

Johnson, W. W. University of New Mexico,
Albuquerque, New Mexico. A simple
Drosophila activity maze.

A number of devices for measuring locomotor activity of *Drosophila* and other insects have been described in the literature (see Barton-Browne and Evans, 1960; Ewing, 1963). One general type

that has been used in studies of spontaneous locomotor activity is known as the activity maze. Two advantages of the maze are that any number of flies can be tested at the same time, and that continuous observation and recording of movements are not required. Although the mazes that have been employed in experimental work have differed in details of construction, their basic design has been the same. In essence, an activity maze consists of a series of cells or chambers that are connected linearly by passages through which flies can migrate from one cell to another. Flies are placed in a cell at one end of the series, and after a period of time the flies are scored according to the number of cells they traverse. Flies reaching cells progressively more distant from the starting point are considered logically to have exhibited correspondingly higher levels of activity. Individuals that move more rapidly than others, or that sustain activity for longer periods, would be expected to locate more readily the passages between cells, and thus pass farther along the series in a given period of time.

An activity maze for *Drosophila* can be constructed easily and inexpensively from a polyethylene ice cube tray, a 12" x 6" piece of masonite, six large paper clamps, and ten corks. The only specific requirement is that the tray be of one-piece construction and have adjacent cells separated from one another by common walls.

Into the bottom of each cell in the tray a 1/4" hole is drilled and fitted with a size 00 cork stopper. These holes are used for introducing flies into the maze at the beginning of a run and for inserting ether-soaked cotton to anesthetize the flies at the end of the test period. When the maze is in operation the tray is inverted on a flat surface and in this position the corks can be removed and replaced rapidly with little chance that any of the test flies will escape.

Communication between the cells is made by punching a hole in each of the internal dividers with a hand paper punch. This gives pathways for movements not only between cells in a row, but also between rows of cells. Different patterns for the movement of flies can be assigned by merely sealing off certain of the passages with adhesive tape. One of the most useful arrangements is obtained by isolating the two rows of cells, thus giving two cell chains in which the activity of males and females can be tested concurrently.

Added convenience in handling the maze and scoring the flies can come from placing the tray on a masonite board that has had the latticed outline of the tray cells drawn on it. A very satisfactory means of fastening the tray securely in register with the outline is to clamp the shoulder of the tray to the board with paper clamps. When the flies in each cell are etherized at the end of a run they will fall onto the corresponding rectangular area marked off on the base board. The tray can then be lifted from the board and the number of flies in each cell can be determined quickly by tallying the flies in each area.

The fact that this maze lacks certain of the refinements built into other activity mazes does not limit to any great extent its application to studies of locomotor activity in *Drosophila*. For example, in an attempt to increase discrimination between activity levels, funnel-shaped apertures have been used in other mazes to encourage transits from cells of lower to higher order. Although the effectiveness of this modification never actually has been evaluated, it appears certain that it does reduce the frequency with which flies will reverse direction and re-enter cells previously passed through. However, there is no reason to expect that flies with higher activity will have a predisposition for retrogressive movements and flies with lower activity a predisposition for progressive ones. Therefore, even in the simple maze I have described in which funneled passages have not been used, there should be a positive correlation between the activity of a fly and the rank of the cell in which it is found at the end of a test period. The validity of this supposition is born out by the success with which high and low activity lines have been developed through the use of this maze. (See Ewing, 1963, for a discussion of reactivity, or the interaction among flies in a crowded condition, as a factor in the performance of flies in an activity maze.)

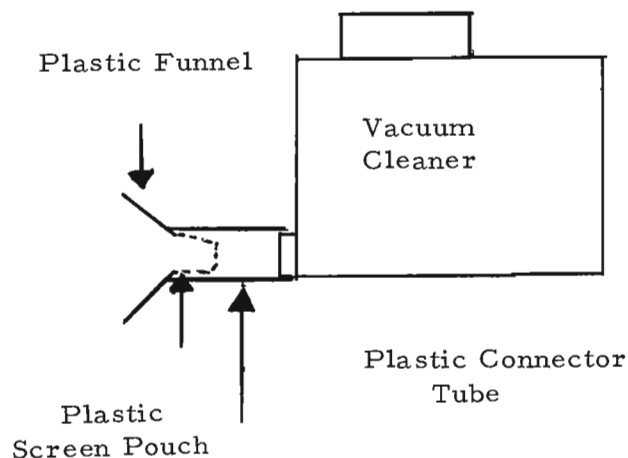
Random locomotion and reactivity are not the only behavioral traits that can be investigated with this maze. The translucent quality of the polyethylene tray makes the maze suitable for a variety of studies dealing with phototactic response. In such work, the light transmitted through the tray from a light source located at one end of the maze would

act as a directional stimulus for the movement of the flies through the cells of the maze.

References: Barton-Browne, L., and Evans, D. R., 1960, Locomotor activity of the blowfly as a function of feeding and starvation. *J. Insect Physiol.* 4:27-37; Ewing, A. W., 1963, Attempts to select for spontaneous activity in *Drosophila melanogaster*. *Anim. Behav.* 11:369-378.

MacMahon, J. A. and D. Taylor. University of Dayton, Dayton, Ohio. Another method for removing *Drosophila* from traps.

relative abundance estimates in studies of natural populations. It is, therefore, necessary to have a foolproof method of collecting all flies in a trap.



Differential flight characteristics of flies in traps may allow fast, agile species to escape, during the trap emptying process, easier than more sedentary species. Such activities may affect

Traps similar to those described by Miller (DIS 37:141, 1963) have been emptied, without loss of flies, by utilizing a small, modified, battery powered vacuum cleaner (Fig. 1). The cleaner is equipped with a plastic funnel of a diameter which will completely cover the trap. The funnel is inserted into a plastic tube which fits the cleaner's hose connection. Affixed to the funnel is a plastic screen pouch which prevents the flies from being sucked into the cleaner. The procedure is to turn the cleaner on before the trap is disturbed. The funnel is placed over the trap, which is then tapped lightly. The flies are sucked into the collecting pouch. The funnel opening is stoppered and the funnel plus the attached pouch are removed. The pouch is inserted into an etherizer whose diameter is the same as the plastic tube. Flies may then be transferred to vials.

Shelton, E. E. Utah State University, Logan, Utah. A density method of collecting and cleaning eggs from *D. mel.*

yeasted spoons. Eggs and yeast were washed onto a piece of black cloth cut to fit inside a Buchner funnel. Most of the yeast washed through the cloth. The eggs and the remaining debris were washed from the cloth into a 12 ml. conical centrifuge tube. Sedimentation was facilitated by spinning briefly in an International Clinical centrifuge. The water was sucked off with an aspirator and the pellet resuspended in approximately 4 ml. of 16% sucrose. Approximately 2 ml. of 20% sucrose solution then was layered under the suspension. This was accomplished by placing the tip of a 9-inch Pasteur pipette at the bottom of the tube and allowing the 20% solution to flow slowly into the tube. The tube with its layered contents was spun in the centrifuge for 3 min. at 1610 X g. Most of the debris and all of the first instar larvae formed a pellet at the bottom of the tube. Debris of relatively low density remained at the top of the solution while the eggs accumulated at the interface between the 16 and 20% sucrose solutions and were easily removed with a pipet.

