fairly taut. A free airway must be provided through the cork in the manometer by means of v-shaped grooves cut into the cork. The setting of the variable resistor will be dependent upon the resistance of the

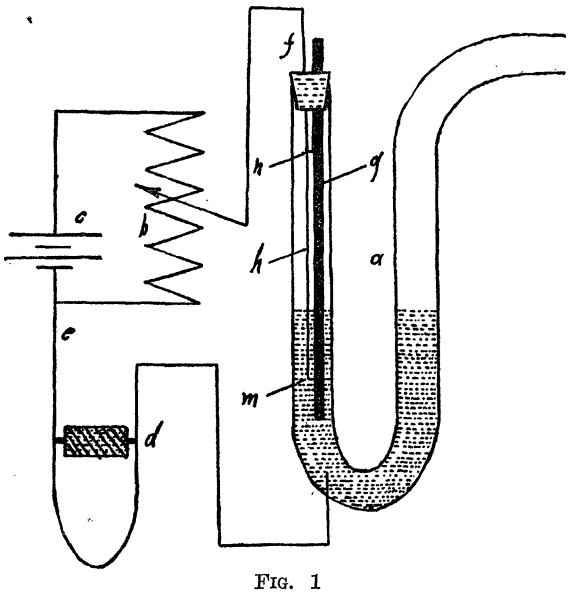

FIG. 1

oscillograph unit, the voltage employed and the sensitivity desired. With a Westinghouse supersensitive oscillograph unit, the deflection at 22 inches optical distance corresponded roughly to the fluctuations of the mercury when the resistance was set at 100 ohms and the battery potential was 1½ volts. All the internal parts of the manometer should be kept scrupulously clean to avoid uneven flow of the mercury and consequent errors in the records.

The same arrangement also should be of value as a myograph for recording muscular contractions by connecting the muscle to a tambour and the tambour to the manometer.

RICHARD H. FITCH
ARTHUR L. TATUM

DEPARTMENT OF PHARMACOLOGY,
UNIVERSITY OF WISCONSIN

PLANT JUICE CLARIFICATION FOR NITRATE NITROGEN DETERMINATIONS

THE introduction of the small laboratory hydraulic press has stimulated scientific investigation concerning the chemical composition of plant juices. Phosphorus and potassium may be determined to a fair degree of accuracy, but the determination of nitrogen existing in the juice as nitrate presents difficulties that are almost insurmountable because of the organic matter present. In plant juices the nitrates are usually determined by the colorimetric phenoldisulphonic acid method on account of its rapidity and ease of manipulation. In order to obtain reliable results a clear solution of the juice is absolutely essential. Many clarifying agents have been used, such as copper sulphate, iron hydroxide, aluminum hydroxide, calcium carbonate and a host of other substances. These reagents have not always been satisfactory because of brown tints which are developed when the evaporated portion is compared with a standard nitrate solution. Using the expressed juice from the corn plant the following method has given clear extracts and clear tints when matched with a standard in a colorimeter. The method as developed in this laboratory is as follows.

Measure out 10 cc of the corn juice into a small evaporating dish. Add sufficient silver sulphate to precipitate any chlorides that may be present. Evaporate the solution containing the silver sulphate to dryness on a water bath. Cool and rub up the residue using cold water. Transfer to a 200-cc graduated flask, make up to mark and filter off 100 cc of the solution. Transfer the solution to a Nessler tube 3 cm in diameter and 20 cm in length fitted with a 2-hole rubber stopper carrying a tube reaching to the bottom of the liquid and a shorter one just passing through the stopper. Add 2 grams of G. Elf carbon black and mix thoroughly. Attach the shorter tube to a suction pump and aspirate for four hours at the rate of 30 bubbles per minute. Filter through two dry 11 cm S. and S. filter-papers and take 10 cc of the clear filtrate for the determination of nitrogen as nitrate. Evaporate to dryness and add 2 cc of the phenoldisulphonic acid reagent and allow to stand for 10 minutes on a beaker filled with cold water. This keeps the dish cold while the reaction is taking place. Add 20 cc water and allow the residue to dissolve slowly. Cool thoroughly and develop the yellow color with 1 to 1 ammonium hydroxide solution and make to a volume of 100 cc. Compare with a standard nitrate solution in a Duboscq or other standard colorimeter using a standard potassium nitrate solution containing 0.1 milligram of nitrogen to each 100 cc of water.

By evaporating and drying the juice at the temperature of boiling water and taking up with cold water a solution is obtained which is easily clarified by carbon black, and the clarification appears to be intensified by passing a slow current of air through the solution which keeps the carbon black continually moving. This method of clarification has been tried on corn juice with success, and further studies as to its perfection and application to other plant juices are now under way.

H. H. HILL

VIRGINIA AGRICULTURAL
EXPERIMENT STATION