Culex tarsalis Coquillett was collected at New Cumberland, Pennsylvania 2 September 1970 (C.E.I.R., 1970), a new record for Pennsylvania. New Cumberland is about 30 miles north of the Maryland-Pennsylvania line. This species may occur in Maryland.

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PLASTIC CAGES FOR MOSQUITO REARING AND DISEASE TRANSMISSION STUDIES

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Mass colonization of mosquito vectors to support disease transmission studies has led to the development of two new types of mosquito cages in our department. The cages are variations of those used in our insectary for a number of years, which were fabricated of ¾-inch plywood frames covered by transparent plastic sheeting (Tenite)® and 18-mesh wire screening.

Plastics have long been used to construct mosquito cages. Among the first plastic cages used in malarial transmission studies were small, cylindrical cages designed by Young and Burgess (1946). Some plastics however, have been found unsuitable for cage construction. Maramorosch (1952) observed that cellulose acetate impregnated with diethyl phthalate (a plasticiser) was toxic to both fish and plants. This material is also toxic to the cigarette beetle, *Lasioderma serricorne* (F.) (Simeone, 1953) and *Culex tarsalis* Coquillett (Barnett, 1955). Other plastics have proven satisfactory. Chao (1959) constructed a cage partially of a clear acetate material for holding *Culex tarsalis* and *C. pipiens* L. and Hayward, *et al.* (1969) described an insect cage made with an aluminum framework and polyethylene sheeting.

Our new cages are constructed of clear thermoplastic polymers, Lexan,® a polycarbonate resin, and Lucite,® an acrylic resin. Many characteristics of these plastics,

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such as high impact strength, dimensional stability and heat resistance, were formerly found only in metals. The flexibility of these materials allows fabrication of cages with relative ease. These plastics have been found to have good abrasive, chemical and stain resistant qualities, and are non-toxic to mosquitoes.

The first cage (Figure 1) is a large, semi-cylindrical cage for oviposition and emergence, and the second (Figure 2) is a smaller, cylindrical cage for holding mosquitoes prior to, during and after various experimental treatments.

The base, back and top of the large cage are constructed of ¼-inch Lucite, and the sides and front of 0.030-inch Lexan sheeting. The cage has three openings, 1A, 1B and 1C (Figure 1). Opening 1A is a removable, sliding top constructed of ¼-inch Lucite and 16 x 18-mesh stainless steel screening. The sliding top is secured to the cage by four cleats machined from 2-inch Lexan stock material. Opening 1B is a 6-inch diameter opening on the side of the cage. The opening consists of a section of ⅛-inch extruded Lexan tubing fitted with a ¼-inch flange onto which a removable surgical stockinet sleeve 6 inches in diameter and of suitable length is secured by double rubber bands.

Opening 1C is a 10-inch diameter open-

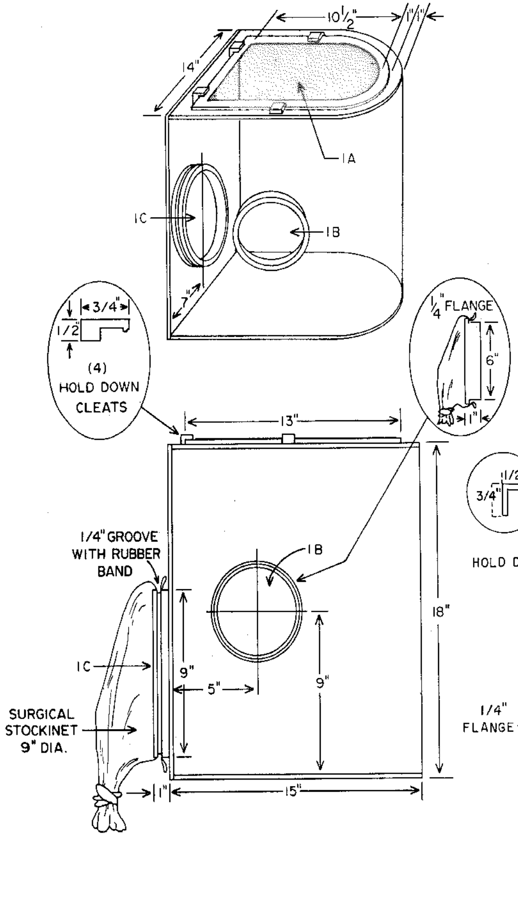

Fig. 1.—Large cage for rearing.

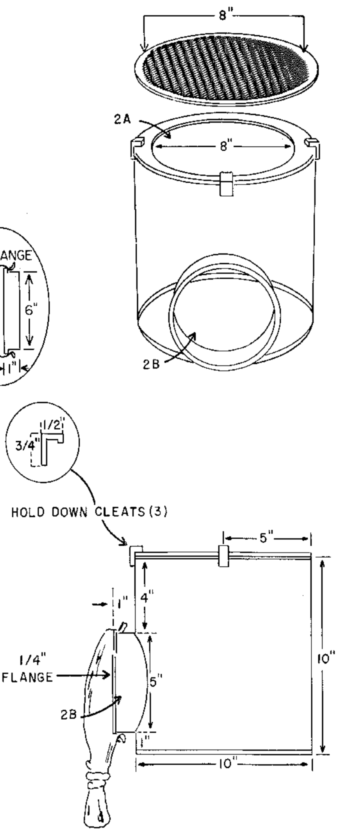

Fig. 2.—Small cage for holding.

ing located on the back of the cage. This opening consists of a section of ¼-inch extruded Lexan tubing with a ⅛-inch machined groove onto which a surgical stockinet sleeve 9 inches in diameter is fastened. Double rubber bands are used to secure the stockinet sleeves on openings 1B and 1C as a precautionary measure in case one of the bands should break.

The base and top of the small holding cage (Figure 2) are also constructed of ¼-inch Lucite, and the sides of 0.04-inch Lexan sheeting. This cage has two openings—2A, covered by a circular sliding top of ¼-inch Lucite and a 16 x 18-mesh stainless steel screening held by three cleats; and 5-inch circular flanged opening (2B) constructed in the same manner as opening 1B in the large cage.

All parts of both cages are pre-cut, with standard steel working tools, and permanently assembled by cementing each component with a viscous preparation of Lexan chips dissolved in chloroform.

Openings 1C and 2B in both cages are used to transfer food, small blood donors such as mice and chicks, containers of mosquitoes in various stages of development, or other large materials. Opening 1B is used for transferring individual adult mosquitoes only. The sliding screen tops 1A and 2A have a dual purpose—(1) to support large blood donors secured to a restraining rack and (2) to clean the inside of the cage.

Cleaning may be accomplished by washing the cage in warm, soapy water and rinsing thoroughly with fresh cool water, or by wiping with a sponge or towel saturated with 70 percent ethanol or a 10 percent sodium hypochlorite solution. The entire cleaning process rarely takes over 5 minutes for the large cage and less time for the small cage.

Observations were made to determine the possibility of toxicity of the plastics to adult mosquitoes. This was accomplished by placing a known number of *Anopheles stephensi* Liston in various types of mosquito cages, including the new plastic ones. The mosquitoes were provided apple slices and 10 percent sucrose solution in cotton pads as a food source and observed until all individuals had died. No noticeable decrease in longevity was observed in the new cages which would indicate the presence of toxic properties in these plastics.

The outstanding features of these mosquito cages are simple construction, durability, visibility and accessibility. The sliding tops and sleeves of these cages are easily removed for cleaning. Although some investigators dislike the use of a cloth sleeve as an entrance to mosquito cages, it is still the most practical method of manipulating potentially infected mosquitoes in the laboratory.

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