A ROTARY INSECT-PREFERENCE TRAP

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One of the problems confronting the investigator who is studying certain aspects of the bionomics of flying insects with the aid of preference traps is that of eliminating the bias of position. A review of the literature revealed that most traps that had been described were limited in their use (Peterson, 1953). Several individual stationary traps or a single direction trap with several compartments may offer unequal attraction to insects because of unequal distances of the traps from the source of insects or because of wind direction, adjacent trees and rough terrain.

Investigations at this station had revealed that *Culex quinquefasciatus* fed readily on chickens and that it preferred chicken blood to that of all other domestic animals tested (Edgar, *et al.*, 1949). In view of anticipated studies on relationship of this mosquito to transmission of certain poultry diseases, it was desirable to learn more about its habits. To facilitate the realization of this objective, some sort of apparatus was necessary. Thus, a rotary trap was designed and constructed for the purpose of studying host, color, light intensity and other preferences of this and other mosquitoes. Described in this report are the trap and the uses for which it was designed. Data obtained, particularly concerning *C. quinquefasciatus*, with the aid of the trap will be the subject of another paper.

DESCRIPTION OF THE TRAP. The trap proper is of sheet aluminum and from above appears hexagonal in shape, Figures 1 and 2.[2] It has six wedge-shaped compartments with partitions of solid aluminum riveted to the top and bottom. Toward the back of each compartment is a plate holder that will support filters to regulate color or intensity of light. The front side of each compartment has a door in which a screen inlet is mounted. The maximum opening of the rectangular inlet is 1.5 x 8 inches, the aperture of which can be reduced in size and changed in shape as desired. The depth of each inlet is 11 inches and behind each inlet, space

[1] The trap was designed by the authors and constructed by Ray Patterson of the Engineering Shops, Alabama Polytechnic Institute.

[2] Persons interested may obtain blueprints of the trap from the Department of Poultry Husbandry.

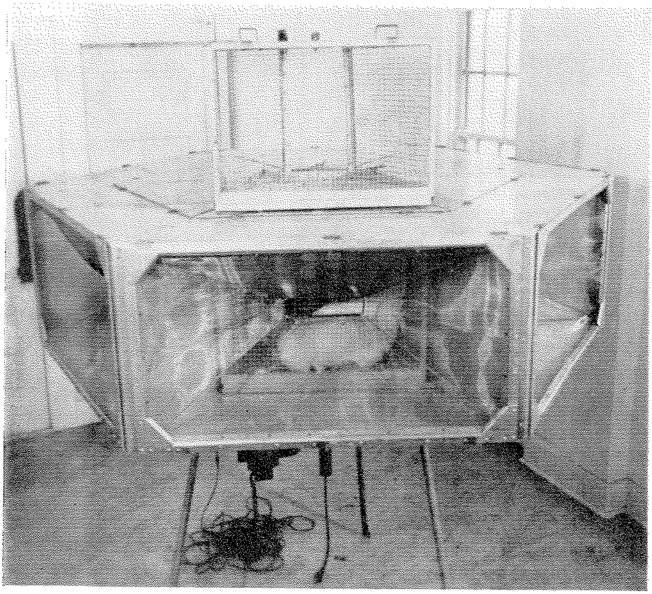

FIG. 1. Front view of one compartment of the six-compartment rotary inset preference trap with chicken in animal cage directly behind inlet cone. A sample animal cage is on top of trap.

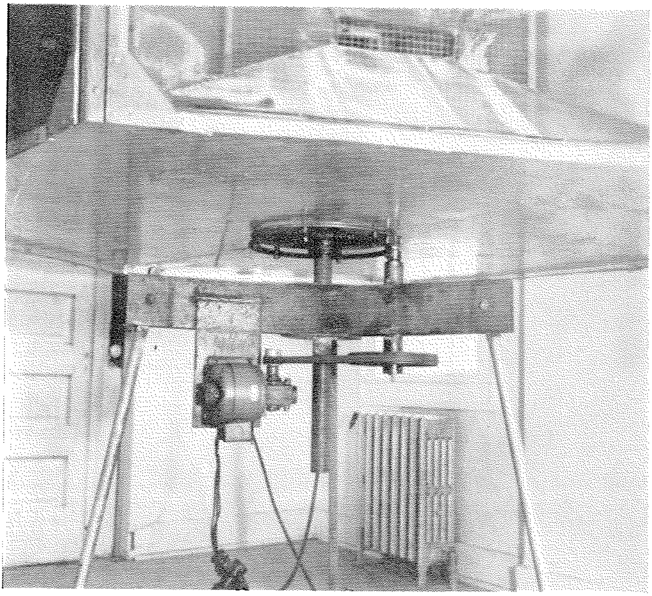

FIG. 2. View of underside of trap showing tripod base and driving mechanism

is available for a wire animal cage with dropping pan, test panels, delivery of CO_2 or other test subjects. There is also a top door to each compartment; thus the operator can introduce cages or other equipment by either route.

The trap proper is mounted on an adjustable tripod base, which is removable for ease in handling. The trap revolves around a central pole to which is mounted a stationary battery of six lights. The compartment, or turn-table portion, is electrically driven and the driving mechanism is designed to allow the trap to rotate at several speeds by merely changing pulley wheels.

Accessory items for the trap include glass cells and filter frames that can be placed in plate holders. Glass cells are water tight, designed to hold solutions of different colors and intensities. Designed, but not tried, are panels that can be painted with repellents or attrahents that can be placed behind the inlet. A CO_2 drum can be placed on the top of the trap with outlets to each of the compartments.

Prior to use, the trap was carefully tested to detect compartment differences. It was placed in the field under a canvas canopy near mosquito breeding sites and operated for several nights with white light, but without bait. Compartments rotated around the centrally illuminated pole at the rate of one complete revolution per 74 seconds. A comparison of the numbers of winged insects that entered each compartment revealed that there were no compartment differences. Collections included several species of mosquitoes as well as a good many other insects.

In a similar manner, the trap was operated for several nights in a heated, thermostatically controlled, mosquito-tight room. Mosquito breeding containers, which contained only stages of *Culex quinquefasciatus* were located in the room so that there was continuous emergence of adults during the test. Again, daily counts of male and female mosquitoes entering each compartment revealed that there was no difference between compartments.

In another series of nine trial runs, the trap was operated in the aforementioned room with Leghorn hens that had been carefully selected for similarity as baits. One hen was placed in each of three adjacent compartments for three successive nights. They were randomized to new compartments for each run. Since most of the mosquitoes that entered were females and they took blood meals, counts were based on mosquitoes that had fed. In spite of possible differences between similar hens in the different compartments, the difference between the numbers that fed on different birds was not significant. This was taken as another indication that there was no difference between compartments.

POSSIBLE USES. Of the several uses, the trap is suitable for making host-preference determinations. As many as six different animals can be placed in separate compartments or several smaller animals in each compartment and the attraction to and/or feeding on such animals by any winged, blood-sucking insect can be compared. Cage-size limits the size of animal that can be compared, and a 20-pound animal is about the limit of a single cage. The trap can be operated in the field or in a room where specific insects can be liberated. In addition, the attraction of insects to varied numbers of small animals or plants of different breeds or varieties, sexes, ages and sizes can be compared. The cages and compartments are easily cleaned between runs to eliminate odors.

By means of flat glass cells that hold colored dyes or by colored filters, the attraction or repellence of different colors of the spectra for winged-insects can be determined. By using dyes in cells rather than fixed filters, it is possible easily to alter the concentration of contents in order to study the effects of different light intensities on insects. The attrahent effect of different concentrations of CO_2 for insects that feed on warm blooded animals also can be determined with this apparatus.

Data pertaining to some insects' attraction to or repellence by plants, animals, or other substances can be gained much more rapidly and less expensively by a trap of the design described herein than by some of the conventional methods of observation now being used. It is believed that a trap of this design may prove useful to other investigators interested in similar studies and that other uses for such a trap may be developed.

References

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