

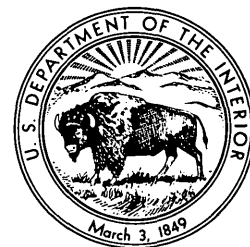
Fossil Bryozoa from Drill Holes on Eniwetok Atoll

By D. A. BROWN

BIKINI AND NEARBY ATOLLS, MARSHALL ISLANDS

GEOLOGICAL SURVEY PROFESSIONAL PAPER 260-EE

*Five bryozoans from the Tertiary
(stages b, f, and g) are described
and figured*



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FOSSIL BRYOZOA FROM DRILL HOLES ON ENIWETOK ATOLL

By D. A. BROWN¹

ABSTRACT

One cyclostome and four cheilostome bryozoans are described and figured from drill holes into the Tertiary (stages *b, f, g*) of Eniwetok Atoll. None of the specimens is well-enough preserved to permit specific identification.

INTRODUCTION

Specimens of organisms from drill holes E-1 and F-1 on Eniwetok Atoll (Ladd and others, 1953) were received from Ruth Todd of the U.S. Geological Survey. From these, four species of Bryozoa² were obtained, comprising one cyclostome and four cheilostomes as detailed in this report.

SYSTEMATIC DESCRIPTIONS

Order CYCLOSTOMATA

Family DIASTOPORIDAE

Genus DIASTOPORA Lamouroux

Diastopora sp?

Figures 321, 322

Specimens A and B belong most probably to the same species and originate from core 9 at 3,655-3,665 feet in the Tertiary *b* section of drill hole F-1 which is described (Ladd and others, 1953, p. 2266) as "Firm to hard white foraminiferal limestone; corals as molds; some mollusks (*Pecten*) retain original shell." Specimen A is a curved fan-shaped laterally concavo-convex zoarium from core sample F-1-9-2, and specimen B is a thin section cut from a similar zoarium found in core sample F-1-9-3.

Specimen A at its greatest width is 3.0 mm, stands 2.38 mm in height, and has a narrow base 0.40 mm in width. Its distal part is curved and fan shaped with a flattened distal surface approximately 0.42 mm in width, along which is a median ridge giving the zoarium a bilaminar appearance (fig. 321). At a magnification of 216 diameters this surface is seen to be perforate. Both lateral surfaces of the colony are perforate also, with the zooecial tubes directed obliquely distally, their distal ends projecting as a series of papillae arranged in flabellate rays. These tubes extend almost to the base of the specimen.

Specimen B (fig. 322) a thin section, has a maximum width of 2.0 mm and a height of 1.62 mm. The section shows a series of tubes diverging from the base so as to remain approximately normal to the upper distal edge

of the fan-shaped colony. The tubes, which are all of the same general dimensions, average about 0.08 mm in diameter and are without diaphragms. Near the base of the zoarium may be seen what appear to be cross sections of zooecial tubes normal to the lateral surface.

Neither specimen possesses an identifiable gonozoecium, nor are any details of the orifices discernible in

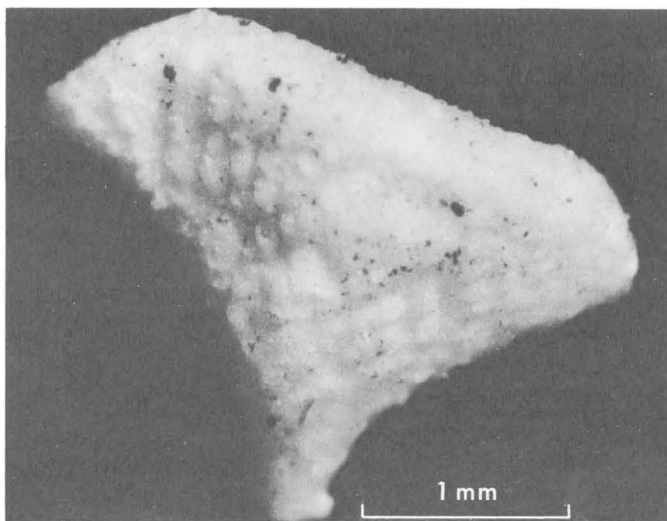


FIGURE 321.—Specimen A. *Diastopora* sp? Concave lateral aspect of fan-shaped zoarium showing papillate surface, $\times 35$.

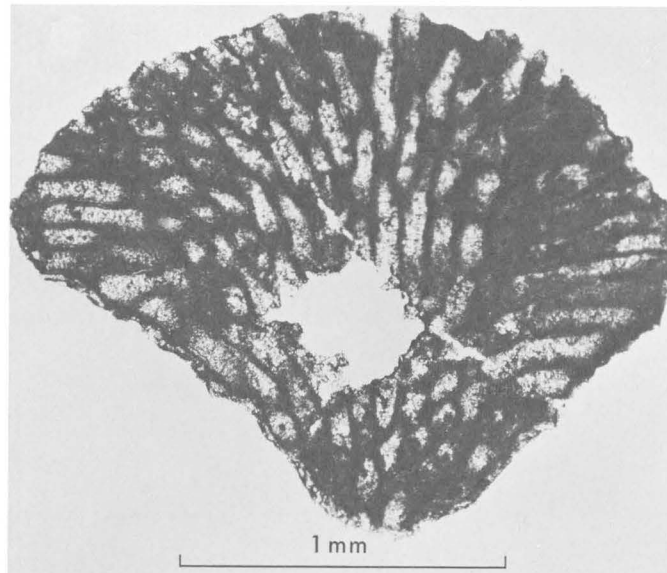


FIGURE 322.—Specimen B. *Diastopora* sp? Thin section of zoarium showing arrangement of zooecial tubes, $\times 75$.

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²This name is used to conform to the U.S. Geol. Survey practice; the author believes the name *Polyzoa* to be more correct for this phylum.

the papillate surface of the zoarium. The arrangement of the zooecial tubes in a bilamellar pattern with many tubes opening on the narrow distal extremity of the zoarium is an unusual one, although a somewhat similar arrangement may be observed in *Fascipora pavonina* Michelin sp., 1846, a Cenomanian species. Borg's (1944) classification of the Stenolaematous Bryozoa is not applied here, chiefly because of the absence of any gonozooecium in this material. However, in Bassler's (1953) classification which is chiefly morphological and more adapted to fossil forms, the genus *Diastopora* seems an appropriate designation. *Diastopora* is first recorded in Jurassic strata and is an abundant genus, encrusting or in foliate expansions, among Recent cyclostomes.

Order CHEILOSTOMATA
Suborder ANASCA
Superfamily MEMBRANIPORIDAE
Genus NELLIA Busk
Nellia aff. *oculata* Busk

Figure 323

Specimen C₁ is a fragment of an internode 1.87 mm in length from cuttings at a depth of 990–1,000 feet in drill hole E-1 in beds referred to Tertiary *f* (Cole, 1957, p. 745). The section is described (Ladd and others, 1953, p. 2264) as "Buff to tan coralliferous limestone with well-preserved, shallow-water mollusks and smaller Foraminifera."

The specimen (fig. 323) has an internode almost square in cross section, about 0.40 by 0.40 mm. Edges of the aperture are not raised, and no development of cryptocyst is shown. The floor of the zooecium is open V-shaped with a deep medial longitudinal trench with evenly sloping sides. No fertile zooecia were observed.

*Measurements:*³ $L_z=0.80-0.85$ mm; $l_z=0.37-0.40$ mm; $h_a=0.54-0.70$ mm; $l_a=0.25-0.30$ mm.

This specimen very closely resembles *Nellia oculata* Busk var. *quadrilatera* d'Orbigny var., 1851, described and figured in detail by Harmer (1926, p. 242). The following differences are noted.

1. There is but a single triangular avicularium (*av*) present, located in one of the proximal angles of the gymnocyst.
2. The lateral communication pores of the zooecia (*cp*²) (Harmer, 1926, p. 243, text fig. 3A) are clearly visible, but there is no definite indication of the other pair of lateral pores (*cp*¹). On the other hand, the area in the vicinity of Harmer's *cpm*

³ The symbols used in this report for measurements are as follows: L_z , length of zooecium; l_z , width of zooecium; h_r , length of orifice; l_r , width of orifice; L_{ov} , length of ovicell; h_a , length of aperture; l_a , width of aperture.

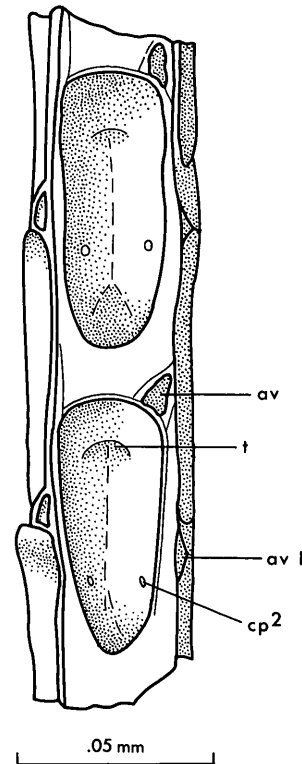


FIGURE 323.—Specimen C₁. *Nellia* aff. *oculata* Busk. Mature internode showing zooecia. *av*, single avicularium; *av l*, avicularium of lateral zooecium; *cp*², lateral communication pores of zooecia (cf. Harmer, 1926, p. 243, text fig. 3A); *t*, tunnellike opening near distal end of zooecium.

(terminal communication pore between zooecia) is occupied by a large tunnellike opening (*t*) which may perhaps include and obscure the pores *cp*¹. Harmer (1926, p. 245) was also unable to detect these pores in the zooecia of *N. tenuis* Harmer.

3. On two zooecia a circular pore passes through the proximal edge of the gymnocyst near the median line, in both cases slightly truncating the distal edge of the proximal zooecium. This opening may have accommodated an articulating fiber, though such a mode of branching is unusual in this genus.

On account of the small amount of material, this specimen is unnamed.

Specimen C₂ is another internodal fragment of the same variety from the same location, but in this case the zooecia are aborted, that is, the apertures are greatly reduced in size and there are no avicularia present.

Nellia oculata is a common species, both Recent and fossil, being found in moderately shallow waters in the temperate and tropical regions. It is recorded from Eocene beds (Jackson) in the Eastern United States. *N. oculata* var. *quadrilatera* is known only from Recent seas.

Suborder ASCOPHORA
 Family EXOCHELLIDAE
 Genus ESCHAROIDES Milne-Edwards

Escharoides sp?

Figures 324, 325

Specimen D is a part of an encrusting zoarium from cuttings at a depth of 990–1,000 feet in drill hole E-1 (Tertiary *f*) as described under specimen C₁. The zoarium (encrusting a pelecypod shell) consists of about 20 zooecia, 4 of which are ovicelled. Immature distal zooecia are represented by proximal side walls.

Zooecia are elongate-quadrate, arranged in radiating rows, and separated by shallow but strong furrows along which lie thin salient walls between the rows of marginal areolae. Secondary orifice is subquadrate, rounded and narrows proximally; the proximal lip is concave; the peristome is slightly salient and urceolate distally. Frontal wall is convex and consists of a perforate granular pleurocyst; the pores are partly obscured by granular calcification and overlie a smooth olocyst with pores confined to the lateral margins. Marginal areolae are in a single prominent row.

Ovicells are large, finely perforate, embedded deeply in and occupying a large area of the distal zooecium and bordered by a single row of marginal areolae (fig. 324). Avicularia were not seen.

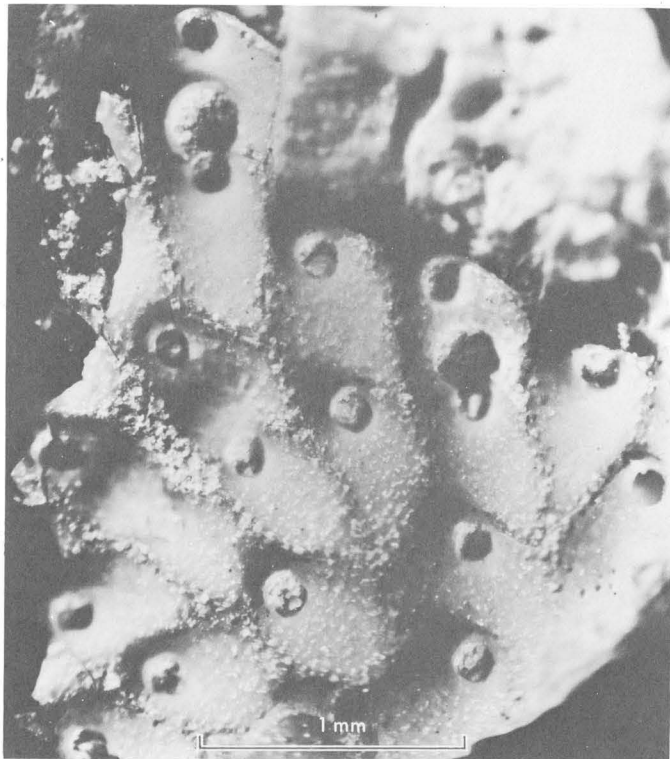


FIGURE 324.—Specimen D. *Escharoides* sp? Encrusting zoarium, some zooecia-bearing ovicells. The ovicells are more strongly perforate than the photograph suggests, \times 53.

Measurements: $L_z=0.90-1.05$ mm; $l_z=0.65-0.75$ mm; $h_r=0.24-0.25$ mm; $l_r=0.22-0.23$; $L_{ov}=0.35-0.37$ mm.

The generic affinities of this species are not clear particularly since the orifices are for the most part blocked by deposits, so that no distinct view of the primary orifice may be obtained. The external features, however, such as the perforate granular pleurocyst with marginal areolae and the perforate immersed ovicells also with marginal areolae, strongly suggest affinities to *Escharoides* Milne-Edwards. No trace of spine bases along the distal margin of the orifice was detected.

The distal wall of the zooecium, which projects slightly along the distal margin of the orifice, shows (fig. 325) a marked tendency to split apart along the lateral lines near the distal end of the orifice.

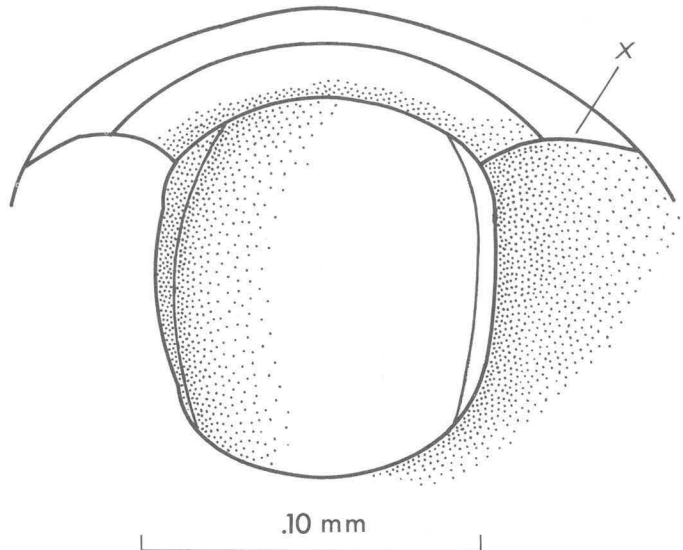


FIGURE 325.—Specimen D. *Escharoides* sp? Details of secondary orifice showing curved line, \times on both sides, along which zooecia tend to split.

Genus and species undetermined

Figure 326

Specimen E was taken from cuttings at 830–840 feet (Tertiary *g*) in drill hole E-1 and consists of a small coral with parts of two zooecia cemented to its underside. The section of the drill hole from which this specimen comes is described (Ladd and others, 1953, p. 2264) as

Buff, weakly cemented limestone made up of coral (slender, branching forms and more massive types, including *Porites* and *Millepora*), shallow-water gastropods with original shell (*Polinices*, *Cerithium*, *Cypraea*, *Trivia*, *Conus*, *Bulla*) and beach-type Foraminifera.

The bryozoan remains compromise two zooecia with their basal walls removed exposing an internal view of

evenly perforate frontal walls and a semicircular orifice (fig. 326) with concave proximal margin. In the absence of any details of the external frontal aspect, such as ovicells or avicularia, it is difficult to determine the identity of the specimen either generically or specifically. However, it may be stated definitely that this is an Ascophoran Cheilostomatous bryozoan with a hippoporine orifice. In the shape of the orifice and the evenly perforate convex frontal wall, there is a resemblance to the type species of *Cosciniopsis*, *C. coelatus* Canu and Bassler, 1927, a Recent species from the Sulu Archipelago, Philippine Islands.

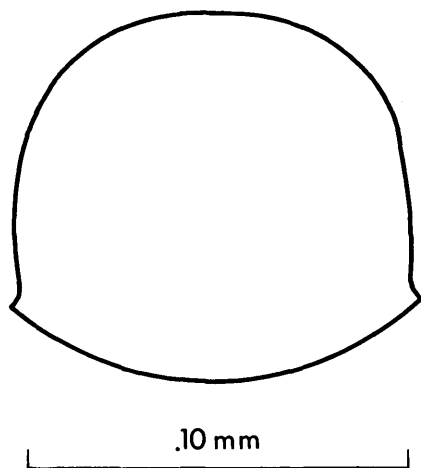


FIGURE 326.—Specimen E. Suborder Ascophora. Shape of orifice.

?Family RETEPORIDAE

Genus and species undetermined

Figure 327

Specimen F, obtained from cuttings taken at a depth of 2,830–2,840 (Tertiary *b*) feet in drill hole E-1, is a part of a dendritic growth rising about 2.5 mm above a flattened subcircular base 1.75 mm in greatest width. The branches are subcylindrical, about 0.5 mm in diameter, and have irregular tubules arising on all sides and with some degree of regularity. Some of the tubules are long, others are short and merely salient openings on the main branches, all with terminal subcircular openings (orifices?) with strongly thickened margins. A number of these openings are subtended by smaller subtriangular openings, which may be avicularia. Both the main branches and the tubules are imperforate and

prominent vibices appear in several places on the surface of the main branches (fig. 327).

The nonperforate nature of the zoarium and the presence of subsidiary structures resembling avicularia suggest affinities with the Cheilostomata. Vibices are a common feature of reteporidans. On the other hand, the arrangement of the “orifices” on all sides of the “trabeculae” is not that generally observed in the Reteporidae, and in the present specimen there is no certain indication that the branches fused to form the network so typical of that family.

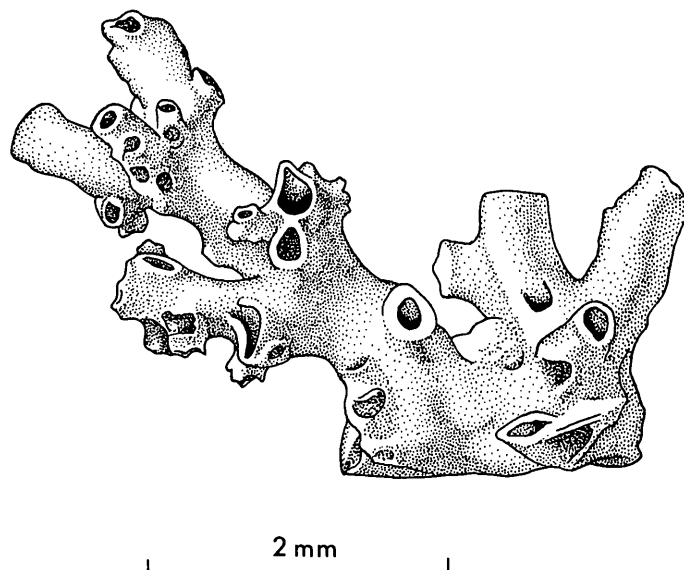


FIGURE 327.—Specimen F. ?Family Reteporidae. Sketch of colony.

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