A MODIFIED CDC LIGHT TRAP

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Light traps are used commonly to sample species composition and relative abundance of mosquito populations but may require modifications to meet particular operational conditions in the field. Two models of traps have gained general acceptance for sampling mosquitoes. The New Jersey light trap developed by Headlee (1932) is used in locations where mains power is available or with portable generators. The CDC miniature light trap of Sudia and Chamberlain (1962), powered by storage batteries, is used at sites not served by mains power and where living mosquitoes must be collected for disease studies. The automation of light traps at sites served with mains power presents little difficulty as many types of timers and switching mechanisms are available for operation on 115V AC. But the use of automated light traps in remote areas not so served has been severely restricted by the lack of suitable control mechanisms that will operate on low voltage DC. Thus to sample mosquito populations in remote areas it became necessary to modify the CDC light trap.

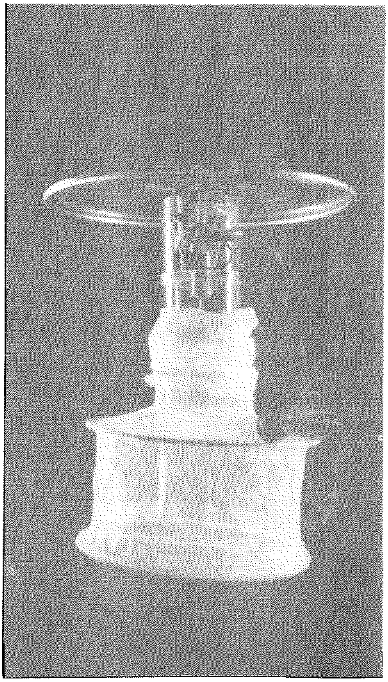

FIG. 1.—The CDC light trap.

The CDC light trap (Fig. 1) is operated from a 6V DC lead acid battery which runs the light and the fan motor. The mosquitoes are attracted to the light and drawn into the mesh bag by the air stream created by the fan. To contain the captured specimens the fan must run continuously throughout the collecting period and until the trap can be cleared. This mode of operation is suitable for collecting live mosquitoes at nearby sites which can be reached quickly at evening to start the trap and at morning to clear and stop it manually. However, if these traps are to be used at scattered distant sites when it is not necessary to take the mosquitoes alive, this mode of operation becomes uneconomic because of the large expenditure of time required to service the traps twice daily and the greater frequency of replacement of fan motors and recharging of storage batteries required because the traps must operate for more hours daily. To overcome these operational problems the traps were automated for a sunset to sunrise collecting period, and the mesh collecting bag was replaced with a killing jar.

MODIFICATIONS (Fig. 2). A light-acti-

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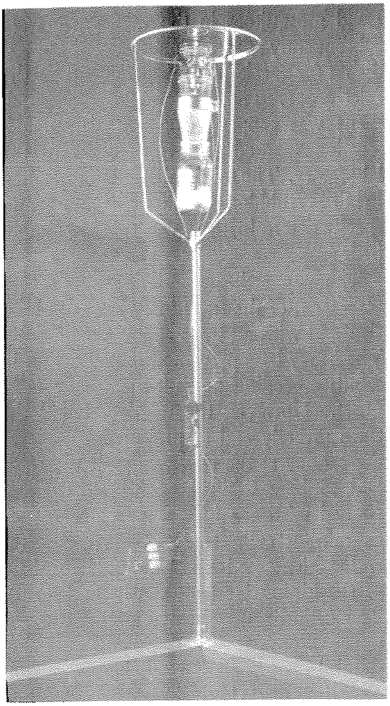

FIG. 2.—A modified CDC light trap. The restraining cylinder is not shown.

vated switch as designed by Buckley and Stewart (1970) was inserted into the 6V DC line. This switch consists basically of a photoconductive cell which triggers a pair of transistors to open or close the circuit in accordance with the light-proportional conductivity of the cell. A variable resistor permits selection of the illumination level at which the switch will actuate. The switch, contained in a glass weatherproof container, was strapped with electricians' tape to the upright of the cage-supporting stand with the photoconductive cell pointing directly to the ground.

A cyanide killing jar was attached to the lower end of the trap cylinder to replace the mesh bag. The attachment was made of a tapered cylinder of 14 mesh stainless steel screen, .017 inch diameter wire with 57.2 percent open area, welded to a 1 inch band of 18 gauge stainless steel at top and to the inside top of an "Improved Gem" jar ring at bottom. The screen cylinder was 3 inches long to allow an open area of approximately 9 square inches, equivalent to the cross sectional area of the trap cylinder, so there would be minimal air resistance to the fan. The top end of the attachment was drawn tight around the lower end of the trap cylinder by a ¼ inch bolt through the 1 inch band and the killing jar screwed into the jar ring at the bottom end. A 7 ounce waxed paper drinking cup was suspended in the constricted top of the 1 quart killing jar to contain the specimens. The walls of the cup were perforated with 120 holes, .010 inch diameter, and the bottom with a lesser number by means of a simple hand tool fabricated for the purpose.

CDC traps are designed to be suspended from tree limbs or similar aerial structures by means of the ring wing nut centrally located above the canopy. In open prairie regions such structures are not always available so a portable supporting stand was developed. It consisted of a 3-footed base of 1½ inch x 1½ inch angle iron with the feet 26 inches long radiating horizontally at intervals of 120° from the central hub. A ½ inch pipe coupling was welded vertically at the central hub to receive a 4 foot length of ½ inch galvanized steel pipe threaded at each end. The pipe was topped with a ½ inch pipe coupling to which three struts of ¼ inch steel rod 22 inches long were welded at intervals of 120° and bent upward and outward to the diameter of the canopy. The upper ends of the struts were flattened, tapered and bent at the appropriate angle to be inserted under the flange of the canopy and held firm by the outward thrust of the struts. The supporting stand can be dismantled readily and packaged for transport.

RESULTS AND DISCUSSION. Six of the modified CDC traps were operated at remote sites about 30 miles from the laboratory during the period May 12 to October 14, 1969. At this location, latitude 52°N, the nights decrease from 8 hours 21 minutes on May 14 to 7 hours 15 minutes at June 21 and increase to 13 hours 45 minutes by October 14. The switches were adjusted to actuate the traps at a reading of 6.4 foot candles as measured with a Photovolt 501 M meter with C sensor and ⅛ inch cone window.[2] Thus the light and motor were on from shortly before sundown to shortly after sunrise and were off all day except when the light level dropped below 6.4 foot candles. Periodic checks of night operation of the traps and shading the photoconductive cell each time the traps were cleared showed the switches to be completely trouble free. None failed during the whole period of operation nor did the actuation level change. The switches assured minimal nightly operation of the traps and consequently the 105 ampere hour 6V DC storage battery would run the trap for at least 21 consecutive nights on a charge, even during the latter part of the period when nights were longest. During the preceding year when the traps were turned on and off manually the batteries required charging at weekly intervals. The saving of needless operation of the lights and motors also resulted in less frequent replacement of these components.

The killing jar had many advantages over the mesh bag which it replaced. It prevented escape of the mosquitoes when the motor stopped so the traps could be cleared at any appropriate time of day. Consequently, for sampling species composition and relative populations the traps were cleared thrice weekly rather than daily as had been required previously when the mesh bags were used. The perforated cup, suspended above the killing agent in the jar, contained the killed specimens. The perforations in the cup permitted free movement of the cyanide fumes within the cup and were small enough to retain any rain water in the cup and prevent undue saturation of the potassium cyanide-sawdust mixture in the bottom of the jar. Dead mosquitoes in the rain water were subsequently floated on water in petri dishes for species determination under the microscope. The cup containing the specimens was capped upon removal, dated, location marked and transported to the laboratory. The minimal handling resulted in little rubbing of the specimens and species determinations were greatly simplified.

The supporting stands permitted easy placement of the traps in any desired location and with all traps at the same height. The heavy base prevented tipping; even in winds exceeding 50 miles per hour none upset. However, the wind whipped the traps severely and to prevent breakage of the canopy at the ring wing nut the traps had to be stabilized. This was accomplished with a 4 inch x 4 inch 12 gauge restraining cylinder closed at the lower end, which fitted loosely around the base of the killing jar (not shown in Fig. 2). The cylinder was held on centre in the upper pipe coupling of the supporting stand by means of a ⅜ inch diameter centering peg 1½ inches long welded to the base of the restraining cylinder. The clearance from the bottom of the killing jar to the upper pipe nipple was 2¾ inches so the centering peg could be raised out of the pipe coupling, moved laterally and the restraining collar dropped clear of the killing jar for easy clearing of the traps.

SUMMARY. The modifications of the CDC trap consist of a light-operated switch, a killing-jar attachment and a stabilized supporting stand. The light-operated switch can be used only in conjunction with the killing jar because live specimens would escape when the trap is shut off. However, it reduces servicing of the traps and minimizes travel and time requirements for clearing them. The perforated collecting cup in the killing jar produces specimens with minimum rubbing and simplifies species determination. The supporting stand affords similar placement of any number of traps and prevents damage to the traps in field operation.

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[2] Photovolt Corporation, 95 Madison Avenue, New York 16, N.Y.

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FIELD TRIALS OF AN AMINE OVICIDE AGAINST *AEDES AEGYPTI* (L.)[1]

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Control measures in the recent U.S. Aedes aegypti Eradication Program consisted primarily of source reduction activities and the cyclic application of residual larvicides. Despite such measures, isolated foci persisted in all areas under attack largely because the toxicants were ineffective against eggs remaining in the breeding containers. Since over much of its range in the U.S. a high percentage of the population of this species is in the egg stage during the cooler months or drought periods, application of ovicidal spray at such times should further the eradication goal.

The effectiveness of amine mixtures against *Ae. aegypti* eggs in laboratory studies has been reported (Wilton *et al.*, 1968; Cline *et al.*, 1969). The activity of amine mixtures under a number of temperature and humidity conditions and the functions of the separate components have been investigated (Wilton and Fay, 1969). Simulated field applications showed that an aqueous formulation containing ethanolamine and Duomeen L-11[2] was effective against eggs in tires and cans (Jakob, 1969). These studies led to field trials in south Florida and Mississippi during the time overwintering eggs constituted a high percentage of the existing *Ae. aegypti* population.

MATERIALS AND METHODS

SOUTH FLORIDA. Naturally occurring containers, considered likely to contain eggs, were selected as test vessels in a lower socioeconomic, residential area near Perrine, Florida, in February 1969. An attempt was made to obtain similar numbers of representative containers for comparison of the treatments with the controls. All test containers were marked with spray paint, numbered, and the location, type, approximate capacity, and actual water content recorded.

Treatment consisted of the application of aqueous formulations containing 2:0.2 percent or 4:0.4 percent of ethanolamine: Duomeen L-11. All inside surfaces of the containers were treated using a 2-gallon hand compression sprayer, operating at 40 p.s.i., and dispensing a hollow cone spray from a Teejet 5500-X18 nozzle. All liquid in the containers, including ovicide,

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[2] Manufactured by Armour Industrial Chemicals, McCook, Illinois. Use of trade names is for identification purposes only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health, Education, and Welfare.