MIocene Bryozoa from Guadal Formation at the Southern Border of Lago General Carrera, Aysen, Region of Chile, South America

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ABSTRACT

Bryozoa from the marine Guadal Formation (Oligocene-Miocene), cropping out at the southern border of Lago General Carrera, Aisen Region (XI) of Chile (46°30' S; 72°W) are here described.

The Cyclostomatous genera *Tretocyclotia*, *Tubulipora*, *Tennysonia*, *Pastulopora*, *Homera*, *Crizia* and *Crisula* represented by eight species were found. Four new species are introduced: *Tretocyclotia chile-chicoensis*, *Tubulipora chilensis*, *Neofungella ovata* and *Idmiidronea robusta*.

RESUMEN

Se describen Bryozos procedentes de la Formación Guadal (Oligoceno-Mioceno), cuyos afloramientos se extienden al sur del Lago General Carrera, Región de Aisén (XI-Chile (46°30' S; 72°W).

Se identifican los siguientes géneros del orden Cyclostomata, representados por ocho especies: *Tretocyclotia*, *Tubulipora*, *Tennysonia*, *Pastulopora*, *Homera*, *Crizia* y *Crisula*. Además, se introducen como especies nuevas las siguientes formas: *Tretocyclotia chile-chicoensis*, *Tubulipora chilensis*, *Neofungella ovata* e *Idmiidronea robusta*.

INTRODUCCIÓN

The Bryozoa discussed in the present paper have been collected from Guadal Formation at two localities outcropping at the southern border of Lago General Carrera (Fig. 1): (1) Western outcrops: near Puerto Guadal; (2) Eastern outcrops: near Chilé-Chico town.

The material was collected by Hans Niemeyer, Geologist of the Instituto de Investigaciones Geológicas, in 1974.

The here studied fossiliferous samples consist of lithified, calcareous sandstones, and contain a fair amount of Bryozoa. Bryozoa are an important biological constituent of sedimentary rocks together with molluscs, calcareous algae and porifera. The state of preservation of the Bryozoa is reasonably good, but external weathering and recrystallization occur. Thus, preparation of external characters of the Bryozoa contained in these rock samples is difficult and they have mainly been identified from thin sections and peels. Therefore, only Cyclostomes which can be successfully identified in sections are discussed here, although Cheiostomes are also present in the investigated material.

Bryozoa from the Tertiary of southern South America have been studied earlier by several authors including Ortmann (1902), Canu (1904; 1909) and Conti (1949). Tertiary Southamerican bryozoa species have been commonly considered conspecific with modern and Tertiary species from Europe. These identifications are obviously open to question as a close comparison of Southamerican material and European specimens considered, could reveal conspecific differences.

Revista Geológica de Chile No. 12, p. 59-77, 2 figs., 6 plates.
The following abbreviations are used in this report:

\[\begin{align*}
    N & : \text{number of measured objects.} \\
    x & : \text{arithmetic mean value, given with} \\
    V & : \text{coefficient of variation.} \\
    s & : \text{standard deviation.} \\
    \text{O. R.} & : \text{observed range.} \\
    \text{azw} & : \text{width of autozooecial aperture.} \\
    \text{azp} & : \text{width of autozooecial peristome.} \\
    \text{kzw} & : \text{width of kenozoecial aperture.} \\
    \text{pw} & : \text{width of pore.} \\
    z/\text{mm}^2 & : \text{number of opening zoecia in} \ 1 \ \text{mm}^2. \\
    \text{daf} & : \text{distance between fascicles of autozoecia.}
\end{align*}\]

The terminology used here is the same as in Brood (1972). The list of synonyms considers records from southern South America only. The type material (GID 597-610) is deposited in the Geological Institute, University of Stockholm.

**PART I: BRYOZOA FROM WESTERN OUTCROPS NEAR PUERTO GUADAL**

The material of the westerly outcrops of Lago General Carrera comes from three sections in the limbs of a broad syncline in the Guadal Formation: Pampa Castillo (Field numbers HN-C94-73 and HN-C89-B73), El Manzano (Field number HN-D7-73), and Pampa Guadal (Field number HN-D24-73), (Fig. 2). Table 1 shows the distribution of identified Cyclostomatous bryozoa found in this material, and Plates 1 to 4 illustrate it.

**TABLE 1**

<table>
<thead>
<tr>
<th>Species</th>
<th>Sections</th>
<th>Pampa Castillo</th>
<th>El Manzano</th>
<th>Pampa Guadal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong></td>
<td><strong>Samples</strong></td>
<td><strong>HN-C94-73</strong></td>
<td><strong>HN-C89-B73</strong></td>
<td><strong>HN-D7-73</strong></td>
</tr>
<tr>
<td>Tretoecycloecia rooveretoi (Conti)</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tubulipora chilensis n. sp.</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennysonia subcylindrica Ortmann</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pustulopora australis Busk</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pustulopora sp. A.</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hornera cf. striata Milne-Edwards</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crisia radians Lamarck</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crisia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions**

\[\begin{align*}
    \text{aw} & : \ 0.095 \pm 0.120 \\
    \text{kw} & : \ 0.030 \pm 0.075 \\
    \text{az/mm}^2 & : \ 10 \pm 15 \\
    \text{kz/mm}^2 & : \ 60 \pm 74
\end{align*}\]
Description. The colony forms hemispherical masses with short, bifurcating, cylindrical stems. The autozoecia open all over the surface of the colony and the apertures are flush with the surface. The autozoecia are surrounded by the kenozoecia, which are approximately four times as common as the first ones. The stems are approximately 2.8 - 3.2 mm thick. The apertures of the autozoecia are generally circular; the kenozoecial apertures are commonly polygonal or oval, but may also be circular.

As seen in a section, the autozoecia are long and begin in the centre of the stem, their proximal part running parallel with the growing direction of the stem. The distal end turns abruptly outwards and opens transversely to the surface of the colony. The interzoecial walls are thin (~0.01 mm) in the endoozone; they widen in the exozone, where their thickness increases up to 0.05 mm. New zooecia begin in the corners between already existing zooecia without affecting their shape. Numerous interzooidal pores cross the interzoecial walls. Kenozoecia only exist in the exozone.

Ultrastructurally, the skeleton consists of laminar and granular calcite. The main part of the skeleton is formed by tabular laminae, which are approximately 0.4 μ thick and several μ wide. The
central part of the interzooecial walls are commonly occupied by a zone with coarse tabular crystals, of approximately 1 μ. A middle granular layer appears to be generally absent or poorly developed.

The internal surface of the zooecia bears several small spines (Pl. 1, Fig. 5), which are approximately 15 μ at their base, and consist of a central core of granular calcite surrounded by inclined laminae.

**Occurrence.** The present species occurs in the Miocene of South America. It is found in the Superpatagonian of Peninsula de Valdés, Argentina (Conti, 1949); and it is also found in the Aisen Region of Chile.

**Remarks.** The present species is characterized by the small auto- and kenozoecial dimensions and the comparatively high number of kenozoecia.

**Tubulipora chilensis** n. sp.

(Pl. 2, Figs. 3-4)

**Holotype.** Specimen GI D 528, illustrated in Pl. 2, Fig. 4.

**Type Stratum and Type Locality.** The Oligo-Miocene of Guadal in Lago General Carrera area.

**Derivation of Name.** After the country of Chile.

**Material.** Approximately 10 specimens. GI D 528 and 529 and several unnumbered sections.

**Diagnosis.** A *Tubulipora* species with medium sized autozooecia and four to five autozooecia in each fascicle.

**Dimensions**

<table>
<thead>
<tr>
<th>N=30</th>
<th>O. R.</th>
<th>x</th>
<th>V</th>
<th>s</th>
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</thead>
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<tr>
<td>az ...</td>
<td>0.130 - 0.185</td>
<td>0.153 ± 0.004</td>
<td>7.32</td>
<td>0.0112</td>
</tr>
<tr>
<td>pz ...</td>
<td>0.150 - 0.235</td>
<td>0.187 ± 0.004</td>
<td>5.57</td>
<td>0.0103</td>
</tr>
</tbody>
</table>

**Description.** The zoarium is partly erect, composed of bifurcating flattened rhomboidal in cross section. The apertures of the autozooecia open in alternating, transverse fascicles on the frontal side of the stem. The stems are approximately 1.8 - 2.2 mm wide and 0.7 - 0.8 mm thick. The exterior zooecial wall is penetrated by numerous small pseudopores.

Transverse sections show rhombic or polygonal cross sections of the autozooecia. The internal zooecial walls are approximately 0.02 mm and the exterior ones, approximately 0.03 mm thick. In longitudinal section, the zooecial walls are commonly undulating.

**MIOCENE BRYOZOA FROM GUADAL FORMATION**

Microstructurally, the skeleton consists of laminar and granular calcite. The laminar crystals are approximately 0.5 μ thick and 3-5 μ wide. The granular middle layer within the interzooecial walls is poorly developed.

**Occurrence.** The present species has so far only been found at Guadal in the Aisen region.

**Remarks.** The present species is characterized by comparatively few autozooecia in the fascicles and undulating interzooecial walls.

**Tennysonia subcylindrica** Ortmann, 1902

(Pl. 2, Figs. 7)

**Tennysonia subcylindrica** Ortmann, 1902, p. 69, Pl. 13, Fig. 5.

**Tennysonia subcylindrica** Ortmann, Canu, 1904, p. 22.

**Tennysonia subcylindrica** Ortmann, Canu, 1909, p. 320, Pl. 13, Fig. 1.

**Remarks.** Two section of a double walled, cancellate species have been obtained from the investigated material. These specimens agree well with descriptions and figures of *T. subcylindrica*, which is certainly a double walled form, possibly related to the crisnides.

**Pustulopora australis** Busk, 1852

(Pl. 2, Figs. 1-6)

**Pustulopora australis** Busk, 1852, p. 350.

**Pustulopora australis** Busk, Busk, 1875, p. 21, Pl. 17 A.

**Entalopora australis** (Busk), Mac-Gillivray, 1887, p. 219.

**Entalopora australis** (Busk), Borg, 1944, p. 111, Pl. 2, Figs. 1-2.

**Remarks.** The skeleton is composed of laminar and granular calcite. The laminar layer consists of lath-like crystals, approximately 0.4 - 0.5 μ thick. The granular middle layer of the interzooecial walls is thin; approximately 2 - 4 μ thick.

The present species, which is here considered as identical with the modern *P. australis* from the Antarctic and Australia, is characterized by large autozooecia dimensions with a diameter of the autozooecial aperture of approximately 0.25 mm and the presence of numerous pseudopores in the exterior zooecial walls.
Pustulopora sp. A

Remarks. Several specimens of a Pustulopora species with small autozooecial dimensions occur in the investigated material. The stems are approximately 0.5 mm wide and the width of the autozooecial aperture is approximately 0.10 mm. The microstructure of the skeleton consists of laminar and granular calcite. The laminae are approximately 0.5 mm thick. These specimens probably belong to a new species.

Hornera cf. striata Milne-Edwards, 1838
(Pl. 4, Figs. 1-4)

Hornera striata Milne-Edwards, 1838 (?), p. 213, Pl. 11, Fig. 1.

Description. The zoarium is erect with dichotomously branching stems. The stems are oval in transverse section. The autozooecia open irregularly on the frontal side of the stem but tend to become arranged in lateral lines. The autozooecial apertures are circular, with an approximate diameter of 0.08 - 0.09 mm. The exterior side is ornamented with longitudinally arranged, bifurcating and anastomosing ribs. The zoarial walls are penetrated by numerous pores with an approximate diameter of 0.05 mm.

The ultrastructure consists of laminar and granular calcite. Granular calcite is located in the central part of the interzooecial wall and may be up to 0.02 mm thick, also occurring as central cores of the spinose structures on the reverse side of the stems (Pl. 4, Fig. 1). These cores are approximately 3 μ thick; the laminae are approximately 0.4 - 0.5 μ thick and 4 - 5 μ wide, and they may be up to 50 μ or more in length.

Remarks. This hornerid species, which occurs in several sections, is probably identical with the Hornera striata reported from Argentine by Canu (1909). However, the specimens from southern Chile differ from the European specimens in having larger apertures of the autozooecia and in showing a tendency to grouping autozooecial apertures in transverse lines. Presumably, the specimens from south Chile belong to a yet undescribed species, but the material here investigated is not sufficient to postulate a new species.

Crisina radians Lamarck, 1816

Remarks. Two specimens of a Crisina species are found in the investigated material. They consist of the modern C. radians type, and are probably conspecific with it as the dimensions and structure are almost identical. The presence of a Crisina species in the investigated material is of interest as this genus has never been reported from South America before (Borg, 1941).

Crisia sp.

Remarks. One specimen of an unidentified Crisia species was found.

PART II BRYOZOA FROM EASTERN OUTCROPS NEAR CHILE-CHICO

The material of the eastern outcrops of Lago General Carrera come from two sections: one from Guadal Formation sediments within a basaltic sequence at Meseta Buenos Aires, (Field number HN 2-74) and the other one from an isolated outcrop of Guadal Formation at Río Geinimeni (Field number HN 4-74) (Fig. 2). Table II shows the distribution of identified Cyclostomatous bryozoa found and Plates 5 and 6 illustrate this material.

TABLE II.
DISTRIBUTION OF IDENTIFIED CYCLOSTOMATOUS BRYOZOA FROM STRATIGRAPHIC SECTIONS NEAR CHILE-CHICO TOWN

<table>
<thead>
<tr>
<th>Species</th>
<th>Meseta Buenos Aires</th>
<th>Río Geinimeni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tretocycloecia chile-chicoensis n. sp.</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Neofungella ovata n. sp.</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Idmidronea robusta n. sp.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tretocyloecia chile-chicoensis n. sp.  
(Pl. 5, Figs. 1-5)

**Type.** GID 598, holotype; GID 599, 600, paratypes.

**Type Locality and Type Stratrum.** Chile-Chico, Lago General Carrera, Aisen region of Chile; Oligocene-Miocene.

**Derivation of Name.** The present species is named after the town of Chile-Chico.

**Material.** Two zoaria.

**Description.** The zoarium is erect, composed of stout, branching cylindrical stems. The surface is smooth. The auto- and kenozooecia open irregularly all over the surface. The kenozooecia are approximately four times more numerous than the autozooecia. The autozooecial aperture is circular and of moderate size; the kenozooecial aperture is generally polygonal and much smaller than the above ones.

The autozooecia are budded from the centre of the stem and curve gently outwards. The zoecia open transversely to the surface of the stem. The endozone is comparatively thick. The interzooecial walls are thin (~0.020 - 0.030 mm), and penetrated by numerous interzooidal pores. Apart from the diaphragms formed during the degeneration-regeneration processes, they are rare, but a few basal and intermediate diaphragms may be found in the proximal part of the zoecia. The interzooecial walls are constituted by approximately 0.06 μ thick lath-like laminae. No brood-chamber has been observed.

**Dimensions**

<table>
<thead>
<tr>
<th>N=45</th>
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<th>x</th>
<th>V</th>
<th>s</th>
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<tbody>
<tr>
<td>azw . .</td>
<td>0.100 - 0.120</td>
<td>0.108 ± 0.001</td>
<td>4.20</td>
<td>0.0045</td>
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<tr>
<td>kzw . .</td>
<td>0.052 - 0.075</td>
<td>0.060 ± 0.003</td>
<td>15.73</td>
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<tr>
<td>az/mm²</td>
<td>17 - 24</td>
<td>20.1 ± 0.5</td>
<td>8.63</td>
<td>1.735</td>
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<tr>
<td>kz/mm²</td>
<td>58 - 88</td>
<td>74.2 ± 2.7</td>
<td>11.96</td>
<td>8.877</td>
</tr>
</tbody>
</table>

**Remarks.** *T. chile-chicoensis* is characterized by its moderate dimensions, thin interzooecial walls with many interzooidal pores, and few diaphragms. It differs from *T. roveretoi* (Conti) in having fewer autozooecia, wider kenozooecia and lacking the internal spines. It differs from *Heteropora bifurcata* Canu, *H. thevenini* Canu, *H. crassa* Canu, and *H. ortmanni* Canu in the much smaller dimensions of the zoecia.

Neofungella ovata n. sp.  
(Pl. 5 Fig. 6 and Pl. 6, Figs. 1-3)

**Type.** GID 597, holotype; GID 595, paratypes.

**Type Locality and Type Stratrum.** Chile-Chico, Lago General Carrera, Aisen region of Chile; Oligocene-Miocene.

**Derivation of Name.** *Ovatus* (Latin) = egg-shaped, referring to shape of the zoarium.

**Material.** Two colonies.

**Description.** The zoarium is globular or massive, composed of several superimposed layers, which are approximately 2 mm thick. The autozooecia are generally short and confined to one growth layer only, but some pass through one or more layers. The surface is smooth. Both auto- and kenozooecia open irregularly all over the smooth surface. The kenozooecia are approximately twice as numerous as the autozooecia. The autozooecial aperture is circular and of moderate size. The kenozooecial aperture is smaller and generally polygonal, but it may also be polygonal in younger stages.

In longitudinal section, the interzooecial walls are thin and 0.02 - 0.03 mm thick. The zoecia generally lack basal and intermediate diaphragms, but terminal diaphragms occur. Interzooecial pores are common. Brood-chambers are not observed.

**Dimensions**

<table>
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<th>N=50</th>
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<tbody>
<tr>
<td>azw . .</td>
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<td>0.099 ± 0.002</td>
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</tr>
<tr>
<td>kzw . .</td>
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<td>0.058 ± 0.002</td>
<td>12.04</td>
<td>0.0070</td>
</tr>
<tr>
<td>az/mm²</td>
<td>19 - 25</td>
<td>21.7 ± 0.5</td>
<td>7.32</td>
<td>1.558</td>
</tr>
<tr>
<td>kz/mm²</td>
<td>36 - 46</td>
<td>41.4 ± 0.8</td>
<td>6.59</td>
<td>2.72</td>
</tr>
</tbody>
</table>

**Remarks.** The present species is characterized by the moderate dimensions of the zoecia and by having twice as many kenozooecia as the autozooecia; this being the difference between *N. ovata* and type species of the genus, *N. claviformis* (Waters). The assignment of the present species to *Neofungella* is therefore tentative.

The skeleton of the present species is recrystallized and the ultrastructure cannot be determined.

Idmidronea robusta n. sp.  
(Pl. 6, Figs. 4-9)

**Type.** GID 605, holotype; GID 606-610, paratypes.
Derivation of Name. Robustus (Latin) = robust, referring to the large dimensions of the zoarium.

Type Locality and Type Stratum. Chile-Chico, Lago General Carrera, Aisen region of Chile; Oligoecene-Miocene.

Material. One very large zoarium with hundreds of stems.

Description. The zoarium is erect, composed of dichotomously branching stems. The latter are rounded-triangular in cross section and approximately 1 mm wide. The autozoecia open in alternating, lateral fascicles consisting of six to eight zoecia each. The autozoecial aperture is of moderate size. The back side of the stem is smooth and rounded. No kenozoecia are present on the back side of the stems except for the basal part of the zoarium. The gonozoecium is not observed.

In thin section the autozoecia are moderately long. They are budded from the dorsal side. The interzoecial walls are thin in the proximal and middle parts (approximately 10 μ) but thicken in the distal end. The interzoecial walls are formed by two laminar layers separated by a thin middle granular layer which is approximately 4 μ thick. Each lamina is approximately 0.6 μ thick. The exterior walls are thick, approximately 40 μ, and penetrated by numerous pseudopores, while interior walls are penetrated by interzooidal pores. Basal and intermediate diaphragms rarely occur.

Dimensions

<table>
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<tr>
<th>N=41</th>
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<td>0.094 ± 0.002</td>
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<td>0.0066</td>
</tr>
<tr>
<td>azp...</td>
<td>0.110 - 0.135</td>
<td>0.122 ± 0.005</td>
<td>13.49</td>
<td>0.0165</td>
</tr>
<tr>
<td>daf...</td>
<td>0.40 - 0.65</td>
<td>0.55 ± 0.02</td>
<td>10.49</td>
<td>0.057</td>
</tr>
</tbody>
</table>

Remarks. The present species is characterized by its thick stems with many autozoecia in the fascicles, a smooth rounded back side and numerous pseudopores in the exterior walls.

REFERENCES


Longitudinal section through bifurcating stem showing arrangement of autozoocia. GI D 525. X 15.

Tangential section showing auto- and kenozoocia and interzooecial pores. Stereoscan 5326. X 450.

Transverse section of stem showing budding pattern of zooecia. GI D 526. X 15.

Transverse section of interzooecial wall showing arrangement of laminae. Stereoscan 5326. X 1800.

PLATE II

Tretocydoecia roveretoi (Conti), 1949

1 Longitudinal section through interzooecial wall showing interzooecial pore and spine (at arrow) with calcareous rod. Stereoscan 5315. X 900.

2 Longitudinal section showing budding pattern of zooecia. GI D 527. X 8.

Tubulipora chilensis n. sp.

3 Distal end of interzooecial wall showing connection between interzooecial and exterior wall. Stereoscan 5408. X 400.

4 Transverse section of autozooecia showing interzooecial wall at centre and exterior walls to the right. Stereoscan 4816. X 200.

5 Transverse section of stem showing autozooecial arrangement. GI D 528. X 15.

6 Oblique longitudinal section of stem showing undulating interzooecial walls. GI D 529. X 15.

Tennysonia subcylindrica Ortmann, 1902

7 Transverse section through bifurcating stem. GI D 530. X 15.
PLATE III

Pustulopora australis Busk, 1852

1 Longitudinal section through exterior wall showing tabular crystals of laminar layer. GI D 4912. X 1000.

2 Transverse section through stem showing arrangement of autozoecia. Stereoscan 4911. X 45.

3 Section through interzoecial wall showing granular middle layer and flanking laminar layer. Stereoscan 4830. X 2000.

4 Section through exterior wall showing pseudopore to the left and crystals from the laminar layer. Stereoscan 4809. X 4000.

5 Section through exterior wall showing several close grouped pseudopores. Stereoscan 4924. X 350.

6 Section through interzoecial wall passing into exterior wall, showing middle granular layer of interzoecial wall and laminar layer. Stereoscan 5201. X 900.
PLATE IV

*Hornera cf. striata* Milne-Edwards, 1838

1. Longitudinal section through back side of stem showing laminar zoarial layer crossed by calcareous rods with granular structure. Stereoscan 5429. X 1800.

2. Tangential section showing pores penetrating the zoarial laminar layer. Stereoscan 5412. X 180.

3. Transverse section of distal end of autozooecia showing granular middle layer surrounded by flanking laminar layers. Stereoscan 5420. X 180.

4. Longitudinal section through back side of stem showing pores surrounded by laminar calcite. Stereoscan 5426. X 450.

5. Transverse section of interzooecial walls showing well developed middle granular layer and flanking laminar layers. Stereoscan 5419. X 400.
PLATE V

Tretocycloecia chile-chicoensis n. sp.

1 Longitudinal section showing shape of autozooecia. GID 598, holotype. X 10.

2 Tangential section showing auto- and kenozooecia. GID 598, holotype. X 22.

3 Longitudinal section through zooecia showing regeneration zone at lower part of picture and interzooecial walls penetrated by interzoooidal pores. GID 598, holotype, X 200.

4 Longitudinal section of interzooecial wall showing laminae. GID 598. X 1000.

5 Longitudinal section showing diaphragm near regeneration zone. GID 598, X 200.

Neofungella ovata n. sp.

6 Deep tangential section showing auto- and kenozooecia without diaphragms. GID 597, holotype. X 10.
PLATE VI

Neofungella ovata n. sp.

1 Longitudinal section showing several growth layers. GID 597 b, paratype. X 18.

2 Surface of holotype showing auto- and kenozooecia. GID 597. X 20.

3 Tangential section showing auto- and kenozooecia. GID 597, holotype. X 22.

Idmidranea robusta n. sp.

4 Lateral section showing autozooecia. GID 606 b. X 12.

5 Longitudinal section showing autozooecia. GID 606 b. X 10.

6 Transverse sections. GID 606 c. X 10.

7 Transverse section of distal end of autozooecium showing granular middle layer and flanking laminar layers of interzooidal wall and exterior wall penetrated by pseudopores. GID 605, holotype. X 450.

8 Transverse section of autozooecia showing granular middle layer and flanking laminar layers. Note interzooidal pores. GID 605, holotype. X 450.

9 Transverse section showing autozooecia. GID 605, holotype. X 100.
NEOFUNGELLA - IDMIDRONEA