IN THE LABORATORY

The Maceration of Woody Tissue With Acetic Acid and Sodium Chlorite

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A simple chemical treatment which would separate cells for microscopic examination without mutilation would be helpful to the wood anatomist. The method commonly in use at present is extremely drastic, inasmuch as it consists of treatment of the wood sample with nitric acid and potassium chlorate, reagents which may seriously injure some of the fibers, particularly in the hands of inexperienced workers. A less drastic treatment (chlorine and sodium sulfite) has been suggested by Harlow (*1*), but this requires considerable manipulation.

TABLE 1

MACERATION OF WOODY TISSUES

(based on 1 gram of air-dry wood)

Schedule	Size (in.)	Time* (hrs.)	Water† (ml.)	Acetic acid (drops)	Sodium‡ chlorite (grams)	Average temperature (°C.)
1	$\frac{1}{8}$ x $\frac{1}{8}$ x $\frac{3}{4}$	0	35	—	—	90
		1	—	5	0.6	
		1	—	5	0.6	
		1	—	5	0.6	
		1	—	5	0.6	
		1	—	5	0.6	
2	$\frac{1}{8}$ x $\frac{1}{8}$ x $\frac{3}{4}$	0	35	—	—	85
		1	—	30	5.0	At 85 for 1 hr., then allowed to stand overnight at room temperature
		3	—	6	1.0	
3	$\frac{1}{16}$ x $\frac{1}{8}$ x $\frac{3}{4}$	0	35	—	—	85
		3	—	12	2.0	
		3	—	6	1.0	

* Following expulsion of air from sticks; solution may be left overnight at room temperature at any point.

† The liquor-wood ratio is not critical.

‡ Analytical grade was used, but the technical grade is much cheaper and probably just as satisfactory, because the solution is not highly acid.

The removal of lignin from wood by treatment with acidified sodium chlorite, for the preparation of holocellulose, has been explored recently (*2–4*). This is accomplished with negligible loss of carbohydrate material, unless one attempts to remove all the lignin during the treatment; the tissue is simultaneously bleached. Since a slight loss of the carbohydrate fraction would not mutilate the cell elements for purposes of fiber identification, more drastic treatment than that given in the above references suggests itself for the maceration of woody tissues.

Four species of wood were used in our experiments: Loblolly pine (*Pinus tæda*), red spruce (*Picea rubra*), buckeye (*Aesculus* sp.), and black gum (*Nyssa sylvatica*). Several series of tests were made, using different conditions of time, temperature, and concentration. The schedules given in Table 1 will serve as guides for satisfactory results.

In all these experiments the black gum wood was more resistant to the chlorite, and it was necessary to repeat the final step listed to obtain complete maceration. Actually, sufficient material separates for the desired purpose at the end of the tabulated schedules. Each species presents a separate problem, however, and the person making the macerations must adjust conditions to give best results. The thickness of the sticks is an additional factor to consider.

The method is as follows: (1) Split out material of matchstick size (approximately $\frac{1}{8}$ x $\frac{1}{8}$ x $\frac{3}{4}$ inch); (2) remove the air by boiling, soaking, or evacuation; (3) follow through one of the schedules of chloriting as given in Table 1; (4) wash; and (5) shake to separate the fibers.

Certain precautions must be observed. The acetic acid must be added *before* the sodium chlorite in each step, and a hood and reflux must be used. In connection with the latter, an Erlenmeyer flask, with an inverted smaller Erlenmeyer or volumetric flask in the neck, is convenient. Finally, easily oxidizable material, such as rubber or sulfur, must be kept away from the sodium chlorite in order to obviate explosion.

References

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A Tunnel Clamp for Use in Controlling Infusion Rates

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The rate of inflow of intravenous, intramuscular, or subcutaneous infusions is ordinarily controlled by a pinchcock of one type or another. Since the head of pressure that drives fluid through the needle remains quite high and relatively constant, and since the venous, muscular, or tissue tension opposing inflow is relatively small, the rate of flow is primarily a function of the resistance offered by the tubing and needle. With an ordinary pinchcock, the resistance is adjusted by changing the diameter of a short segment of the tubing. However, small spontaneous changes in the diameter of the short, constricted region may occur and cause large variations in

resistance. This variation is greatly reduced and the rate of inflow more easily controlled when the region of constriction is extended by use of a long clamp.

The instrument described here is similar to that used by a group working on problems of renal physiology in man and animals in the Department of Physiology and Medicine, New

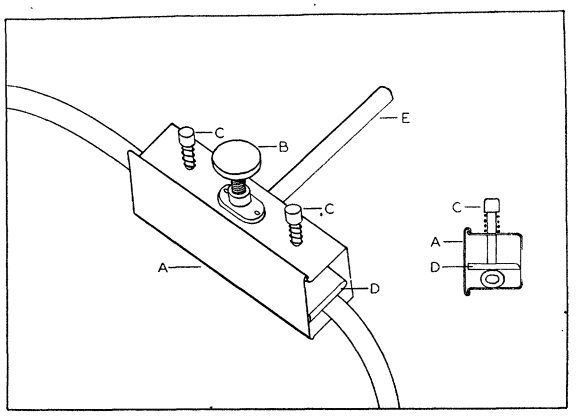

FIG. 1

York University College of Medicine, under the direction of Homer W. Smith. It was originally designed by J. E. Shannon and has been modified for use in clinical work at the Massachusetts Memorial Hospitals.

The clamp[1] (Fig. 1) is constructed of nickel-plated brass with all attached parts riveted and joined with high-melting-point solder to permit sterilization. It is 4 inches long, and $\frac{3}{4}$ inch square in cross-section. The outer side is closed by a metal slip (A), so designed that the construction becomes tighter as the tubing is compressed. Uniform compression of the rubber tubing is assured by bolstering the centrally placed adjustment screw (B) by two pins (C) passing through a lateral wall of the clamp affixed to the compressor plate, and held in place by steel springs that expand between the terminal head of the pins and the lateral wall of the clamp to keep the compressor blade pressed against the adjustment screw. The pins are placed $2\frac{1}{2}$ inches apart, $\frac{3}{4}$ inch from each end of the clamp. A short bar (E) may be attached to the inner wall to support the clamp independently of the tubing.

This clamp has found intensive use whenever constant inflow rates are necessary, as, for example, in renal clearance (*3*, *4*) and hepatic blood flow (*2*) determinations, the administration of penicillin (*1*), and other chemotherapeutic agents. Where very slow rates of inflow (1–2 ml./minute) over long periods of time are required, as with the intramuscular injection of penicillin or the parenteral administration of fluids to infants, it has proved particularly valuable.

References

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[1] This instrument may be obtained from the Harvard Apparatus Company, Dover, Massachusetts.

An Improved Alcohol Check for Rat Metabolism Apparatus

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In connection with the open-circuit determination of basal metabolic rates of small animals, one of the most troublesome problems which arises is a method of alcohol combustion which will produce carbon dioxide at a rate comparable to that of the animal and yet result in complete combustion, thus allowing

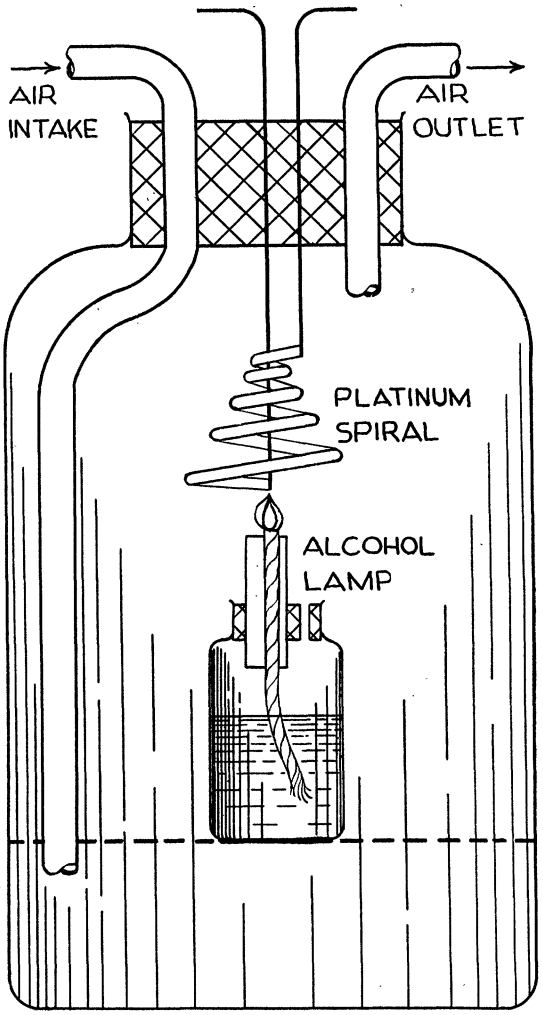

FIG. 1

for an accurate check on a theoretical respiratory quotient (R.Q.). Schwabe and Griffith (*3*) encountered this difficulty and finally resorted to the mechanical withdrawal of oxygen and addition of carbon dioxide at rates comparable to those encountered in their experimental work with rats. Bunnell and Griffith (*1*) devised a metabolism check apparatus using illuminating gas. This method, however, is subject to criticism unless analyses of the illuminating gas are reported.