

times an area of soft screen or a wire tunnel where a blood source could be made available without opening the cage. Most of these cages require considerable time and labor to construct, and the adjoining parts and corners make them almost impossible to clean thoroughly. The more recent use of metals such as aluminum has somewhat reduced the cleaning problem by providing a cage that can be autoclaved or soaked in liquid disinfectants, but construction time and expense are still a problem. Moreover, the typical rigid box design has always presented a storage problem that is only partially solved by using a collapsible cage.

We are now using a cage designed to overcome all of these problems. It provides sufficient resting area for about 800 adult *Anopheles quadrimaculatus* Say, but for test purposes, the limit is usually set at 250 per cage.

Construction is simple and fast. A 0.040 gauge sheet of aluminum is cut into 71.12 x 21.25 cm (28 x 6 inches) pieces, the edges are filed smooth, and two right-angle bends are made 25.4 cm (10 inches) from each end to form a "C" shaped frame. Then, a 1.295 m (51 inches) length of seamless tubular gauze is knotted at one end and slipped over the frame. Thus, the open sides are covered and an entry sleeve is provided (Fig. 1). The entire cage can be assembled in about 5 to 6 minutes.

Thirty-three cage frames can be made from one 1.22 x 2.44 m (4 x 8 foot) sheet of aluminum and 35 cages can be covered with one roll of tubular gauze. The average costs of the frames and the tubular gauze are \$0.70 and \$0.16, respectively.

Cleaning is fast and thorough since the aluminum frame has no corners and the tubular gauze can be discarded or, if necessary, cleaned and/or sterilized and reused. Reused tubular gauze is susceptible to tears, but the holes are easy to patch with masking tape. The shape of the frames allows them to be stacked one inside



FIG. 1.—One-piece aluminum cage covered with seamless tubular gauze (left) and frames stacked one inside another for storage (right).

another (Fig. 1) during sterilization or storage. Bleeding of adult mosquitoes is accomplished without putting the blood source in the cage. The cage is placed on its side or front over a restrained animal. The weight of the cage is sufficient to mold the soft, flexible tubular gauze to the shape of the animal, and the openings in the tubular gauze are large enough so the insects can feed.

A COMBINATION ASPIRATOR AND KILLING TUBE FOR COLLECTING MOSQUITOES AND OTHER INSECTS¹

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INTRODUCTION. Many different aspirators utilizing the portable, hand-held vacuum cleaners have been developed in recent years (Carver, 1967). Trpis (1968) developed a portable unit with detachable collecting cages. There are several workers currently utilizing aquarium cleaner bulbs as holding cages. These bulbs are readily available and require little modification.

The authors found a need to develop a combination aspirator when they were working with bed-net penetration studies. Studies of this type required an individual collector in each net to make timed collections, keeping the collections separated for each increment of time. When many nets were being compared simultaneously, an outside technician was hurried to collect the large number of bulbs and kill the mosquitoes before the next collection period ended. The combination collector was developed to alleviate this problem by providing an inexpensive holding cage combined with a rapid killing agent. This unit provided undamaged specimens that could be left in the bulb for an indefinite period.

DESCRIPTION OF ASPIRATOR. The unit consists of a 5-mm thick Plexiglas "O" ring with a center opening diameter of 4.3 cm. The ring is permanently attached to the vacuum cleaner intake with an appropriate adhesive. A 4.3 x 7.0 cm aquarium bulb is prepared by removing the flanged cleaning tube. The opening in one end of the bulb is then enlarged to 2 cm with a low-speed drill or counter-sink. A piece of 22-mesh

¹ The opinions or assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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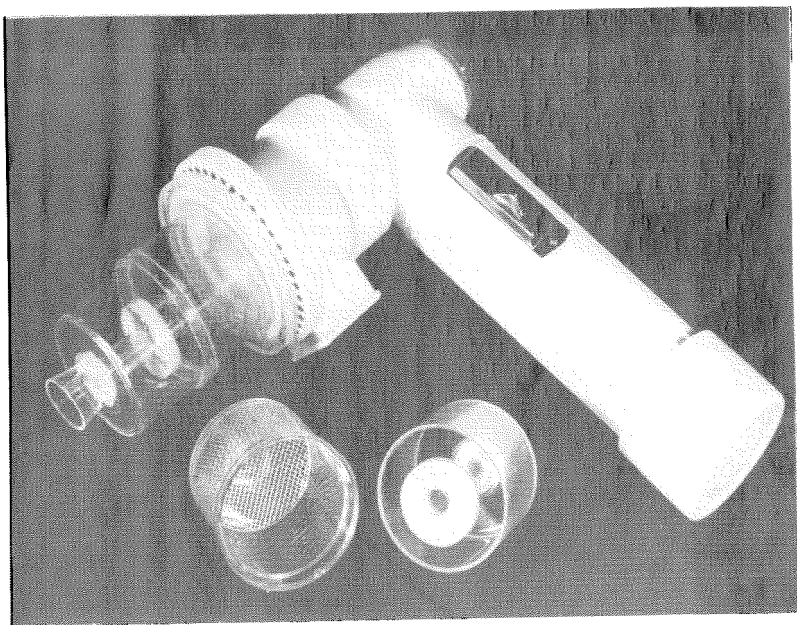


FIG. 1.—Modified aquarium cleaner bulb used in combination aspirator and killing tube.

screen wire is placed over this orifice from the inside. The flanged cleaning tube is reduced to 3 cm in length, with a 2 cm flanged orifice and inserted into the collecting unit (see Figure 1). After the bulb has been converted to a collecting cage, a small doughnut-shaped piece of dichlorvos resin strip is placed snugly over the collecting tube. The two halves of the collecting bulb are then put together and the unit inserted into the "O" ring.

This unit has the advantage of using several commercial parts, thus reducing the cost of labor when large numbers of cages are needed. The major advantage is the elimination of a killing jar. This makes it possible to obtain any number of samples without a transfer problem. Mosquitoes collected in the cage begin to die within one minute of collection time and do not damage themselves attempting to escape. They can then be left in the cages or transferred without damage.

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THE USE OF HYPODERMIC NEEDLES AS SCALPELS FOR INSECT MICRODISSECTION

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Extremely effective micro-scalpels can easily be made from various gauges of hypodermic needles, particularly from the #27 gauge needle bearing the trademark B-D, because of its long bevel. The large hole in the body of the needle, which receives the snout of the syringe, is deep enough to receive and hold a wooden, metal, or plastic rod, the front of which is shaped to fit into the hole. Cement may be applied if desired, although a tight-fitting rod does not fall out in ordinary use. Other needle gauges may be used. The #27 gauge needle comes in various lengths; the writer prefers the $\frac{3}{8}$ " or $\frac{1}{2}$ " length because