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A TECHNIQUE FOR DEPICTION OF GRIND SECTIONS OF FORAMINIFERA BY AID OF COMPILED ELECTRONMICROGRAPHS

by

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During studies of growth patterns and microstructure of some Lower Tertiary buliminid foraminifera, it became necessary to develop a technique which would allow preparation of overlapping electronmicrographs of replicas of etched sections undisturbed by the bars of the grids.

Inspired by a technique described by KRINSLEY and BÉ (1965) the following technique was developed:

The foraminiferal test is embedded in Lakeside 70 cement and ground to a level a little above the axial plan. The Lakeside is dissolved in alcohol and the test is embedded in Araldit. By aid of a needle the test is placed in the same position in the Araldit as it had in the Lakeside. By this double embedding it is possible to avoid air bubbles in the ground face as the Araldit flows readily into the opened chambers. If Lakeside cement is used for the final embedding the stripping of the replica becomes impossible as the replication material will dissolve the surface of the cement. To obtain the correct depth when grinding, the process is carried out under binocular microscope. Instead of grinding powder small ground glass plates are used. Water is used as lubricant, which makes the ground glass transparent and the grinding can be stopped as soon as the correct level is reached. The section is etched with an aqueous saturated solution of EDTA. Etching intervals of 15–30 seconds are sufficient. Afterwards the section is washed in distilled water and dried. It is replicated with collodium dissolved in amylacetate and the stripped replica is shaded with carbon in a vacuum evaporator.

A hole a little larger than the section is cut in the grid and it is covered with a formvar film. The shaded replica is cut with a scalpel to get a suitable size. It is placed with the shaded side downwards on the formvar film. The collodium is then dissolved in a reflux unit. The central part (where the bars are missing) may stick to the substrate and cause some difficulty when the grid is removed. This can be avoided by placing the grids on nuts.

The replica is photographed in the electron microscope with ca. 25% overlap.

The above described method has also been applied in studies of shell structure in ammonites.

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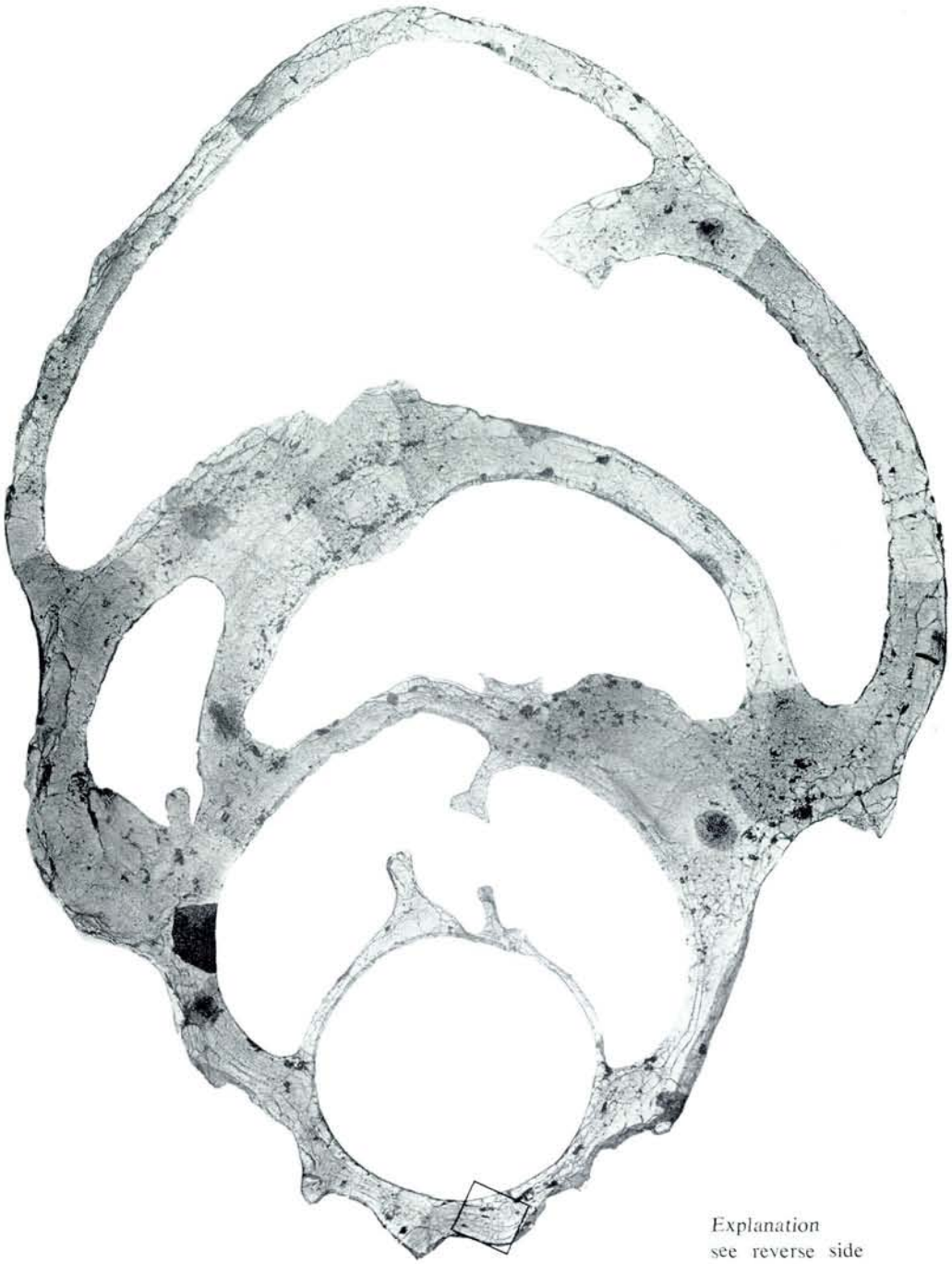
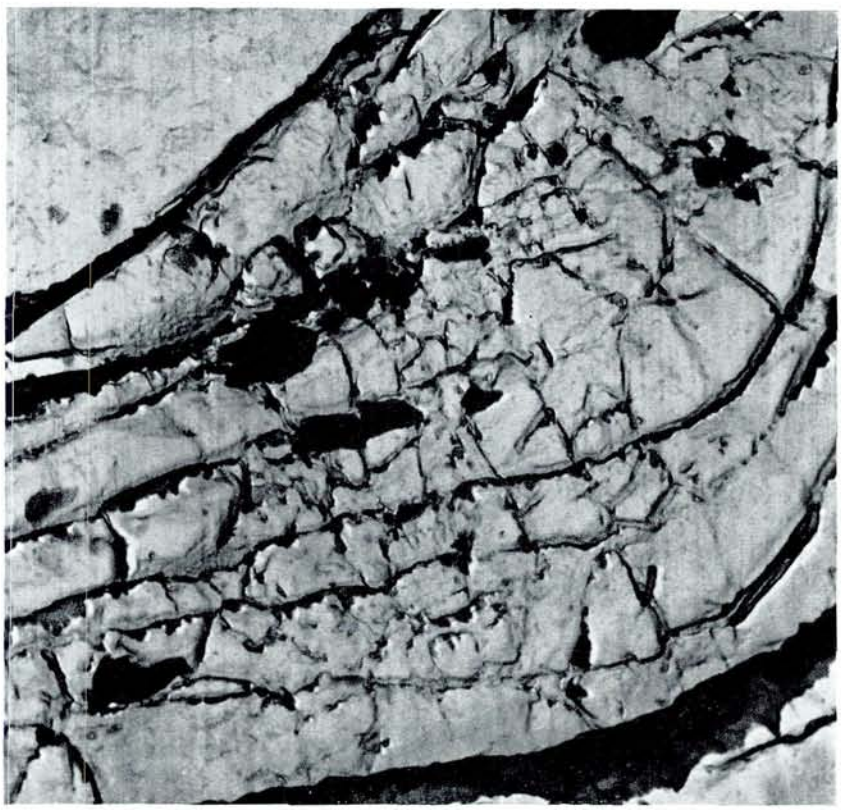


Explanation
see reverse side



Electron micrograph showing details of the growth lamellae of a basal spine of *Bulimina midwayensis* CUSHMAN & PARKER. The enlarged area is indicated on fig. 1. (Enlargement ca. 8750 ×).

Plate 1.

Longitudinal section of a megalospherical specimen of *Bulimina midwayensis* CUSHMAN & PARKER from the Lower Paleocene of Jutland (locality Basballe). The size of the original compiled picture is 66 by 90 cm. (Enlargement 2850 ×). It is composed of 42 overlapping electron micrographs. The growth lamellae are especially well exposed in the initial part of the test where they have a thickness of about 1 micron.

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EINE PRÄPARATIONSTECHNIK ZUR UNTERSUCHUNG VON NANNOPLANKTON IM LICHTMIKROSKOP UND IM ELEKTRONENMIKROSKOP

von

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Abstract

A method is described by which the same coccolith can be studied using an optical microscope followed by an electron microscope.

A drop of solution containing coccoliths is placed on a copper net which is covered by a formvar film. When dry the net is placed on a glass microscope slide, a drop of methylisobutylketone (n=1,396) is added, and it is covered with a coverslide. The sample can now be examined with an optical microscope.

When the coverslide is removed the methylisobutylketone evaporates and the net can be shadowed with carbon in a vacuum. The net is placed in dilute HCl, followed by HF. It is then washed and dried and is ready for electron microscope studies.

Zusammenfassung

Es wird eine Präparationstechnik beschrieben die es erlaubt, bestimmte Objekte, speziell Coccolithen und verwandte Formen, sowohl im Lichtmikroskop als auch im Elektronenmikroskop zu untersuchen.

Einleitung

Die Zahl der Unterschungen von fossilen Kalkflagellaten ist in den letzten Jahren stark gestiegen und es ist gelungen, Coccolithen und Discoasteriden zu stratigraphischer Gliederung heranzuziehen. Zur Untersuchung der 1–40 μ grossen Nannofossilien wird das Lichtmikroskop und das Elektronenmikroskop verwendet. Ausser HALLDAL, MARKALI & NAESS, die 1954 eine Methode beschrieben, um Objekte vom Lichtmikroskop auf markierte Plätze auf Elektronenmikroskopnetze zu bringen, brauchten meines Wissens alle Autoren bisher zwei verschiedene Präparate für die Untersuchung unter dem Licht- und dem Elektronenmikroskop. Während es bei grösseren Coccolithen, den meisten Discoasteriden und besonders charakteristischen Formen leicht möglich ist, sie nach der Betrachtung im einen Mikroskop im anderen wiederzufinden, ist dies bei kleinen oder uncharakteristischen Formen unsicher oder gar unmöglich. Es lag daher nahe, nach einer Präparationstechnik zu suchen, die es erlaubt, dasselbe Präparat und damit bestimmte einzelne Objekte sowohl im Licht-, als auch im Elektronenmikroskop zu untersuchen.

Präparationstechnik

Die Probe wird zuerst in destilliertem Wasser desintegriert, ev. mit Ultraschall behandelt und die Coccolithen durch Sedimentation oder Zentrifugation konzentriert (vgl. EDWARDS 1964 u. a.). Ein Tropfen der Aufschlämmung wird auf ein Kupfernetz gegeben, dessen Mitte z. B. mit einem V markiert ist und