

A sensitive relay is required, as otherwise the heating at the mercury-platinum contact is sufficient to cause trouble in the operation of the instrument; however, either a 2 ma 110 V. AC or a 10 ma 6 V. DC relay has been found satisfactory. The relay should be normally closed for the instrument as illustrated if used in a humidifying system.

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SECTIONING AND STAINING REFRACTORY MATERIALS IN PARAFFIN

MANY tissues, as, for example, the lens of the vertebrate eye, are difficult or impossible to section in paraffin with ordinary methods. Such materials may be cut in celloidin, but the celloidin method has several disadvantages, chief of which are (1) the impracticality of cutting thin sections and (2) the difficulty of keeping serial sections in order.

None of the steps in the paraffin method to be described here are new—in fact, all are to be found in the tenth edition of Lee's "Microtome's Vade-Mecum"—but they have been combined in an unusual way and the results obtained have been more than satisfactory.

The steps in the method, as it was finally developed, are as follows:

- (1) Fix material in Bouin's solution;
- (2) Transfer, without washing, to 100 per cent. dioxan and change once during an eight-hour period;
- (3) Transfer to paraffin containing 0.5 per cent. beeswax and change twice during an eight-hour period;
- (4) Embed in the usual manner and then expose tissue by cutting away one side of the block;
- (5) Soak block in water for at least twenty-four hours before sectioning;
- (6) Section;
- (7) Place section (or sections) on water on clean slide and warm gently;
- (8) Allow to cool and replace water with solution No. 1 of Mallory's triple connective tissue stain. Stain for five minutes;
- (9) Drain off first stain and replace with Mallory's solution No. 2. Stain for five minutes;
- (10) Drain off second stain and replace with water;
- (11) Drain off water immediately and replace with 95 per cent. alcohol;
- (12) Drain and repeat with absolute alcohol;
- (13) Center section on slide and run over it a few drops of 0.5 per cent. celloidin (dissolved in equal parts of ether and alcohol);
- (14) Dry for several hours or overnight;
- (15) Clear in xylol;
- (16) Mount in balsam or clarite.

The materials used in testing the method consisted of the following: frog heads (adult *Acris gryllus* and recently metamorphosed *Rana pipiens*); skin from frog (*Rana pipiens*); skin from seven-day old rat; grasshopper eggs (*Melanoplus differentialis*); amphibian eggs in early cleavage stages (*Triturus* sp.); compound eyes from grasshopper (*Melanoplus differentialis*); compound eyes from beetle (*Dytiscus* sp.); human lens with cataract; and pathological human liver tissue.

All were sectioned at 4 and 6 micra with unbelievable ease except the *Dytiscus* eyes which could not be cut successfully at less than 8 micra. On the other hand, frog's skin and frog's head, including the lenses of the eyes, were sectioned at 2 micra.

Cellular details were found to be even better than those obtained with ordinary paraffin methods. Such structures as intercellular bridges, rods and cones of the retina, the cytoplasm of the cells in the lacunae of cartilage, ciliated epithelium of the oral cavity, muscle striations and the cells surrounding the lens in the sections of the frog's head were in excellent cytological condition. Mallory's stain, when used as described above, shows greater delicacy and precision than is obtained when sections are stained after the removal of the paraffin. Another advantage of the method lies in the fact that tissues such as vertebrate lens and insect cuticle remain flat and do not curl away from the slide as they almost invariably do when sections containing them are spread and dried in the usual way.

The method outlined above is rapid, simple, gives perfect, thin, serial sections of materials ordinarily very difficult to cut and insures fine cellular detail.

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BOOKS RECEIVED

- ARMBRUSTER, DAVID A. *Competitive Swimming and Diving*. Pp. 301. Mosby. \$3.25.
- DUKES, H. H. *The Physiology of Domestic Animals*. Fifth edition. Pp. xiv + 721. Cornell University Press.
- LYNCH, THERESA I. *Communicable Disease Nursing*. 156 illustrations, 5 color plates. Pp. 378. Mosby. \$3.75.
- SHULL, A. FRANKLIN. *Laboratory Directions in Principles of Animal Biology*. Fifth edition. Pp. ix + 102. McGraw-Hill. \$1.00.
- Standard Plant Names*. Prepared by the editorial committee, HARLAND P. KELSEY, chairman of the American Joint Committee on Horticultural Nomenclature. Second edition. Pp. xv + 675. J. Horace McFarland Co., \$10.50.