



FIGS. 1-4.—Mosquito holding and feeding cage. 1. General view of cage. 2. Aperture to wire mesh tunnel with tray *in situ*. 3. Wood tray with vertical stop at rear end. 4. Side view of wire mesh tunnel in position in cage. (Dimensions given in centimetres.)

cage by wood strips. The wire mesh tunnel slopes towards the front of the cage and opens by an aperture which is 1 to 2 cm. higher than the maximum diameter of an adult guinea pig (Fig. 2). To operate, the wood tray (Fig. 3) with vertical stop at the rear, is inserted half-way into the tunnel and a guinea pig introduced to the aperture. When the animal has entered—which it will do readily—the tray is pushed fully into the tunnel and raised by inserting plywood strips beneath it. Strips of various thickness can be kept for this purpose: useful sizes are 4, 6 and 10 mm. The slope of the tunnel ensures that the animal's back, on which the mosquitoes feed, is in close contact with the wire mesh, it prevents compression of the thorax and also prevents the animal moving back towards the tunnel entrance. Faeces and urine are deposited in the tray. To remove the guinea pig it is merely necessary to extract the plywood strips (holes can be cut at one end to facilitate this) and withdraw tray and animal. In operation, it requires about 30 seconds to insert the animal and 10 seconds to remove it—and the tray is the only part requiring regular cleaning.

This type of cage has been successfully used for over a year in maintaining laboratory colonies of insecticide-resistant *Anopheles gambiae* Giles and has also been tried successfully with *Aedes aegypti* L.

References

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AN IMPROVED DIET FOR INSECTARY REARING OF *Anopheles quadrimaculatus* SAY.—For several years *Anopheles quadrimaculatus* mosquito larvae were reared successfully on powdered dog biscuit following the technique used by Crowell (1940), but at various times trouble developed, due possibly to formula changes in the dog food, and the weak pupae that emerged barely kept the colony alive.

In 1958, through a trial and error screening method in search of a better diet, it was learned that a powdered beef liver extract produced the strongest and healthiest larvae ever reared in the insectary. Some of these larvae had the white stripe down their back that is commonly seen

in natural populations, and the percentage of adults emerging from these pupae compared favorably with the best performance records of the past.

In feeding this diet, a stock solution of liver extract is prepared 24 hours before it is to be used, by adding 20 grams of liver powder* to 1000 cc. of tap water. White enamel pans 12" x 24" x 2½" are used for rearing. In starting a new pan it is first scrubbed with a cleansing powder and rinsed. Then 1000 cc. of tap water and 25 cc. of stock solution are added along with about 3,000 first instar larvae. Each day thereafter an additional 25 cc. of 24-hour old stock solution is added to each pan. On the third day an additional 1000 cc. of tap water is added to each pan and this water level is maintained until the larvae pupate. It has been learned that when the dry liver powder is sprinkled directly into the water in the rearing pans the larvae do not live. Best results have been obtained when a stock solution is prepared 24 hours before it is to be used.

The liver powder is the only food that is given the larvae, but this mixture provides a good medium containing many elements essential for the abundant growth of microorganisms. Although their origin is unknown, all pan cultures are

* "Liver Powder N.F." from Nutritional Biochemicals Corporation, Cleveland 28, Ohio—\$3.50 per pound.

swarming with bacteria and protozoa, with bacilli and *Nassula aurea* being the most abundant. Other bacteria are spirilla and spirochaetes, and other protozoa are *Bursella* (with symbiotic zoochlorella) and *Chilodonella*.

The insectary has been operated successfully for over a year using liver powder exclusively. From the numbers of strong healthy mosquitoes produced, it is evident that this medium with its important supporting microorganisms furnishes the essential food elements needed for good growth and development of *A. quadrimaculatus* mosquito larvae.

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