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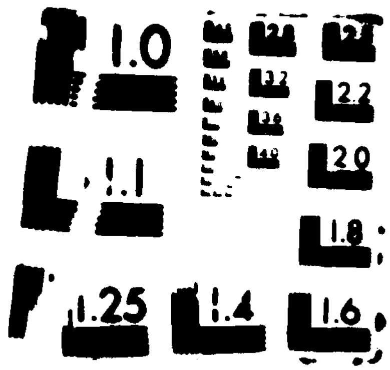
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SHORT COMMUNICATION

A new type of collapsible insect-surveillance light trap for sampling Diptera

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ABSTRACT. The newly designed Army Collapsible Insect Surveillance trap for nocturnal collection of flying Diptera that are attracted by light is described. A polyvinyl chloride construction increases durability, while the capability to collapse from a height of 92.1 cm to 24.1 cm facilitates transportation and storage.

Key words. Light trap, Diptera, insect-surveillance, U.S.A.

Mosquito surveillance operations often make use of light traps, comprised of a light source which attracts the insects at night, and an electric fan which draws the mosquitoes into a container. The most commonly used light traps are: the Communicable Disease Center (CDC) Miniature (Sudia & Chamberlain, 1962), the Monks Wood (MW) light trap (Service, 1970), the Solid State Army Miniature (SSAM) (Driggers *et al.*, 1980) and the Model 50 New Jersey (Mulhern, 1934). The CDC, MW and SSAM are designed to collect live specimens for disease vector or rearing studies, the New Jersey trap to sample mosquitoes for determining population density and diversity. The Army Collapsible Insect Surveillance (ACIS) trap described here is designed to reduce weight and size, and to enhance durability over that of the New Jersey trap.

The main body of the ACIS trap (Fig. 1) consists of two sections of 0.48 cm thick polyvinyl chloride pipe. The upper section (A) has an outside diameter of 20.0 cm that collapses into the lower section (B) with an inside diameter of 20.2 cm. A 35.6 cm diameter by 1.9 cm deep aluminium lid (C) is used as a rain shield. A hanging or carrying handle (D) mounted on the lid supports the trap in operation and facilitates handling during transportation. The lid is supported by three adjustable rods (E) with three height settings. The lowest position is used during storage and transportation, and the other two settings are used during operation to accomodate light bulbs of different dimensions. Three aluminium telescoping legs (F) attached to the lower section of the trap body provide a built-in tripod. When the trap is collapsed, or supported by the handle, the legs are retracted and held in place by a spring-loaded detent in the leg mounting bracket.

The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

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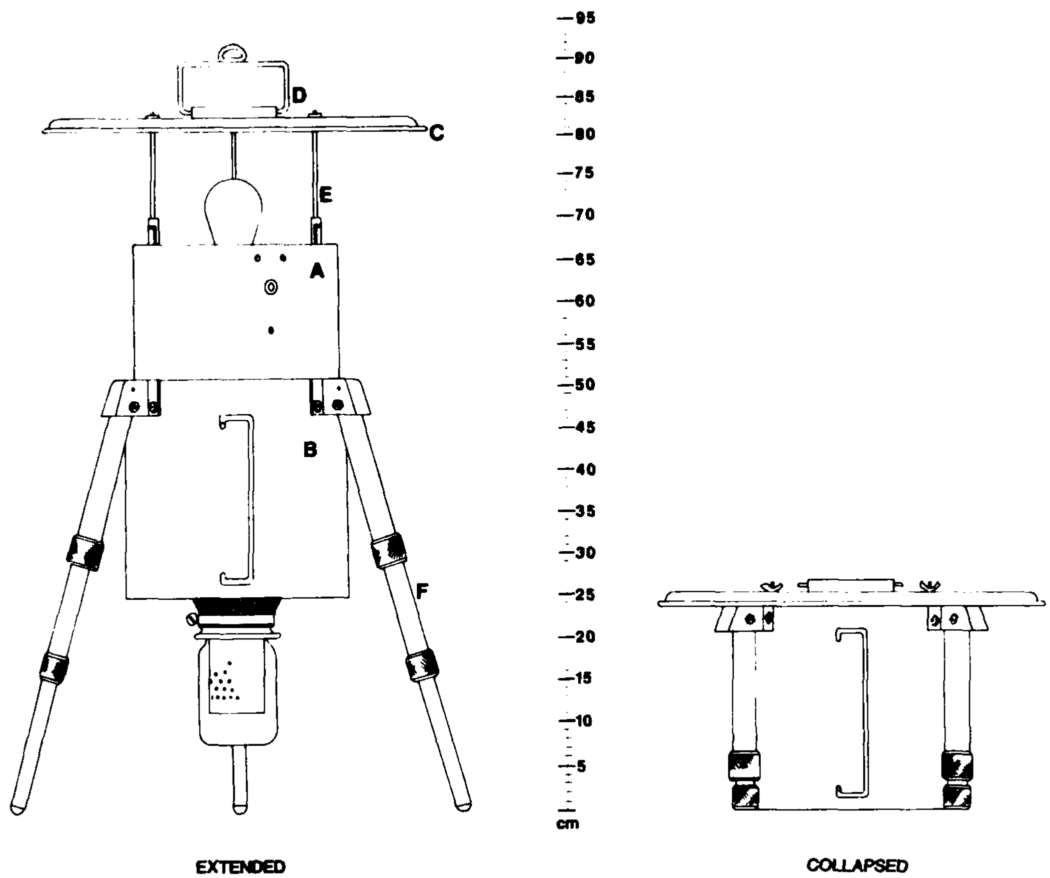

FIG. 1. Diagram of the ACIS trap extended for operation and collapsed for storage. Major exterior components are shown: (A) upper section, (B) lower section, (C) lid, (D) hanging or carrying handle, (E) adjustable rod, (F) telescoping leg.

Inside the trap (Fig. 2), an aluminium mounting ring (a) and a support frame (b) with three radiating arms allow attachment of the motor (c), lamp holder (d), and hardware-cloth screen with 0.64 cm (¼ in.) mesh (e). A totally enclosed 1/60 hp motor (Fasco® Industries, Inc., Boca Raton, Fl.) and a 16.8 cm rigid thermal plastic (RTP) fan (f) produces a 12 m^3 (425 ft^3)/min airflow using procedures similar to those described by Mulhern (1948). The lamp holder (for medium-sized screw-base bulbs) is mounted to the support frame by an L-bracket and hose clamp. In an effort to extend filament life an axial-lead diode, rated at 1000 peak inverse voltage (PIV) at 1 A, was installed according to the method described by West & Cashman (1985). The hardware-cloth screen is seated horizontally on the mounting ring to exclude larger insects.

The collection assembly consists of a 20.3 cm deep funnel (g) made of 22 mesh plastic screening, a polypropylene jar lid (h) with a 6.0 cm diameter opening, and a 500 ml polypropylene kill jar (i). A perforated plastic insert (j) prevents specimens in the collected sample from contacting the killing agent or any condensate inside the jar. The collection assembly attaches to the main body of the trap by a 1.9 cm wide Velcro® strip (k).

The 110 V AC current required to power the trap is supplied through a 3 m section of cord that connects to the upper trap section via a

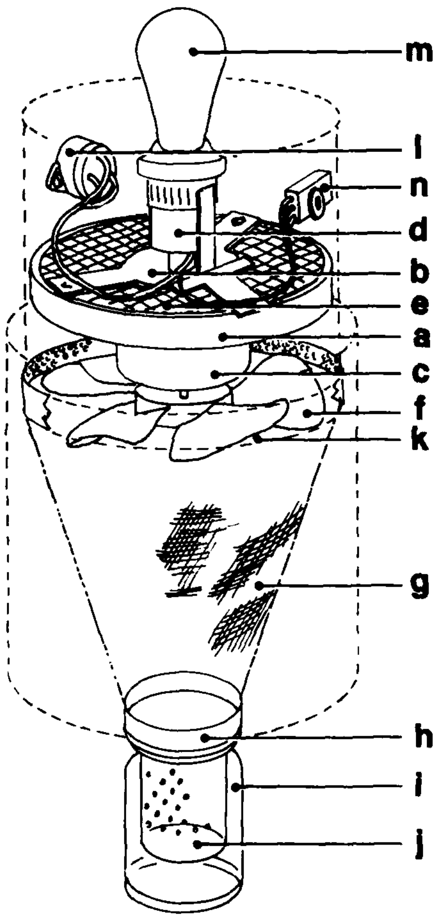

FIG. 2. Diagram of ACIS trap showing interior components: (a) mounting ring, (b) support frame, (c) motor, (d) lamp holder, (e) screen, (f) fan, (g) funnel, (h) jar lid, (i) kill jar, (j) kill jar insert, (k) Velcro strip, (1) twistlock jack, (m) light source, (n) photocell.

twist-lock jack (1). Operational reliability of the trap was determined by cycling the motor on and off 48,000 times over a 2000 h period. Additionally, the motor was operated continuously for 10,000 h without failure. On and off cycles of the light source (m) were controlled by a photocell (n) (Precision Multiple Controls. Inc., Midland Park, N.J.). The photocell was cycled on and off 5500 times over a 1000 h period.

Durability testing was conducted to determine the trap's ability to withstand impact. The extended trap was dropped nine times from a height of 4 ft onto a hardwood surface. The trap was oriented differently for each drop. After nine drops the trap was still serviceable with minor repairs (straightening lid and screen, etc.). Survivability was attributed to the PVC construction and relative light weight (4.4 kg compared to the New Jersey trap weighing 6.6 kg). When the trap was collapsed; a 92.1 cm high piece of equipment was converted into a compact package 24.1 cm high. Chances of damaging the trap during transportation were further reduced while in the collapsed mode. The light bulb, collection funnel, and electrical cord are packed inside the collapsed trap during storage and transportation.

Comparative tests between the ACIS trap and the New Jersey trap were conducted in Panama, Central America, and South Carolina, United States of America. These studies evaluated total numbers of adult mosquitoes captured using ultraviolet and incandescent light with and without a carbon dioxide dry ice supplement. Preliminary results showed that, under tropical conditions in Panama, the ACIS trap captured

TABLE 1. Comparison of total mosquitoes captured with the Army Collapsible Insect Surveillance (ACIS) trap and the New Jersey (NJ) trap. Results are for 40 trap-nights at Daufuskie Island and Kitchings Mill, South Carolina, 1 June to 31 July 1986, with paired traps set in sparse, temperate, deciduous forest. For each of the four types of light setting, no significant differences were found between the two types of traps ($P>0.05$; $N=5$; Duncan's Multiple Range Test).

Light type	Mosquitoes captured/trap night ($\bar{X}\pm$SE)	
	ACIS	NJ
Incandescent	7.6±1.5	8.6±1.7
Incandescent CO_2	12.0±1.4	14.4±1.4
Ultraviolet	8.4±1.9	8.0±1.9
Ultraviolet CO_2	11.6±1.7	16.2±1.4

significantly higher numbers of mosquitoes than the New Jersey trap (Marvin Lawson *et al.*, in press). However, the North Carolina study showed no significant differences in total number of mosquitoes captured by the two types of traps fitted with incandescent or ultraviolet bulbs, with and without CO_2 supplementary attractant (Table 1).

The advantages of the ACIS trap can be summarized as follows: (1) the ACIS trap is 33% lighter than the New Jersey trap; (2) the ACIS trap is 62% shorter when collapsed than the New Jersey trap; (3) PVC construction has enhanced durability; (4) improved materials and technology increased operational reliability; (5) trap results are not significantly different from the most widely used mosquito light trap. Because the ACIS trap was found to have operational advantages over the New Jersey trap, the ACIS trap will become the standard trap in US Army field units and is recommended to other workers. It will soon be made available from a commercial supplier.

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