acid per plant been found to occur at night, but instead, losses of 15 to 20 per cent. have been observed. It is thus evident that neither the total gain nor loss at night can be estimated by the methods which have been employed and that the total losses are probably considerably greater than have been estimated. The results thus suggest that vitamin C may play a much more important part in the economy of the plant than has been previously attributed to it.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN APPARATUS FOR VACUUM DRYING IN THE FROZEN STATE[1]

IN the fractionation of thermo-labile biological products it often becomes necessary to recover small amounts of solids from comparatively large volumes of solution. Vacuum drying in the frozen state, as recommended by Flosdorf and Mudd[2] and Link, Eggers and Moulton,[3] is often preferred, particularly if the material is protein in nature.

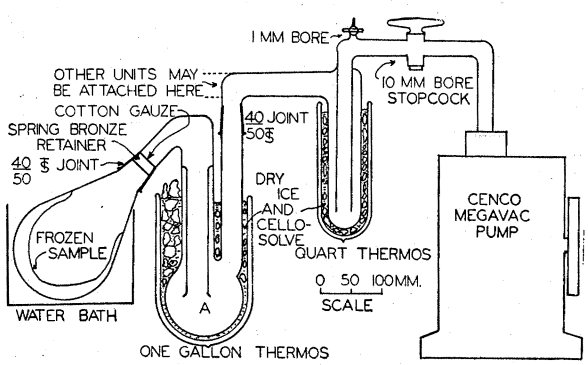

FIG. 1

The apparatus shown in the diagram is designed so that each receiver (A) is capable of receiving 500 to 600 cc of the distillate within a period of twelve hours. A Cenco Megavac pump serves to create the vacuum. A mercury vapor diffusion pump is not necessary. The water bath surrounding the flask containing the sample is left at room temperature and serves to prevent ice formation on this flask during evaporation. An acetone bath chilled by solid carbon dioxide is used to freeze the sample to be evaporated, while methyl cellosolve is used in place of acetone in the vacuum bottles in order to minimize loss through evaporation. A short spring bronze cylinder is used to hold a piece of cotton gauze in the neck of the sample flask to prevent loss of dry particles due to rapid vapor currents.

The apparatus is constructed of pyrex glass, is simple, compact and sturdy and has become nearly indispensable in our laboratory. It has been used to recover biologically active materials from as much as one liter of solution in a period of twenty-four hours with a single change of the receiver and recharging with solid carbon dioxide after twelve hours. Solutions containing the gonadotropic or thyrotropic fractions from the pituitary, choline esterase, bacterial toxins, whole blood, minced tissues and various extracts have been shown to retain their solubility and biological activity under such treatment. Solutions treated with toluene according to the method of Railton, Cunningham and Kirk[3] yield sterile preparations.

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ELIMINATION OF DEHYDRATION IN HISTOLOGICAL TECHNIQUE

THE classical methods for preparing tissues for microscopic study have a number of disadvantages. One of the more important is the extensive dehydration of the specimen by passage through increasing concentrations of alcohol. Another, consequent upon this, is the solution of cellular fat in the alcohol; this requires, for fat stains, the setting aside of special blocks of tissue and the use of the frozen section technique.

In the search for an improved method which would avoid dehydration, we thought of the recently synthesized group of resins, the polyvinyl alcohols, more familiar in the trade as PVA. These substances are readily soluble or dispersible in water, forming sols which penetrate easily into tissues. They can be made to form gels of a consistence comparable with that of celloidin. Sections may be cut as thin as four to five micra without difficulty. These stain excellently with hematoxylin-eosin, Masson's trichrome, Weigert-van Gieson; staining for fat is done with Sudan III on sections cut from the same block. The polyvinyl alcohols in solution are considered stable to the action of bacteria and most fungi; in our tests, the gels as well

[1] This work was supported in part by a grant from Armour and Co.

[2] E. W. Flosdorf and S. Mudd, *Jour. Immunol.*, 29: 389, 1935.

[3] G. K. K. Link, V. Eggers and J. E. Moulton, *Bot. Gaz.*, 102: 590, 1941.

[3] I. R. Railton, B. Cunningham and P. L. Kirk, SCIENCE, 94: 469, 1941.