acetic acid and phenol. Under the microscope, tubercle bacilli containing this pigment reduce ammoniacal $AgNO_3$ and Fehling's solution.

Studies are under way in order to determine the possible relationship of this pigment to a metabolite derived from PABA and especially to factors of the vitamin B complex.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

GLYOXAL, A NON-IRRITATING ALDEHYDE SUGGESTED AS SUBSTITUTE FOR FORMALIN IN HISTOLOGICAL FIXATIONS

MANY histologists who find the traditional formaldehyde solution distressing to the eyes and nose would doubtless welcome a less offensive hardening agent of equal efficiency. Glyoxal, or oxalic aldehyde, which has recently become available[1] in fair quantities, appears very promising in this respect.

Glyoxal, whose molecule consists merely of two linked aldehydic groups, and is the simplest of the dialdehydes, has been recommended by the manufacturers as an "insolublizing agent" for protein materials such as casein, albumin, gelatin and glues. This suggested to us that perhaps the dialdehyde could also be applied for hardening animal tissues in histological fixation.

A variety of tissues of the mouse was tried in different strengths of glyoxal. Reasoning that the ordinary "10 per cent. formalin" is approximately a 4 per cent. formaldehyde solution, and that glyoxal has two aldehyde groups, one would expect a 2 per cent. solution to be about right. Liver, kidney, muscle of leg, tongue, heart, skin, spleen, lung, brain and fatty tissue of the breast of mouse were used and human breast tissue and brain. With small blocks of tissue, we found the 2 per cent. glyoxal to compare very favorably with 10 per cent. formalin, with the possible exception of muscle. Nuclei were well stained in all specimens. Even a 1 per cent. glyoxal solution was adequate for small samples of many tissues. Concentrations much higher than 2 per cent. were not suitable for small blocks. The addition of acetic acid yielded poorer results. Controls were run with 10 per cent. formalin. Only haematoxylin-eosin stain was employed, no difference being noted in the coloration of tissues between those fixed in formalin and in glyoxal.

When large masses of tissue, such as an entire human brain, were fixed, 10 per cent. concentration and slightly longer time was necessary. Either the weaker solution was exhausted or the larger glyoxal molecule does not diffuse as readily as formaldehyde.

Glyoxal is now supplied as a crude 30 per cent. to 40 per cent. aqueous solution, deep yellow and syrupy in consistency. It is quite impure and too acidic to be used without treatment. Dilute the crude solution to 10 per cent. concentration with tap water. Add powdered calcium carbonate, and stir until effervescence ceases. Frothing is severe but can be controlled by adding a little ethyl ether. Filter by suction through a rapid crepe paper. Pass through a second time if not clear. Dilute further to 2 per cent., or as desired. The final solution will be still faintly acidic (to litmus) and should be left so, never alkaline. It has only a weak odor and is not irritating.

A 30–40 per cent. crude solution of glyoxal sells for one dollar a pound in lots of a gallon or under. However, at 2 per cent. dilution it costs only about 10 to 15 cents a liter. It is expected to become cheaper and more abundant, but even now 50 gallons of the 30–40 per cent. concentration can be purchased on one order.

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[1] Carbide and Carbon Chemicals Corporation, 30 East 42nd St., New York. We are most grateful to F. J. Rauscher of the St. Louis office for generous samples of glyoxal solution.

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