# A MODIFIED VISUAL TRAP FOR *AEDES AEGYPTI*[1]

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A daytime trap for *Aedes aegypti* mosquitoes, based on the attractant qualities of a gloss black panel for adult males, has been described (Fay, 1968). Although devised primarily for surveillance use in houses, limited outdoor tests with the trap in a dump area near Miami, Florida, demonstrated that during the early afternoon mosquitoes and other small Diptera were collected almost to the complete exclusion of other insects. Approximately 25 percent of the insects collected were mosquitoes, and these were all *Ae. aegypti*, with a predominance of adult males.

In field tests on the dispersion of marked *Ae. aegypti* males at Meridian, Mississippi, the traps showed promising recaptures (Fay and Craig, 1969), but at the same time certain changes in trap design were indicated.

The present paper details the changes made and the factors which are considered pertinent in obtaining optimum field efficiency.

DESCRIPTION OF THE TRAP. As shown in Figure 1, the single support (A), a 4-foot length of ½-inch-O.D. pipe, is fitted with a foot piece (B), braced at right angles 10 inches from the lower sharpened end of the pipe. Two cross arms (C) clamped to the support are adjustable for height and length. From the upper cross arm, a cover (D), which rotates with the wind, is suspended. This cover, 0.040-gauge aluminum, is a horizontally oriented trapezoid 17½ inches across the open front, 7¾ inches across the back, and 5 inches deep, with a height of 6 inches. A recessed shelf (E), 2¾ inches wide, connects at the back of the cover at a height of 2¼ inches. A 4-inch diameter semicircular notch (F) is recessed in the center of the forward edge of the shelf; and the front edge of the shelf, including the semicircular portion, is extended vertically downward for a distance of 2¼ inches, making the edge flush with the back and sides of the cover. The back portion of the aluminum cover above the shelf contains a transparent plastic window (7¾ × 3¾ inches) (N). The cover parts are fastened together with pop rivets, and a hole (G) in the top is centered over the front edge of the semicircular recessed portion in the shelf. Adjustable sliding panels (H) provide additional weight on the front edge so that the cover will balance when suspended by a wire through the centered hole in the top.

A galvanized metal cylinder (J), 6 inches high and 3½ inches in diameter, is attached to the end of the lower cross arm by a hose clamp (I). This cylinder houses a 4.5 D.C. motor which drives a two-bladed 3⅛-inch fan located 1½ inches above the lower end of the cylinder. A collapsible cylindrical cage 10 inches in diameter and 6 inches high (K), equipped with a sleeve 1 inch in diameter (L) for aspirating mosquitoes, is attached to the lower end of the cylinder by an elastic sleeve.

The color pattern of the trap is as follows: the supports and the exposed metal portion, both outside and inside of the top, back, and sides of the cover, are gloss white; the shelf including the vertical front portion is gloss black; the outside of the cylinder and the upper half of the inside are gloss black.

A 6-volt battery, painted white to minimize its attractant qualities for the adult mosquitoes, provides energy for the trap. Elecrical connections (M) to the motor are made by wiring which fits into slots in the cylinder.

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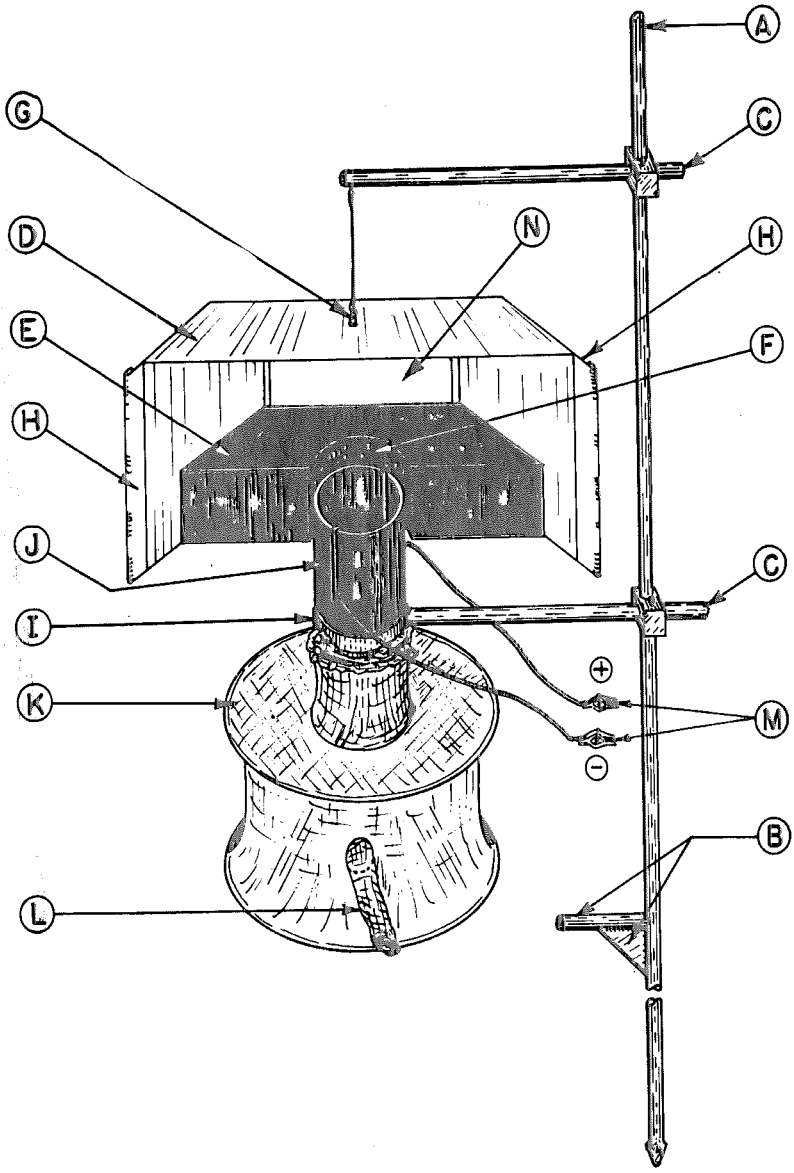


FIG. 1.—The trap has the following components: (A) support leg, (B) foot piece, (C) cross arms, (D) cover, (E) recessed shelf, (F) recessed shelf portion, (G) point of suspension, (H) balancing panels, (I) clamp, (J) metal cylinder holding fan and motor, (K) screen cage, (L) aspirating sleeve, (M) electrical terminals of motor, and (N) plastic window.

In the field the support is driven into the ground and the lower cross arm is adjusted so that the cage is off the ground and the cylinder is sufficiently away from the support to allow the cover to rotate. The upper cross arm is then adjusted so that the semicircular recessed area of the shelf is centered on the cylinder with the shelf about ½ inch above the upper edge of the cylinder. The position of the cover is checked to insure free rotation about the stationary cylinder.

DISCUSSION AND RESULTS. Field trials in 1967 had indicated that several modifications in trap design would be advantageous. During a sampling period of several hours, the direction of the wind invariably fluctuated. Since the formation of the male swarms of *Ae. aegypti* was downwind from the black panel, the trap had to be modified to provide for orientation of the panel to the wind direction. If the trap components attached to the lower support arm (C) rotated, any connections to a stationary battery would present a design problem. Therefore, in the revised design only the cover portion, containing the black panel, rotates. Finally, rainfall during a sampling period was deleterious to the unprotected suction fan motor. In many cases, the fan stopped. The wind-oriented cover on the trap offers considerably more protection for the motor and insures more reliable operation in the field.

The uneven ground conditions and the presence of shrubbery or immovable objects in the field restricted the locations suitable for placement of a fixed-height, two-support trap. The single support capable of being driven in by foot proved more practical, and the adjustable support arms made height changes possible.

In laboratory tests, 33 trap design modifications were evaluated with 2- to 4-day-old males and females of *Ae. aegypti*. The efficiency of the trap, especially in catching the adult females, appeared to be influenced by the following design factors: (1) a trapezoidal cover was more effective than a semicircular cover; (2) a cover 6 inches in height was more effective than one 5 inches or less in height; (3) a nontransparent top on the cover was better than a clear top; (4) a clear plastic window on the back panel of the cover worked more effectively than a nontransparent back panel; (5) the all-black top and front surfaces of the shelf were more effective than such surfaces with any white areas; (6) the recessed shelf enticed the mosquitoes further into the trap than a shelf flush with the front of the cover; (7) the cylindrical motor housing with a fully open top provided better suction than one with a constricted top, such as a funnel; and (8) the cylinder top set ½ inch below the shelf level gave the best suction.

Laboratory evaluations in a 100-cubic-foot chamber using four replicates of 25 male and 25 female 3-day-old adults each gave 5-minute captures of 75 percent and 90 percent, respectively. In the field over a 4-week period 2,750 genetically marked males were released daily throughout a 12-block urban area. Twelve traps in the area were operated for a 7-week period and supplied weekly estimates of the proportions of genetically marked and wild males in the experimental area, as shown in Table 1. Only a few, apparently accidental, specimens of other insects were taken. The adults of *Ae. aegypti* were not injured by their capture.

TABLE 1.—Adult *Ae. aegypti* mosquitoes taken in black traps in a 12-block urban area of Meridian, Mississippi.

| Week | Wild *A.a.* | | MISS MARK | Ratio Wild Male: MM male |
|---|---|---|---|---|
| | Female | Male | Male | |
| 0* | 48 | 60 | 6 | 10:1 |
| 1* | 19 | 99 | 93 | 1:1 |
| 2* | 32 | 49 | 252 | 1:5 |
| 3* | 13 | 22 | 253 | 1:12 |
| 4 | 9 | 18 | 6 | 3:1 |
| 5 | 16 | 22 | 0 | ... |
| 6 | 7 | 7 | 0 | ... |

*Approximately 2,750 MISS MARK males (genetically marked with a silver mesonotum character) were released daily during weeks 0–3.

The trap described is proving to be a valuable asset in studies on population

dynamics of *Ae. aegypti* but, on the basis of presently available data, would not be of value for other species.

SUMMARY. A daytime trap quite specific for adult *Ae. aegypti* mosquitoes has been designed and field-tested. The design is based on the attraction of contrasting gloss black and white panels, and involves a wind-orienting cover, a stationary cylinder housing the suction motor, and a cage to hold the trapped mosquitoes. A field test with genetically marked males has demonstrated its usefulness in estimating the proportions of the field population represented by the released *Ae. aegypti* mosquitoes.

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