ASCOPHPORA

6.1 SYSTEMATICS:

Order: Cheilostomata Busk, 1852
Suborder: Neocheilostomina d’Hondt, 1985
Infraorder: Ascophora Levinsen, 1909
Superfamily: Catenicelloidea Busk, 1852

6.1.1 Family: Catenicellidae, Busk, 1852

Genus: *Ditaxipora* MacGillivray, 1895

*Ditaxipora lakdiensis* n. sp. pl.14 figs.1, 2 &3

Material: Holotype: GIS/B: 0678; Paratypes: GIS/B: 0679-0684.

Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.012-0.014</td>
<td>0.0134</td>
<td>10</td>
<td>0.000028</td>
<td>2.16</td>
</tr>
<tr>
<td>Wz</td>
<td>0.01-0.012</td>
<td>0.0106</td>
<td>10</td>
<td>0.000259</td>
<td>2.73</td>
</tr>
<tr>
<td>Lop</td>
<td>0.004-0.006</td>
<td>0.0054</td>
<td>10</td>
<td>0.00028</td>
<td>5.36</td>
</tr>
<tr>
<td>Wop</td>
<td>0.004-0.006</td>
<td>0.0044</td>
<td>10</td>
<td>0.00025</td>
<td>5.74</td>
</tr>
</tbody>
</table>

Type Horizon and locality:

Fossiliferous yellowish limestone of Chhasara Formation exposed on the left bank of Lakdi River, 6 km from Tera.

Age: Lower Miocene (Burdigalian).
Diagnosis:


Description:

Segments delicate, erect, and branching. Autozooids arranged in zigzag pattern; vase shaped with sides tapering towards proximal end. Orifices wider than long, arched distally, proximal edge concave. Frontal shield with 2 long ridges tapering proximally, separated by triangular median gymnocrystal ridge. A single avicularium per zooid, always on the outer (marginal) side of the orifice, with a rounded opesia, complete cross bar and acute rostrum. Ovicells not observed.

Remarks:

Presence of triangular gymnocrystal ridge and two cryptocystal ridges is a characteristic feature to differentiate this species from the other species described elsewhere from the world. Present species exhibits close resemblance with *Ditaxipora pannonensis* Braga in Antolini et al., 1980 (p.60, fig. 63-64) from the Priabonian (Upper Eocene) of northern Italy and Gordon & Braga, 1994 (p.68, fig.6a-c) in the shape of colony and autozooids, but, differs in having, transversely oval orifice, triangular gymnocrystal ridge and absence of septular pores in cryptocrystal areas. Present species differs from *Ditaxipora internodia* (Waters), Gordon & Braga, 1994 (p.66, fig.5a-c) from the Miocene of Victoria in zigzag pattern arrangement of autozooids, shape of autozooids and gymnocrystal ridge and absence of septular pores in cryptocrystal area.

Occurrence:

Lakdi River (23° 19’ 19” N; 68° 56’ 14”E) 6 colony segments from yellow limestone (Lower Miocene, Burdigalian).
**Etymology:** The species is named after type locality Lakdi Nadi.

Grade: Lepraliomorpha Gordon, 1989

Superfamily: Schizoporeloidea Jullien, 1883

**6.1.2 Family: Bitectiporidae MacGillivray, 1895**

Genus: *Schizomavella* Canu & Bassler, 1917

**Metroperiella ghareii n. sp. pl.14 figs.4,5 & 6**

**Material:** Holotype: GIS/B: 0685; Paratypes: GIS/B: 0686-0714.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.2-0.022</td>
<td>0.018</td>
<td>6</td>
<td>0.0005</td>
<td>3.24</td>
</tr>
<tr>
<td>Wz</td>
<td>0.01-0.014</td>
<td>0.010</td>
<td>6</td>
<td>0.0005</td>
<td>5.05</td>
</tr>
<tr>
<td>Lop</td>
<td>0.004-0.006</td>
<td>0.004</td>
<td>6</td>
<td>0.0001</td>
<td>4.21</td>
</tr>
<tr>
<td>Wop</td>
<td>0.004-0.006</td>
<td>0.004</td>
<td>6</td>
<td>0.0001</td>
<td>4.21</td>
</tr>
<tr>
<td>Lovi</td>
<td>0.01-0.008</td>
<td>0.009</td>
<td>3</td>
<td>0.0001</td>
<td>1.74</td>
</tr>
<tr>
<td>Wovi</td>
<td>0.01-0.012</td>
<td>0.011</td>
<td>3</td>
<td>0.0001</td>
<td>1.44</td>
</tr>
</tbody>
</table>

**Type Horizon and locality:**

Fossiliferous yellowish limestone cliff section in Waigor-Charopadi stream near bridge 1.5 km south east of Waghot village.

**Age:** Lower Miocene (Aquitanian).
**Diagnosis:**


**Description:**

Colony encrusting, unilaminar. Autozooids subhexagonal in shape, bordered by thin, raised distinct mural rim; frontal shield perforated by large, circular pores. Orifices wider than long, distally arched, proximal edge concave; a small suboral avicularium placed below the orifice on raised triangular orificial bar; drop-shaped, with acute rostrum, directed proximally with complete cross bar. Ovicells large, globular, hyperstomial, resting on the distal zooid, frontal surface perforated with 45-50 pores.

**Remarks:**

26 species are so far described from the world among them this species is very unique in the morphological features and appears to be new to science. The present species superficially resembles *Metroperiella anatina* Canu & Bassler, 1927 (http://bryozoa.net/cheilostomata/smittinidae/metrana) resembles the present species in the nature of avicularium and autozooidal frontal shield but, differs in having longer than wide orifices, rectangular autozooids and ovicell has few large pores. *Metroperiella grandipora* Canu & Bassler, 1920 (p. 362, pl.47, figs. 3-6) also resembles the present species in having hexagonal to subhexagonal autozooids but, differs in having condyles in the orifice, triangular suboral avicularium and multilaminar growth habit. *Metroperiella hastingsae* (Soule, Soule & Chaney, 1995) (p.285, pl. 109 A-D) shows some resemblance with the present species in having encrusting growth habit, shape of orifices, perforated autozooidal frontal and shape of avicularia but, differs in having very distinct lateral condyles, absence of triangular peristomial collar below the orifice and sometime replaced with widely spatulate avicularium. *Metroperiella circumflexa* Tillbrook, 2006 (p.183, pl. 39 E-F) differs
from the present species in having cup-shaped avicularium, directed distally and originating proximolateral to the orifice, autozoooidal frontal pores surrounded by raised rims and ovicells are partially embedded in the frontal shield of the distal autozoooid.

**Occurrence:**

Waghot (23° 23’ 58” N; 68° 41’55” E) 29 colony fragments from yellow limestone (Lower Miocene, Aquitanian).

**Etymology:** The species is named after Indian Palaeontologist Late Dr. M.A. Ghare.

**6.1.3 Family: Tetrapliariidae Harmer, 1957**

Genus: *Tetraplia* Tenison-Woods, 1878

*Tetraplia tuberculata* Canu & Bassler, 1920 pl.15 figs.1,2,3 & 4

1920 *Tetraplia tuberculata* Canu & Bassler, p. 368, pl.48, figs.7-10.

1967 *Tetraplia turgida* Tewari & Srivastava, p.26, fig.2, nos.4 and 4a.

**Material:** Plesiotypes: GIS/B: 0715-0726.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.045-0.039</td>
<td>0.042</td>
<td>8</td>
<td>0.001</td>
<td>2.54</td>
</tr>
<tr>
<td>Wz</td>
<td>0.021-0.024</td>
<td>0.021</td>
<td>8</td>
<td>0.005</td>
<td>2.58</td>
</tr>
<tr>
<td>Lop</td>
<td>0.009</td>
<td>0.012</td>
<td>8</td>
<td>0.006</td>
<td>5</td>
</tr>
<tr>
<td>Wop</td>
<td>0.009</td>
<td>0.001</td>
<td>8</td>
<td>0.004</td>
<td>4.05</td>
</tr>
</tbody>
</table>
Description:

Internodes erect, articulated, 4-serial. Autozooids arranged in pairs, facing alternately at right angles to one another; convex, distinct sutures; pyriform, tapering proximally; frontal shield with elongated pits, each with a pore. Orifices semicircular, proximal edge somewhat concave with narrow sinus, with two small tubercles on either side of the orifice. Ovicells large, globular, hyperstomial, resting on the distal autozooid, frontal surface with numerous small pores.

Remarks:

The present species agrees in all essential characters with *Tetraplaria tuberculata* Canu & Bassler, 1920 (p.368, pl.48, figs.7-10) described from the Upper Eocene of Florida. *Tetraplaria turgida* described by Tewari & Srivastava from the Lutetian of Sche also agrees in all essential characters with the present species except they have not mentioned about tubercles on proximolateral sides of the orifice.

Occurrence:

Fulra (23°42’ 30” N; 68° 47’ 12” E) 3 internode fragments from claystone (Middle Eocene, Lutetian), Harudi (23° 31’ 25” N; 68° 41’ 07” E) 8 internode fragments from gypseous shales (Middle Eocene, Lutetian).

Distribution:

Upper Eocene (Priabonian): Florida USA.

6.1.4 Family: Porinidae d’Orbigny, 1852

Genus: *Porina* d’Orbigny, 1852

*Porina* sp.A pl.15 figs.5 & 6
**Material:** Plesiotypes: GIS/B: 0727-0776.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.006-0.008</td>
<td>0.0072</td>
<td>10</td>
<td>0.0003</td>
<td>4.30</td>
</tr>
<tr>
<td>Wz</td>
<td>0.004-0.006</td>
<td>0.0048</td>
<td>10</td>
<td>0.0003</td>
<td>6.45</td>
</tr>
</tbody>
</table>

**Description:**

Colony erect, with an oval or seldom circular cross-section. Autozoooids arranged in 4 longitudinal autozooidal rows, autozooidal shape indiscernible. Peristomes aviculiferous, circular. 3 to 4 small, circular avicularia emplaced around the orifice, situated on the peristome. Primary orifices placed within the peristome. Interzooecial avicularia, drop-shaped, without cross bar, rostrum directed distally. Frontal shield perforated with small pores. Ascophore and ovicells not observed.

**Remarks:**

Kutch specimens are much worn and eroded. Most of the features are not clearly seen in the specimens. So far approximately 35 species of Porina have been described from the various parts of the world. We do not have all the species for comparison, hence, due to this reason the author is not giving the specific name till the more literature is obtained. The Present species closely resembles Porina tubifera (MacGillivray, 1895), (http://www.bryoza.net/cheilostomata/Porinidae/Porina) in the shape of orifice and the nature of peristomial avicularia. But, differs in having oval cross-section, position, and size of ascophore. Porina gracilis (Lamarck, 1816), (http://www.bryoza.net/cheilostomata/Porinidae/Porina) differs from the present species in having strongly porous frontal shield, 2 to 3 small, oval avicularia on peristomes and elongate oval ascophore placed just below the orifice. Porina coronata (Reuss), Braga, 1980 (p.51, fig.45-48) and Zágoršek, 2003 (p.171) shows
some resemblance with the present species in having the nature of autozoooids, number of peristomial avicularia but, differs in having strongly porous frontal shield.

**Occurrence:**

Waior (23°25’ 30”N; 68° 41’ 58” E) 49 colony fragments from white nummulitic limestone (Upper Oligocene, Chattian).

**Porina sp.B pl.15 figs. 7,8 & 9**

**Material:** Plesiotypes: GIS/B: 0777-0807.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.04-0.042</td>
<td>0.0412</td>
<td>10</td>
<td>0.0003</td>
<td>0.75</td>
</tr>
<tr>
<td>Wz</td>
<td>0.016-0.02</td>
<td>0.0176</td>
<td>10</td>
<td>0.0003</td>
<td>2.15</td>
</tr>
</tbody>
</table>

**Description**

: Colony erect, with an oval cross-section. Autozoooids arranged in 2 to 6 longitudinal rows, autozooidal shape indistinct due to strongly porous frontal shield. Orifices transversely oval with obliquely raised peristomes; 2 to 3 small, oval avicularia placed around the orifice, emplaced on the peristome. Ascophore placed below the peristome, slightly larger than frontal pores. Adventitious avicularia, small, oval with cross bar, placed on the frontal shield. Ovicells not observed.

**Remarks:**

Present species closely resembles *Porina gracilis* (Lamarck, 1816), (http://www.bryozoa.net/cheilostomata/Porinidae/Porina) in having strongly perforated
frontal shield and transversely oval orifices but, differs in having small, rounded ascophore and colony with oval-cross section. *Porina coronata* (Reuss), Braga, 1980 (p.51, fig.45-48) and Zágoršek, 2003 (p.171) also show close resemblance with present species in having oval-cross section, strongly perforated frontal shield but, differs in having 5 to 7 circular avicularia and circular orifices. The present species differs from *Porina duplicata* (Reuss), Zágoršek, 2003 (p. 171, pl.27, fig.3) very short peristomes, comparatively less perforation on the frontal wall. *Porina* sp.A differs from the present species in having, less porous frontal wall, comparatively long peristomes and drop shaped avicularia.

**Occurrence:**

Waior (23°25’ 30”N; 68° 41’ 58” E) 39 colony fragments from white nummulitic limestone (Upper Oligocene, Chattian), Harudi (23° 31’ 25” N; 68° 41’07” E) 30 colony fragments from gypseous shales (Middle Eocene, Lutetian).

*Porina* sp.C pl.16 figs. 1, 2 & 3

**Material:** Plesiotypes: GIS/B: 0807-0829.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.016-0.018</td>
<td>0.0172</td>
<td>10</td>
<td>0.0003</td>
<td>1.80</td>
</tr>
<tr>
<td>Wz</td>
<td>0.012-0.016</td>
<td>0.0138</td>
<td>10</td>
<td>0.0003</td>
<td>2.46</td>
</tr>
</tbody>
</table>

**Description:**

Colony erect, with an oval cross-section. Autozooids arranged in 3 to 4 longitudinal autozooidal rows, autozooidal shape indiscernible. Peristomes raised obliquely, aviculiferous, circular; 2 to 3 small, oval avicularia emplaced around the
orifice, situated on the peristome. Primary orifices placed within the peristome. Frontal shield perforated with few small pores. Ascophore small, circular, placed below the peristome and ovicells not observed. Ovicells medium, globular, emplaced on the peristome, perforated with few small pores.

**Remarks:**

The present species closely resembles *Porina* sp. A in having oval cross section, circular peristomes but, differs in the number and shape of peristomial avicularia and the presence of ovicells. *Porina duplicata* (Reuss), Zágoršek, 2003 (p. 171, pl.27, fig.3) differs in undeveloped peristomes, presence of only to avicularia, very small ascophore and absence of ovicells. *Porina salebrosa* Marsson, Cheetham, 1971 (pl.10, fig. 2-4) differs from the present species in having large, circular ascophore, placed at midlength, small scattered pores on the frontal shield and numerous small and rarely large avicularia.

**Occurrence:**

Waior (23°25' 30"N; 68° 41’ 58” E), 22 colony fragments from white nummulitic limestone (Upper Oligocene, Chattian), Harudi (23° 31’ 25” N; 68° 41'07” E) 40 colony fragments from gypseous shales (Middle Eocene, Lutetian).

Superfamily: Schizoporellaidea Jullien, 1883

**6.1.5 Family: Margarettidae Harmer, 1957**

Genus: Margareetta Gray, 1843

*Margareetta amplipora* n. sp. pl.16 figs.4 & 5

**Material:** Holotype: GIS/B: 0830; Paratypes: GIS/B: 0831-0871.
Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.048-0.05</td>
<td>0.05</td>
<td>10</td>
<td>0.0005</td>
<td>1.13</td>
</tr>
<tr>
<td>Wz</td>
<td>0.024-0.026</td>
<td>0.025</td>
<td>10</td>
<td>0.0003</td>
<td>1.26</td>
</tr>
<tr>
<td>Lop</td>
<td>0.027-0.03</td>
<td>0.0291</td>
<td>10</td>
<td>0.0004</td>
<td>1.49</td>
</tr>
<tr>
<td>Wop</td>
<td>0.022-0.026</td>
<td>0.0244</td>
<td>10</td>
<td>0.0003</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Type Horizon and locality:

Fossiliferous yellowish limestone cliff section in Waior-Charopadi stream near bridge 1.5 km south east of Waghot village.

Age: Lower Miocene (Aquitanian).

Diagnosis:

Erect, Cellariiform, articulated colonies with hexagonal autozooids arranged in alternating rows; frontal surface flat, with median ascophore, very short peristome, orifices transversely oval. Avicularia, ovicells and oral spines wanting.

Description:

Colony erect, elongated, cellariiform, articulated. Autozooids arranged in four longitudinal alternating rows; hexagonal, broader in the middle, tapering distally and proximally; frontal surface almost flat, depressed below the orifice and slightly bulging in the middle, regularly perforated with equal sized, elongate pores. Peristomes low, thin. Orifices transversely oval. Ascophore larger than frontal pores, circular, placed below the orifice near the bulging slope of the front. Avicularia, ovicells oral spines not observed.
Remarks:

The presence of broad hexagonal autozooids with flat frontal surface, transversely oval orifices and very low peristome are the unique features of this species. The present taxon closely resembles *Margaretta* sp.1 (http://www.bryozoa.net/ cheilostomata/ Margarettidae /Margaretta /Nmita.html) in having four serial growth habits but, differs in having broad autozooids with flat frontal surface, very low peristome, large, circular ascophore. *Margaretta barbata* (Lamarck), Gordon, 1989, (p.64, pl.1H, pl.35B,D) has also 4-serial autozooids, however, it differs from the present species in having granular ridges on the frontal shield, semicircular orifices, very long peristome and presence of peristomial brood chambers. *Tubucellaria parvaporosa* Canu & Bassler, 1920 (p.543, pl.70, figs.1-4) differs from the present species in having fusiform autozooids, convex frontal shield and long peristomes.

Occurrence:

Waghrot (23°23’ 55” N; 68° 40’ 50” E) 43 internode fragments from yellow limestone (Lower Miocene, Aquitanian), Laiyari (23° 24’ 03” N, 68° 47’ 19”E) 32 internode fragments from yellow limestone (Lower Miocene, Aquitanian).Lakdi River (23° 19’ 19”N, 68° 56’ 14”E) 88 internode fragments from yellow limestone (Lower Miocene, Burdigalian).

Etymology: The specific name is derived from Latin word ampla meaning large, presence of large ascophore.

*Margaretta cereoides* Ellis & Solander, 1786  pl.16  figs.6,7,8 & 9

1786 *Cellaria cereoides* Ellis & Solander, p. 26, pl.5, figs. b,B-E

1852 *Tubucellaria opuntioides* d’Orbigny (pars), p.336
1852 *Onchopora inbulosa* Busk, p.320, pl.4, figs. 1.1a.

1907 *Tubucellaria cereoides* (pars) Waters, p.129, pl.15. fig.8, 9, 15, 16.


1030 *Tubucellaria mediterranea*, Canu & Bassler, p.64, 65, pl.9, figs. 1-17.

1957 *Margaretta cereoides* (Ellis & Solander); Harmer, p. 829 pl. LV, fig. 12; Text-figs. 88-90

**Material:** Plesiotypes: GIS/B: 0872-0911.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.018-0.022</td>
<td>0.016</td>
<td>10</td>
<td>0.015</td>
<td>9.8</td>
</tr>
<tr>
<td>Wz</td>
<td>0.008-0.01</td>
<td>0.009</td>
<td>10</td>
<td>0.00049</td>
<td>0.089</td>
</tr>
<tr>
<td>Lop</td>
<td>0.006-0.008</td>
<td>0.006</td>
<td>10</td>
<td>0.00028</td>
<td>0.12</td>
</tr>
<tr>
<td>Wop</td>
<td>0.006-0.008</td>
<td>0.006</td>
<td>10</td>
<td>0.00028</td>
<td>0.12</td>
</tr>
</tbody>
</table>

**Description:**

Colony erect, elongated, celliform, articulated. Autozoooids arranged in four or five longitudinal alternating rows; fusiform, tubular, broader in the middle, tapering distally and proximally; frontal surface bulging in the middle, perforated with rounded pores placed between the vertical ridges. Peristomes long, obliquely raised, thin longitudinal striations at the edge of the peristomial openings. Orifices semicircular to oval distally rounded and proximally slightly straight, thin, raised border. Ascophore oval shaped, placed near the base of the peristome. Avicularia, ovicells oral spines not observed.

**Remarks:** The present species agrees in all essential characters with *Margaretta fusiformis* Guha & Gopikrishna, 2007 (p.208, pl. IV, figs. 3-7). However, this name is
already preoccupied by *Tubucellaria fusiformis* d’Orbigny, 1852. On Bryozoa hompage (http://bryozoa.net/cheilostomata/margarettidae/margceer.html) Dr. Phil Bock has mentioned that *Margaretta fusiformis* Guha & Gopikrishna and not *Tubucellaria fusiformis* d'Obigny. Even if both species are different still Guha & Gopikrishna's name does not stand as new species. Because, Harmer 1957 given priority to *Margaretta* Gray, 1843 as a senior subjective synonym of *Tubucellaria* d’Orbigny, 1853 since then all the species described under *Tubucellaria* become *Margaretta*.

According to Phil Bock (pers. Comm. Sep. 2011) there are simply too many problems with the d'Orbigny material - until they are fully revised. Harmer (1957) placed *Tubucellaria fusiformis* as a synonym of *Margaretta opuntioides* (Pallas, 1766) and this may be correct. However, Harmer spread his synonymies too wide, and they may be different species - but until there is a neotype of Pallas species, nobody knows. Strictly speaking, if the d'Orbigny species is recognised as distinct from *M. opuntioides*, then the Guha & Gopikrishna species name becomes a secondary homonym. At present, I prefer to consider the d'Orbigny species as a junior synonym (and let the Guha & Gopikrishna, 2007 species stay, but the choice is yours). I attach the extract of d'Orbigny's text. There was no figure.

However, Gordon (pers. Comm., Sep.2011) is of the different opinion that, According to Harmer (1957, p. 832), *Tubucellaria fusiformis* d'Orbigny, a Recent species from the Malacca Straits, is a junior subjective synonym of *Margaretta opuntioides* (Pallas, 1766). Although the combination *Margaretta fusiformis* (d'Orbigny) does not seem to have been used, it nevertheless follows that *Margaretta fusiformis* Guha & Gopikrishna, 2007 is a junior objective synonym of d'Orbigny's species. Guha & Gopikrishna's species therefore needs a new name.

Thus, considering both views, the author feels that *Margaretta fusiformis* Guha & Gopikrishna, 2007 is a junior objective synonym of d’Orbigny’s species and which is not available them. *Margaretta cereoides* Ellis & Solander, 1786 (http://bryozoa.net/cheilostomata/margarettidae/margceer.html) also agrees with *Margaretta fusiformis* in all essential characters, hence, the present species is placed under *M. cereoides*.
Occurrence:

Waior (23° 25' 30" N; 68° 41' 58" E), 87 internode fragments from white nummulitic limestone (Upper Oligocene, Chattian), Waghot (23° 23' 55" N; 68° 40' 50" E) 103 internode fragments from yellow limestone (Lower Miocene, Aquitanian), Laiyari (23° 24' 03" N; 68° 47' 19" E) 42 internode fragments from yellow limestone (Lower Miocene, Aquitanian). Lakdi River (23° 19' 19" N; 68° 56'14" E) 84 internode fragments from yellow limestone (Lower Miocene, Burdigalian). Murachban (23° 30'10" N; 68° 52' 90"E) 38 internode fragments from yellow limestone (Lower Miocene, Aquitanian).

Distribution:

Tertiary: France, Oligocene; Recent: Mediterranean, Taranto, Aegean Sea, Algeria,

*Margaretta rajui* Guha & Gopikrishna, 2007 pl. 17, figs.1, 2 & 3

2007 *Margaretta rajui* Guha & Gopikrishna, p.209, pl. IV, figs. 8-9.

**Material:** Plesiotypes: GIS/B: 0912-0950.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.008-0.011</td>
<td>0.0097</td>
<td>10</td>
<td>0.00027</td>
<td>2.78</td>
</tr>
<tr>
<td>Wz</td>
<td>0.003-0.005</td>
<td>0.004</td>
<td>10</td>
<td>0.00036</td>
<td>0.25</td>
</tr>
<tr>
<td>Lop</td>
<td>0.002-0.003</td>
<td>0.0026</td>
<td>10</td>
<td>0.00036</td>
<td>0.42</td>
</tr>
<tr>
<td>Wop</td>
<td>0.002-0.003</td>
<td>0.0026</td>
<td>10</td>
<td>0.00033</td>
<td>0.42</td>
</tr>
</tbody>
</table>
**Description:** Colony erect, elongated, cellariiform, articulated. Autozoooids arranged in four longitudinal alternating rows; vase shaped, tubular, broader in the middle, tapering proximally; frontal surface flat, perforated with small pores. Peristomes short obliquely raised, thick. Orifices oval in shape, longer than wide, slightly raised border. Ascophore circular, placed near the base of the peristome. Avicularia, ovicells oral spines not observed.

**Remarks:**

The present species agrees in all essential characters with *Margaretta rajui* Guha & Gopikrishna, p.209, 2007 (pl. IV, figs. 8-9).

**Occurrence:**

Waier (23°25′ 30″ N; 68° 41′58″ E), 45 internode fragments from white nummulitic limestone (Upper Oligocene, Chattian), Waghot (23° 23′55″ N; 68° 40′ 50″ E) 89 internode fragments from yellow limestone (Lower Miocene, Aquitanian), Laiyari (23°24′ 03″ N; 68°47′ 19″ E) 22 internode fragments from yellow limestone (Lower Miocene, Aquitanian). Lakdi River (23°19′ 19″N; 68°56′ 14″E) 94 internode fragments from yellow limestone (Lower Miocene, Burdigalian), Murachban (23°30′10″ N; 68°52′ 09″ E) 28 internode fragments from yellow limestone (Lower Miocene, Aquitanian).

**6.1.6 Family: Gigantoporidae Bassler, 1935**

Genus: *Consciniopsis* Canu & Bassler, 1927

*Consciniopsis parilis* Guha & Gopikrishna, 2007 pl. 17  figs.4,5,6 & 7

2007 *Consciniopsis parilis* Guha & Gopikrishna, p.209, pl.IV, fig.10, pl.V, figs.1-2.

**Material:** Plesiotypes: GIS/B: 0751-1000.

**Measurements:**

115
<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.04-0.038</td>
<td>0.0382</td>
<td>10</td>
<td>0.0011</td>
<td>2.91</td>
</tr>
<tr>
<td>Wz</td>
<td>0.018-0.024</td>
<td>0.0212</td>
<td>10</td>
<td>0.007</td>
<td>3.32</td>
</tr>
<tr>
<td>Lop</td>
<td>0.01-0.014</td>
<td>0.0118</td>
<td>10</td>
<td>0.0004</td>
<td>3.75</td>
</tr>
<tr>
<td>Wop</td>
<td>0.01-0.012</td>
<td>0.0102</td>
<td>10</td>
<td>0.004</td>
<td>4.34</td>
</tr>
<tr>
<td>Lavi</td>
<td>0.01-0.014</td>
<td>0.0116</td>
<td>10</td>
<td>0.004</td>
<td>4.08</td>
</tr>
<tr>
<td>Wavi</td>
<td>0.03-0.027</td>
<td>0.0291</td>
<td>10</td>
<td>0.0004</td>
<td>1.49</td>
</tr>
<tr>
<td>Lovi</td>
<td>0.01-0.012</td>
<td>0.011</td>
<td>2</td>
<td>0.00014</td>
<td>1.28</td>
</tr>
<tr>
<td>Wovi</td>
<td>0.01-0.012</td>
<td>0.011</td>
<td>2</td>
<td>0.00014</td>
<td>1.28</td>
</tr>
</tbody>
</table>

**Description:**

Colony encrusting, uni or bilaminar. Autozooids arranged quincunxially, more or less rectangular in outline, separated by thin, raised mural rim; frontal shield convex, evenly perforated with large rounded pores. Orifices elongate-oval, arched distally, proximal edge concave. Avicularia paired or unpaired, placed proximolateral to the orifice, rostrum curved with pointed tip, directed distolaterally, rounded opesia with complete cross bar. Ovicells large, globular, hyperstomial, resting on the subjacent distal zooid, frontal shield perforated with 30-35 large and small pores.

**Remarks:**

The present species agrees in all essential characters with *Consciniopsis parilis* Guha & Gopikrishna, 2007 (p.209, pl.IV, fig.10, pl.V, figs.1-2). However, Guha & Gopikrishna, 2007 could not found the ovicells. *Coscinopsis fallax* Canu and Bassler (Canu and Bassler 1929, p. 276, pl. 28, fig. 7) from Northwestern Australia and Philippines zooecia are rectangular and elongated having two distal avicularia on each zooid pointing towards median axis. *Coscinopsis lonchaea* (Busk), Harmer 1957
(p. 1083, pl.) has large tubercles and minute pores, one or a pair of aivicularia located on lateral sides of aperture directed inwards and distally. While, in present species a single avicularium is positioned below the aperture and directed outward. *Coscinopsis castanea* Cook (1985 p.153, pl. 19, F) from west coast of Ghana, Africa has much larger zoonid dimensions, very strong tubercles and big frontal pores and possesses an occasional avicularium and hence differs from the present material.

**Occurrence:**

Waior (23° 25’ 30”N; 68°41’58”E), 27 colony fragments from white nummulitic limestone (Upper Oligocene, Chattian), Harudi (23° 31’ 25” N; 68°41’07”E) 49 colony fragments from gypseous shales (Middle Eocene, Lutetian).

**Distribution:**

Middle Eocene (Lutetian): Harudi, Upper Oligocene (Chattian): Waior.

*Consciniopsis tuberosa* Guha & Gopikrishna, 2007 pl.18 figs.1,2,3,4,5 & 6

2007 *Consciniopsis tuberosa* Guha & Gopikrishna, p.209, pl.V, figs.3-6.

**Material:** Plesiotypes: GIS/B: 1002-1054.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.032-0.038</td>
<td>0.034</td>
<td>6</td>
<td>0.0005</td>
<td>1.73</td>
</tr>
<tr>
<td>Wz</td>
<td>0.01-0.018</td>
<td>0.014</td>
<td>6</td>
<td>0.0008</td>
<td>5.67</td>
</tr>
<tr>
<td>Lop</td>
<td>0.01-0.014</td>
<td>0.011</td>
<td>6</td>
<td>0.0004</td>
<td>3.76</td>
</tr>
<tr>
<td>Wop</td>
<td>0.006-0.008</td>
<td>0.007</td>
<td>6</td>
<td>0.0023</td>
<td>3.14</td>
</tr>
<tr>
<td>Lovi</td>
<td>0.012-0.016</td>
<td>0.014</td>
<td>4</td>
<td>0.0002</td>
<td>2.02</td>
</tr>
<tr>
<td>Wovi</td>
<td>0.014-0.016</td>
<td>0.016</td>
<td>4</td>
<td>0.0003</td>
<td>2.01</td>
</tr>
<tr>
<td></td>
<td>Lo</td>
<td>0.01-0.014</td>
<td>0.012</td>
<td>6</td>
<td>0.0003</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>------------</td>
<td>-------</td>
<td>---</td>
<td>--------</td>
</tr>
<tr>
<td>Wo</td>
<td></td>
<td>0.01-0.012</td>
<td>0.011</td>
<td>6</td>
<td>0.00024</td>
</tr>
</tbody>
</table>

**Description:**

Colony eschariform, bilaminar. Autozooids elongate, subrectangular in shape, arranged in linear rows, separated by thin, raised, distinct mural rim; frontal shield, slightly convex below the orifice, perforated with numerous, equidimensional, oval pores with tubercles. Orifices longer than wide, distal arch, thick, raised and broad, proximal edge raised and deeply concave. Avicularia paired or unpaired, emplaced subjacent to the orifice, rostrum curved with pointed tip, directed proximolaterally, opesia rounded with complete cross bar. Ovicells, large, globular, hyperstomial, resting on succeeding distal zooid, frontal wall perforated with 40-45 numerous small pores.

**Remarks:**

The present species agrees in all essential characters with *Consciniopsis tuberosa* Guha & Gopikrishna, 2007 (p.209, pl.V, figs.3-6). However, Guha & Gopikrishna could not observed the ovicells in their specimens. *Coscinopsis caerulea* Canu & Bassler, 1929 (p.388, fig. 2-4) from Jolo island, Philippine differs from the present species in the shape of zoecia which is conical and frontal highly perforated by very small tremopores. A New Guinea species *Coscinopsis declivis* Harmer 1957 (p. 1085, pl.72, figs. 14 and 15) having different shape of zooids and lacks avicularia.

**Occurrence:**

Waior (23° 25’ 30” N; 68° 41’ 58” E), 43 colony fragments from white nummulitic limestone (Upper Oligocene, Chattian), Harudi (23° 31’ 25” N; 68° 41’07” E) 69 colony fragments from gypseous shales (Middle Eocene, Lutetian).
Distribution:

Upper Oligocene (Chattian): Waior, Lower Oligocene (Rupelian): Ramania stream, Middle Eocene (Lutetian): Harudi.

6.1.7 Family: Microporellidae Hincks, 1879

Genus: Microporella Hincks, 1877

*Microporella* sp. pl. 19 fig.1,2 & 3

**Material:** Plesiotypes: GIS/B: 1055.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.02-0.018</td>
<td>0.0188</td>
<td>10</td>
<td>0.00030</td>
<td>1.64</td>
</tr>
<tr>
<td>Wz</td>
<td>0.01-0.012</td>
<td>0.0113</td>
<td>10</td>
<td>0.00028</td>
<td>2.49</td>
</tr>
<tr>
<td>Lop</td>
<td>0.006-0.008</td>
<td>0.0074</td>
<td>10</td>
<td>0.00028</td>
<td>3.91</td>
</tr>
<tr>
<td>Wop</td>
<td>0.006-0.008</td>
<td>0.0062</td>
<td>10</td>
<td>0.00018</td>
<td>3.06</td>
</tr>
</tbody>
</table>

**Description:**

Colony encrusting, unilaminar. Zooids hexagonal, arranged quincunxially in longitudinal rows, distinctly separated by deep grooves; frontal wall slightly convex, granular and evenly perforated. Orifices semicircular distally, with entire proximal rim, distal oral spine bases not visible. Ascophore small, crescentic, slightly raised, smooth margin, placed immediately proximal to the orifice. Avicularia single or paired immediately placed proximolateral to the orifice on both sides, rostrum subtriangular, with raised walls, directed slightly distolaterally. Ovicells not observed in the available material.
Remarks:

A single eroded colony encrusting molluscan shell found in the Murachban material. The present species closely resemble *Microporella waghotensis* Guha & Gopikrishna, 2007 (p.214, pl.VI, figs.7-8) in general aspect of autozoooidal morphology, however, in present material we could not observed o vicells.

Occurrence:

Murachban (23°30' 10" N; 68° 52' 09"E) single worn colony on molluscan shell fragment from yellow limestone (Lower Miocene, Aquitanian).

6.1.8 Family: Calwellidae MacGillivray, 1887

Genus: *Malakosaria* Goldstein, 1882

*Malakosaria gordonii* n. sp. pl.19 fig.4,5 & 6


Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.04-0.036</td>
<td>0.042</td>
<td>4</td>
<td>0.0021</td>
<td>5.12</td>
</tr>
<tr>
<td>Wz</td>
<td>0.02-0.042</td>
<td>0.0305</td>
<td>4</td>
<td>0.00155</td>
<td>5.11</td>
</tr>
</tbody>
</table>

Type Horizon and locality:

The argillaceous sediments of the Harudi Formation from the cliff, North of Harudi village by the side of the road from the Waior village to Narayan Sarovar.

Age: Middle Eocene (Lutetian).
Diagnosis:

Erect, dichotomously branching. Autozooids arranged back to back alternating pairs, tapering proximally.

Description:

Colony erect, dichotomously branching. Autozooids biserial arranged back to back, alternating series; distally broad, tapering proximally, frontal shield smooth, with single, long, narrow T -shaped pore chambers. Scapular region of autozooids exhibits hook like avicularian process, curved proximally. Orifices oval, higher than wide. No oral spines, avicularia. Ovicells not present in the available material.

Remarks:

So far only three species of *Malakosaria* were described from the world. Among these three species Kutch specimens are very distinctive in having long, narrow, T-shaped pore chamber on the frontal and lateral surface, hook like avicularian process in the scapular regions. The present species differs from *Malakosaria sinclairii* (Busk, 1857), (p.172, XV, figs.1, 2, and 3) in having long, narrow, T-shaped pore chamber on the frontal and lateral surface, hook like avicularian process in the scapular regions. *Malakosaria atlantica* Vieira et al., 2010 (p.27-28, figs.64-66) widely differs from the present species in having elongate autozooids, crescentic ascophore and six oval excavations around the orifice.

Occurrence:

Harudi (23° 31’ 25” N; 68° 41’ 07” E) 4 internode fragments from gypseous shales (Middle Eocene, Lutetian).

Etymology: The species is named after renounced Bryozoologist Dr. D.P. Gordon.

6.1.9 Family: Escharinidae Tilbrook, 2006

Genus: *Therenia* David & Pouyet, 1978
**Theremia indica** Guha & Gopikrishna, 2007 pl.20 fig.1,2 & 3

2007 Theremia indica Guha & Gopikrishna, p.809, pl.2, figs.5-7.

**Material:** Plesiotypes: GIS/B: 1061-1087.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.022-0.024</td>
<td>0.0234</td>
<td>10</td>
<td>0.00028</td>
<td>1.23</td>
</tr>
<tr>
<td>Wz</td>
<td>0.02-0.018</td>
<td>0.0194</td>
<td>10</td>
<td>0.00028</td>
<td>1.49</td>
</tr>
<tr>
<td>Lop</td>
<td>0.01-0.008</td>
<td>0.009</td>
<td>10</td>
<td>0.00031</td>
<td>3.51</td>
</tr>
<tr>
<td>Wop</td>
<td>0.004-0.006</td>
<td>0.0052</td>
<td>10</td>
<td>0.00030</td>
<td>5.95</td>
</tr>
<tr>
<td>Lovi</td>
<td>0.01-0.008</td>
<td>0.009</td>
<td>02</td>
<td>0.00014</td>
<td>1.57</td>
</tr>
<tr>
<td>Wovi</td>
<td>0.01-0.008</td>
<td>0.009</td>
<td>02</td>
<td>0.00014</td>
<td>1.57</td>
</tr>
</tbody>
</table>

**Description:**

Colony unilaminar, encrusting on bivalve shell. Autozoooids arranged quincunxially, hexagonal to sub-hexagonal in shape; frontal surface convex, perforated with numerous minute pores; autozoidal boundaries separated by distinct sutures. Basal surface uncalcified, large, oval uniporous septula. Orifices circular with a V-shaped proximal sinus. Ascophore placed below the orifice. Avicularia adventitious, single, rounded with thick rostrum. Ovicells small, globular, hyperstomial, frontal surface smooth, imperforate with a median umbo.

**Remarks:**

Most of the colonies were collected from different localities which encrust bivalve and oyster shells but due to small autozoidal size majority of colonies are either damaged or their frontal pores filled with sediments. Hence, generally misleads
in identification. But, Dr. P.D. Taylor (Pers. Comm. Nov. 2010) has examined the SEM photos and he has agreed regarding the placement of this species in *Therania* David & Pouyet, 1978. The present species agrees best with *Therania indica* Guha & Gopikrishna, 2007 (p. 809, pl. 2, figs. 5-7) in all essential characters.

**Occurrence:**

Kharai (23° 28’ 18” N; 68° 40’ 15” E) 11 colony fragments from white buff coloured limestone (Middle Eocene, Lutetian), Murachban (23° 30’ 10” N; 68° 52’ 09”E) 10 colony fragments from yellow limestone (Lower Miocene, Aquitanian), Lakdi River (23° 19’ 19” N; 68° 56’ 14” E) 23 colony fragments from yellow limestone (Lower Miocene, Burdigalian).

**Distribution:**

Middle Eocene (Lutetian): Harudi, Kharai; Upper Miocene (Burdigalian): Murachban; Lower Miocene (Aquitanian): Lakdi River.

Superfamily: Didymoselloidea Brown, 1952

**6.1.10 Family: Didymosellidae Brown, 1952**

Genus: *Didymosella* Canu & Bassler, 1917

*Didymosella larvalis* (MacGillivray, 1869). pl. 20 figs 4,5 & 6

1904 *Porina larvalis* (MacGillivray), Maplestone, p. 214.

1909 *Escharoides larvalis* (MacGillivray), Levinsen, p. 318.


**Material:** Plesiotypes: GIS/B: 1088-1098.
**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.022-0.026</td>
<td>0.0242</td>
<td>10</td>
<td>0.00001</td>
<td>1.82</td>
</tr>
<tr>
<td>Wz</td>
<td>0.014-0.016</td>
<td>0.0152</td>
<td>10</td>
<td>0.0003</td>
<td>2.03</td>
</tr>
<tr>
<td>Lori</td>
<td>0.01-0.014</td>
<td>0.013</td>
<td>10</td>
<td>0.0004</td>
<td>3.26</td>
</tr>
<tr>
<td>Wori</td>
<td>0.006-0.01</td>
<td>0.008</td>
<td>10</td>
<td>0.0004</td>
<td>5.00</td>
</tr>
<tr>
<td>Lavi</td>
<td>0.008-0.01</td>
<td>0.0092</td>
<td>10</td>
<td>0.0001</td>
<td>1.82</td>
</tr>
<tr>
<td>Wavi</td>
<td>0.006-0.008</td>
<td>0.007</td>
<td>10</td>
<td>0.0003</td>
<td>4.51</td>
</tr>
</tbody>
</table>

**Description:**

Colony erect, bilaminar or cylindrical. Autozooids pyriform, arranged quincunxially in longitudinal rows, not distinctly separated. Primary orifice transversely oval in outline, sometimes a pair of spine bases at the proximal edges. Peristome salient, proximal edge raised in to blunt elevation directed distally upwards. Proximal slope of peristome punctured by two large, subcircular pores. Frontal shield flattened, coarsely perforated by large pores. Avicularia single, large, raised, with complete cross bar, acute rostrum directed laterally outwards. Ovicells large, globular, separated from that of autozooid.

**Remarks:**

The present species agrees in all essential characters with *Didymosella larvalis* (MacGillivray), Brown, 1952 (p.195, figs. 135-138). *Didymosella conchicola* Gordon, 1989 (p.35, pl.17A-C) widely differs from the present species in having encrusting growth habit and paired triangular avicularia.

**Occurrence:** Murachban (23° 30'10" N; 68°52' 09"E) 10 colonies from yellow limestone (Lower Miocene, Aquitanian).
Distribution:

Miocene and Pliocene: Victoria and South Australia. Middle Miocene: South land, Middle Oligocene: Weka Pass, Pareora, Otaian. Recent: South & East coast of Australia.

Superfamily: Syphonicytroidea Harmer, 1957

6.1.11 Family: Syphonicytaridae Harmer, 1957

Genus: *Syphonicytar* Busk, 1884

*Siphonicytar*robertsonae n. sp. pl. 21 figs. 1 & 2

Material: Holotype: GIS/B: 1099; Paratypes: GIS/B: 1100-1130.

Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.03-0.033</td>
<td>0.0318</td>
<td>10</td>
<td>0.0004</td>
<td>1.46</td>
</tr>
<tr>
<td>Wz</td>
<td>0.021-0.024</td>
<td>0.0228</td>
<td>10</td>
<td>0.0004</td>
<td>2.03</td>
</tr>
<tr>
<td>Lavi</td>
<td>0.015-0.018</td>
<td>0.0165</td>
<td>10</td>
<td>0.0004</td>
<td>2.87</td>
</tr>
<tr>
<td>Wavi</td>
<td>0.009-0.012</td>
<td>0.0102</td>
<td>10</td>
<td>0.0004</td>
<td>4.55</td>
</tr>
</tbody>
</table>

Type Horizon and locality:

White nummulitic limestone horizon of the Maniyara Fort Formation, upstream direction of the Waior village in front of ‘Jaypee Cement’ factory in the stream.

Age: Upper Oligocene (Chattian).
Diagnosis:

Erect cylindrical colonies with hexagonal autozoooids, ascophore placed near proximal margin. Paired avicularia.

Description:

Colony erect, cylindrical. Autozoooids arranged quincunxially on all sides; hexagonal in outline, frontal shield depressed laterally with median ridge, 3-4 rounded, marginal areolae deeply sunken; autozooidal boundaries distinct, deep grooves. Ascopore beneath its proximal margin. Avicularia paired present distolaterally. Orifices circular wider than high with slightly raised, thin peristome. Avicularia paired, placed subjacent to the orifice, rhomb shaped, with acute rostrum directed distolaterally, complete cross bar. Ovicells not observed in available material.

Remarks:

The present species differs from *siphonicytara hexaserialis* Guha & Gopikrishna, 2007 (p.217, pl.VII, figs.7-8) in the shape of autozoooids, number of marginal areolae, nature of mural rim and the shape of avicularia. *Syphonicytara confusiata* Guha & Gopikrishna, 2007 (p. p.217, pl.VII, fig.9, pl. VIII, fig.1) widely differs from the present species in having bilaminar, eschariform growth habit, indistinct autozooidal boundaries, number of marginal areolae and the shape of avicularia. *Syphonicytara vittata* Gordon & D’Hont, 1997 (p. 47-48, fig., 109-11) exhibits close resemblance with present species in the nature and number of marginal areolae but, differs in having distinct raised mural rim, long peristomes and single suboval avicularium.

Occurrence:

Waior (23°25’ 30” N; 68°41’ 58” E), 34 internode fragments from white nummulitic limestone (Upper Oligocene, Chattian).
Etymology: The species is named after Bryozoologist Dr. Alice Robertson.

Syphonicytara confusiata Guha & Gopikrishna, 2007 pl. 21 figs. 3 & 4

2007 Syphonicytara confusiata Guha & Gopikrishna, p. p.217, pl.VII, fig.9, pl. VIII, fig.1.

Material: Plesiotypes: GIS/B: 1131-1181.

Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.033-0.036</td>
<td>0.0348</td>
<td>10</td>
<td>0.0004</td>
<td>1.33</td>
</tr>
<tr>
<td>Wz</td>
<td>0.021-0.024</td>
<td>0.0228</td>
<td>10</td>
<td>0.0004</td>
<td>2.03</td>
</tr>
<tr>
<td>Lavi</td>
<td>0.018-0.021</td>
<td>0.0189</td>
<td>10</td>
<td>0.0004</td>
<td>2.30</td>
</tr>
<tr>
<td>Wavi</td>
<td>0.012-0.015</td>
<td>0.0141</td>
<td>10</td>
<td>0.0004</td>
<td>3.08</td>
</tr>
</tbody>
</table>

Description:

Colony bilaminar eschariform. Autozooids sub-hexagonal in shape; autozooidal boundaries indistinct, 3-6 areolar pores dissimilar in size, encircling the autozooid. Orifices nearly circular in outline, longer than wide, deeply sunken; peristome slightly raised. Avicularia paired, sub oral, drop-shaped, acute rostrum with complete cross bar, directed distolaterally. Ovicells not observed in available material.

Remarks:

The species agrees in all essential characters with Syphonicytara confusiata Guha & Gopikrishna, 2007(p.217, pl.VII, fig.9, pl. VIII, fig.1). Syphonicytara vittata Gordon & D’Hont, 1997 (p. 47-48, fig., 109-11) shows some resemblance with the present species but differs in having erect, vinculariform growth habitat, distinct mural rim and long peristomes.
Occurrence:

Waior (23°25′ 30″N; 68°41′ 58″ E), 56 internode fragments from white nummulitic limestone (Upper Oligocene, Chattian).

Distribution:

Middle Eocene (Lutetian): Jadwa, Upper Oligocene (Chattian): Waior.

Superfamily: Mamilliporoidea Canu & Bassler, 1927

6.1.12 Family: Mamilliporidae Canu & Bassler, 1927

Genus: Anoteropora Canu & Bassler 1927

Anoteropora magnicapitata Canu & Bassler 1927 pl. 22 figs.1,2,3 & 4

1927 Anoteropora magnicapitata Canu & Bassler, p.10, pl.1, fig. 11

1929 Anoteropora magnicapitata Canu & Bassler, p.476, pl.94, figs. L, N

1957 Anoteropora magnicapitata Canu & Bassler, Harmer, p.888, 19 – 21

1994 Anoteropora magnicapitata Canu & Bassler, Cook and Chimonids, p.53, figs. 1 d, 2 c, d


Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.012-0.016</td>
<td>0.0134</td>
<td>10</td>
<td>0.0004</td>
<td>2.98</td>
</tr>
<tr>
<td>Wz</td>
<td>0.012-0.014</td>
<td>0.0128</td>
<td>10</td>
<td>0.0003</td>
<td>2.34</td>
</tr>
<tr>
<td>Lop</td>
<td>0.006-0.008</td>
<td>0.007</td>
<td>10</td>
<td>0.00031</td>
<td>4.42</td>
</tr>
<tr>
<td>Wop</td>
<td>0.006-0.008</td>
<td>0.008</td>
<td>10</td>
<td>0.0003</td>
<td>4.41</td>
</tr>
</tbody>
</table>
### Description:

Colony free-living, discoidal, convex at the surface. Autozooids hexagonal taller than broad with cryptocyst; the interzooecial area of each autozoid separated by deep grooves with 2 to 4 marginal areolae. Each autozoid with distally placed, transversely positioned single avicularium on a raised, rounded rostrum with complete cross bar. Orifice circular with medially placed condyles. Frontal shield imperforate except for marginal septulae. Ovicells large, without avicularium, hyperstomial, embedded in the adjacent autozoid.

### Remark:

The Present specimen agrees in all essential details with *Anoteropora magnicapitata* Canu and Bassler, 1927(p.10, pl.1, fig. 11) It has a wide geographic distribution in Indo West Pacific extending from Torres Strait and Southern Philippines to the Red Sea and along the East African Coast to Southern Madagascar. The present species differs from *Anoteropora rajnathi* Tewari et al., Guha & Gopikrishna (P.16, pl. I, figs. 4-6) in having hexagonal shape of autozooids, 2-4 marginal areolae and avicularium with rounded rostrum.

### Occurrence:

Waghot (23° 23' 55'' N; 68° 40' 50'' E) 34 disc fragments from yellow limestone (Lower Miocene, Aquitanian), Laiyari (23° 24' 03'' N; 68° 47' 19'' E) 22 internode fragments from yellow limestone (Lower Miocene, Aquitanian).Lakdi River (23° 19' 19'' N; 68° 56'14'' E) 44 disc fragments from yellow limestone (Lower Miocene, Burdigalian), Murachban (23° 30' 10'' N; 68° 52' 09'E) 58 disc fragments from yellow limestone (Lower Miocene, Aquitanian).
Superfamily: Celleporoidea Johnston, 1838

6.1.13 Family: Celleporidae Johnston, 1838

Genus: Lagenipora Hincks, 1877

*Lagenipora chedopadiensis* Guha & Gopikrishna, 2007 pl. 23 figs.1,2 & 3

2007 *Lagenipora chedopadiensis* Guha & Gopikrishna, p.88, figs. 2D,E.

**Material:** Plesiotypes: GIS/B: 1231-1261.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.052-0.054</td>
<td>0.0536</td>
<td>10</td>
<td>0.00025</td>
<td>0.471</td>
</tr>
<tr>
<td>Wz</td>
<td>0.056-0.058</td>
<td>0.0576</td>
<td>10</td>
<td>0.00025</td>
<td>0.439</td>
</tr>
<tr>
<td>Lop</td>
<td>0.042-0.046</td>
<td>0.045</td>
<td>10</td>
<td>0.0014</td>
<td>3.28</td>
</tr>
<tr>
<td>Wop</td>
<td>0.05-0.052</td>
<td>0.0502</td>
<td>10</td>
<td>0.00071</td>
<td>1.43</td>
</tr>
</tbody>
</table>

**Description:**

Colony nodular, encrusting, unilaminar. Autozooids sub-erect to erect, somewhat conical, frontal shield thick, smooth rarely tuberous, bordered by widely spaced, indistinct marginal areolae; autozooidal boundaries distinct, wide. Orifices terminal, nearly circular in outline, encircled by a short, thick peristome. Avicularia single, peristomial, oval, rostrum indistinct. Ovicells not observed in available material.

**Remarks:**

The present species agree best with *Lagenipora chedopadiensis* Guha & Gopikrishna, 2007 (p.88, figs. 2D, E) except minor variation observed in the colonies.
The present species superficially resembles *Lagenipora* cf. *tuba* (Manzoni), Zágoršek, 2003 (p.179, pl.31, fig.4) in having non porous, smooth frontal wall and indistinct, small marginal areolae but, differs in having circular orifices and single avicularia.

**Occurrence:**

Waior (23° 25’30" N;  68° 41'58" E), 33 nodular colonies from white nummulitic limestone (Upper Oligocene, Chattian).

**Distribution:**


**6.1.14 Family: Phidoloporidae Gabb & Horn, 1862**

Genus: *Iodicyum* Harmer, 1933

*Iodicyum brevipora* n. sp. pl. 23 figs. 4 & 5

**Material:** Holotype: GIS/B: 1262; Plesiotypes: GIS/B: 1263-1267.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lori</td>
<td>0.015-0.021</td>
<td>0.0183</td>
<td>10</td>
<td>0.006</td>
<td>3.62</td>
</tr>
<tr>
<td>Wori</td>
<td>0.015-0.012</td>
<td>0.0135</td>
<td>10</td>
<td>0.006</td>
<td>4.71</td>
</tr>
</tbody>
</table>

**Type Horizon and locality:**

Fossiliferous yellowish limestone cliff section in Waior-Charopadi stream near bridge 1.5 km south east of Waghot village.
Age: Lower Miocene (Aquitanian).

Diagnosis:

Fenestrate colonies, subhexagonal to sub-rectangular autozooids with two, small marginal areolae on the frontal surface. orifices circular with small sinus. Avicularia wanting. Ovicells with damaged frontal walls.

Description:

Colony fenestrate, fenestrae rectangular to subrectangular in outline. Autozooids subhexagonal to sub-rectangular in outline, separated by distinct, thin, raised furrows, with smooth frontal surface, arranged in 3-4 alternating rows, with paired marginal areolae. Orifices circular in shape with a small sinus, with thin peristome, smooth low. Avicularia not observed. Ovicells, hyperstomial, immersed in proximal region of distal autozooid, oviscell opening into orifice, broader distally, frontal wall damaged.

Remarks:

There are five fenestrate fragments in the Waghot material which appears to be distinctive in absence of avicularia and distinct autozooidal boundaries. The present species closely resembles Iodicytum rubeschii (Reuss), Zágoršek, 2010 (p.165, pl.136, figs. 1-5) in the shape of autozooids but, differs in the shape of orifice and additional avicularia on the oviscell. Iodicytum megapora Guha & Gopikrishna, 2007 (p.218, pl.VIII, figs.2-4) differs from the present species in having four large marginal areolae.

Occurrence:

Waghot (23° 23’ 55” N; 68° 40’ 50” E) 5 fenestrate colonies from yellow limestone (Lower Miocene, Aquitanian).
**Etymology:** The species is named after small marginal pores (Latin, brevipora).

**Genus:** *Reteparella* Busk, 1884

*Reteparella sp. pl. 23 figs.6 & pl. 24 figs.1 & 2*

**Material:** Plesiotypes: GIS/B: 1268-1300.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.008-0.01</td>
<td>0.0092</td>
<td>10</td>
<td>0.0003</td>
<td>3.36</td>
</tr>
<tr>
<td>IZ</td>
<td>0.006-0.008</td>
<td>0.0068</td>
<td>10</td>
<td>0.0003</td>
<td>4.55</td>
</tr>
</tbody>
</table>

**Description:**

'Colony fenestrate, fenestrae oval to subrectangular in outline. Autozoooids indistinct, with smooth frontal surface, arranged in 3-4 alternating rows, autozooidal boundaries indistinct, merged with those of adjacent autozoooids, with paired marginal areolae. Orifices circular in shape, sinus indistinct; peristome thin, smooth low. Avicularia adventitious, large, oval, occupying various positions on the frontal shield. Ovicells, hyperstomial, immersed in proximal region of distal autozooid, ovicell opening into orifice, broader distally, frontal wall damaged.

**Remarks:**

Due to poor preservation and absence of characteristic features do not allow precise determination of many colonies of *Reteparella*. Detailed examination of the type material does not permit delineation of characteristic feature, so this species is
placed as *Reteporella* sp. only. The present species closely resembles *Reteporella granti* Guha & Gopikrishna, 2007 (p.220, pl. VIII, figs. 8-10) in the general aspects of the colony but, differs in lacking labial avicularia and tuberous frontal surface.

**Occurrence:**

Waior (23°25′ 30″ N; 68° 41′58″ E), 36 fenestrate colonies from white nummulitic limestone (Upper Oligocene, Chattian), Waghot (23° 23′ 55″N; 68° 40′50″ E) 44 fenestrate colonies from yellow limestone (Lower Miocene, Aquitanian), Lakdi River (23°19′ 19″ N; 68°56′14″E) 32 fenestrate colonies from yellow limestone (Lower Miocene, Burdigalian), Murachban (23° 30′ 10″ N; 68° 52′ 09″E) 14 fenestrate colonies from yellow limestone (Lower Miocene, Aquitanian).

Genus: *Reteporellina* Harmer, 1933

*Reteporellina* sp. indet. pl. 24 figs.3,4 & 5

**Material:** Plesiotypes: GIS/B: 1301.

**Measurements:**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lz</td>
<td>0.012-0.015</td>
<td>0.0133</td>
<td>9</td>
<td>0.00044</td>
<td>3.35</td>
</tr>
<tr>
<td>Wz</td>
<td>0.009-0.012</td>
<td>0.01</td>
<td>9</td>
<td>0.00042</td>
<td>4.24</td>
</tr>
</tbody>
</table>

**Description:**

Colony, erect, dichotomously branching. Autozooids arranged in 2-3 longitudinal alternating rows, autozooidal boundaries not clearly delimited: peristome raised laterally in the form of lappets. Primary orifices circular, with small sinus;
suboral avicularium placed distally. A different shaped small avicularium occurs on
the frontal surface. Oral spines, ovicells not observed in the available material.

**Remarks:**

A single much worn specimen found in the Waior material. According to
Gordon (pers. comm.Sept. 2011) this specimen belongs to the genus *Reteporellina*
Harmer, 1933. This may be probably the first oldest fossil record of this genus in the
Tertiary sediments all over the world, because so far 23 species of this genus in the
Recent (http://bryozoa.net/cheilostomata/ phidoloporidae/
reteporellina). However, important morphological characters are worn and it is
impossible to assign the specific name unless well preserved material at hand.
*Reteporellina evelinae* (Marcus, 1955) (http://bryozoa.net/cheilostomata/
phidoloporidae/reteporellina) described from the Pleistocene of Costa Rica closely
resembles the present species in the nature of autozooids, peristome and orifices but,
other details are not seen in the Kutch taxon.

**Occurrence:**

Waior (23° 25‘ 30” N; 68° 41’ 58”E), one worn internode fragment from white
nummulitic limestone (Upper Oligocene, Chattian).