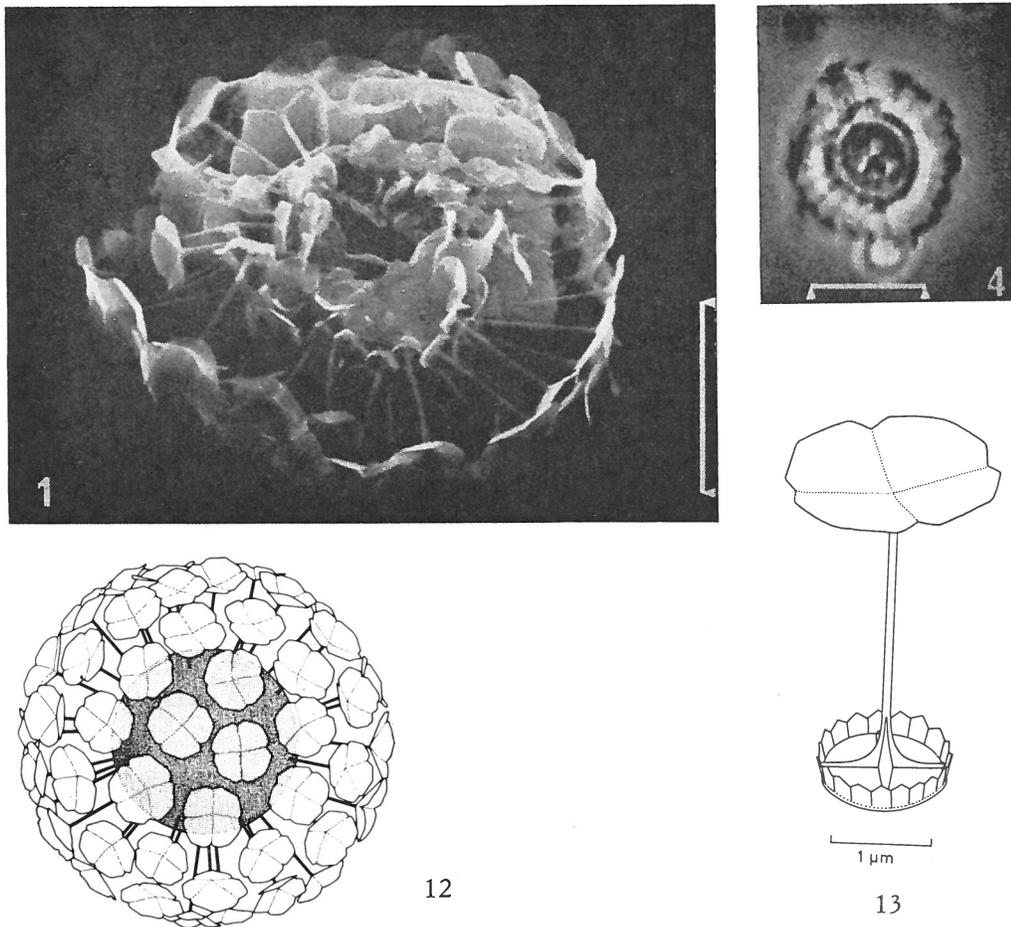


Papposphaera lepida TANGEN, 1972



Figs. 1, 4, 12, 13 — *Papposphaera lepida* n. sp. 1) SEM. Holotype collapsed and partly disintegrated on the grid. Scale 5 μ. 4) LM. Holotype in equatorial focusing. Scale 10 μm. 12) Diagrammatic drawing of a coccolith. 13) Diagrammatic drawing of a coccosphere indicating the spacing of the coccolith appendices. 14) The occurrence related to temperature and salinity. Circles show temperature and salinity of all examined samples. Filled circles: *Papposphaera lepida* n. sp. present.

Description:

Latin diagnosis: Per microscopum ordinarium observata. Coccosphaera interdum bilateraliter planior cum paulo minoribus coccolithis in lateribus planioribus. Cellula 50-100 coccolithis hyalinibus tecta, aequaliter in superficiem cellulae distributis. Diametrus corporis cellulae 4,5-7 μm, diametrus coccosphaerae 11-16 μm. Appendix coccolithi stilus tenuis, longitudo 2.0-3.9 μm, cum structura distali infundibuliformi, diametrus 1.1-2.1 μm.

Per microscopum electronicum observata. Pars inferior coccolithi elongata ad

rotundam, longitudo axis 0.8-1.4 μm . Orbis marginalis 18-24 tenuibus bracteis compositus, como dilatans distaliter, angulus ad bracteam circiter 105 graduum; altitudo orbis marginalis 0.2-0.35 μm . Longitudo appendicis 2.3-4.0 μm , diameter stili 0.08-0.12 μm , angulus ad structuram distalem circiter 110 graduum. Lobi rotundi ad quadratos, ad 0.05-0.2 μm incisi.

Observations in LM. Cocosphere sometimes bilaterally flattened with slightly smaller coccoliths on flattened sides. Cell covered with 50-100 hyaline coccoliths equally distributed on cell surface. Diameter of cell body 4.5-7 μm , cocosphere diameter 11-16 μm . Coccolith appendix a delicate rod, length 2.0-3.9 μm , with distal funnel-shaped structure, diameter 1.1-2.1 μm .

Observations in SEM. Basal part of coccolith elliptical to subcircular, long axis 0.8-1.4 μm . Marginal ring composed of 18-24 thin plate elements, conically expanding distally, angle to bottom plate about 105 degrees; height of marginal ring 0.2-0.35 μm . Length of appendix 2.3-4.0 μm ; diameter of rod 0.08-0.12 μm , angle to distal structure about 110 degrees. Lobes rounded to four-sided, incision depth 0.05-0.2 μm .

Remarks:

The coccoliths of *Papposphaera lepida* n. sp. have four decurrent ridges on the proximal part of the appendix rod; the ridges diverge at the bottom plate and form a distinct cross (Fig. 7). The delicate marginal ring which is composed of flat pentagonal elements resembles a crown with irregular toothed upper rim (Fig. 3). In LM the cross at the bottom plate is invisible while the coccolith basis looks crenated; the individual crowns, however, cannot be distinguished. The narrow outward expansion at the basis of the crown (Fig. 11) is possibly a ring composed of small elements, but this is not clarified so far. In contrast to *Discosphaera tubifer* (MURR. & BLACKM.) Ostenf. the coccolith appendix of *Papposphaera lepida* is definitely not tubular. At the distal end of the appendix rod there is a wide funnel-shaped structure which is composed of four lobes between which there are shallow incisions. Each of the lobes is flattened so that the funnel looks like a pyramid which is turned upside down. A schematical drawing of a coccolith is presented in Fig. 12. The main pattern of the coccoliths seems to be uniform, but some cells are slightly bilaterally flattened with smaller coccoliths on the two flattened sides.

Several extinct coccolithophorids are characterized by having the same basic architectural plan of the coccolith as *Papposphaera lepida* an elliptical to subcircular base with four converging bars which are connected to a central more or less complex upright structure. Perch-Nielsen (1968) described several fossil genera with coccoliths of that type within the families Eiffellithaceae (REINHARDT) PERCH-NIELSEN and Podorhabdaceae NOËL. However, they all seem to have a much more complex marginal ring than *Papposphaera lepida*. Deflandre (1959) described a Cretaceous coccolith type with a simple marginal ring, *Zygrhablithus intercisus* (Deflandre) Deflandre (= *Deflandrius cretaceus*) (Deflandre) Perch-Nielsen pro parte, but the cross was diagonally oriented and the appendix differed considerably from that of *Papposphaera lepida*.

As pointed out by Black (1968), the same architectural plan is also found among uncalcified Haptophyceae, e.g. some body scale types within the genus *Chrysochromulina* LACKEY.

The general impression of *Papposphaera lepida* in LM (Figs. 4, 5, 9, 10) is much the same as that of *Discosphaera tubifer*, and the two species might have been confused in previous investigations, although *Papposphaera lepida* looks more

delicate because of the very thin and hyaline coccolith appendices. Lohmann's description of *Discosphaera tubifer* (LOHMANN 1920) includes a cell with as much as 84 coccoliths, which is considerably more than other authors have reported, and that cell may therefore have been a specimen of the genus *Papposphaera* gen. nov.

The recorded cell numbers during the investigated period are listed in Table I. Maximum cell number was 10,000/litre 2nd Sept. at 2.5 m depth. At this date there was a bloom of coccolithophorids with *Coccolithus huxleyi* (LOHM.) KAMPT. as the dominating species in the brackish surface water, with 9.7 mill. cells/litre, and *Calciopappus caudatus* GAARDER & RAMSFIELL dominating below the halocline, with 2.5 mill. cells/litre at 2.5 m depth. The occurrence of *Papposphaera lepida* related to temperature and salinity is presented in Fig. 14. For the majority of records the salinity was above 27‰ although the total salinity range was 10.3-30.3‰. The temperature dependence is quite obscure, observations being scattered almost over the whole range, 6.5-20.5 centigrades. The observations indicate that the species may be stenopolyhaline and eurytherm.

Most of the observations are from levels where the water masses are strongly influenced by marine water brought into the fjord by tidal currents. It seems, therefore, reasonable to regard *Papposphaera lepida* as an allochthonous element of the phytoplankton community inside the fjord. In a previous all-year investigation in Nordasvatnet (Braarud & Hope 1952, Hope 1952) neither this species nor *Discosphaera tubifer* with which it might have been confused, were observed. Two recent investigations performed at Institute of Marine Biology, Section B, University of Oslo, have demonstrated a wide geographic distribution of *Papposphaera lepida* in the Atlantic region. Throndsen (1972) reports the species (Coccolithophorid sp. 2 from two stations in the Caribbean, one station southwest of Jamaica (St. 03. 16°21N, 78°45W, depth 6 m), the other between Cuba and Haiti (St. 18. 19°21N, 73°47W, depth 91 m). Berit R. Heimdal (pers. comm.) has observed some specimens in SEM preparations from surface samples off the coast of North-West Africa (St. 12014-1. 24°25.0N-25°48.5N, 14°43.0W-15°33.0W); the cells were somewhat more calcified than the Nordasvatn cells. Both in the Caribbean and the North-West African samples *Papposphaera lepida* n. sp. was observed together with *Discosphaera tubifer* from which it could hardly be distinguished in LM preparations.

Type level:

Recent.

Type locality:

Nordasvatnet, Bergen, Hordaland, Western Norway.

Depository:

Institute of Marine Biology, Section B, University of Oslo.
Holotype: KT 15-71; paratype: KT 26-71.

Author:

Tangen K., 1972, p. 172; figs. 1-14.

Reference:

Papposphaera lepida, gen. nov., n. sp., a New Marine Coccolithophorid from Norwegian Coastal Waters. Norwegian Journal of Botany, vol. 19, no. 3-4, pp. 171-178, figs. 1-14, 1 tab.