A METHOD OF MOUNTING FLAT PATHOLOGICAL AND OTHER SPECIMENS IN GELATIN.*

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SINCE the War the great increase in the cost of materials for the mounting of museum specimens, and the impossibility of obtaining glass jars has led me to consider the question of mounting small specimens, and slices of larger ones, in gelatin between flat glass plates. I made my first preparations during the summer of 1919, but before I was satisfied a paper appeared by Kelley Hale (1919¹) dealing with this subject. This paper described what is substantially the same method, and similar to that used in certain Medical Schools in Germany, where for some years specimens have been mounted in gelatin in Petri dishes. Gelatin is not a very suitable medium for mounting large specimens in jars, for with the greater bulk the opacity of the medium is increased, and so also is the difficulty of hardening it to prevent liquefaction at a later date; but it seems admirably suited to smaller objects, not exceeding half a centimetre or so in thickness and in these the gelatin is practically invisible. The method to be described differs mainly in detail from that of Kelley Hale, but it seems to me that this method is easier to use, and certain of the materials are more readily obtained.

I. *Preparation of the Specimen.*

The Kaiserling method, with certain modifications, is the one employed. I use only 10 instead of 15 per cent. of formalin in making up the first solution, and when made up the solution is rendered neutral to litmus before use by the addition of caustic soda. Neutralisation of the formic acid which is slowly produced in any solution of formalin is of the first importance if good colour preservation is to be obtained, and it is safe to leave a small or delicately coloured specimen in fluid so neutralised for a longer time, and so obtain more efficient hardening of the tissue, than is the case if acid formalin is employed. If, however, too much alkali is used the tissue will be preserved but

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with ineffectual hardening. I do not now use potassium acetate in the final fluid in which specimens soak before gelatin mounting, but 40 or 50 per cent. glycerin, to which a trace of thymol has been added. In this fluid specimens are stored until a batch has been collected for mounting.

Any specimen that can be reduced in thickness by slicing or spreading out, or is in itself of suitable size, such as an appendix, can be mounted by this method however it has been hardened, but those which have been prepared by the Kaiserling, or other colour preserving method, give most brilliant results.

II. *The Mounting Chamber.*

A feature of this mounting method is the compactness of the preparation, and to render the storage of the specimens compact also, it is well to make them of a uniform size, or at any rate the

FIG. 1.

majority. With this object in view I use as a base, on which to build a containing chamber for the specimen, a strong glass plate (window glass—22 oz. to the square foot), with ground edges cut to a standard size. This base is made longer than the actual length of the chamber, so that its projecting ends may fit a slotted storage case, carry a label or number, or provide a convenient handle. Such glasses actually in use are made long enough to carry a chamber of which a photographic quarter plate, or lantern plate, is to form the cover. For this purpose the base glass may conveniently be cut 6 inches $\times$ $3\frac{1}{4}$ inches and the chamber, oblong or square, $4\frac{1}{4}$ inches $\times$ $3\frac{1}{4}$ inches or $3\frac{1}{4}$ inches $\times$ $3\frac{1}{4}$ inches.

The chamber is built upon this base as follows:—

Paint in good white enamel the outline of the chamber proposed, the outside of the area painted being the size of the outside of the chamber, or a little larger (Fig. 1); the lines of enamel should be about $\frac{1}{4}$ inch wide, and should be painted carefully in order to get the

inner margin true. This is baked for a few hours in the paraffin oven at 55° C. to get a hard "stoved" surface.

On this surface a chamber is built of four lengths of glass rod of uniform bore; the adhesive is the same white enamel, and the plate with the glass rods mounted upon it is again stoved. In a couple of hours or so the glass rods will be found to be firmly fixed, and the chamber needs only a little retouching with enamel, here and there, to make the corners water-tight (Figs. 2 and 3).

The cover for the cell should have its margin painted all round to a depth of $\frac{1}{8}$ inch to $\frac{1}{4}$ inch, so that, when it is put in position, it may hide

FIG. 2.

FIG. 3.

the glass rods from view. It is well to paint and stove this with the rest so that it may be ready when it is wanted.

III. *Mounting the Specimen.*

The mounting medium consists of a 10 per cent. solution of gelatin of the best quality, to which about 20 per cent. of glycerin is added, after clearing with white of an egg, as in the preparation of gelatin for bacteriological purposes. The chamber is partly filled with this medium, and the preparation to be mounted is lowered into it in such a way as to avoid the formation of bubbles on its under surface. The whole is then set aside to cool, and, when the gelatin has set, the surface is painted over with strong formalin to harden it. Hardening does not take long, but it is best to err on the safe side and harden well, for the formalin has to penetrate the gelatin deeply to avoid softening some months later.

If any part of the specimen projects above the level of the surrounding glass rods, it can now be taken off with a sharp razor, without disturbing the gelatin.

A little more gelatin should now be poured on to the surface, and the cover glass put into position. There should be no bubbles under it, and the painted margin should be downwards, next to and obscuring the glass rods. Excess of gelatin will flow off, and the remainder is allowed to set beneath a weight to ensure a close contact. What formalin has

FIG. 4.

been absorbed into the first quantity of gelatin will diffuse easily into the final layer, and harden it effectually.

When the cover has been placed in position, and the whole preparation is solid, the edges need to be filled in with a suitable cement, and the final stage is reached. All gelatin which has flowed out and remains adherent round the edges must be removed, and the junction between the glass rods and the cover glass well coated with enamel to render the seal water-tight, and prevent shrinkage of the gelatin. This coat must be allowed to dry thoroughly before proceeding (Fig. 4).

The cement now used consists of white lead to which gold size is added, and mixed to make a smooth and fairly stiff paste. This is applied all round the preparation, and smoothed down to produce a clean seal between the two layers of glass, and burying the glass rods entirely (Fig. 5). These rods should not now be visible anywhere;

FIG. 5.

on the under surface they are hidden by the margin of enamel applied before the chamber was built (Fig. 1), and on the upper surface they are similarly hidden by the enamel on the cover glass, which lies in contact with them (Fig. 6). In a day or two the cement will be quite dry and hard, and can be made perfectly smooth by the use of a sheet of sand paper. The edges are now given a coat or two of enamel to finish them off.

A number of other cements have been tried, but this has been found to answer very well, and as it is white, and is applied to surfaces already painted white, it makes as neat a seal as any. Further, enamel is found

to dry on it very readily, and if the surface is rendered smooth before the enamel is applied the effect produced is perfect.

Kelley Hale describes a method of applying pointers or direction lines to indicate details displayed, but I have not followed this method for in teaching it does not seem to me desirable to have the important points too prominently displayed. Labels or numbers can be attached to, or painted on the projecting ends of the preparation. A convenient method is to write upon a small card, and place this beneath an ordinary microscope slide to be fixed to the base plate by cement, or a ring of paint, just as a cover slip may be. This will keep the label clean and free from scratches.

The process may seem laborious, but it will not be found so if specimens are mounted in batches and not singly, and a set carried through will amply repay the trouble taken.

FIG. 6.

Kelley Hale fills in his preparations from the end instead of from the top, but I think it is much easier to avoid bubbles by the method just described, and bubbles will be found to be the chief trouble. Also, it must be harder to close an end successfully than the flat top, which can easily be held in position by a weight while the gelatin is setting.

To the numerous advantages that Kelley Hale claims for the method of mounting flat in gelatin I will add one important one, namely, that such preparations can be used for teaching at the bedside, being by no means objectionable, and as a rule quite unrecognisable to the patient.

For the composition of the cement I am indebted to Mr W. Jackson, my laboratory attendant, who has experimented with a considerable number of mixtures before the present simple formula was reached; he has also invented a number of "dodges" which go to make the method a success.

REFERENCE.

1. KELLEY HALE *Journ. Amer. Med. Assoc.*, 1919, vol. lxxiii. p. 767.