that presents a flat surface to the incident beam. Further protection can be secured at the intermediate level by use of the magnetic shielding provided.

X-radiation from the top port, which might have been expected to be the most intense, is apparently eliminated by supplying the microscopes with lead glass. The intermediate and final levels do not seem to be so much protected in these 3 microscopes. The x-radiation from the top port can also be minimized by discarding the angled screen.

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A Low-Temperature Incubator

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Occasionally the need arises for an accurate and versatile low-temperature incubator or BOD box, but the purchase of a commercial unit is not always justified. In this laboratory a large incubator operating at 28° C and containing 4 fluorescent light fixtures was required for the incubation of microbiological assay tubes of *Euglena gracilis*. Commercial BOD boxes available at that time did not have adequate usable incubating space to serve this purpose, but a standard household refrigerator was easily converted into a large-capacity, low-temperature incubator.

The conversion was accomplished by building and inserting on the top full-width shelf of the refrigerator the unit shown schematically in Fig. 1. Dimensions have been omitted, since actual construction details depend upon size and position of shelves and freezing unit in the refrigerator being converted. This conversion unit effects the isolation of the cooling coils of the refrigerator from the rest of the box, and, by means of controls, the desired temperature of the remainder of the box can be maintained. No mechanical modifications of the refrigerator are necessary, the unit is easily removed to allow normal use of the refrigerator, and the refrigeration mechanism is not put under any strain. The necessary materials, a sensitive thermoregulator and a relay, a coil heater, a fan, and various other items, are readily obtainable.

The freezing unit is isolated from the rest of the box with rigid insulation board (¾-in. Celotex sheathing) partitions. The edges of the insulation boards are edged with rubber weatherstripping to form a snug seal at the back wall, side wall, top, and door of the refrigerator.

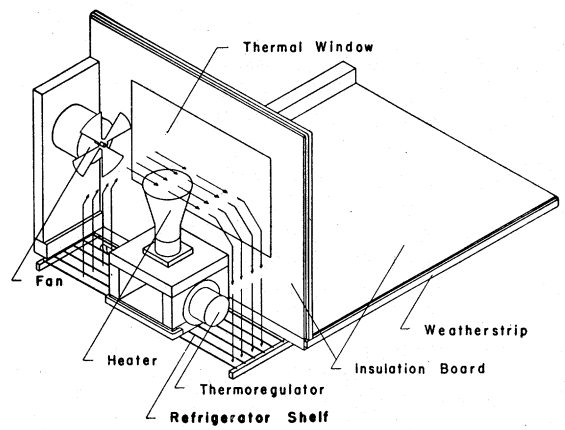

FIG. 1.

The isolated freezing unit is thus allowed to operate normally, and the amount of "cold" transferred to the rest of the box can be controlled by means of a "thermal window," a sheet of metal fitted into an opening in the vertical insulation board next to the freezer. This window acts as the cooling surface for the air in the rest of the box and is made large enough to transfer more heat than is produced by the fan motor and other heat sources.

The temperature of the circulating air is then adjusted by a heater coil that is actuated by a thermoregulator assembly. The heater and thermoregulator are placed, as indicated, on a support that also serves to force the seal of the unit to the side walls, and to direct the flow of air. The fan is attached to a wooden support that also reinforces the partitions, and is placed so that by its direction of rotation it draws air up from the box, forcing it past the thermal window and heater, and down into the box again (Fig. 1). The sensitive bimetallic end of the thermoregulator is placed below the fan so that it is affected by the air coming up from the box. The relay control box is placed outside the refrigerator. Necessary electrical wiring to the fan, heater, and thermoregulator is passed between the box and the rubber insulation of the door.

With the refrigerator operating at a temperature colder than is necessary, the thermoregulator can be adjusted to maintain the desired temperature in the box. Temperatures ranging from 7° to 40° C can be maintained, with no greater variation than ± 1° C throughout the incubating space.