SUGGESTED IMPROVEMENTS FOR AN UNBREAKABLE ASPIRATOR AND KILLING TUBE[1]

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For many years, glass tubes have been used in the construction of aspirators for collecting adult mosquitoes and other insects; consequently, there has always been the hazard of breakage. A thin gauze barrier has usually been used to prevent the insect from being sucked up into the mouth.

Aspirators are made in various forms; often the insects, as they are caught, are retained temporarily in a glass cylinder or test tube, and are later transferred to a glass killing tube or jar.

Some entomologists, in an attempt to avoid the hazards of glass, use plastic tubes for their aspirators. The author, having been one of those who have lost valuable specimens through breaking of glass containers, has designed an unbreakable aspirator which may be made with rigid or flexible plastic tubing.

The chief feature of this aspirator is an adapter made from 5/8-inch hardened aluminum rod stock and having a total length of 1¼ inches. (Fig. 1). It should be machined on a lathe, but requires very little work in its construction. The anterior half inch of the rod is cut to a diameter of ½-inch, and is intended to receive the plastic tube. The next 3/16-inch is left untouched, but may be knurled, if desired. The last 9/16-inch is cut to a diameter of 5/16-inch, and is intended to receive the rubber hose. A ¼-inch hole is then bored through the entire adapter while it is mounted horizontally on the lathe.

Instead of gauze, the author uses #28 gauge brass screening, but any gauge between #18 and #28 may be used. Since the individual wires in #28 gauge screening are very close together, cementing of the screening to the adapter is made easier. A round piece having a diameter of 7/16-inch is cut from the screening, and is cemented to the front end of the adapter with a powerful rubber cement-type adhesive known as "Pliobond," manufactured by the Goodyear Tire and Rubber Company.

A convenient length for the rubber tubing is 25 inches. An excellent type is red rubber cloth-impression tubing having a 3/16-inch bore and a 3/64-inch wall thickness. A mouthpiece 2 inches long is cut from rigid plastic tubing of 3/16-inch diameter, but a pipe stem may be used, if desired. Both ends of the plastic mouthpiece may be flared, simply by holding in a flame for a few seconds.

The collecting tube itself may be made either of flexible or rigid transparent plastic tubing having a bore of ½-inch and a wall thickness of 1/16-inch, the outside diameter being 5/8-inch. If flexible tubing is used, the adapter will also fit a tube of 3/32-inch wall thickness and 15/32-inch bore. An excellent type of flexible tubing is that known as "Tygon," manufactured by U. S. Stoneware, Akron 9, Ohio. A convenient length is 14 inches. The "Tygon" tubing will retain a slight bow or curvature after being doubled up on itself, and may be bent to any desired arc without damage or apparent wear to the material. It may be folded and placed in the pocket. There are several degrees of flexibility, but the less flexible type seems to be best for use as an aspirator. The tube fits over the forward end of the adapter, and grips the latter firmly. A cork may be inserted in the front end of

[1] The material presented herein does not necessarily constitute an indorsement by the Department of Defense.

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the tube to retain insects until they are transferred to the killing tube. Figure 2 shows the assembled aspirator.

If rigid plastic tubing is used, it will stand up very well, but the ends must be protected, as fracturing may occur when rigid plastic tubing falls on end. A ½-inch piece of rubber or flexible plastic tubing fitted over each end will prevent fracturing of the rigid plastic; the bore of this protective piece should equal 5/8-inch, so as to fit snugly over the collecting tube.

Rigid plastic tubing may be bent if heated gently and evenly on a hot metal plate, over a flame, in a dry sterilizer, incubator, or oven, or by placing the plastic in boiling water for 3 to 5 minutes. It is wise to experiment with small pieces first, in order to ascertain the bending properties of the plastic. Plastic tubing may be drawn out like glass when carefully heated in a Bunsen flame, thereby avoiding use of an adapter; however, a gauze barrier is necessary in this case. Rigid tubing is best cut with a saw having a hacksaw-type of blade. Unlike glass, plastic tubing cannot be broken by scratching it transversely with a file. Rigid plastic tubing may be obtained from the Plax Corporation, Hartford, Connecticut, from the American Phenolic Corporation, Chicago, Illinois, or from any retailer of plastics.

Plastic tubes may also be used for other purposes in insect survey activities. A 15 cc rubber bulb on a 10-inch piece of ¼-inch plastic tubing yields an oversized, unbreakable pipette for rapidly collecting mosquito eggs, larvae, and pupae.

The usual killing tube consists of a glass tube at the bottom of which is a deep layer of sodium or hydrogen cyanide or rubber fragments soaked in chloroform. The killing agent is covered with several layers of porous material, and tight-fitting discs of blotting paper keep all the other layers in place.

The author has found it convenient to use a transparent celluloid test tube and a single plug made from a cellulose sponge. The test tube is made of Lus teroid, and is sold by several scientifi supply companies. A convenient size i 6 inches long and 1¼ inches in diameter

A plug, the diameter of the test tube is cut from a size 2C "O-Cel-O" cellulos sponge. It is pushed down into the tube and will remain in place indefinitely if i fits snugly. (Fig. 3). Eight such plug can be cut from one size 2C sponge. A yellow color is suggested, as it provides a suitable background for viewing insects.

Neither carbon tetrachloride nor cya nide has any effect on the Lusteroid tes tube or the artificial sponge. Liquic chloroform affects the tube slowly during prolonged contact, but if chloroform i used sparingly, a tube will last a long time. The synthetic sponge is not affected in any way by chloroform. Ether should not be used in a Lusteroid tube, since i softens the tube rapidly.

A chloroform killing tube may be as sembled in several ways. If a sponge plug is pushed to the bottom of an un breakable tube, and 1 cc of chloroform i slowly spread over the sponge, it will re tain the chloroform for many days. There will be initial sweating of the walls of the tube due to the heavy fumes, but after the tube has been in use for a short time the sweating ceases.

A simple variation of the usual chloro form tube may also be employed. Small pieces of rubber, which have been soaked in chloroform for several hours, may be placed in the bottom of the tube to a depth of about ¾-inch. A synthetic sponge plug is then pushed down the tube and against the rubber fragments. As the chloroform evaporates slowly from the rubber, the fumes penetrate the sponge and are retained for many weeks. Passage of the fumes through the cork may be prevented by dipping the cork in hot paraffin.

A plug of synthetic sponge may be soaked in carbon tetrachloride for several hours. The liquid is then squeezed out, and the plug is pushed to the bottom of a Lusteroid tube. If desired, a dry plug

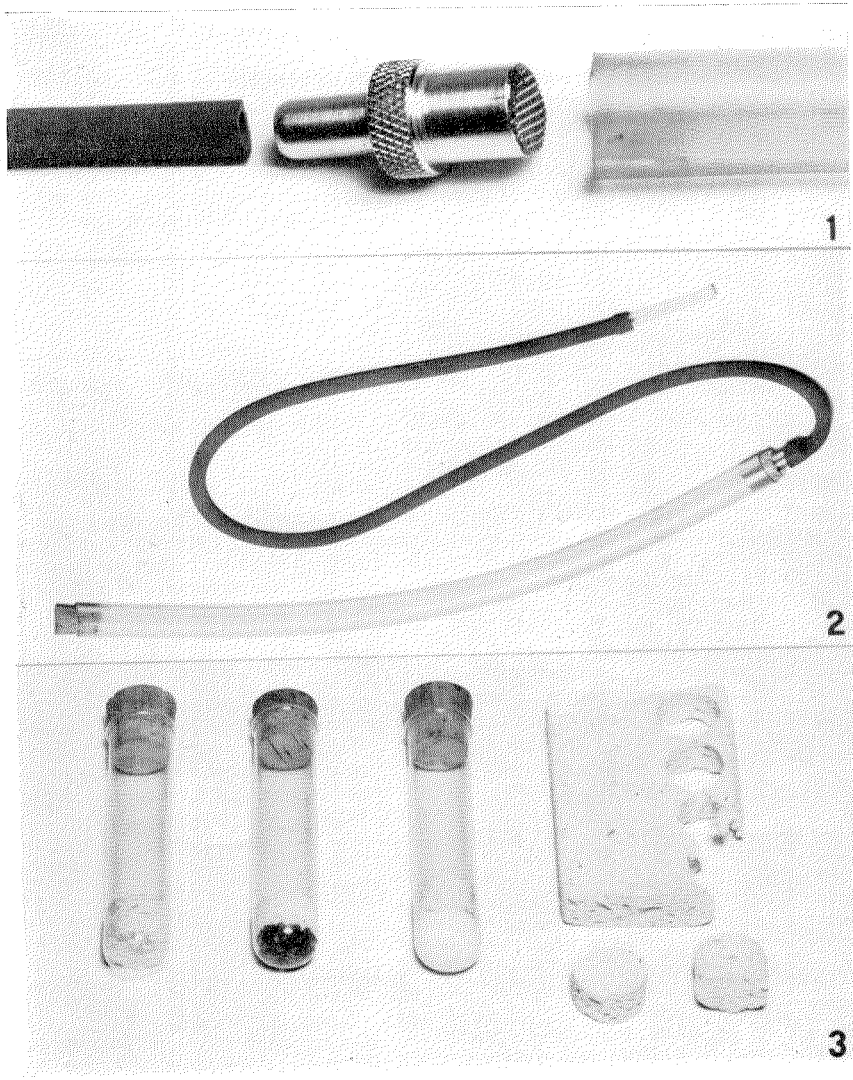

FIG. 1. Close-up view of adapter.

FIG. 2. Complete aspirator. The transparent portion is "Tygon" plastic flexible tubing.

FIG. 3. Plastic killing tubes made in various ways, i.e., with artificial sponge plug alone, and with sponge plug holding chloroform-soaked rubber and potassium cyanide in place.

is inserted initially, and is then covered with carbon tetrachloride. After several hours, the chemical is poured off and the tube is left uncorked until most of the liquid has evaporated. The sponge will retain the fumes for a considerable time.

A cyanide tube may be easily made by placing a one-inch layer of potassium cyanide at the bottom of a Lusteroid tube, and covering it with a tight-fitting synthetic sponge plug. No other layer is necessary, but it is to be emphasized that the plug must fit very tightly over the poison.

In ordinary use, a killing tube is not exposed to a flame, but it should be remembered that Lusteroid is a type of celluloid and will burn if brought into direct contact with a flame. There are several types of plastic test tubes and vials available which may be used in place of Lusteroid, if desired.

THE MOSQUITOES OF NEW MEXICO [1]

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The mosquito fauna of New Mexico first received attention due to malaria which was present in the irrigated valleys of the State. This disease was a major problem in the 1920's, but incidence has declined during the past decade in line with the national trend (*1*, *2*, and *3*). With the expansion of irrigation agriculture in recent years, mosquito-borne encephalitis has become more prominent as a problem. Most of the mosquito species recorded from New Mexico have been disease-vectors or pests of man and animals.

This note summarizes the data known from early and recent works on the mosquitoes of the State.[2] The most recent collection data are from the northeast quadrant of the State and were taken mainly from a series of nine New Jersey type mosquito light traps run during 1951 and/or 1952. Traps were operated in the range of 44 to 73 trap nights per season for a total of 559 trap nights for the period of study. Trap stations were confined to reservoirs or irrigation districts. The mosquito seasons studied extended from approximately June 1 through the month of October.

Over half of the mosquitoes taken were *Culex tarsalis*, noted for encephalitis vection. This species may be collected during the entire mosquito season. Other very common species found were *Aedes dorsalis*, *Aedes nigromaculis* and *Culiseta inornata*. The latter species has the unusual habit of breeding in all months of the mosquito season in this area.

SPECIES RECORDED

Anopheles freeborni, *A. crucians*, *A. punctipennis*, *A. pseudopunctipennis*, and *A. franciscanus*.

Aedes aegypti, *A. atropalpus*, *A. campestris* (?),[3] *A. canadensis*, *A. dorsalis*, *A. increpitus*, *A. mitchellae*, *A. nigromaculis*, *A. sollicitans*, *A. trivittatus*, and *A. vexans*.

[1] From the Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia.

[2] This survey of the mosquito fauna of New Mexico is a function of the Mosquito Control and Allied Problems Work Group of the Arkansas-White-Red River Basins Inter-Agency Committee which is planning water resources developments in the general region.

[3] Barber's question (*1*).