A SIMPLE SEPARATOR FOR MOSQUITO LARVAE AND PUPAE [1]

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INTRODUCTION. Separating larvae of various stages, or larvae from pupae, is a tedious but necessary operation in the study of mosquitoes. Various methods have been designed to facilitate this operation. Bar-Zeev and Galun (1961) fed iron filings to fourth instar larvae and held them in a magnetic field while removing the pupae. This ingenious method is time-consuming, for though the actual separation is done in a moment, ingestion of the filings takes about half an hour. Weathersby (1963) chilled the animals to about 5° C. to immobilize them; the larvae sank to the bottom while the pupae remained at the surface. This method is useful when large numbers of animals have to be separated and when temperature is not critically involved in the study. For laboratory use, several devices have been made, utilizing the fact that the pupae have a larger thoracic diameter than the larvae. The first such separator was made by Fay and Morlan (1959) and consisted of two glass plates held so closely together that the pupae were retained while the larvae passed through.

Dr. H. G. Simkover of Shell Development Laboratory in California made a separator with two fixed glass tubes held so closely together that the pupae would be retained. The separator described herewith is a refined form of that apparatus.

DESCRIPTION. As shown in Fig. 1, the separator consists of three plastic cylinders (Plexiglas tubing), two of which (1) are cemented half an inch apart to the end pieces (3). They act as a funnel and are larger (1½" outer diameter) than the third cylinder (2) which has an outer diameter of ¾". The small cylinder is centered beneath the two fixed ones and is cut fractionally shorter than the distance between the end pieces so it can move freely. Two identical adjusting levers (4) are shaped from ⅛" thick Plexiglas. Through the enlarged base of each lever a slot (½" wide and 1" long) is cut at an angle of

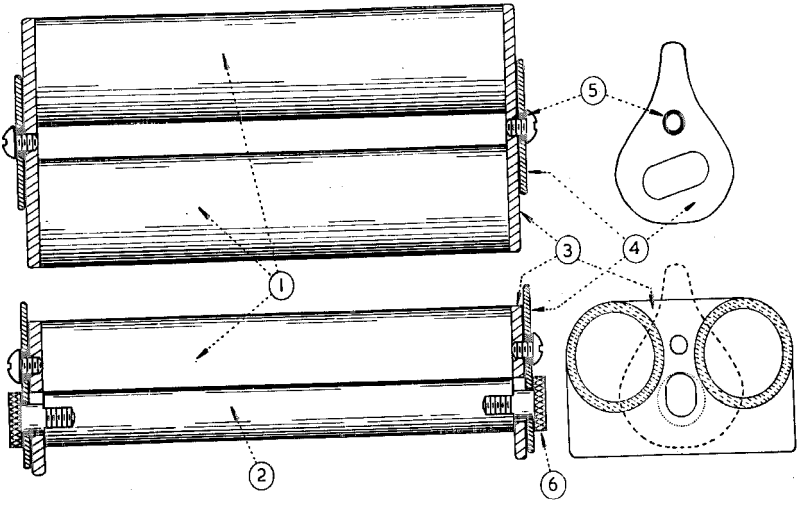

FIG. 1.—Sketch of separator. (1) two 1½" plastic cylinders, (2) one ¾" plastic cylinder, (3) two end pieces, (4) two adjusting levers, (5) two plastic bushings, and (6) two brass bearing screws.

25°, to act as a cam. Above this slot a pivot hole is drilled and fitted with a plastic bushing (5) to receive ¼" brass #20 machine screw. For moving the center rod (2) in the vertical plane, a much larger bearing screw (6) is passed through each cam slot and thence through a slot

[1] Acknowledgment is made of support from the National Institute of Allergy and Infectious Diseases through program-project research grant AI-06587.

in the end pieces and into the tapped rod. These large screws (6) are machined from stock having a diameter of the knurled heads, leaving 5/16" x 1/2" d. shoulder to slide in the cam slot when the whole screw is tightened into the small cylinder.

The separator is 8½" long, fitting the rearing pans used in this laboratory. Longer models would allow more animals to be separated at one time. The capacity can also be increased by using a larger number of parallel cylinders in the unit.

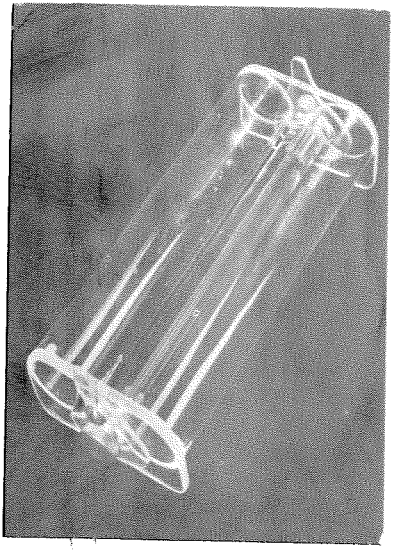

FIG. 2.—The basic 3-cylinder type separator.

OPERATION. The operation of the separator is simple. The two gaps between the three cylinders are adjusted to retain the particular size of pupa by moving both cam-levers simultaneously, thus lowering or raising the center cylinder.

The separator is placed in an empty pan and each sample to be separated is slowly poured down between the tubes. Most of the larvae wash straight through, but a few remain, caught among the pupae. These are easily seen through the clear plastic and may be forced through with a jet of water. A few small pupae may wash through too, but these can be recovered easily and quickly with a medicine dropper. The pupae are removed from the separator by opening the gaps fully and washing them off into a container.

The separator is quickly reset to the original opening if the upper edges of the end pieces have scales etched on them, which are used in conjunction with center lines on the levers.

ADVANTAGES OF THE DESIGN. The separator described has several advantages over previous models: (1) It is small, compact, and lightweight so that it may be used both in the laboratory and in the field. It is simple to make of inexpensive materials, and can be modified to fit most requirements. (2) It is simple and quickly manipulated in operation. A special advantage is that the trapped pupae can be lifted on the separator to another container and there quickly removed by enlarging the openings. (3) Considerable time can be saved. In pans with 100 individuals, half of which have pupated, 2–3 minutes are required per pan to remove the pupae with an eyedropper. With the separator, the time is one minute per pan, including recovery of the few pupae that may pass through. (4) As the openings can be adjusted over a large range, it is possible to separate various sizes of larvae and pupae as well as different species.

References Cited

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SOME NOTES ON THE MOSQUITOES OF LOUISIANA, INCLUDING THE ADDITION OF *Aedes hendersoni* COCKRELL

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Aedes hendersoni was originally described as a variety of *A. triseriatus* (Say) in 1918 by Cockerell. Breland (1960) raised *A. hendersoni* to full species status and reported it from many areas in Texas. Hedeen (1963) reported this species from Illinois which is the easternmost record in this country. Nielson *et al.* (1967) listed it additionally from Colorado, Idaho, Montana, New Mexico, South Dakota, and Wyoming. A record of *A. hendersoni* was reported from Missouri by Smith and Enns (1968).

A treehole in a sweet gum northeast of Sulphur (Calcasieu Parish) was found to contain larvae of *A. hendersoni* in March, 1968. Companion species were *A. triseriatus* and *Orthopodomyia signifera* (Coquillett). Reared adult females of *A. hendersoni* closely resembled the scutal drawing of the species from Illinois by Hedeen (1963), although the base of the dark scaled area in our

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