

A NOTE ON NANNOFOSSIL PREPARATION OF ORGANIC-RICH MUDSTONES USING POTASSIUM HYDROXIDE

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Abstract: During a recent nannofossil study of Paleocene marine mudstone from the Nuussuaq Peninsula, central W Greenland, a preparation technique using 10% potassium hydroxide was tested in order to remove amorphous organic material from the samples because this was obscuring the nannofossil component. The test proved to be successful.

Introduction

More than 200 dark mudstone samples were collected from three outcrops and four onshore wells from the Nuussuaq Peninsula between 1990 and 1998, in order to establish a refined Lower Paleocene biostratigraphic zonation for the area, based upon nannofossils and dinoflagellate cysts (Nøhr-Hansen *et al.*, in press). During an initial reconnaissance of several slides, it was clear that a small calcareous component was present, although largely obscured by organic amorphous debris. Consequently, conventional methods for nannofossil preparation required modification.

Methodology

Initially, a standard nannofossil preparation technique, previously used for chalk samples at GEUS, was utilised: approximately 1cm³ of sediment was crushed and added to a glass tube along with distilled water. The tube was shaken for 15 seconds and the suspension allowed to settle for 30-60 seconds. A few drops were pipetted from the middle of the liquid fraction, placed on a glass coverslip, spread evenly using a toothpick and allowed to dry. Two to three drops of Norland optical adhesive were added to the coverslip, which was then placed onto the sample slide, exposed to daylight (UV light) and left to cure for 24 hours. However, this technique was modified for two main reasons:

1. the mudstones contained a high percentage of organic matter; any calcareous material that the sample contained was largely masked by this amorphous organic matter; and

2. the sediments were found to be rich in sulphur; water used in the preparation of the slide is likely to react with the sulphur in the mudstones to form sulphuric acid and this would dissolve away any calcareous component the sample might contain.

To counteract this, the sediment was added to a 10% potassium hydroxide (KOH) solution and allowed to stand for 3-5 minutes to remove the humic material by oxidation. The sample was then centrifuged, decanted and a small amount of ethanol was added instead of distilled water in order that a potential reaction between sulphur and water be avoided. A glass tube containing the sample was shaken and allowed to settle before a few drops were pipetted from the middle part of the liquid, as before. The rest of the nannofossil slide preparation was carried out as previously described.

Results

The samples prepared with KOH yielded poorly-preserved, fairly low-abundance and low-diversity nannofossil assemblages. Whole coccolith specimens were only rarely encountered, often only outer rim-cycles or remnants remaining, as illustrated on Plate 1, Figures 1 and 2. However, the main organic component had been successfully washed away, allowing for a more efficient analysis of the slide than previously. Plate 1, Figure 3 shows the degree to which the organic matter obscures the calcareous component in an unadulterated sample. The calcareous nannofossils appear to have been left virtually intact after the oxidation step.

Previous techniques

Techniques used for the breakdown of humic (amorphous organic carbon) material have been previously described for palynomorph preparation (Sarjeant, 1974; Wood *et al.*, 1996). Oxidising agents (*e.g.* potassium carbonate, potassium hydroxide, sodium hydroxide, ammonium hydroxide) were used to remove the amorphous organic component. More recently, Eshet & Moshkovitz (1995) and Eshet (1996) described a similar technique to prepare organic carbon-rich sediments for nannofossil analysis with a 10% sodium hypochlorite solution in order to remove the amorphous organic material.

Conclusion

The use of KOH as an oxidising agent on amorphous organic carbon-rich mudstone samples from the Nuussuaq Peninsula, W Greenland, enabled the recovery of a significant amount of nannofossils. This allowed an integration of the nannofossil biostratigraphy with the palynological biostratigraphy and the erection of a detailed biostratigraphic zonation of the Lower Paleocene, onshore W Greenland.

Acknowledgements

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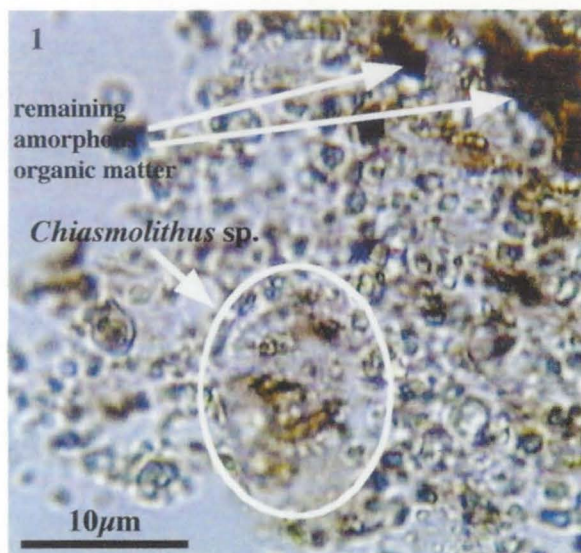
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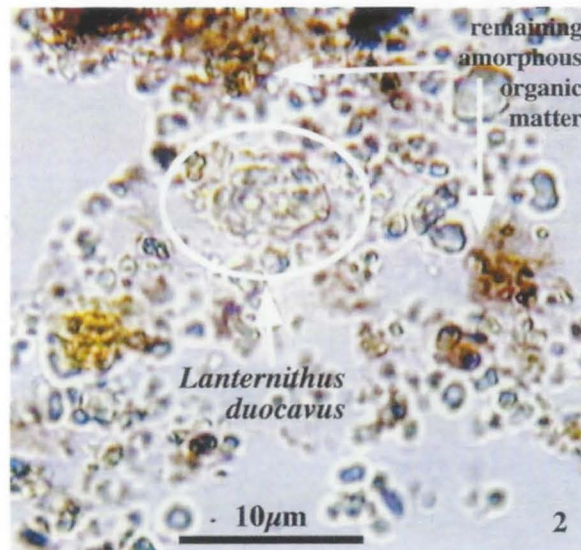
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PLATE 1

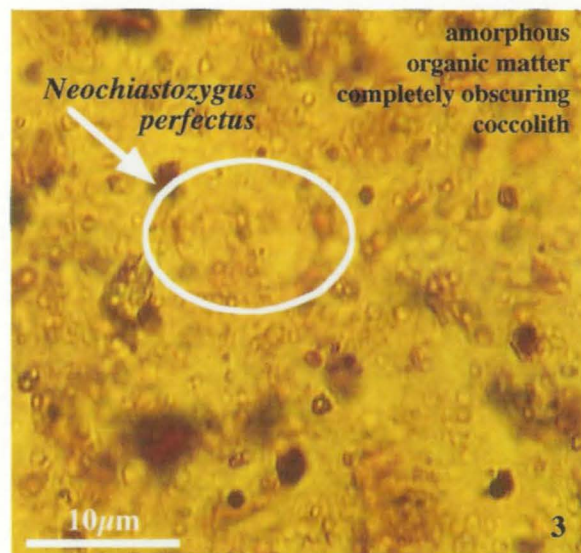
LVR = laser video record



After preparation with KOH (Kangilia outcrop; LVR10992; Sample 369733-C780)



After preparation with KOH (Kangilia outcrop; LVR10989; Sample 369712-C775)



Before preparation with KOH (Well Gane #1; LVR10973; Sample E604)