behavior, the presence of such groups or guilds warrants consideration.

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A LIGHTWEIGHT BATTERY-POWERED ASPIRATOR FOR COLLECTING RESTING MOSQUITOES IN THE FIELD[1]

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The collection of mosquitoes during the resting phase of their behavior is undoubtedly the most efficient means of obtaining a representative sample of the population of many species, as well as the most productive method of obtaining blood engorged specimens for host identification studies. Many exophilic nuisance and vector species rest among grassy and shrubby vegetation and on the foliage of bushes (Service 1976). Various devices have been constructed to sample mosquitoes from these areas. Many have narrow openings for the mosquitoes to enter and are unsuitable for efficient sampling in grasses and low herbaceous growth where mosquito densities may be low.

One exception is the model described by Dietrick (1961) that is commercially available as the *D-VAC*. It has a large opening (34.3 cm diam) and is powered by an air cooled 2-cycle gasoline engine. The *D-VAC* is very efficient in collecting small insects.

The disadvantages of the *D-VAC* are its weight (12.5 kg), noise, vibration, exhaust from the engine, and the need to carry gasoline for frequent refueling.

A large, but lightweight, battery-powered aspirator has been designed by G. F. O'Meara (Florida Medical Entomology Laboratory, personal communication). Basically, his device is a 121 cm long × 37.5 cm diam cylinder of aluminum with a clear vinyl nosecone in the front, and a net collecting bag mounted in the center of the tube. This device is quiet, portable, and efficient in collecting mosquitoes and other small insects from low foliage. The main disadvantage of this design is that most of the parts are not easily obtained and it must be fabricated by an experienced machinist.

The battery-powered aspirator described below (Figure 1) combines the light weight (less than 5 kg), portability, and efficiency of the aspirators mentioned above while being constructed from easily obtained parts with a minimum of tools or expertise (parts and suppliers listed in Table 1). The total cost of constructing this aspirator is approximately $80 (not including bags and batteries) compared to $590 for a backpack model *D-VAC*.

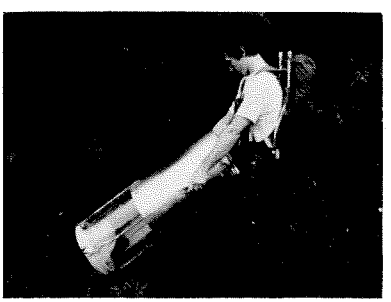

Fig. 1. Battery powered aspirator in use.

The apparatus, shown diagramatically in Figure 2, consists of a 61 cm (24 in) long × 34.3 cm (13.5 in) inside diam tube fabricated by a local sheet metal shop from 24 g aluminum, and a 61 cm (24 in) long ×34.3 cm (13.5 in)

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Table 1. Parts list and source of aspirator components.

Part	Source	Part	Source
61 cm (24 in) × 34.3 cm (13.5 in) 24 g aluminum tube	local sheet metal shop	Push button switch	local hardware and lumber stores
		Heavy duty 14-2 electrical cable, 4 m	" " "
61 cm (24 in) × 122 cm (48 in) sheet .030 clear Lexan	Cadillac Plastic Co. 51467 U.S 31 North, South Bend, IN 46556	2 heavy gate handles	" " "
D-VAC bag	D-VAC Company P.O. Box 2095 Riverside, CA 92516	6 "S" clips, rubber bands	" " "
		Bolts, nuts, washers, wood screws, motor support, motor base	" " "
12 V DC motor part 2M272	W. W. Grainger Inc. 5959 Howard St. Chicago, IL 60648		
10 in fan blade part 2C356	" " "	2 Globe Union Gel Cells 6 V, part GC 6200	Globe Union, Battery Division 5777 N. Green Bay Ave. Milwaukee, WI 53209
Brass bearing part 2X355	" " "		
Motor mounting kit part 3M133	" " "		

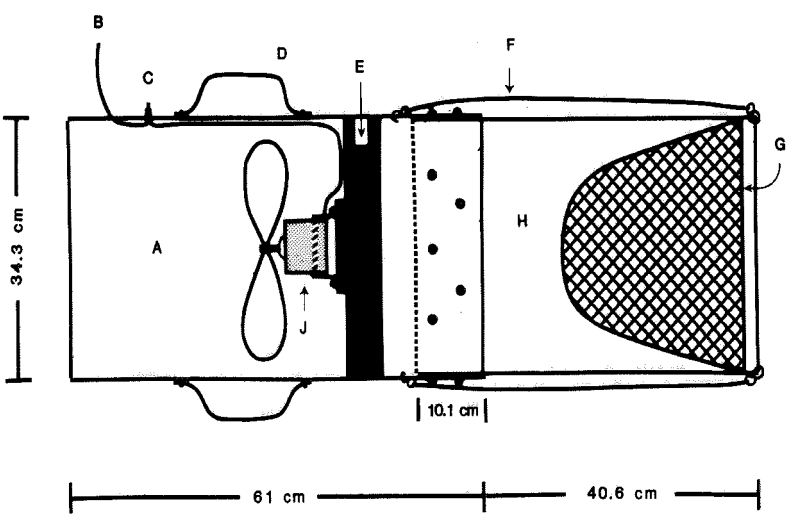

Fig. 2. Diagramatic representation of aspirator; A. aluminum tube, B. wire to battery, C. push-button switch, D. heavy duty gate handle, E. wooden motor support, F. heavy rubber band with "S" clips at either end to secure collecting bags, G. *D-VAC* bag folded over rim of Lexan tube, H. Lexan tube partially inserted and bolted inside aluminum tube, J. motor mount assembly (also see Figures 3 and 4).

outside diam tube constructed by overlapping and bolting an appropriate size sheet of .030 clear Lexan® plastic. The Lexan tube is then inserted 10.1 cm (4 in) into the aluminum tube and bolted into place. After the fan, motor, and mount are centered on the motor support (a pine 2 in × 4 in stud rounded at the ends to match the curve of the aluminum tube), the entire assembly is fastened inside the aluminum tube with wood screws as shown in Figure 2. Details of how the motor is mounted on the support are shown in Figures 3 and 4.

Large gate handles are bolted on the aluminum tube opposite each other in a position comfortable for the operator (Figure 1). The wires from the motor are secured to the motor support and inside surface of the aluminum cylinder with heavy duty heating duct tape to prevent entanglement in the fan blades. The wires are connected to a push-button switch mounted in the tube and then pass out to the battery.

The diameter of the Lexan tube permits the muslin neck of the *D-VAC* bag to be folded snugly over the outside of the tube. "S" clips attached to large rubber bands are hooked over the edge of the bag to aid in keeping it in place. When a collection is completed, the "S" clips are removed, the net bag is slipped out and sealed with a rubber band.

The apparatus is powered by two 6 volt Globe Union Gel Cells connected in series which when fully charged, can run the aspirator for approximately 6 hr without any appreciable loss of power. These batteries are ideal for transport in a backpack due to their light weight and the fact that they are sealed and cannot spill corrosive materials.

In studies concerning blood-feeding habits (R. S. Nasci, unpublished data), and the effects of habitat on resting distribution of sylvan mosquities in northern Indiana (J. C. Beier, University of Notre Dame, unpublished data), males and females of many species were col-

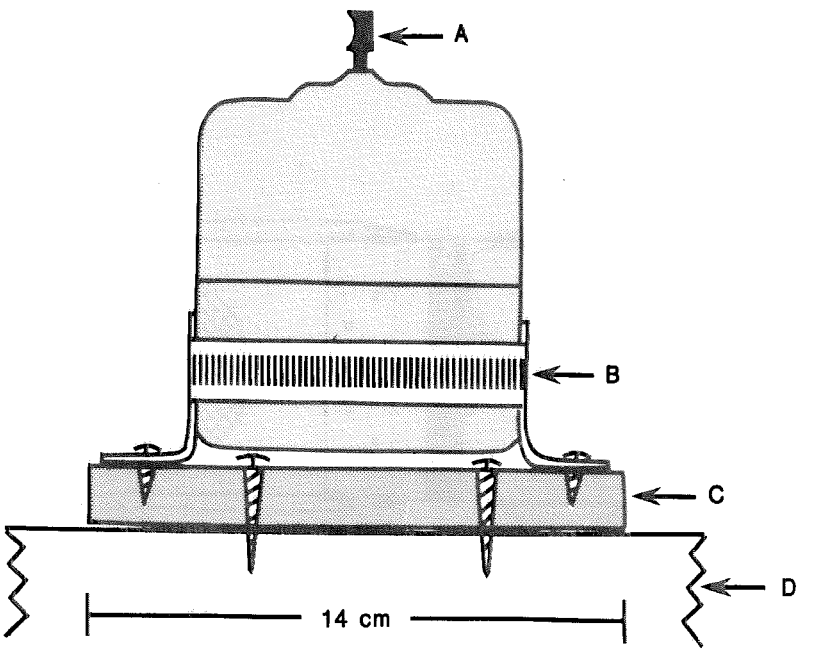

Fig. 3. Diagram of motor mount assembly, side view; A. brass bearing notched with file and in position on motor shaft before attaching fan blade, B. position of securing strap from motor mount, C. 14 cm (5.5 in) square × 1.25 cm (.5 in) thick plywood base for motor mount, D. 34.3 cm (13.5 in) long wood motor support (2 × 4 in stud) rounded at the ends to fit the aluminum tube, to which the motor mount base is attached.

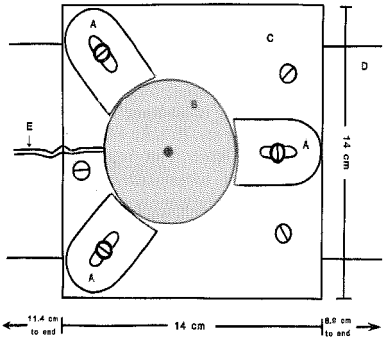

Fig. 4. Diagram of motor mount assembly noting position on motor support, top view; A. screw brackets for motor mount, B. motor body, C. plywood base for motor mount, D. motor support, E. wires from motor.

lected with this device. They included: *Aedes vexans* (Meigen), *Ae. triseriatus* (Say), *Ae. hendersoni* Cockerell, *Ae. trivittatus* (Coquillett), *Ae. stimulans* (Walker), *Ae. sticticus* (Meigen), *Ae. cinereus* Meigen, *Coquillettidia perturbans* (Walker), *Culex pipiens* Linnaeus, *Cx. restuans* Theobald, *Cx. territans* Walker, and *Uranotaenia sapphirina* (Osten Sacken).

The fact that collection of resting mosquitoes produces males as well as females, and that these collections are more representative of the populations than those made by most other collecting methods indicates the usefulness of this method of sampling in studies of mosquito biology.

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