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HARVESTING MOSQUITO PUPAE WITH COLD WATER[1]

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Harvesting mosquito pupae is one of the most menial and time-consuming tasks in the mosquito insectary. Perhaps the first method, and one still in use today, utilized a wide-mouth medicine dropper to pick the pupae one at a time from the larval cultures. Lewis (1933) collected pupae with an apparatus using a large rubber bulb to produce a vacuum. A refined, glass-blown, vacuum device (Fig. 1A) is used in this laboratory for picking small numbers of pupae. Some insectaries employed a small screen-wire scoop for this purpose. With certain species of mosquitoes the culture conditions can be so regulated that pupation occurs nearly simultaneously, thus eliminating the need for separating the developmental stages. With many species it is not possible to produce such uniform development, and harvesting of the pupae becomes a problem.

A number of workers have reported on devices and techniques for expediting the harvesting of pupae. McKiel (1957) reported on a simplified method for large-scale laboratory rearing of *Aedes aegypti* which required little effort or attention and separation of pupae and larvae was not required. A removable collecting cage, into which the adults emerged, was mounted over a thermo-regulated tank containing the aquatic stages. Fay and Morland (1959) described a mechanical device consisting of two glass plates, slightly separated and adjustable, for separating developmental stages, sexes and even species of mosquitoes. The stages were separated according to size when the cultures were poured through the apparatus. Separation of 1,000 pupae required 20 minutes in ordinary insectary production. In contrast, they reported that skilled operators required about 90 minutes to pick 1,000 pupae with a screen wire spoon. Bar-Zeev and Galun (1961) added iron dust to the cultures and exposed them to a magnetic field. Since only the larvae retained the ingested iron

[1] Supported in part by research grant AI 05253–01 from the National Institute of Allergy and Infectious Diseases, U. S. Public Health Service.

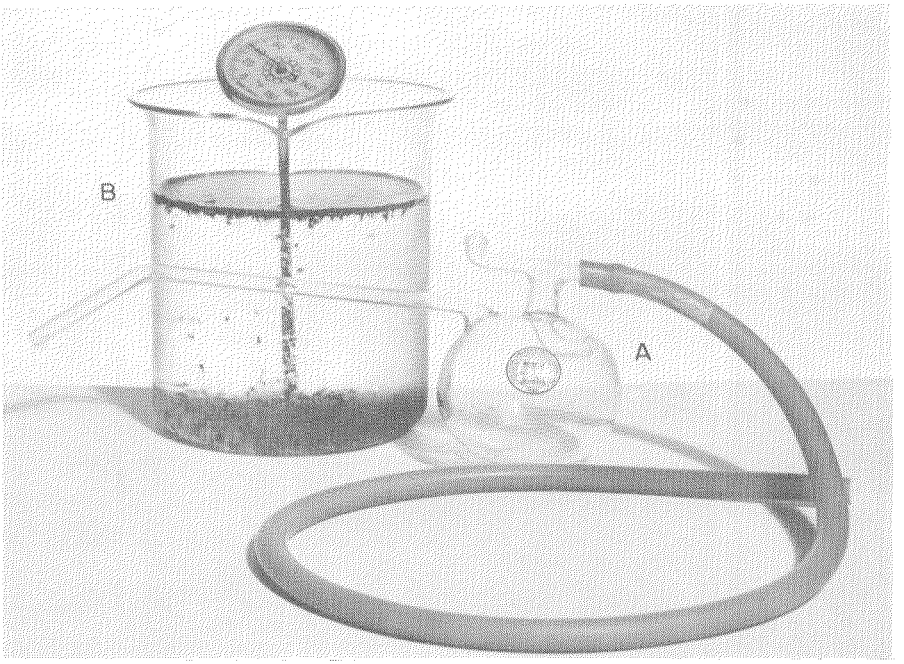

FIG. 1.—A. Vacuum "picker" for harvesting mosquito pupae. B. Separation of mosquito larvae and pupae in beaker of cold water.

they were held at the bottom of the cultures while the pupae were poured from the apparatus. McCray (1961) described a device for rapid sexing of *A. aegypti* pupae in which the larvae and pupae were poured onto an inclined aluminum screen with louvered slits 1" long (17 per linear inch) and openings of 0.039". The larvae and pupae were gently flushed over the screen with a fan-shaped stream of water. Female pupae were retained by the screen while larvae and male pupae readily passed through.

Several devices and techniques for pupal harvesting have been employed satisfactorily in our insectary. For small numbers of pupae the vacuum picker shown in Figure 1A is quite satisfactory. It is a long spout glass bulb with a glass "T" at the top. When held in the hand, the forefinger is in position to open or close the vacuum permitting aspiration or discharge of the pupae. A slight vacuum is all that is required. Other techniques that were fairly successful have been discontinued in favor of the one reported here.

Cold water (38°–40° F) has been found to be excellent for the separation of *Culex* and *Anopheles* pupae from the larvae (Fig. 1B). Ice water or water from most refrigerated drinking fountains is about the right temperature. The cultures containing the larvae and pupae are poured through a tea strainer, and the insects are quickly immersed in a beaker of the cold water. The larvae sink immediately, whereas the pupae float and may be poured

or aspirated from the surface. The larvae are then redistributed to the culture pans. The pupae are not adversely affected by the cold water and may be held for some time in the water without emergence. *Culex pipiens pipiens, C. pipiens* var. *pallens, C. tarsalis, C. tritaeniorhynchus, Anopheles quadrimaculatus,* and *A. sinensis* pupae separate readily but *Aedes aegypti, A. albopictus* and *Armigeres subalbatus* do not separate so completely. With occasional agitation to cause submerged pupae to rise, about 80 percent of *Aedes aegypti* will separate in cold water and the resulting mixture of larvae and pupae are so retarded in movement that harvesting with a vacuum picker is expedited. *A. aegypti* and *A. togoi* may be reared so that time of pupation is uniform and harvesting of the pupae for many projects is not necessary.

The time required for experienced personnel to harvest 1000 pupae from 1000 fourth instar larvae *(C. pipiens)* averages 52 minutes using a wide mouth medicine dropper, 20 minutes with the vacuum picker, and 3½ minutes in cold water. The percentage of error is about the same for each method dependent on the care of the individual. Normally 12 to 15 larvae will be carried over with the pupae and 15 to 20 live pupae may remain at the bottom of the cold water with the larvae. These are collected with a pipette or vaccum picker when the nature of the work requires complete separation.

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THE FIRST INTERNATIONAL CONGRESS OF PARASITOLOGY

The World Federation of Parasitologists met in Rome, Italy, Sept. 10–12, 1962 and decided to hold the First International Congress of Parasitology in Rome, September 1964.

The Congress, open to all Parasitologists and Societies of Parasitology throughout the world, will be organized by an International Consultative Committee under the chairmanship of Prof. P. C. C. Garnhar (London, England) and by a Local Committee, whose members are:

President: Prof. E. Biocca, Direttore dell' Istitute di Parassitologia dell' Università, Roma; General Secretary: Prof. A. Corradetti, Istituto Superiore della Sanità, Roma; Treasurer: Prof. E. Bronzini, Direttore del Giardino Zoologico del Comune, Roma.

Tentatively, the main sections of the Congress will deal with: (1) General Parasitology, (2) Protozoan Parasites, (3) Helminth Parasites, and (4) Arthropod and Molluscan Parasites and Disease Vectors. Symposia, invited papers and contributed papers are being planned.

For further information relating to the Congress, write to Prof. F. J. Kruidenier, Secretary of the World Federation of Parasitology, Department of Zoology, University of Illinois, Urbana, Illinois, U.S.A.; or to Primo Congresso Internazionale di Parassitologia, Istitute di Parassitologia, Città Universitaria, Roma, Italy.