thirds of the sum) and subsistence fees from scientific workers.

The station is given the advantage of various concessions made by the government officials of the Panama Canal Zone and several steamship and railway companies, which greatly lessen the traveling and other personal expenses of investigators. Particulars concerning transportation from the United States to the Canal Zone and expenses while at the station can be had by application to Dr. Thomas Barbour, Museum of Comparative Zoology, Cambridge, Massachusetts. Those planning to work at the station should state approximately when they expect to sail and from which port. In some cases return transportation can be arranged with the steamship company before leaving the United States. Passports are not required in the Canal Zone.

The governor of the Panama Canal issues to visiting scientists a complimentary annual card pass on the Panama Railroad and also a card authorizing purchases in the Panama Canal commissaries. The governor has also generously extended to the working scientists of the station and to their families the same rates at the Gorgas Hospital that apply to families of employes of the Panama Canal. These rates are extremely reasonable and the hospital facilities are excellent in every way. Dr. Barbour's report especially acknowledges the continued cooperation of government officials in every department. Without this constant willingness on the part of these officials to support the station, its maintenance would be far more difficult.

Much has been done during the year in the way of extending trails and of making repairs and additions to the building and material equipment of the station. The old dock has been replaced by a new one. The guest house has been given more ventilation and light. All the buildings have been repainted. Several interesting long-time experiments on termite resistance of various kinds of wood are under way.

Dr. Barbour has prepared a list of papers published since the opening of the station, presenting the results of work done at the station by visiting investigators. This list includes 118 titles. Conspicuous among these publications is the recent book of Dr. Frank M. Chapman entitled "My Tropical Air Castle." This is a charming and authentically informing book of Barro Colorado Island natural history.

During the past year sixteen investigators have worked at the station for varying lengths of time, and about one hundred other persons visited the island.

More financial help is needed by the station for material equipment of one kind and another, and for work to be done on trails and in connection with the buildings of the station. A few thousand dollars more available each year to the station would enable great improvements to be made in it, and afford greatly improved opportunities for the investigators. The cooperation of universities and biological organizations by table subscriptions is the simplest and most desirable way to effect the needed aid. In the meantime, thanks to the generosity of Dr. Barbour and others, the station offers a unique opportunity to those who would work in the American tropics.

VERNON KELLOGG,
Permanent Secretary
NATIONAL RESEARCH COUNCIL

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN ELECTRICAL RECORDING MANOMETER

IT is frequently desirable when studying pressure changes in the circulatory and respiratory systems to be able to photograph simultaneously these pressure changes together with other variables on the same strip of film. Previous set-ups for this purpose demand a rather cumbersome optical system which is particularly disadvantageous because it interferes with the recording of other phenomena on the same film. The recording manometer here described possesses the advantages that it can be easily and cheaply constructed from available laboratory materials, is simple and can be used in conjunction with a multi-unit oscillograph, the other elements of which can be utilized for time lines and other desired records.

The constants as given are of course applicable only when used with oscillograph units similar to those employed here, but slight modifications in resistances would adapt it to any oscillograph or fairly high speed galvanometer.

The parts required consist of:

a. an ordinary blood-pressure mercury manometer
b. 900 ohm variable resistor
c. 1½ to 6 volts in dry cells
d. oscillograph or galvanometer
f. connection to resistance wire
g. glass tubing support for resistance wire
h, h, m. resistance wire No. 30 nichrome

The resistance wire is fastened to a length of drawn out glass tubing by means of small sealing-wax bridges. The tubing should be as small as possible and still be firm enough to keep the resistance wire

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

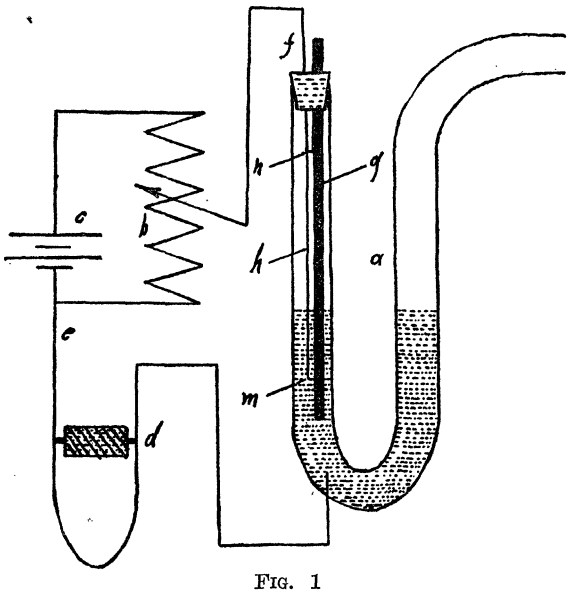

FIG. 1

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.

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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