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# BRYOZOA FROM THE LATE MIOCENE MICA CLAY OF MORSUM KLIFF, SYLT, WESTERN GERMANY

by

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Cadée, G. C. Bryozoa from the Late Miocene mica clay of Morsum Kliff, Sylt, Western Germany. - Meded. Werkgr. Tert. Kwart. Geol., 14 (2): 43-50, 1 Tab., 1 Pl. Leiden, june 1977.

The RGM collection from Morsum Kliff contained only seven species of Bryozoa. Three lunulitiform species (Lunulites burdigalensis, Cupuladria haidingeri and C. canariensis) formed the bulk of the sample. This predominance of free-living cup-shaped Bryozoa is well-known for Miocene mica clay deposits in NW Europe. Comparison with the Recent occurrence of lunulitiform Bryozoa indicates that they are thriving in (sub-)tropical environments, where sedimentation prevails. The rarity of solid substrates (shells, stones, algae) accounts for the paucity of other Bryozoa.

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Contents:

SAMENVATTING

De collecties van het Rijksmuseum van Geologie en Mineralogie te Leiden van het Morsum Kliff op Sylt bevatten slechts zeven soorten Bryozoa. Drie lunuliteforme soorten (*Lunulites burdigalensis, Cupuladria haidingeri* en *C. canariensis)* vormen de hoofdmoot. Dit overheersen van hoedvormige vrijlevende Bryozoa in de miocene mica-kleien van NW Europa is niet nieuw. Bestudering van recente lunulitiforme bryozoen heeft aangetoond dat zij in staat zijn te leven in een (sub)tropisch milieu, waar sedimentatie overheerst en waar andere soorten ontbreken omdat geschikt substraat (schelpen, stenen, algen) voor hen ontbreekt.

## INTRODUCTION

The collections of the Rijksmuseum van Geologie en Mineralogie at Leiden (RGM) contain some samples of Bryozoa from the Morsum Kliff at Sylt, collected by A. W. Janssen in 1973-1975. In a recent paper on Miocene Bryozoa from NW Germany (Buge, 1973) this locality is not mentioned. Moreover, some boring Bryozoa were found not encountered by Buge. Publication of the species found therefore seems justified.

## MATERIAL

The material consists of several hundreds of bryozoan specimens from four fossiliferous layers in the Morsum Kliff. These layers could be correlated by Janssen (1975) with those in a section of the Dammbau-Grube (now under water), Nösse, at Sylt, described by Bentz (in Staesche, 1930).

## BRYOZOAN SPECIES FOUND

The material consists largely of cup-shaped so-called lunulitiform Bryozoa. The convex side of the colonies contains the zooecia in which the animals lived and smaller openings (vibracularia) which contained chitinous movable setae, used for clearing the colonies from sediment particles. The concave basal side of the colonies is provided with grooves, pores may be present. In general the basal side is better preserved in fossils. Fortunately identification to species level is often possible with the characters of the basal side only.

*Lunulites burdigalensis* Canu, 1909
Plate 1, fig. 1a-b

1973 *Lunulites burdigalensis* - Buge: 37, pl. 7, fig. 7-9.

This species is characterised by alternating rows of zooecia and vibracularia on the convex side of the zoarium. The concave basal side of the colony has undulating radial

grooves and three to four rows of pores in the sectors between these grooves.

*Cupuladria haidingeri* (Reuss, 1847)
Plate 1, fig. 2a-b

1973 *Cupuladria haidingeri* Buge: 36, pl. 6, fig. 3-4.

Each zooecium is accompanied by a vibracularium as in *C. canariensis*. The zooecium is partly closed by a calcareous plate which leaves a characteristic dentated opening. In the central part of the colony the zooecia are closed by secondary calcification. The concave side of the colony has radial grooves only, the sectors in between are covered by small tubercles.

*Cupuladria canariensis* (Busk, 1859)
Plate 1, fig. 3

1973 *Cupuladria canariensis* - Buge: 36, pl. 6, fig. 1-2.

Differs from the foregoing species by the absence of the dentated calcareous closing plate; the central zooecia are not closed and the concave side of the colony is divided by radial and tangential grooves in irregular sectors with a variable number of pores.

*Biflustra savartii* (Savigny-Audouin, 1826)
Plate 1, fig. 4a-c

1952 *Biflustra savartii* - Lagaaij : 19, pl. 1, fig. 3.

Only very small fragments of this species were found. Unilamellar colonies, zooecia rectangular, arranged in regular longitudinal rows.

*Cellaria marginata* (Münster in Goldfuss, 1829)
Plate 1, fig. 5a-b

1973 *Cellaria marginata* - Buge: 40, pl. 5, fig. 1-2, pl. 7, fig. 4.

Only two fragments found. *Cellaria* colonies consist of cylindrical internodes, which are connected by chitinous tubes. The bush-like colonies are anchored with rootlets in the bottom.

*Spathipora* sp.
Plate 1, fig. 6

1953 *Spathipora* - Bassler: 37, fig. 9 (6).

A boring bryozoan with characteristic fusiform pits arranged alternately on the left and the right side of a groove. The pits contained the animal, the grooves the connecting stolon. Found only in two shell fragments.

*Immergentia* sp.
Plate 1, fig. 7

1953 *Immergentia* - Bassler : 37.

The pits are situated on the groove of the stolon. Differs from *Terebripora* by the absence of secondary grooves attached to the sides of the pits. Found in one ehell fragment only.

Identification to the species level is only possible after impregnation of the shell fragments with polyester resin, followed by dissolution of the shell material with dilute hydrochloric acid (Pohowsky, 1974) This yields casts of the Bryozoa which can be studied by (scanning-electron) microscopy.

## DISTRIBUTION OF THE BRYOZOA IN THE DIFFERENT LAYERS

All data are collected in table 1. Bryozoa other than lunulitiform occur only in the *Aporrhais* zone. Observations on living lunulitiform species (Marcus & Marcus, 1962; Cook, 1963; Greeley, 1967) have indicated that after settlement of the larvae on a small grain of shell or sand these Bryozoa live free on the sediment, supported by the marginal setea. The setae serve to free the colonies from sediment particles and even if the colonies become burried under a layer of sediment they can free themselves by using these setae. This freeliving habit enables them to live in muddy and sandy sediments hostile for most other Bryozoa, which need a hard substrate to grow on. The Miocene deposits of the North Sea Basin are a nice example, the lunulitiform Bryozoa form the bulk of the Bryozoa present, as already noted by Buge(1973 : 47).

Frequently different lunulitiform species occur together. This holds for the Tertiary deposits of the North Sea Basin (Lagaaij, 1953) and recent examples are given in Cadée (1975).

Remarkable is the absence of another lunulitiform species, *Discoporella umbellata* (Defrance), widespread in the middle-miocene deposits of the North Sea Basin. Buge (1973: 47) found this species to be very rare in Late-Miocene deposits of NW Germany and supposes a migration to lower latitudes as a consequence of the climate becoming colder. I agree with this. Galopim de Carvalho (1971) reports this species from the Pliocene of Portugal, Cook (1965) from the Pliocene of Italy. It is absent from the Pliocene of the North Sea Basin. Its northern limit now is Madeira, Canaries and Algeria (Cook, 1965). The migration to lower latitudes is well documented.

The *Aporrhais* zone is somewhat richer in species. Apparently during the formation of this zone sedimentation was less and shells laying on the surface could be colonized by boring Bryozoa. But sedimentation still prevailed and no rich bryozoan fauna could establish. *Cellaria* is according to Lagaaij & Gautier (1965) of all the species in the marine Rhone delta area one of the least sensitive to a moderate supply of fine sediment. The more temperate *Cellaria* species apparently replace the tropical and subtropical lunulitiform species in deltaic deposits. They are still rare in Miocene deposits but are frequently found in Pliocene deposits of the North Sea Basin where lunulitiform species become rarer. *Cellaria* predominates in recent sediments of the Rhone delta where lunulitiform Bryozoa are absent (Lagaaij & Gautier, 1965).

| Species / Zone | *Lunulites burdigalensis* | *Cupuladria haidingeri* | *Cupuladria canariensis* | *Biflustra savartii* | *Cellaria marginata* | *Spathipora* sp. | *Immergentia* sp. | RGM sample registration numbers |
|---|---|---|---|---|---|---|---|---|
| Abt. III, ± Schicht 11 | | x | x | | | | | 220 406<br>221 299 |
| Niveau mit *Aporrhais* | | x | x | x | x | x | x | 220 148<br>221 290-3<br>221 297 |
| Niveau mit *Ditrupa* | | x | x | | | | | 220 247<br>220 298 |
| Niveau mit *Dentalium* | x | x | x | | | | | 220 328<br>221 300-1 |

Table 1. Distribution of the Bryozoa over the different zones. The zones are correlated with those of Bentz (in Staesche, 1930) by A.W. Janssen (1975). The last column gives the sample registration numbers of the Rijksmuseum van Geologie en Mineraologie at Leiden.

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EXPLANATION OF PLATE 1.

Fig. 1a-b *Lunulites burdigalensis* Canu
Fig. 2a-b *Cupuladria haidingeri* (Reuss)
Fig. 3 *Cupuladria canariensis* (Busk)
Fig. 4a-c *Biflustra savartii* (Savigny-Audouin)
Fig. 5a-b *Cellaria marginata* (Münster in Goldfuss)
Fig. 6 *Spathipora* sp.
Fig. 7 *Immergentia* sp.

All specimens from Late-Miocene mica-clay of Morsum Kliff, Sylt, NW Germany. Barlenth corresponds to 1 mm. All specimens are kept in the collections of the Rijksmuseum van Geologie en Mineralogie at Leiden (The Netherlands).

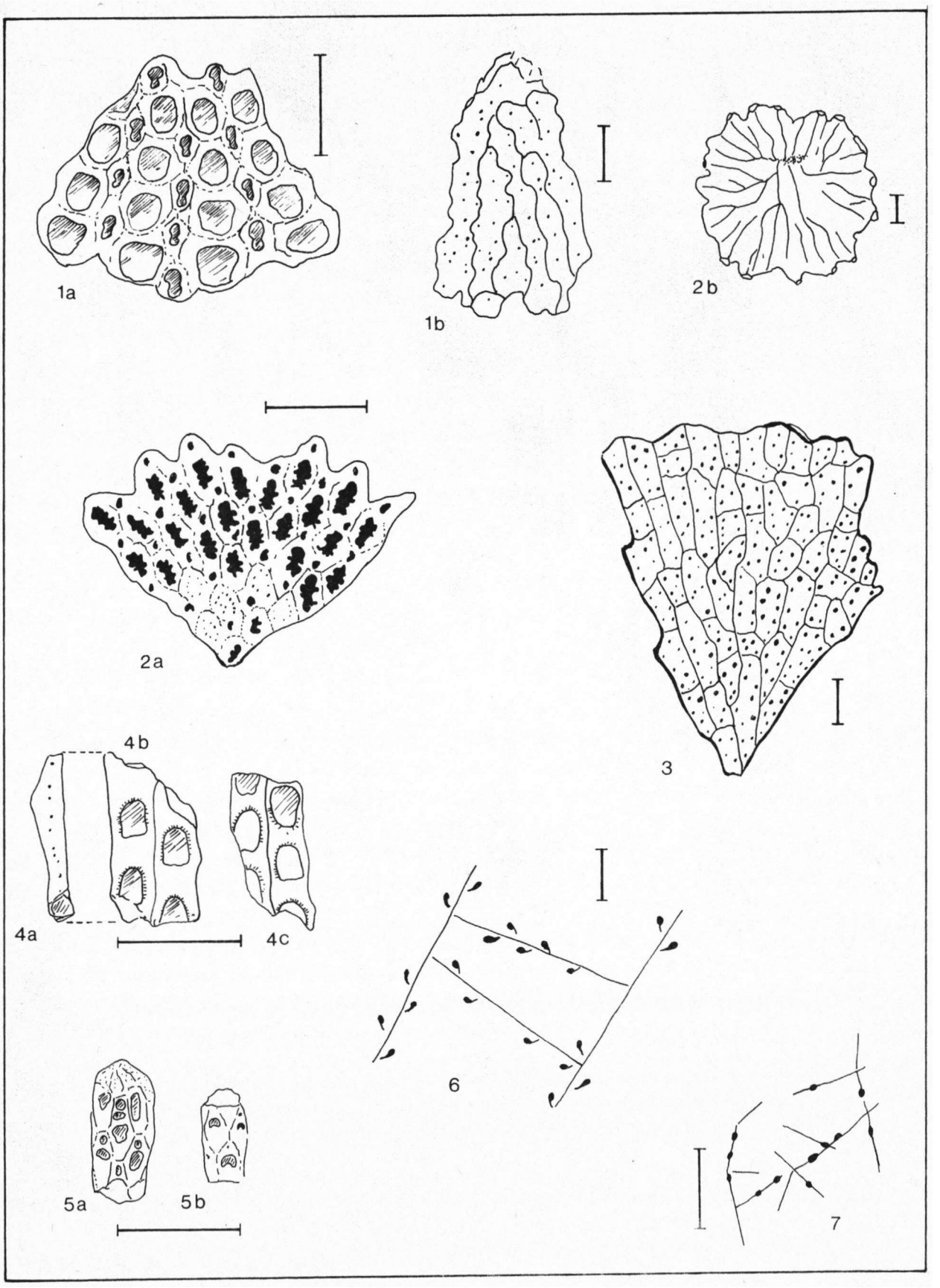


Plate 1

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