TECHNIQUES USEFUL IN THE STUDY OF FOSSIL PLANTS

J. Hobart Hoskins and Aureal T. Cross
University of Cincinnati, Cincinnati, Ohio

ABSTRACT

Many techniques have been worked out after long hours of experimentation in the various paleobotanical laboratories throughout the world. Oftentimes the new methods are never published nor passed on to other workers. It is our purpose here to bring to light or revive some of those techniques which we have found most valuable in recent years in our laboratories. A few of the old techniques have been greatly modified, later ones have been elaborated upon and new ones have been discovered.

It is often advisable to prepare casts and molds to preserve a record of the original condition of the material if it is found necessary to section the specimens for proper study. Air drying liquid rubber has recently been developed which may be applied to the specimen as a paint. After the desired thickness has been attained, a backing of cheesecloth is imbedded in an additional coat of rubber to make the mold hold its shape permanently. The rubber mold may then be removed by lifting a corner and stripping it off. This mold preserves even the most minute details of the surface configuration including overhangs, and will never lose its shape. It is often advisable to make a plaster cast of the back of the rubber mold in which it may be placed to facilitate making positive casts later.

The rubber mold should be dampened just before pouring the plaster into it in order that the plaster will not be withheld from minute surface markings by air bubbles. (Dip the mold in water and then remove all free water with a gentle stream of air.) A fine grade of plaster should be used. The rate of setting of the plaster may be slowed by using ice cold water. A strong solution of salt water will slow it even more. Gum arabic or glue may be added to the solution to make the cast stronger. Water soluble paints of the desired color, i.e. the one most nearly simulating the matrix, may be suspended in the water before mixing it with the plaster. The plaster, when poured, should have the consistency of molasses, i.e. thick but not stiff.

A method of enlarging casts of specimens bearing definite surface configurations or of definite shape has been worked out. The rubber molds are made of the original specimen in the same way as those already described except that the cheesecloth backing must be omitted. The molds are then placed in kerosene and allowed to remain until they have expanded to about one and one-half times their original size. The mold is then carefully lifted out, the excess kerosene is taken up with a blotter and it is placed in a sand mold. This sand backing is almost necessary, for the rubber has lost much of its tensile strength and would break down under the weight of the plaster if unsupported. A plaster cast is then made of the rubber mold. From this enlargement another rubber mold may be made and the step repeated a number of times. Expansion is quite uniform throughout the rubber so that distortion in the enlargements is almost non-existent. If the first mold is taken from a plaster cast which has been colored as described above, part of the color will be transferred accurately to succeeding enlargements for about three or four steps.

Photographing original specimens is sometimes difficult due to surface markings or mineral coloration. If the rubber mold of the original specimen is colored uniformly white by the precipitate of the fumes given off when ammonium chloride is heated in an ammonium chloride tube, a picture may be made of the mold and these difficulties are overcome. It is best to overexpose and underdevelop both the negative and the prints. This increases the shadow and the contrast.

Friable or wet impressions or casts of fossils may be preserved in the field in several ways. Rubber molds may be made of large casts or material which may not be moved either because of size or condition. Smaller specimens may be completely imbedded in Duco Cement to hold them together. This may be dissolved off later with amyl acetate when preparing the material for study. Collodion and nitro-cellulose may be used to great advantage in imbedding dry material which is very friable. Nitro-cellu-

lose may be cheaply made by substituting movie film for parlodian or guncotton. The gelatin must be removed from the film with hot water before dissolving it in amyl acetate. Nitro-cellulose so made is equally as good as any other. A supersaturated solution of gum sandarac in water may be used to preserve material either wet or dry. This is the best preservative we have found for all around use and it is simple to make as well as inexpensive. It dries on the specimen into a clear, shiny film that is impervious to most acid fumes, water and dust. It does not shrink when put on a wet specimen as does nitro-cellulose.

Cutting and grinding specimens may be done in a number of ways. One recently improved upon in our laboratories is the use of fine wire with Aloxite or Carborundum powder as the abrasive. A board has been fitted to a vise in the following manner. Holes were bored into it to correlate with the position of the shaft of an ordinary commercial vise. The vise is then taken apart and the board inserted over the shaft which is then reassembled. At each end of the board, which extends about six inches on either side of the vise, a pulley is mounted rigidly upside down. The base of the pulley frame is cut out exposing the base of the pulley. The specimen to be cut is partially imbedded in sealing wax which may be clamped in the vise or fastened to the board. The wire is then drawn over one pulley, across the specimen and over the other pulley. These pulleys act as guides to insure a straight cut. Number 36 gauge steel or tinned wire is found to be quite suitable along with number 400 grade of grinding powder. With this simple device perfectly straight, almost polished cuts may be made with the loss of only about 175 microns of the material.