

A New Method of Glass Knife Preparation for Thin-Section Microtomy. BY STANLEY WEINER.*(From the Department of Pathology, University of Melbourne, Melbourne, Australia.)**

The preparation of glass knives usually requires considerable time; a leak in the "boat" developed during cutting often means loss of good sections and in all cases necessitates a change of knife with consequent loss of tissue on the cutting face of the block.

These difficulties can be overcome by the procedure described below.

A. Glass Marking:

An ordinary cutting wheel is to be preferred to diamond markers. A cutting wheel is held, in the manner of glass cutters, between the index and the third finger—the end-phalanx of the index finger supplying the gentle pressure necessary for the line drawing. The effective line should be thin and clear. For stress-breaking, a short light mark is made at the edge of the plate.

B. Glass-Breaking:

An approximately 3 mm. wide strip of thin adhesive plaster is attached to one jaw of a pair of standard, flat glass pliers in a manner shown in Fig. 1. The marked line is placed on the side opposite to the strip (Fig. 2) and the pliers closed over it with a steadily progressing pressure. The thickness of the adhesive acts as a wedge against the glass mark and effects a slow and clean break.

The thickness of the adhesive tape is determined by the type of glass used and the thinnest effective adhesive should be selected. For $\frac{1}{4}$ " "crystallex" plate glass (Pittsburgh Glass Co.), a single layer of plastic stripping is adequate. An increase in the thickness of the tape or the addition of two further strips to the opposite jaw of the pliers, forming a distinct 3-point pressure, would appear to make the breaking easier but this increases the stress at the moment of breakage, resulting in minute fractures at the edge of the knife similar to those caused when a knife is accidentally dropped onto a hard surface.

The pliers are equally effective in line-breaking, that is, along a line scored right across the whole plate as in strip cutting, as well as in stress-breaking (where only a short starting mark is made at the edge of the plate and the glass is allowed to break along its inherent stress lines).

Stress-breaking is less economical but gives a much higher percentage of clean facets.

The simplicity and efficiency of the operation is remarkable and no experience is needed. Furthermore, the glass can be broken down to the size of the pliers' jaw with equal ease. The adhesive strip is replaced when worn over the edge. Needless to say, the pliers should only be used for glass-breaking.

No previous operation has given more consistent or better results, although many methods were tested; these included ordinary side clamping with traction, heated rod, drill press tool, convex-concave pliers, hard wood wedge, and a modified tension tool used by aviation manufacturers for piston ring adjustments.

During the breaking, the glass does not have to be manipulated, and the fractured fragments remain in the jaws of the pliers until released. This is an additional advantage of the technique as far as the safety of the operator and the contamination of the surfaces are concerned.

C. Manufacturer of Wrap-Around Knife Boats:

Standard boats made of aluminium foil and sealed to the knife with wax were, in our experience, never completely satisfactory. Their preparation was time-consuming and leakages occurring now and then were difficult to repair. A number of cold adhesives tested in lieu of wax gave slightly better results. An adhesive plaster was suggested by Mr. S. V. Hohlov, the Department's engineer. Of the large variety of water-proof tapes tried, an inch wide, soft walled plastic adhesive was found to be the most suitable. A well cleaned, short glass knife of suitable angle (approximately 50°) is placed on the strip (Fig. 3) in such a way that a portion of its back also lies on the adhesive; this ensures a leak-proof enclosure. The projecting end of the tape is cut off with a sharp scalpel along the glass edge. Care must be taken that the adhesive tape does not come into contact with the cutting edge of the knife; if it does, it is much easier to prepare another knife than to try to clean the edge. Under slight tension, which prevents the formation of wrinkles, the plaster is then stretched over the back to the other side of the knife, pressed on, and the surplus tape cut off in the same manner. The resulting continuous boat holds the fluid

* Received for publication, October 16, 1958.

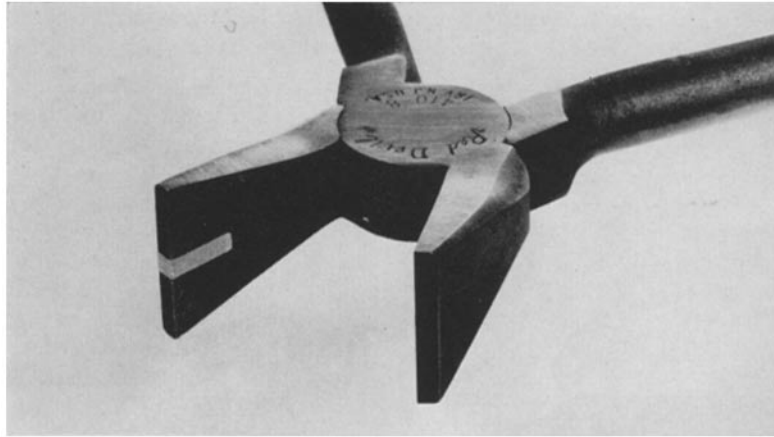


FIG. 1. Plastic strip affixed to one jaw of glass pliers.

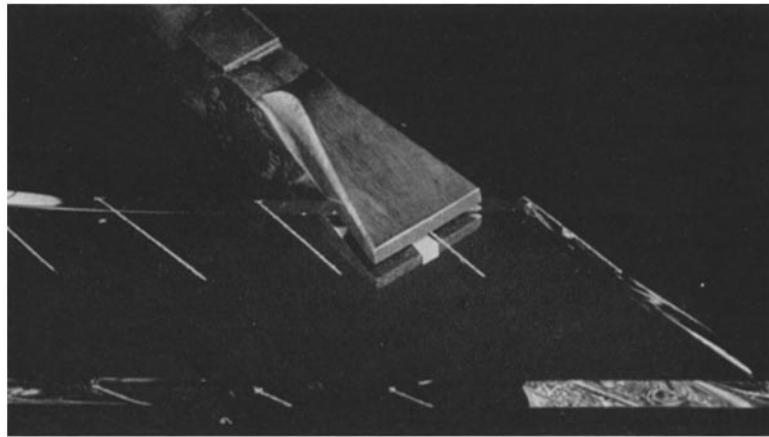


FIG. 2. Marked glass plate placed above the plastic strip for breaking.



FIG. 3. Making of a wrap-around plastic boat; in the background a finished knife.

well, provided that the tape has been pressed well onto the glass which has been previously brought up to body temperature.

During the past 2 years the method described gave satisfactory results. Initial difficulties were caused by attempts to use knives which were too long and consequently the tape had to be forced over the sloping top of the knife (that is, the bottom of the fluid container) instead of adhering continuously along the side-back-side line

of the glass rhombus in a wrap-around fashion. Even so, a second layer of adhesive tape was usually sufficient to render the boat leak-proof; however, such repair affects the stability of the knife if the sides of the boat are within reach of the microtome clamps.

Since this simplification of glass knife preparation has proved so efficacious it is felt that its publication might be of assistance to other microtomeists.