2. The embedding of loose sediments in plastics

By

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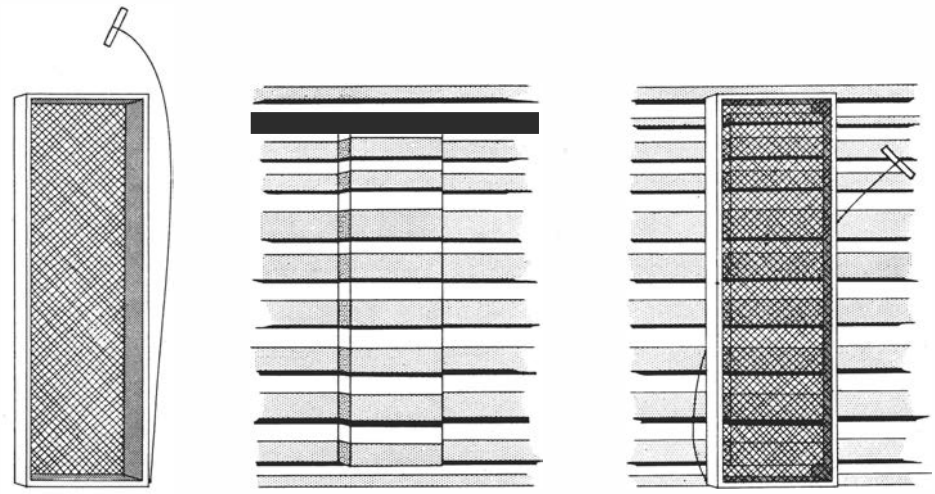
Preparation of the sample in the field

The method described here has been elaborated in connection with the problem of embedding banded clays. It ought, however, to be suitable also for the preservation of other loose or plastic sediments, when it is desired to preserve their primary structures. So far the method has been successfully applied only to the embedding of banded clays, where particular difficulties are encountered.

In the case of banded clays no success can be expected, provided the sample is not taken in an appropriate way and with methods and utensils which do not disturb the primary structure. In simply using a knife or a spade the thickness of the tool produces dislocations along the zones of weakness represented by the boundaries between the different layers. For this reason the use of a so-called sampling box is advisable, whenever possible. Such a sampling box holds the clay sample together, while it is detached from the outcrop by means of a steel cutting-wire, and also later. Fig. 1 represents such a box: it is simply a wooden frame covered on one side with wire netting (mesh ca. 5 mm), and provided with a steel wire fixed to one corner of the opposite side. The free end of the wire terminates in a cross-pin. The thickness of the sample is determined by the height of the frame. One centimetre has been found suitable.

Fig. 2 shows how a sample is prepared in a clay section by cutting around the chosen part. The desired sample should project from the outcrop by the height of the frame, and should be an easy fit into the latter. After this preparatory procedure the frame is put over the future sample which is cut off with the cutting wire as shown in Fig. 3.

For the embedding one has the choice of two procedures, the dry and the wet method. Particularly if it is intended to use the dry method it is important to pick out, before cutting the sample, any pebbles which may be contained in it, without, however, damaging the face that shall become the front of the preparation. This is necessary on account of the shrinkage of the clay (ca. 10 %) occurring in connection with the dry method. The pebbles which do not shrink would otherwise cause the cracking of the clay.

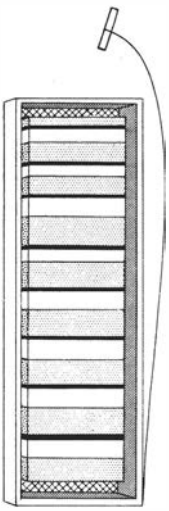


The dry method

Preparatory to this method the clay sample is tipped upon a plane support which does not warp under the influence of the moisture contained in the clay, and which is best a piece of sheet metal. A few layers of newspaper prevent the clay from sticking to the sheet metal, and permit the clay to move in connection with the shrinking. The whole is now covered with a sheet of plastic which is turned every other day. Thereby the condensed moisture upon its lower side is removed from the clay. If possible the clay ought to be turned, and placed face downwards upon fresh paper every time the plastic sheet is removed and turned round. This prevents one face of the clay from drying faster than the other, which would result in warping. When the clay has gradually assumed a light-grey colour it is for some time left uncovered. Finally the still remaining moisture is driven out by very gentle heat. Then the face of the clay which is to become the front of the preparation is painted repeatedly with cellulosa varnish diluted with an equal amount of acetone. The off-side must not be painted, as the air must have the possibility of escaping. The dry preparation is now ready for embedding.

The wet method

The clay sample is best left in the sampling box lying upon the wire netting as shown in Fig. 4, the whole being placed upon a sheet of plastic. The box is covered with cloth saturated with diluted alcohol, and the plastic sheet folded over it in order to prevent the alcohol from evaporating. This should on the contrary penetrate into the clay, and drive out the water. The cloth is



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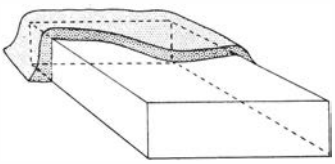

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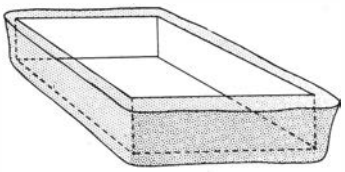

6

changed every day, using increasingly higher concentrations of alcohol until absolute alcohol is reached. This procedure is repeated, but now with xylol instead of alcohol, allowing the same time as before. The sample is then ready for embedding.

Moulds and embedding

The embedding material being fairly expensive, it is good economy to make a mould of appropriate size for every preparation. A suitable material is a sheet (0.5—1.0 mm thick) of cellulose acetate. This is cut to size, about 2 cm being added to all dimensions of the sample. The seams are cemented together by moistening with acetone. The resulting box of cellulose acetate is turned with the bottom up, and covered with a strengthening layer of plaster, as shown in Figs. 5 and 6.

The material used for embedding is Castolite (manufactured by the Castolite Company, Woodstock, Ill., U.S.A.) with the addition of hardener. The promotor which is likewise supplied by the makers of Castolite should not be used in this embedding. The pouring is done in three phases, producing what might be termed bottom layer, middle layer, and covering layer. After the mixing of Castolite and hardener heat is liberated which speeds up the consolidation of the mass. If an excess of hardener is used the resulting amount of heat can produce cracks in the solidifying plastic. For this reason the amount of hardener should be adjusted to the thickness of the layer according to the following figures:

Thickness of layer of plastic	Number of drops of hardener for 300 cc of liquid plastic
up to 0.5 cm	50
1–1.5 cm	25
2.5 cm and above	17

After the hardener has been added to the liquid plastic the mixture is stirred swiftly and thoroughly with a glass rod. It is then poured into the mould, where it assumes within 25–30 minutes a gelatinous consistency, and forms the so-called bottom layer. Using the same proportions a new quantity of the plastic material is mixed, and poured upon the relatively stiff bottom layer, whereupon the clay sample is immediately immersed, with the front side up, into the plastic before this has had time to become more viscous. The entire work connected with this middle layer has to be carried out as fast as possible. A third quantity of liquid plastic is mixed, and poured on as soon as the middle layer has set sufficiently. In this layer the amount of hardener ought to be curtailed, so as to allow air which might be present, to escape.

Air bubbles which stick to the clay or which appear first after the covering layer has started to become gelatinous can be removed in the following way. First a drop of xylol is applied to the covering layer above the air bubble. A needle is then pushed through the drop of xylol and through the covering layer until it reaches the air bubble which is thereby enabled to ascend. The xylol adhering to the needle prevents the formation of greyish flaws which otherwise result.

After the embedding of the clay sample the preparation must under no condition be placed into an oven. It is, however, possible to speed up solidification by means of a 100 watt incandescent bulb placed 15–20 cm from the surface of the plastic. When, after some time, the Castolite has solidified, the plaster cover is carefully knocked off, and the mould of cellulose acetate removed. The Castolite can then be cut with a saw, and ground with glass paper to any desired shape. Polishing is best done with polishing wax, applied to a rotating felt disk.

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