Dr. H. E. Miller performed post-mortem examinations on a number of the animals and stated that no mosquitoes were found in the air passages. While blood loss was no doubt an important factor, it is the writer's opinion that the death of the stock may have been due to the injection of a toxin by the mosquitoes as well as to the loss of blood.

In the case of the larger herds the cattle apparently protected themselves to some extent by bunching closely together, and those which had access to the canal stayed in the water up to their heads, and very little loss occurred in these herds. Smudges and applications of grease and oil were extensively used, and no doubt prevented greater death losses.

Psorophora columbiae is one of the smaller species of the genus. The eggs are laid on the soil and hatch quickly when submerged. Thus, great swarms of adults emerge almost simultaneously when egg-bearing areas are flooded. The species is usually of little importance as a pest of man. In this outbreak, however, it is reported that men who were making smudges and otherwise looking after stock had to wear heavy coats and blankets to protect themselves, and some of them stated that they were sick for several days from the bites of the mosquitoes.

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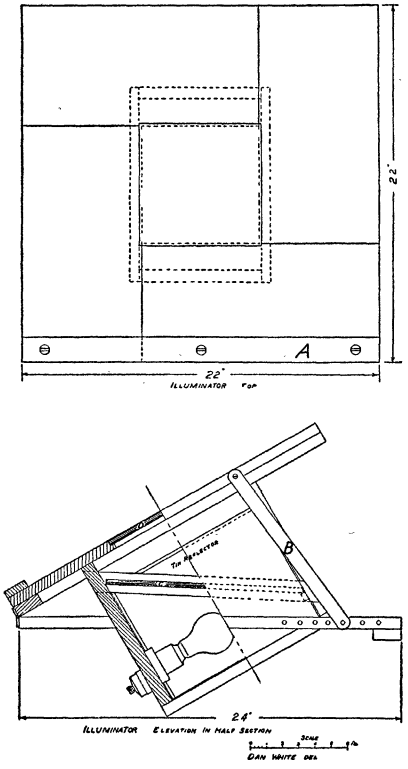
SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN ILLUMINATOR TO FACILITATE THE TRACING OF X-RAYS

IN studying x-rays of the organs of speech it is frequently necessary to make tracings of the films. Manufactured illuminators, intended for viewing films, are inadequate for tracing. They provide no surrounding board to which materials may be fastened; they are not convenient to work on; they heat up rapidly; and they are expensive.

The illuminator shown in the figure can be made cheaply and has none of these disadvantages. It consists primarily of an ordinary drawing board which can be tilted to any convenient angle by shifting the support (B). The strip (A) prevents objects from sliding off. A removable glass (D) of the appropriate size is set in the center of the board. Clear or opalescent glass may be substituted at will. (C) is a piece of clear glass between the bulb and the surface glass to deflect and absorb the heat. It, also, is removable to permit easy changing of the lamp. The tin reflector spreads at the sides to allow free ventilation. This illuminator has been used for several hours at a time without gettting hot.



Masks of black paper, to cover all but the parts being traced, are provided and may be pinned to the board. By their use lines in the x-ray which seem to have been obliterated by overexposure can frequently be found and traced.

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A LARGE RESPIROMETER[1]

IN making some studies of the catalase, nitrogen and carbohydrate changes in asparagus roots after various treatments to break dormancy it was thought desirable to have some information on the respiration while these changes are going on.

Many difficulties were experienced in finding a respirometer which could be satisfactory. Nothing found in the literature described containers large enough to hold the plant roots which were being studied. The usual NaOH containers were too small to hold the amount of carbon dioxide given off in a 48 hour period, and more frequent weighing and measuring was not thought worth while.

After many different set-ups were made and several

[1] Contribution No. 113, Department of Horticulture, Kansas Agricultural Experiment Station.

different arrangements were tried, one which is herewith described (Fig. 1) was found satisfactory in

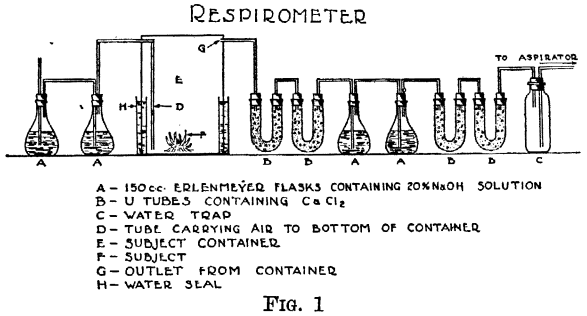

FIG. 1

every respect, including low cost for material and equipment.

The principal divergence from the customary respirometer is the subject container. This was made of galvanized iron. The air which has had the carbon dioxide removed in the pair of NaOH bottles (A) is drawn in at the top of the respiration chamber and carried to the bottom of the container in the metal tube (D). The air with the carbon dioxide of the asparagus respiration is then carried out of the container from the top through the opening (G). In this way there is a continuous change of the air in the container.

In using this container the greatest difficulty was experienced in making an air-tight seal which could be broken easily and frequently for examination of the asparagus root. Sealing wax, paraffin, grafting wax and similar materials had many objections. In no case could a tight seal be held for more than 12 hours, because the waxes withdrew from the galvanized iron container and the base, whether the base was metal or glass. To avoid this difficulty a base was made for the container, and in this base is a double-walled collar. The asparagus roots were set in this base. The side of the galvanized iron subject container fitted in between the walls. The double wall was then filled with water. No further trouble was experienced with air leaking through the container, and the respirometer has been in continuous operation for as long as 48 hours and no leaking has been detected.

An easy check for leaks is made by setting the respirometer up without putting a plant in the container. By introducing carbon-dioxide free air into the container and then passing the air through the entire apparatus the operator is able to take some carbon dioxide out at the aspirator, if there is any leaking in the system. None has been found after two interrupted 24-hour tests and one continuous 48-hour test.

This apparatus has the advantages of being easily and cheaply constructed, can be opened and closed easily and seemingly is satisfactory for measuring the amount of carbon dioxide given off by plants in the dark.

WALTER B. BALCH

NEW FIXING FLUIDS FOR GENERAL PURPOSES

THE number of fixing fluids recommended up to date is admittedly very great. The excuse for the new formulae given here lies in the fact that all other fluids with which I am familiar, either harden the tissues too much or interfere with subsequent staining. Serial sectioning is often made very difficult, while macroscopic dissection becomes almost impossible. In addition, many fluids require prolonged washing. The duration of fixation is also often very limited, resulting in great inconvenience when one attempts to use the fluids on scientific expeditions. The new fluids recommended here represent the results of extensive experimentation extending over many years and are more or less free from the above-mentioned defects. Animals fixed in them remain soft and do not harden subsequently in 70 per cent. alcohol in which they may be left for many weeks. Washing is simple. All common stains may be used. Mallory's triple stain gives brilliant differentiation, though the picture is somewhat different from that obtained after fixation in Zenker's fluid. Complete penetration of all ingredients of the fluids is accomplished at the rate of one half millimeter per hour, but the nitric acid penetrates twice as rapidly. This was determined by an examination of pieces of liver at intervals of one hour. The surface of a smooth cut shows the fixed zone clearly. The penetration of paranitrophenol was determined by wetting the cut surface with ammonia and measuring the width of the zone in which the tissues turned yellow. Similarly, the penetration of cupric nitrate was determined with sodium sulfide.

The change in volume due to fixation was determined by measuring the displacement of water before fixation and after fixation. This was done by Dr. G. E. Pickford, who found an average swelling of about 10 per cent. in beef liver fixed for 24 hours in the phenol and the paranithrophenol mixtures, while in the case of the alpha dinitrophenol mixture the increase in volume was only about 5 per cent. A paranitrophenol mixture made up with 70 per cent. instead of 60 per cent. alcohol caused a swelling of about 20 per cent. Rat testes showed a shrinkage of about 5 per cent. after 24 hours fixation in the phenol mixture, but no appreciable change of volume after fixation in the paranithrophenol mixture. When transferred to 70 per cent. alcohol for 9 days, both showed an increase in volume; in the case of the testis fixed in the phenol mixture the increase amounted to about 13.5 per cent., in the case of that fixed in the paranitrophenol mixture to about 16 per cent. Transferred for 10 days into 80 per cent.