

ABSTRACT

Calcareous nannoplankton may be extracted and concentrated by "short centrifuging". A method of mounting the specimens on slides is described.

A preparation technique for calcareous nannoplankton

A. R. EDWARDS

*New Zealand Geological Survey
Lower Hutt, New Zealand*

INTRODUCTION

The technique described below was developed for the extraction of the Coccolithophoridae and related nannoplankton by an essentially nonchemical method from fine-grained marine sediments such as mudstones, siltstones and limestones. Although developed for use with the coccolithophorids, this technique could easily be adapted to suit the requirements of microforaminifera, silicoflagellates and small diatoms.

Although the calcareous nannoplankton can be easily and simply extracted and mounted, careful and methodical scientific work with this group of Protista requires attention to some special problems.

Due to the small size of the calcareous nannoplankton (usually 1–25 microns), the chances of contamination are higher than for most other fossils. To combat this difficulty special care is needed, when preparing slides, to keep rock dust to a minimum and to see that all equipment is spotlessly clean. By using inexpensive materials which are discarded after use, the chances of contamination are reduced and time is saved in cleaning. Such materials include paper drinking straws attached to a medicine dropper instead of pipettes, and wooden tooth picks for removing bubbles in the mounting medium.

A mounting medium which is permanent, solid and chemically inert is necessary to preserve specimens permanently with the minimum of corrosion. Furthermore, the mounting medium needs to have a refractive index below or between those of calcite (1.658 and 1.486), so as to avoid the effect of inverted relief.

Since important and diagnostic structures of the nannoplankton can be seen only under the polarizing microscope, chemical processes which destroy the crystal structure cannot be used. Also, the specific gravity of coccoliths and common rock-forming minerals is too similar to separate them by using heavy liquids. However, because coccoliths with diameters of four microns and less have distinctive features visible only under the electron microscope, they may be removed, together with all the fine debris, by "short centrifuging" (Funkhouser and Evitt, 1959). This step results in better slides in which the individual specimens are not encumbered by fine debris.

EXTRACTION

Approximately 5 grams of rock are crushed, passed through a 30-mesh sieve and then placed in a 50-cc.

centrifuge tube. Distilled water is added and the mixture is thoroughly stirred. The sample is "short centrifuged" by accelerating to 300 r.p.m. and held at that speed for 15 seconds before decelerating (using brake, if possible). The decantant is set aside and the process is repeated 3 to 8 times until the decantant is nearly clear. The decantant is "short centrifuged" again at 850 r.p.m. for 30 seconds and is then set aside for later examination. The residue contains that portion of the sample having a particle size between 3 and 25 microns. In sediments such as bentonitic claystones, 0.5–2 cc. of 2% solution of Cellosize, added before centrifuging, helps stop flocculation, but it must be used in moderation or it may discolour the mount. When quick examination of samples is required, "short centrifuging" is omitted.

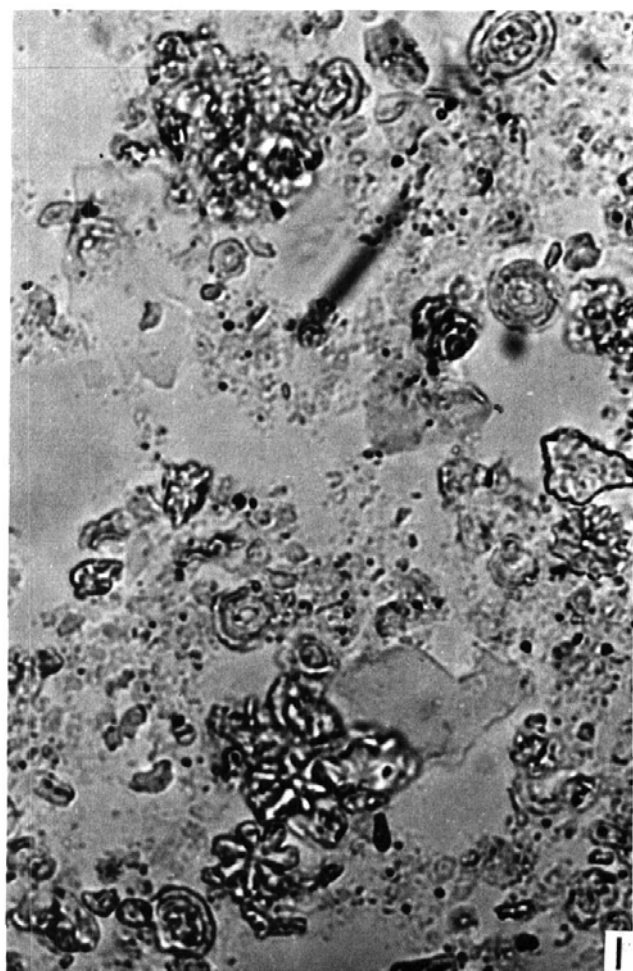
MOUNTING

Distilled water and up to 1 cc. of Cellosize, whenever necessary, are added to the residue before the contents of the tube are mixed. This part of the technique employs an electric air pump, attached to which is a replaceable paper straw. After the air pressure has been regulated, the straw is inserted into the residue in the test tube, and the bubbles stir the sediment, permitting a homogeneous sample to be drawn off with the straw pipette. One or two drops of the mixture are spread over a cover slip ($1\frac{1}{2} \times \frac{7}{8}$ inches), which is then dried under a 250-watt infra-red bulb. One or two drops of the liquid mounting medium are placed on a clean glass slide and the cover slip is placed in position. The slide is heated to 70°C on a slide warmer to gently drive off the solvent. On cooling, the mounting medium becomes solid.

For very detailed examination a viscous silicone, similar to that described by Bramlette and Sullivan, 1961, is used as a semipermanent mounting medium (see under chemicals, below). By means of this medium, specimens can be oriented and photographed from any angle.

STORAGE

The residues are placed in glass specimen tubes (2 inches \times $\frac{1}{2}$ inch), while the unprepared portion of the sample is stored in a small plastic bag. In this way additional slides can be prepared later with a minimum of effort. The residue must be kept wet or it will cake and become useless.



TEXT-FIGURES 1-2

Photomicrographs of two slides of a New Zealand lower Eocene nannoplankton fauna. Text-figure 1 was prepared by standard methods, text-figure 2 by the technique described herein. Note the absence of fine detrital material in text-figure 2.

CHEMICALS

Gurr's neutral mounting medium is dissolved in acetone in the ratio of 2:1 to form the liquid mounting medium (refractive index 1.52). During preparation, gentle heating and stirring of the mixture helps speed the action of the solvent.

A suitable silicone for use as a viscous mounting medium is manufactured by the Dow Corning Corporation of Midland, Michigan, U.S.A. (200 fluid-viscosity grade 60,000).

Cellose (hydroxyethyl cellulose no. WP-09) is prepared as described by Jeffords and Jones (1959).

Trichlorethylene, a dry-cleaning fluid, is used to clean glass slides. After immersion overnight the slides are given a light rub-over before the solvent evaporates.

ACKNOWLEDGMENTS

The technique described here is mainly an adaptation of techniques described previously by the following authors: Bramlette and Sullivan, 1961; Funkhouser

and Evitt, 1959; Jeffords and Jones, 1959; and Kamptner, 1952. I would also like to thank Mr. N. de B. Hornibrook, Senior Micropaleontologist, Mr. C. R. Lennie and others at the New Zealand Geological Survey for their advice.

REFERENCES

- BRAMLETTE, M. M., and SULLIVAN, F. R.
1961 - *Coccolithophorids and related Nannoplankton of the early Tertiary in California*. Micropaleontology, vol. 7, no. 2, pp. 129-188, pls. 1-14.
- FUNKHOUSER, J. W., and EVITT, W. R.
1959 - *Preparation techniques for acid-insoluble microfossils*. Micropaleontology, vol. 5, no. 3, pp. 369-375, text-figs. 1-2.
- JEFFORDS, R. M., and JONES, D. H.
1959 - *Preparation of slides for spores and other microfossils*. Jour. Pal., vol. 33, no. 2, pp. 344-347, text-fig. 1.
- KAMPTNER, E.
1952 - *Das mikroskopische Studium des Skelettes der Coccolithineen (Kalkflagellaten), Übersicht der Methoden und Ergebnisse. I and II*. Mikroskopie, vol. 7, nos. 7-8, pp. 232-244; nos. 11-12, pp. 375-386.