TECHNIQUE OF EMBEDDING DRY ANATOMICAL AND SPECIMENS IN ORGANIC GLASS (METHYL METHACRYLATE)

A. V. Perelygin and N. V. Krylova

Department of Normal Human Anatomy (Head – Corresponding Member AMN SSR Prof. D. A. Zhdanov) of the I. M. Sechenov Order of Lenin First Moscow Medical Institute

(Presented by Active Member AMN SSSR V. V. Zakusov)

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Many valuable anatomical specimens are very brittle, which makes keeping them and working with them very difficult. The necessity for embedding such specimens (especially in the case of the small bones of the skull) has therefore arisen, using hermetically sealed glass jars or other forms of transparent media.

In recent years, attempts have been made to embed anatomical specimens in organic glass [1-8], etc.]. The reports so far published on this subject, however, have given only the general principles of the technique of the process, with no detailed description of the mode of embedding of the specimens; in some reports information is lacking on the composition of the plastic substance used. The incompleteness of these reports for practical use was the reason for the present investigation.

Under the guidance of D. A. Zhdanov, a method of embedding dry anatomical specimens in methyl methacrylate has been developed. This material is a plastic of the acrylic series – the methyl ester of methacrylic acid.

As a result of a series of tests, we devised the following technique.

In order to free the methyl methacrylate from moisture and inhibitor, the monomer is distilled at first at 100° for 15 minutes, and then at 110° for 5 minutes. The monomer thus obtained contains a large quantity of moisture and cannot be used for subsequent polymerization. The methyl methacrylate used for embedding is obtained by further distillation at 130°, which temperature must be kept constant until the end of distillation.

In order to obtain a fore-polymer (condensed monomer), 0.75% by weight of benzoyl peroxide is added to the purified monomer as a catalyst, and the solution thus obtained is kept on a water bath at 60° for 1 hour; the temperature is then reduced to 40° and is maintained at this level for 2-3 hours. The fore-polymer thus obtained may be used for embedding.

Cockchafer, embedded in methyl methacrylate.

The specimen to be embedded in methylmethacrylate must be well dried. If separate bones are embedded, they must also be thoroughly dried and bleached. Hydrogen peroxide cannot be recommended for use in bleaching bones. The thoroughly cleaned, dry specimen is immersed in ready-prepared monomer and allowed to stand in a vacuum of 0.1-0.05 atmos; this ensures that the spaces in the specimen become filled with monomer. The specimen is then placed in a box, constructed of methyl methacrylate polymer plates, from 4 to 12 mm thick, and fixed by polished pegs, also made of polymer; after polymerization, the pegs cannot be seen – they become part of the block.

The embedding can then be proceeded with. Into the bottom of the polymer box, with the specimen mounted inside it, is gradually poured the fore-polymer in a quantity sufficient to ensure that the solution bathes the specimen from top to bottom and that no air bubbles were left behind on its surface. Afterwards, to protect surface of the block from dust and moisture, the box is covered on top with glass or parchment. The specimen thus embedded is kept in a dry room at 20-25° for 3-8 days (the time depends on the thickness of the object).

By the technique described, polymerization proceeds from below upward, and the end of the process can readily be observed by the movement of the border between polymer and monomer. In order to stabilize the process at the end of polymerization, the block is heated to 100-105° for 30 minutes.

The finished product is treated mechanically and polished by the usual method used with objects made from organic glass. The edges of the block must be trimmed evenly with a circular or carpenter's hand saw, and the surfaces cleaned, at first with a polishing stone or file, and later with a metal file or emery paper. The article is then well polished with paste, either on cotton polishing pads or by hand.

The method described can be used successfully for the preservation of collections of insects, butterflies, and so on (see figure). Preparations made in this way keep their natural size and color.

SUMMARY

It is a known fact that many anatomical preparations are very fragile, which makes it difficult to work with them and to keep them for a long time. A method for mounting dry anatomical preparations into organic glass (methylmethacrylate) has been developed.

A detailed description of the technique of mounting these preparations, particularly of small skull bones, is presented. This method may also be successfully employed to preserve collections of insects, butterflies, and other dry biological preparations. The preparations mounted by the above method retain their volume and natural color.

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