped and indented with condyles otherwise with straight lateral sides. Adventitious paired avicularia occupying the disto-lateral region directing inwards with tips not meeting on the median line. Mandibles are acutely triangular. Orifice, orientated medially. Ovicells very large, slightly calcified, rounded and evenly perforated.

Records from Indian waters: Mandapam, Gulf of Mannar and Cochin.

*Distribution***:** Philippines, Australia, Fiji and the Red Sea.

Family PETRALIELLIDAE Harmer, 1957
Genus ***Mucropetraliella*** Stach, 1936

9. *Mucropetraliella thenardii* (Audouin, 1826) (Plate 2a)

Locality: Dwaraka, Gujarat,22° 24' 50.3 N
Substratum: Coral rocks

Description: Colony is encrusting. Autozooids long, convex with inconspicuous septal lines. Primary orifice is circular, wider than long. Two lateral adventious avicularia, oral in position, placed at the top of raised platforms. A spatula tesuboral avicularia noticed in some zooids. Ovicells are smaller than in most species of the genus, the lip is considerably raised above the level of the operculum.

Records from Indian waters: Laccadives Islands and Madras; Indian waters.

*Distribution***:** Egypt; Port Jackson; Ceylon, Strait of Makassar, Celebes Sea.

Family QUADRICELLARIIDAE Gordon, 1984
Genus ***Nellia*** Busk, 1852

10. *Nellia oculata* Busk, 1852 (Plate 2b)

Locality: Sachana, Jamnagar, Gujarat, 22 °.34.00.5'N
Substratum: Dead coral rubble

Description: Colony is erect, delicate, variously branching reaching up to length of 5cm and with rootlets anchoring to a substratum. Internodes are distally greater in length and tapering proximally, square sectioned usually four or five autozooids on each face with alternating back-to-back pairs, dividing dichotomously with nodes consisting of slender cuticular tubes. Autozooids elongate, distal region of the preceding autozooid overarches the proximal portion of the succeeding one. Operculum large and occupies the distal region. Well-developed gymnocyst produces a raised mural rim giving the autozooid the shape of a boat. Cryptocyst is smooth, better developed proximally than laterally. Two raised adventious avicularia positioned frontally on large proximal area of gymnocyst.

Records from Indian waters: Andaman Island; Laccadives and Off Cochin.

Distribution: Florida; Tortugas Island; Crozet Island, Heard Island; Aru Island, Saleyar, Seget, Timer; Victoria; Queensland; Philippines; Siboga stations in the Indo-Australian Archipelago; Ceylon.

Family SMITTINIDAE Levinsen, 1909
Genus: ***Parasmittina*** Osburn, 1952

11. *Parasmittina parsevalii* (Audouin, 1826) (Plate 2e)

Locality: Malvan port, Sindhudurg, Maharashtra,16° 04' 09.8 N
Substratum: Dead coral rubble

Description: Colony is encrusting, multilaminar or occasionally grows into free unilaminar fronds. Autozooids rectangular to irregularly polygonal. Orifice is circular or slightly triangular proximally. Primary orifice could be seen through the peristome, slightly wider than long, distal edge more or less straight, with a few indistinct denticulations. Avicularia are numerous and polymorphic. Two types of small avicularia, one acute and the other rounded, distributed in almost every zooecium. Gigantic adventitious avicularia is present in some autozooids, extending from lateral to orificc proximally, for whole length of autozooid, rostrum spatula shaped, deeply cupped, with a coarsely denticulate distal rim. Ovicell spherical, slightly immersed, ectooecium present at the rim. Peristome may invade the proximal rim extending onto its frontal surface.

Records from Indian waters: Cochin, East and West Coasts of India

Distribution: Egypt, Burma, Sumbawa, Strait of Makassar, Paternoster Island, Sulu Archipelago, Saleyer, South of Celebes, south-east Celebes, West Flares, Banda Sea, Aru Island; Great Barrier Reef.

12. *Parasmittina tubula* (Kirkpatrick, 1888) (Plate 2d)

Locality: Vijaydurg**,** Ratnagiri**,** 16° 55' 82.4 N
Substratum: Encrusting on sea grass

Description: Zoarium encrusting. Small zooecia separated by calcareous lines. Marginal pores are very small. A highly raised peristome, proximally with a sinus. Spines present, two to three in number on the distal region of the peristome. A broad Iyrule present. Unilateral avicularia, with triangular or rounded tip directing proximally. Ovicell not noticed (Menon and Menon, 2006).

Distribution: Madagascar, Ceylon, Mauritius and Indian waters.

13. *Parasmittina egyptiaca* (Waters, 1909) (Plate 2c)

Locality: Mayakarwadi, Ratnagiri, Maharashtra, 17° 03' 88.2 N
*Substratum***:** Dead coral rubble

*Description***:** Colony is encrusting, mostly unilaminar and occasionally multilaminar. Autozooids are quadrangular to hexagonal, regularly arranged in files or in quincunx, separated by deep grooves or superposed. Pores small and areolae large; tubercular. Primary orifice square to rounded, slightly broader than long. Secondary orifice is with a narrow or broad sinus, demarcated by two cusps usually observed when narrow. Peristome is moderate, at most slightly raised and interrupted distally, with two lateral, triangular lappets joined together by a low, proximal collar. Lyrula is short and often narrow. Frontal shield is moderately convex and markedly nodular. Rostral tip is somewhat broad. Avicularia usually polymorphic 1. small, acute or oval, directed proximally, 2. sometimes a large spatulate and 3. oval or acute, mostly small, becoming excessively numerous in the superposed regions. Ovicells are of moderate size, globular, raised, ecto oecium sometimes extensive with regularly arranged small pores.

Records from Indian waters: Quilon and West Coast

Distribution: Sudanese Red Sea, Suez Canal region, Sulu Archipelago, Sumbawa, Banda Sea, New Guinea and Aru Island.

Genus ***Smittina*** Norman, 1903

14. *Smittina abyssicola* (Harmer, 1957) (Plate 2f)

Locality: Rathnagiri fish landing centre, Maharshtra, 16° 99' 92.1 N
Substratum: Encrusting on molluscan shells.

Description: Generally encrusting, occasionally tubular. Zoarium at first unilaminar, often with a later superposition of zooecia, which with their associated avicularia may differ materially from the juvenile condition. Zooecia usually with distinct marginal pores and areolate, sometimes with scattered frontal pores. Spines occasionally well developed, 2-6, often represented merely by their bases; apparently absent in some species. Primary orifice sunk, the operculam delicate. Peristome more or less raised and thin, or represented by a depression with no free wall. Avicularia lateral, or median suboral. Ovicells hyperstomial, globose or immersed; (Menon and Menon, 2006).

Distribution: Ceylon, Sulu Archipelago, Sumbawa, Banda sea, West of North end of New guinea and Aru Islands.

Family ROBERTSONIDRIDAE Rosso, 2010
Genus ***Robertsonidra*** Osburn, 1952

15. *Robertsonidra praecipua* Hayward & Ryland, 1995 (Plate 4b)

Locality: Deogad, Sindhudurg, Maharashtra,16° 37' 32.3 N
Substratum: Coral rubble.

Description: Colony an encrusting. Autozooids small oval to hexagonal, covex. Primary orifice wide than long; Ovicell recumbent on distally succeeding autozooid, about as wide as long, globular; calcification more finely modular than of frontal shield. Umbo absent, avicularia large, present on few zooids, rostrum elongate triangular, often curving slightly medially, directed proximolaterally. Oval orifice; straight proximal edge with pointed condyles; Large, slightly curving frontal avicularia.

Remarks: Recorded for the first time in India.

Distribution: Indo-Pacific in distribution. Heron Island (Great Barrier Reef), Gibson Island, Hamilton Passage, Choiseul, Yandina, Mbanika Island, Russell Islands (Solomon Island). Also reported from South China Sea, Malaysia and the Red Sea.

Family ONYCHOCELLIDAE Jullien, 1882
Genus ***Smittipora*** Jullien, 1882

16. *Smittipora abyssicola* (Smitt, 1873) (Plate 5a)

Locality: Veraval, Somnath, Gujarat, N 20°.53.860'
Substratum: Encrusting on molluscan shell

Description: Encrusting zoaria, hexagonal. Distinct mural rim and contiguous. Cryptocyst provided with minute tubercles, more in number and distally elevated slightly. Opesiules distinct basally, trifoliate. Large avicularia, symmetrical without distinct rostrum. Large opesia slightly expanding distally. The rostrum though not

distinct is profusely tuberculated. Mandibles not noticed. Ovicells absent (Menon and Menon, 2006).

Remarks: Recorded for the first time in India.

Distribution: Indo-Australian Archipelago, Ceylon and Indian waters.

17. *Smittipora cordiformis* Harmer, 1926 (Plate 5b)

*Locality***:** Devbagh, Sindhudurg, Maharashtra, 15° 99' 28.8 N
Substratum: Encrusting on molluscan shell

Description: Colony encrusting. Autozooids are hexagonal or sometimes polygonal, concave, separated by marginal rim and distinct sutures. Membraneous frontal membrane translucent, light orange-brown, covering the sparsely granular cryptocystal frontal space, opesia small, an elongate D-shape, in distal half of zooid, surrounded by frontal cryptocyst. Operculum dark brown-orange in colour, smaller than opesia, lacking any discernible marginal sclerite. Avicularia and autozooids are narrower and apparently torqued towards its sibling autozooid. Cryptocyst granular, concave, opesia elongate oval, distally located, proximal border denticulate, smooth distally, a pair of condyles developed approximately two-thirds along each lateral wall; distal end of avicularium drawn to a point, turned towards its sibling zooid and channeled to accept the mandibular rachis; mandible long; rachis light chocolate brown in colour, hooked at its tip, translucent light orange-brown baldes; fertile zooids similar to in size to autozooids but with dimorphic opesia. Opesial shape; Avicularian shape with its pointed distal end and turned towards its sibling zooid.

Remarks: Recorded for the first time in India.

Distribution: Various Shiboga stations in the Indo-Australian archipelago, Ceylon and Indo-Pacific.

Family PHIDOLOPORIDAE Gabb and Horn, 1862
Genus ***Triphyllozoon*** Canu and Bassler, 1917

18. *Triphyllozoon philippinense* (Busk, 1884) (Plate 5c)

*Locality***:** Malvan fish landing centre, Maharashtra, 16° 05' 44.0 N
Substratum: Coral rubble

Description: Large Zoarium and tubular. Orifices are placed on the outer surface of the tubes. Spines present and placed one on each side of the orifice. Infra fenestral avicularia more or less slanting, oval in shape, placed on slightly raised calcareous thickenings. The labial avicularia not noticed. Small rounded frontal avicularia are found along with ovicells. Ovicells are large and are distinct normally placed in the regions where the bifurcation takes place. Characteristic trifoliate stigma present, the arm of stigma ending in minute rounded pores (Menon and Menon, 2006).

Remarks: Recorded for the first time in India. Even though this species has been reported by Tripathy et al., (2016) in Andaman and Nicobar Islands, it has not been mentioned as new record to India in his research paper. Also, the photograph provided by the authors is not clear and does not bearing clear taxonomic characters which can be seen only by SEM photographs.

Distribution: Sulu Archipelago and Philippines

Family TRYPOSTEGIDAE Gordon, Tilbrook & Winston, 2005
Genus ***Trypostega*** Levinsen, 1909

19. *Trypostega henrychaneyi* Tilbrook, 2006 (Plate 5d)

*Locality***:** Kolamb creek, Sindhudurg, Maharashtra, 16° 07' 51.7 N
Substratum: Intertidal rock

Description: Colony forming broad, thin sheets. Autozooids diamond-shaped to irregularly polygonal in shape slightly convex, separated by shallow grooves. Frontal shield smooth, perforated by numerous evenly spaced, small round pores. Orifice pear-shaped, longer than wide, deep, orbicular anter, poster deep, narrow, cup-shaped, condyles short, triangular proximally directed. Ovicell prominent perforated as frontal shield, oval, longer than wide, a slightly raised median lobe, orifice of ovicellatezoids as wide as long. Zooeciules distal to all autozoids and ovicells, calcification similar to autozooids, orifice small anter deep, poster shallow, mandible rounded.

Remarks: Recorded for the first time in India.

Distribution: Tropical Pacific ocean from the Jicaron islands, off Panama, to the Marquessas Islands, Fiji and the Loyality Islands, westwards to Queensland and the Great Barrier Reef, Torres Strait, New Guinea, Sulu Archipelago, South China Sea, to the Red Sea and Solomon Islands.

Family WATERSIPORIDAE Vigneaux, 1949
Genus ***Watersipora*** Neviani, 1896

20.*Watersipora souleorum* Vieira, Spencer Jones and Taylor, 2014 (Plate 4d)

*Locality***:** Kunkeshwar, Sindhudurg, Maharashtra, 16° 33' 22.5 N
Substratum: Intertidal rock

Description: Colony encrusting, multiserial, sometimes erect, foliaceous and bilamellar, zooids subrectangular, separated by slightly raised lateral walls. Frontal shield slightly convex, with numerous round pseudopores, Frontal shield obscured by dark cuticle. Orifice large, oval with well-defined broad, deeply U shaped proximal sinus; slightly raised orifice sometimes present, bar shaped condyles, operculum narrow, biconcave dark central band with lucidae. Avicularia absent. Ovicells absent. Large orifice; Deep U-shaped sinus; Bar shaped condyles; Operculum with narrow dark central band

Remarks: Recorded for the first time in India.

Distribution: Mediterranean sea, Red Sea, Arabian sea, Pacific ocean, Japan, Australia Galapagos Is, Atlantic (Azores, Cape Verde and Senegal), Mediterranean (Naples) and Indian Ocean (India and Sri Lanka).

Family THALAMOPORELLIDAE Levinsen, 1902

21. *Thalamoporella gothica* (Busk, 1856), (Plate 3a)

*Locality***:** Vijaydurg**,** Ratnagiri**,** 16° 55' 82.4 N
*Substratum***:** Intertidal Rock

*Description***:** Colony is encrusting. Autozooids are large, with a rhomboidal aperture measuring wider than high and having a thin rim. Adoral area is without tubercles or sometimes present as reduced thin mounds. Front is granular with small pores. Oral shelf well developed. Opesiules are plain and very asymmetrical in frontal view. The basal insertions are variable either as a rod or an L-shape, but not hooked. Avicularia is present, ovoid shape tapering distally to a subacute point of a gothic arch and with acutely pointed mandibles. Operculum is complete. Ovicells not found.

Records from Indian waters: Cape Comorin, Quilon and Cochin, West coast of India.

Distribution: Mazatlan, California, Africa.

Family SCHIZOPORELLIDAE Jullien, 1883

22. *Schizoporella unicornis* (Johnston in Wood, 1844), (Plate 3c)

Locality: Rathnagiri, Maharashtra, 16° 99' 92.1 N
Substratum: Boat scrapping.

Description: Colony is encrusting, frequently multilaminar. Autozooids are large; mostly rectangular in shape with wide, squared distal end with single adventitious avicularia. Frontal shield is convex, covered with numerous irregularly arranged pseudopores and deep marginal areolar pores. Umbo is present behind the aperture. Primary orifice broader than long forming a wide D-shape, with U- shaped sinus proximally. Rostrum is acute with concave sides and upturned tip. Opesia is rounded, D shaped and the crossbar is without columella. Mandible is acutely pointed with distal tip curved upwards. Ovicells are porous, striated and often decorated with marginal costae.

Records from Indian waters: Kerala and Maharashtra.

Distribution: Northeast Atlantic, from northwest Africa and Spain to the Faeroes and Western Norway.

Family MEMBRANIPORIDAE Busk, 1852

23. *Biflustra savartii* (Audouin, 1826), (Plate 3b)

Locality: Devbagh, Sindhudurg, Maharashtra, 15° 99' 28.8 N
Substratum: Dead coral rubble.

Description: Colony is encrusting, unilaminar or bilaminar. Distinct autozooids mostly quadrangular arranged in regular longitudinal rows and separated by fine grooves. Frontal membrane covers whole of frontal area. Gymnocyst is abscent. Cryptocyst is thick, surface granular with lateral edges bearing small denticles. Opesia

deep, more or less flat with a median proximal process varying in size and serrated at its free edge.

Records from Indian waters: Manglore.

Distribution: Red Sea, Zanzibar, Sri Lanka, Philippines, New Guinea, Australia, California, Atlantic Morocco, Brazil, Puerto Rico, Japan and China.

24. *Steginoporella buskii* Harmer, 1900 (Plate 3d)

Locality: Malvan port, Sindhudurg, Maharashtra,16° 04' 09.8 N
Substratum: Dead coral rubble and gorgonians.

Description: Colony is encrusting, forming flat sheets. Autozooids usually large, rounded distally, concave proximally and distinct. Frontal area is covered by thick, opaque membrane, greenish-coloured, bordered by a thin, raised, mural rim. The A-zooids squarish to rectangular in shape with semicircular operculum, as wide as zooid, less than half as long, crescentic sclerite and a sub marginal series of small teeth on inner surface. B-zooids are with larger, wider operculum, as wide as zooid, wishbone-shaped sclerite and a sub marginal series of small teeth on inner surface. Gymnocyst barely visible as a smooth, raised distal margin surrounding and supporting operculum, ending at lateral opercular condyles. Cryptocyst are provided with pores sometimes numerous at the region where it ascends, the marginal descending portion is smooth. Distal edge of frontal cryptocyst, immediately above the polypide tube, slightly flared as a slightly concave process with a small pair of rather gracile, marginal flanges.

Records from Indian waters: Calicut and Goa, West coast of India.

Distribution: Gulf of Guinea, Guinea, Ceylon, Indonesia, Torres Strait, Arabia, South Africa, Australia, Caribbean, Brazil, Arabian Sea.

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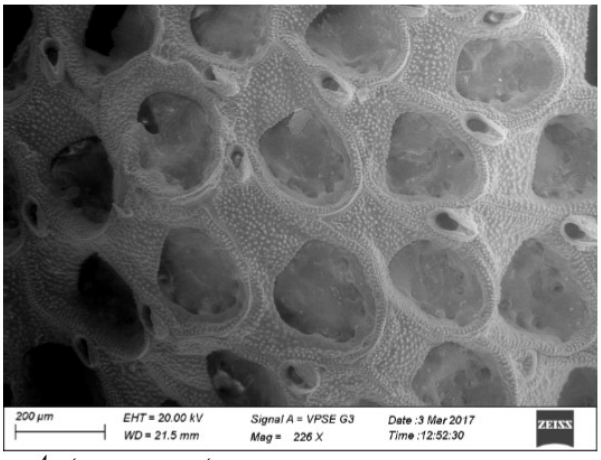
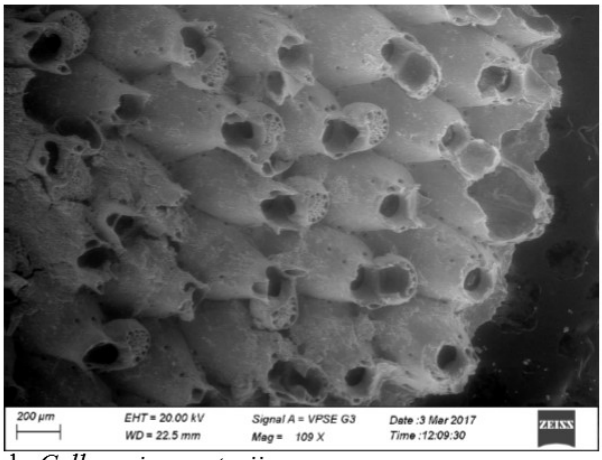
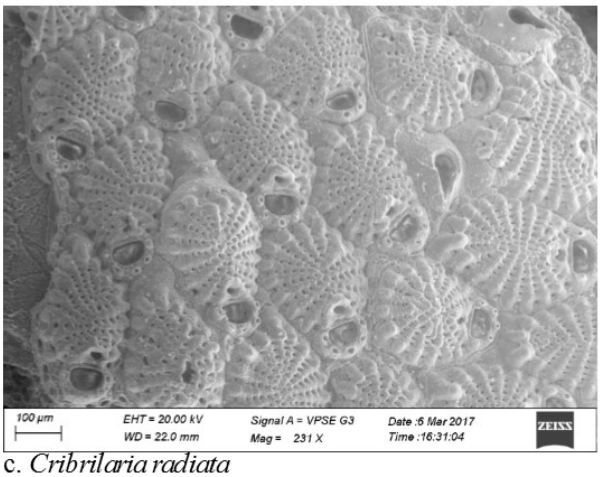
Plate 1



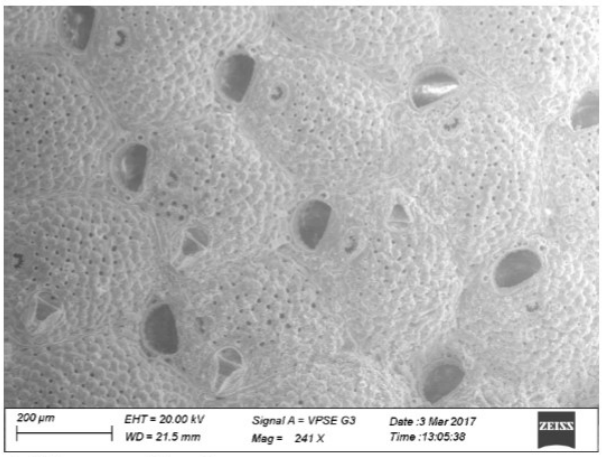
a. *Antropora erecta*



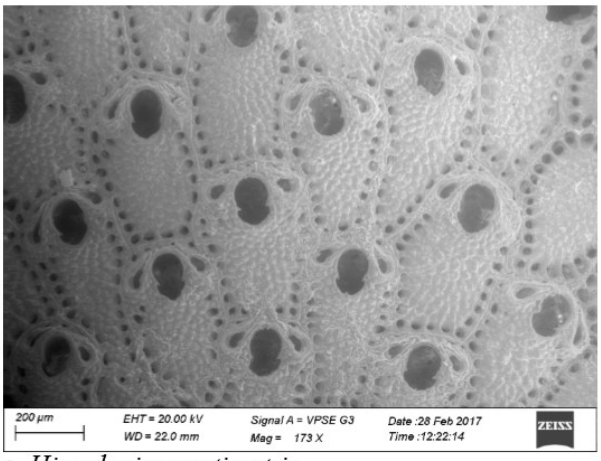
b. *Celleporina costazii*



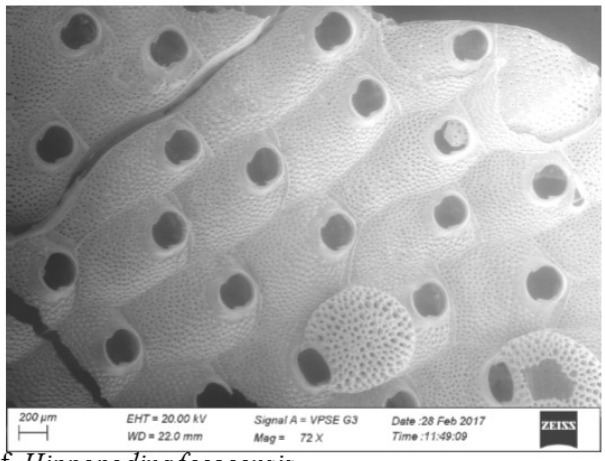
c. *Cribrilaria radiata*



d. *Microporella ciliata*

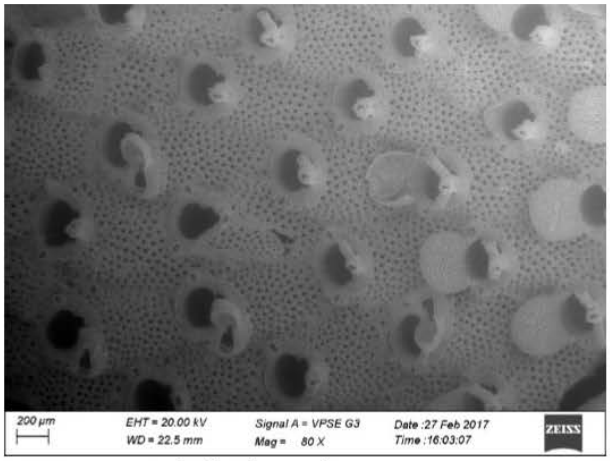


e. *Hippalosina acutirostris*

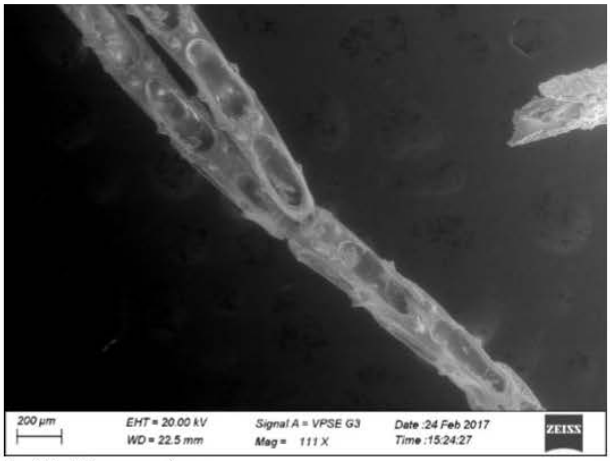


f. *Hippopodina feegeensis*

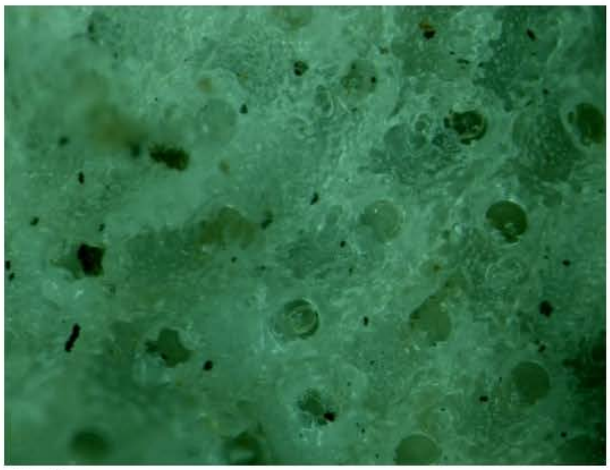
Plate 2



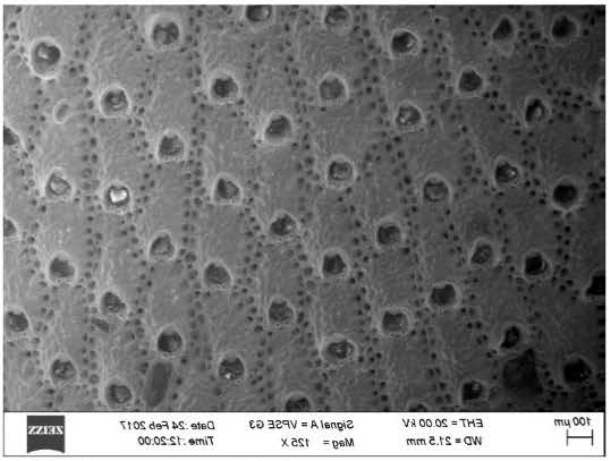
a. *Mucropertraliella thenardi*



b. *Nellia occulata*



c. *Parasmittina egyptica*



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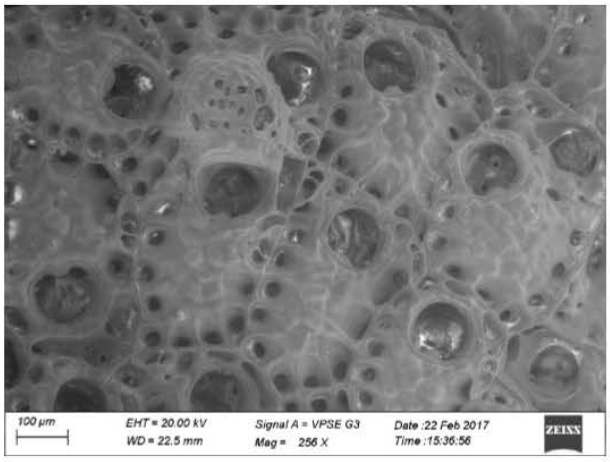
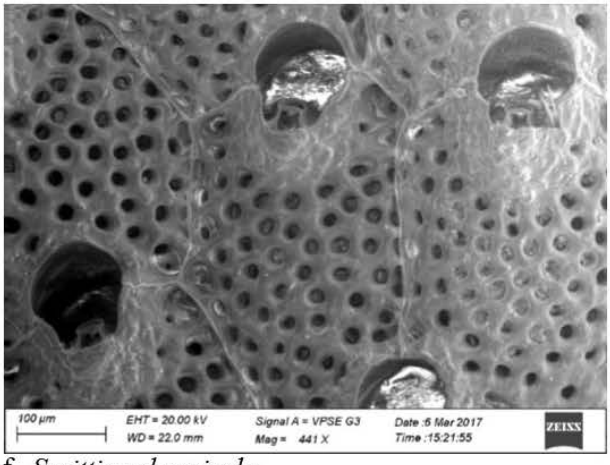


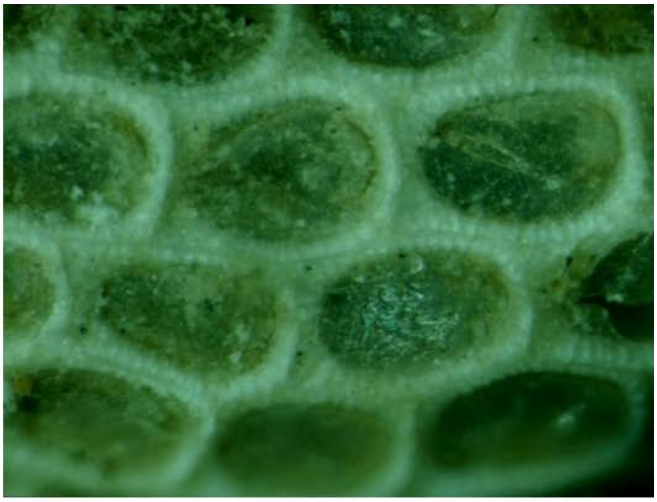
e. *Parasmittina parsevalii*



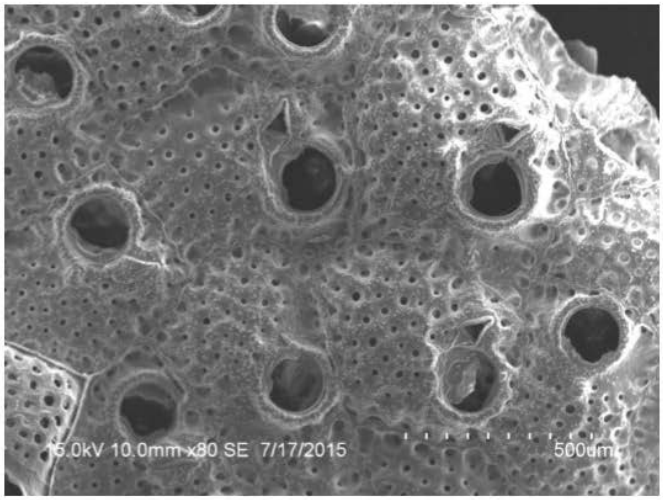
f. *Smittina abyssicola*

Plate 3

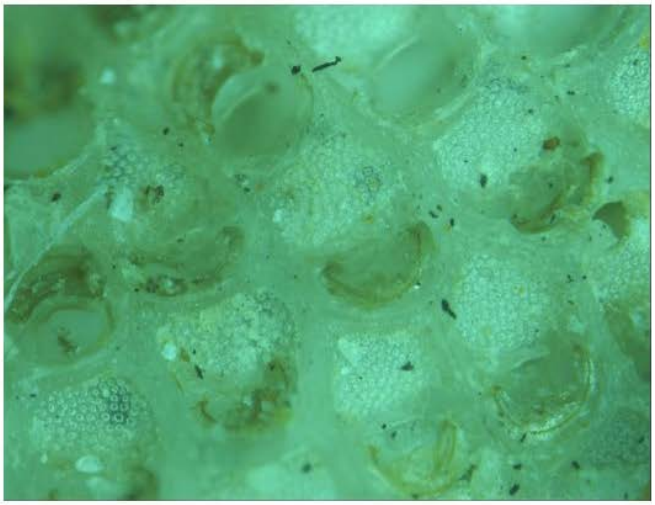
a. *Thalamoporella gothica*



b. *Biflustra grandicella*



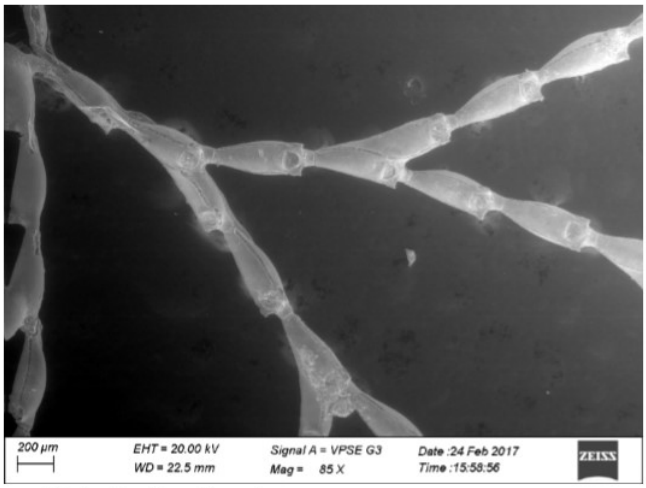
c. *Schizoporella unicornis*



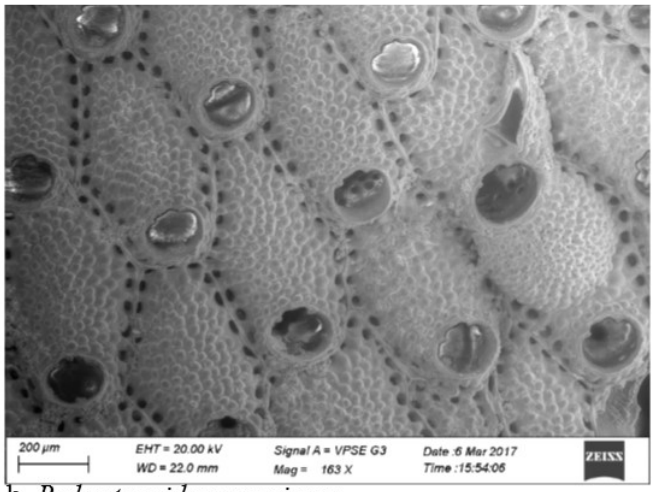
d. *Steganiporella buskii*

Plate 4

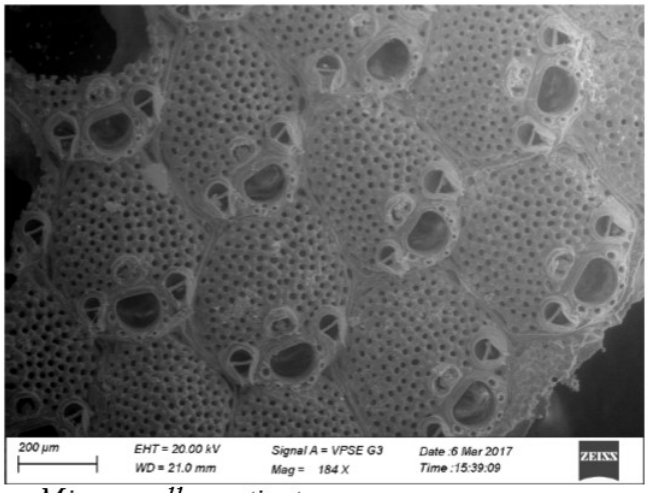
(New record to Indian coastal waters)



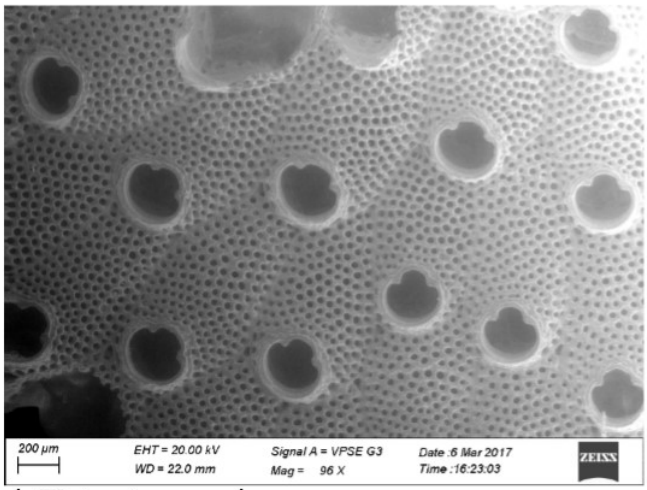
a. *Catenicella uberrima*



b. *Robertsonidra praecipua*



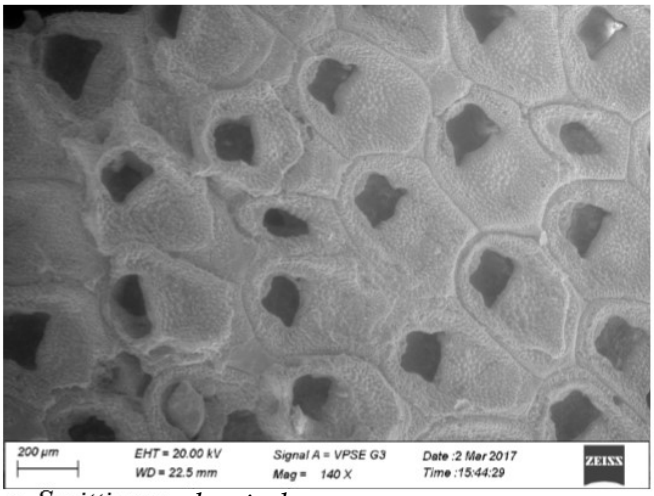
c. *Microporella pectinata*



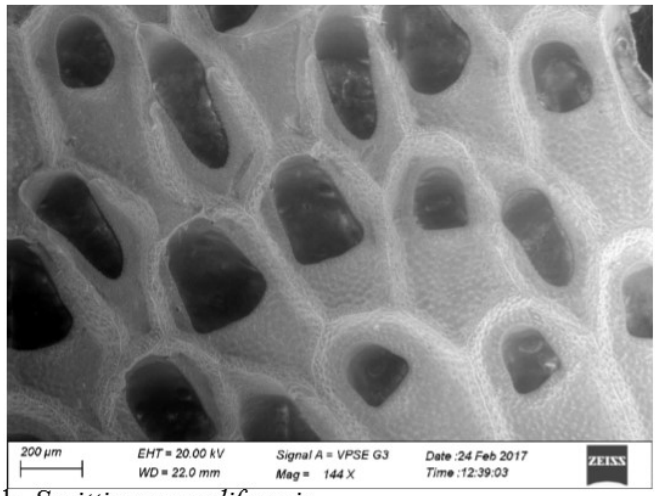
d. *Watersipora souleorum*

Plate 5

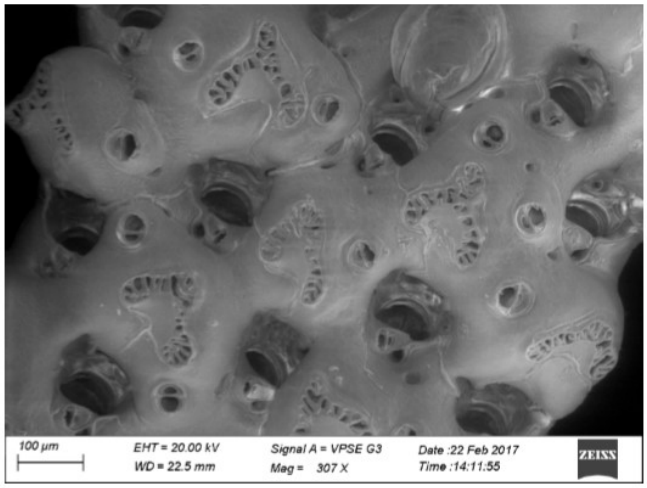
(New record to Indian coastal waters)



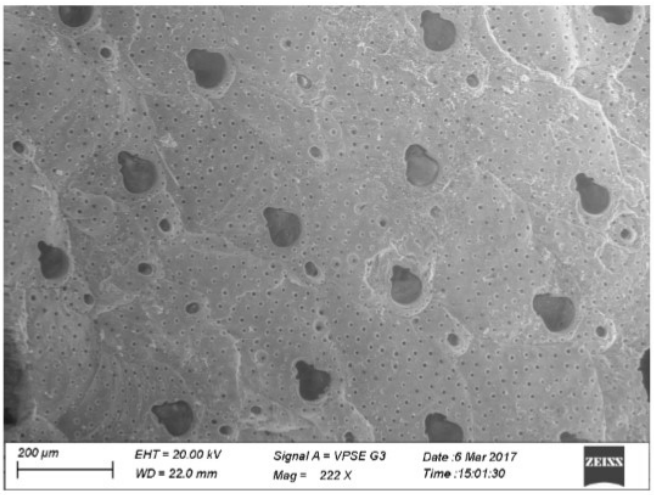
a. *Smittipora abyssicola*



b. *Smittipora cordiformis*



c. *Triphyllozoon philippinense*



d. *Trypostega henrychaneyi*