

**AN APPARATUS TO DEMONSTRATE AND MEASURE  
OPERANT BEHAVIOR OF ARTHROPODA**

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Scientific literature abounds with a wealth of material on the operant behavior of many species. However, there is a noticeable lack of data on the Arthropoda and other lower forms.

The apparatus described in this paper is designed to overcome the problems hindering research on these lower forms.

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The apparatus (see Fig. 1) consists of the (4 × 4 × 4 in.) lucite experimental box (A) with a bar-pressing mechanism (B) and the automatic feeder (C).

A major obstacle in working with the various Arthropoda is the damage to antennae and/or tarsi due to manual manipulation of the subjects. To insure an intact organism in the experimental chamber, a sliding door (D) is provided at one side of the experimental unit to permit transfer of the organism with minimal damage. Removal of the organism is facilitated by a sliding wall opposite the door,

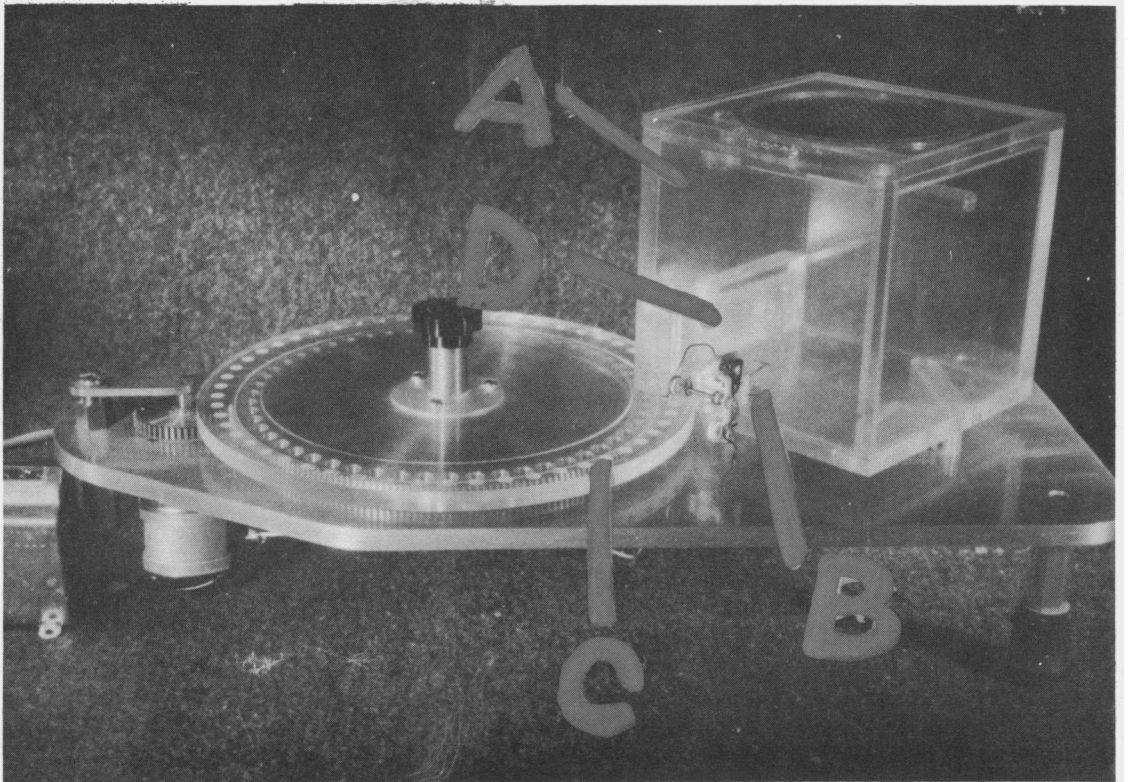


Fig. 1. The apparatus to demonstrate and measure operant behavior of Arthropoda.

A—Experimental Box  
B—Bar Pressing Mechanism

C—Automatic Feeder  
D—Sliding Door

so designed that it can be pulled across the box forcing the organism to exit.

A second obstacle is the selection of a manipulandum with a small force and excursion requirement. A small variable tension lever obtained from a volt meter serves this purpose. This mechanism allows for a change in excursion from  $\frac{1}{4}$  in. with a low force requirement, for an organism such as the stick insect *Dixippus morosus*, up to an excursion of  $\frac{3}{4}$  in. and a high force requirement for the roach *Periplaneta americana*.

Food delivery is accomplished by placing indentations  $\frac{1}{2}$  in. apart around the periphery of an 8 in. lucite disc. As the manipulandum

is depressed, a stepping motor rotates the lucite disc so that the contents of the next indentation are available to the organism through a  $\frac{1}{4}$  in. hole in the floor of the experimental chamber. Use of a preferred food for a particular species is highly recommended, e.g., for the roach *P. americana* the preferred food is apple or banana.

Magazine training can be accomplished by varying the indentations in which food is placed, i.e., every other, every third, etc., indentation.

Rate of response is readily obtained by the addition of a timer and counter or a graphic recorder.