SHORT COMMUNICATIONS

AN IMPROVED METHOD OF MOUNTING PALAEONTOLOGICAL SPECIMENS FOR SEM EXAMINATION

by E. M. FINCH

ABSTRACT. The technique involves the use of wax as the mounting medium for palaeontological specimens. A faster and more efficient mounting of specimens is achieved in addition to precise orientation and increased cleanliness of specimens. Following SEM examination, the specimens can be removed from the wax if necessary.

THE mounting of palaeontological specimens upon stubs prior to examination with the Scanning Electron Microscope (SEM) can be a lengthy and unsatisfactory exercise. When very small specimens are to be examined the need for a simple yet effective means of mounting is increased. Although the method to be described is primarily intended for use by the micropalaeontologist it is unlimited in its application.

Current methods of mounting the smaller specimens for SEM observation require the use of an adhesive such as liquid glue, gum, or double-sided sticky tape. Having used these mountants, the author believes them to have disadvantages which limit their usefulness. Of the three, the tape is the least troublesome, although the exact orientation of specimens is difficult to achieve. The glues and gums are entirely unsatisfactory since both can be transferred on to the surface of the specimens during mounting. This leads to the obscuring of detail and undesirable 'charging' effects (Pl. 59, fig. 2). In order to obtain adequate adhesion of the specimens to the stub it is necessary to use a large amount of glue. The excess glue is likely to flood into porous specimens such as planktonic foraminifera, thereby introducing artifacts and additional problems of 'charging'. The proposed, improved method employs the use of wax as the mounting medium (Pl. 59, figs. 3, 4, and 5).

METHOD

The wax, entitled 'Wax W' is supplied in stick form by the manufacturers (Edwards High Vacuum).

To begin with the surface of the stub must be coated with wax. The wax is softened in a bunsen flame and then applied to the stub surface. Gentle heating of the stub will cause the wax to flow evenly across the stub. The amount of wax that is put upon the stub is governed by the size of the specimen which is to be mounted. The larger specimens require more wax to secure them. As soon as the wax has cooled its surface may be washed with distilled water. The specimens can now be mounted upon the stub. This is usually carried out with the aid of an optical microscope. It is important

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that the microscope lamp has a heat-absorbing glass in place to prevent any softening of the wax at this stage. Place the specimens upon the waxed surface in a position which is as near as possible to the required orientation. Remove the heat filter from the lamp and allow the wax to soften in the beam. When the wax has softened, orientate the specimens to their final positions and gently press them into the wax. The wax will not penetrate the specimens unless it has been considerably overheated. If this happens the specimens are likely to disappear into the wax. Such temperatures are not necessary to soften the wax in order to secure the specimens.

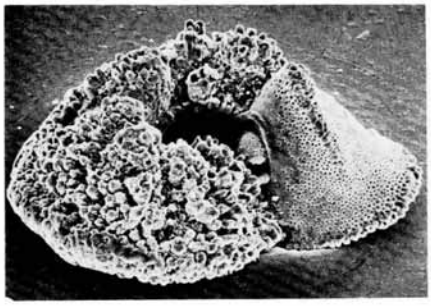
All manipulations of the specimens are performed with a paint brush (Series '00') and a fine sewing needle mounted in a suitable holder. If the specimens are too fragile to be pressed into the wax, a small indentation is made in the wax and the specimens are placed therein. In this case allow a longer time for the wax to soften. On subsequent hardening of the wax the specimens will be held firmly but safely in position. Alternatively, the softening of the wax can be allowed to proceed until the specimens settle into it of their own accord. As these steps are being carried out upon the stage of an optical microscope it is possible to see the depth to which the specimens become embedded in the wax. It is only necessary for the specimens to penetrate the surface of the wax for them to be completely secured (Pl. 59, fig. 1). Once the wax has hardened the specimens may be cleaned and washed if necessary. It is always advisable to wash the stub with distilled water to remove any debris that has accumulated during the mounting procedure. Remove all the surplus wax from the edge of the stub and paint around the edge with 'silver dag'. The stub may now be coated in the normal manner. The wax is unaffected by room temperature, vacuum pressures, ionic bombardment, or coating techniques. Once coated, the wax must not be allowed to soften.

This technique of mounting specimens can also be used for the noncalcareous microplankton. In this case the stub must be covered with a thin layer of wax. Before the wax has hardened, one or more of the standard transmission electron microscope copper grids are pressed into it. Individual specimens can then be placed within the grid squares or alternatively, a drop of concentrate can be deposited across the grid surface. The specimens are secured by softening the wax as previously described (Pl. 59, fig. 6). The main advantage in using the grids is that they enable re-location of specimens in a minimum of time.

Following SEM examination the stubs may be stored for an indefinite period, preferably at a low temperature. If necessary, the specimens may be removed from the wax by cutting the wax into strips and removing it from the stub with a scalpel blade. The wax is dissolved by an organic aromatic solvent such as xylene, benzene, or toluene and the specimens can then be recovered.

EXPLANATION OF PLATE 59

Fig. 1. Specimen mounted with wax demonstrates how only slight penetration of the wax is required to secure the specimen, × 100. Fig. 2. Internal view of specimen mounted with a liquid glue. Note obscuring of detail and 'charging' effects, × 160. Fig. 3. A similar specimen to that illustrated in Fig. 2, but mounted with wax. Note cleanliness of specimen, × 250. Fig. 4. Wax-mounted portion of outer test wall of a foraminifera. Both surface and pores are completely free of contaminant, × 1400. Fig. 5. Clearly revealed microcrystalline wall structure of foraminifer mounted with wax, × 1680. Fig. 6. Dinoflagellate cyst mounted with wax. Only the tips of some of the processes are within the wax but this is sufficient to retain the specimen, × 8000.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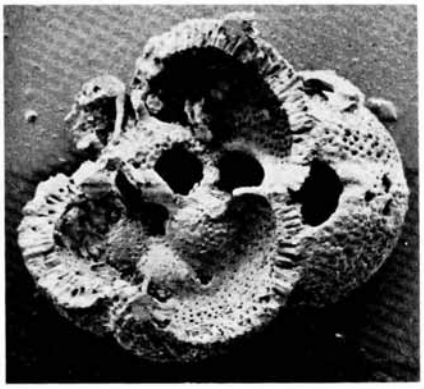
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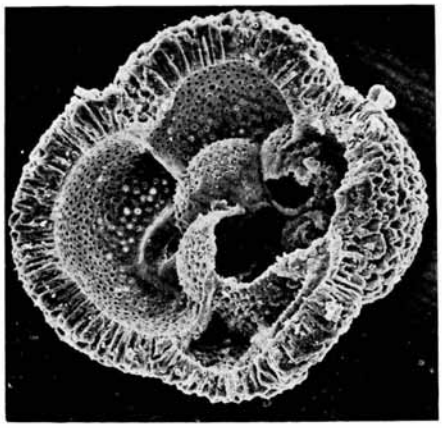
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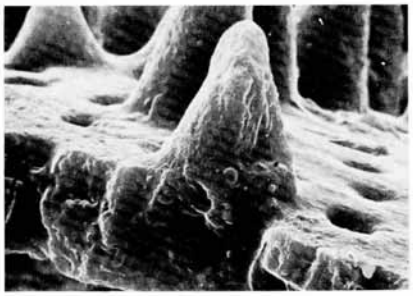
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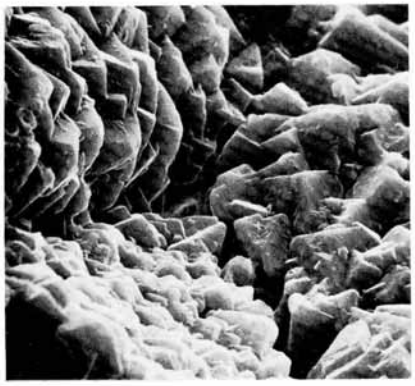
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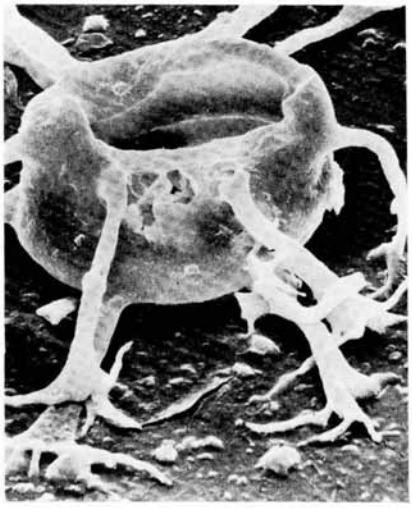
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FINCH, mounting for S.E.M.

In the author's experience there are no disadvantages associated with the use of this technique. By contrast, it enables a larger number of specimens to be mounted on any one stub. The actual number being limited only by the surface area of the stub. By following the correct procedure, the wax will not flood into the specimens thereby eliminating artefacts due to mounting materials. The charging effects associated with the use of other adhesives are overcome. With practice the technique provides a fast but safe way of mounting a wide variety of specimens.

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