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NOTES

Improved Device for the Administration of Fungal Spores to Small Animals via the Respiratory Route

ROBERT BURRELL

Department of Microbiology, West Virginia University Medical Center, Morgantown, West Virginia 26506

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An improved device has been designed and constructed for the administration of fungal spores or other air-suspended particles to mice via inhalation. Fabricated from Lucite [0.25 inch (0.63 cm)], the device was built in the shape of a 6-inch (15.2-cm) cube with two 1-inch (2.5-cm) holes drilled in each side. Mice are restrained in plastic conical centrifuge tubes which fit into the holes by friction. The device is safe, easily cleaned and sterilized, and can accommodate up to eight animals at a single exposure.

With the increasing attention being paid to aerobiology, there has been a growing need for equipment to produce and administer aerosols or particle suspensions to experimental animals. Particular interest has been given to the study of the immunological responses to airborne fungal spores (1), but administrations and quantitation of such spore suspensions have been difficult. Piggott and Emmons (2) described a multiarmed culture flask for exposing mice to airborne fungal spores. Their device must be first sterilized, and a suitable medium must be introduced into the bottom and then inoculated in a conventional manner. After suitable incubation of the culture in the device, mice are inserted into the side arms and the spores are airborne by a vigorous application of air to the agar surface. This device is expensive to produce and easily damaged. In addition, several would be needed to support any kind of study since the entire device would be in use throughout the incubation period.

We have modified the device of Piggott and Emmons by constructing a box out of Lucite [0.25 inch (0.63 cm)] with a removable bottom. Two 1⅛-inch (2.85 cm) holes were carefully machined into each side, and two 0.5-inch (1.27 cm) holes were machined in the top. Figure 1 is an isometric drawing giving details of construction. The individual mouse chambers were nothing more than plastic 50-ml conical centrifuge tubes, each of which had ⅜ inch (0.32 cm) of the conical end cut off. The mouse is inserted in the tube and pushed in far enough so that its muzzle protrudes from the tip opening. The mouse is held in place with disposable rubber culture plugs (Fig. 2). Each tube is held in its place in a wall hole by friction.

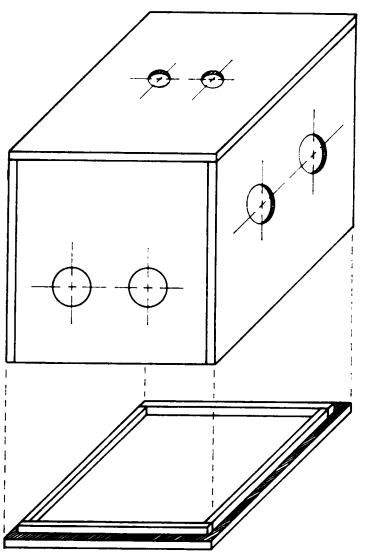

FIG. 1. *Isometric view of device showing details of construction. One-fifth actual size.*

Two vaccine vial stoppers were inserted into

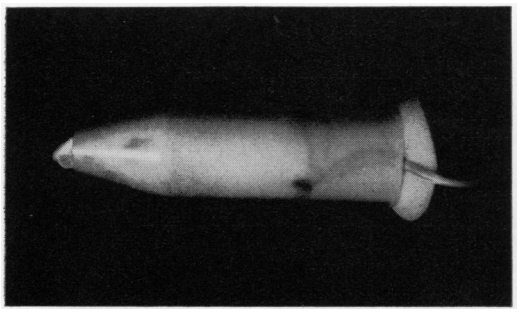

FIG. 2. *Modified conical centrifuge tube showing immobilization and placement of mouse for inhalation experiments.*

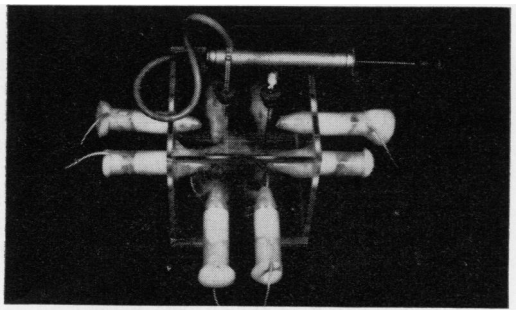

FIG. 3. *Assembled apparatus with mouse chambers, culture plate, and air pump in place ready for an experiment.*

the top. A 13-gauge, cotton-stoppered trochar served as a vent through one stopper and a Pasteur capillary pipette was passed through the other. A small air pump or 50-ml syringe was then attached to the capillary pipette by rubber tubing. A conventional petri dish containing a mature fungus culture was placed on the bottom piece, the unit was placed securely over it, and the junction was sealed with masking tape. Vigorous but short blasts of air produced instantaneous clouds of spores in a completely closed, safe system. Figure 3 shows the completely assembled unit with mice in place. One unit can suffice for many experiments, since cultures can be grown on conventional plates separately without involving the appratus.

We have used the device to produce clouds of *Penicillium* and *Aspergillus* spores as well as clouds of silica dust. With suitable modification, it could easily be adapted to administer aerosols from liquid suspensions or solutions. Quantitation may be performed on samples obtained by withdrawing air samples from the trochar, but we prefer to make plate counts from lung homogenates of mice sacrificed for this purpose. After 10 min of exposure to 1-week-old *Penicillium* plates that had been thoroughly blasted with jets of air, plate counts of lung homogenates demonstrated that a mouse will inhale 5×10^6 to 8×10^6 spores that will reach its lungs. Many more are filtered out around the nares, the accumulations of which can be seen grossly and can be cleansed off for decontamination.

At the conclusion of the exposure, a mouse tube is twisted out and quickly replaced by a stoppered blank. If infectious agents are used, this step would have to be done in an appropriate microbiological hood as contamination could occur here. Sterilization of the apparatus can be accomplished by introducing a small volume of Formalin into the chamber for a few hours.

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LITERATURE CITED

1. Austwick, P. K. C. 1966. The role of spores in the allergies and mycoses of man and animals, p. 321–337. *In* Proc. 18th Symp. Colston Research Society, Butterworths, London.
2. Piggott, W. R., and C. W. Emmons. 1960. Device for inhalation exposure of animals to spores. Proc. Soc. Exp. Biol. Med. 103:805–806.