specimen was taken at light on June 24, 1966. This specimen was nulliparous, showing that it belonged to the newly emerged generation. Of the five specimens of *C.m. dyari*, three were taken in Malaise traps and two in the carbon dioxide baited Malaise traps. None of either species were taken at rat or chicken baited traps in the area or at human bait. No males or larvae were taken at George Lake.

C.s. minnesotae is probably overlooked as it appears to be a secretive species, not strongly attracted to man or to light, the two main methods of sampling adult mosquito populations. Its population peak is over by the time most adult mosquito sampling starts in Canada. In this connection it is interesting to note that *Culiseta alaskaensis* (Ludlow), a species with a similar seasonal distribution, is recorded as rare in Alberta (Hapold, 1963), but at George Lake it was abundant enough to be a distinct nuisance in early and mid-May of both 1966 and 1967.

The finding of *C.s. minnesotae* at George Lake raises the number of mosquito species recorded from Alberta to 39.

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HOLDING TECHNIQUE FOR THE MANIPULATION AND EXCISION OF ADULT ANOPHELINE MOUTHPARTS [1]

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Numerous techniques have been employed to restrain partially anesthetized adult mosquitoes in order to treat, cover or excise morphological members such as eyes, legs, antennae, abdomen, wings and mouthparts (Lavoipierre and Judson, 1965). A simplified and inexpensive technique was used by the writer primarily to handle anopheline mosquitoes. The apparatus designed by Lavoipierre and Judson was not flexible enough to enable manipulation of the type desired.

One pint ice cream cartons, 10 cm. x 9.3 cm. d., bearing pop-off ends, were utilized (Fig. 1). Both ends were removed and the cardboard center of one was popped out. A single piece of organdy mesh, 15 cm. x 15 cm. was placed inside the end ring to replace the cardboard center (Fig. 2). The ring end was then placed back on the pint container and affixed with ¾" masking tape. This created a round container with one open end and one closed end. The mesh closed end exhibited apertures of varying dimensions, i.e., 135μ x 220μ and 250μ x 250μ.

Anopheline mosquitoes were partially anesthetized with chloroform for 2 minutes. After immobilization, one mosquito was dropped through the open end of the pint container (Fig. 3). A 15 cm. x 15 cm. piece of organdy was placed inside the container through the open end and the mosquito was moved into position by moving the organdy. The specimen was not bruised, but situated in such a way that the mouthparts protruded through the organdy apertures (Fig. 4). Female *Anopheles stephensi* Liston, the test species, bear a proboscis with mean measurements of 1639μL. x 49.5μW. and maxillary palpi 1485μL. x 60.5μW. at the base and 38.5μ at the apex. Stable separation of these 3 members can be accomplished with this technique. The mosquito, once affixed in this fashion, infrequently released itself. This allowed time to place the entire apparatus on the stage of a binocular stereomicroscope, tape it to the stage, gently place a finger or a #1 or #2 cork against the specimen and make the necessary manipulations or excisions. The hand rested inside the container and steadied it and the mosquito.

Successful manipulations were achieved using

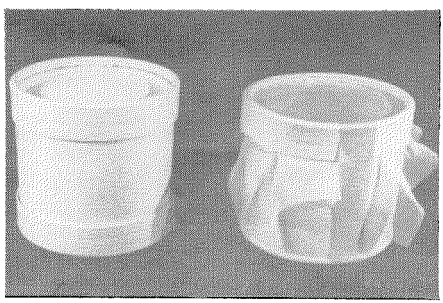

FIG. 1.—Restrainer pint cartons with pop-off ends.

[1] This work was part of an investigation in partial fulfillment for the degree of Doctor of Philosophy.

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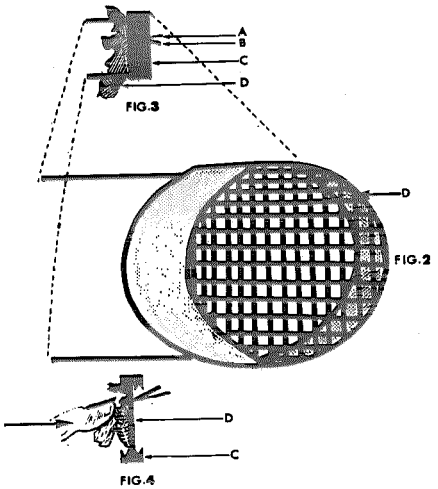

FIG. 2.—Sketch of restrainer carton showing organdy mesh stretched across one end. (D) organdy.

FIG. 3.—Sketch of mosquito inside restrainer with only the mouth parts showing. (A) proboscis; (B) maxillary palpi; (C) container; (D) organdy.

FIG. 4.—Cut-away container showing mosquito in position for mouth part surgery. (C) container; (D) organdy.

sharpened minuten nadeln inserted into wooden applicator sticks (Patton and Evans, 1929). Excision of the maxillary palpi and/or the proboscis, partially or completely, was done with microscissors (Jones, 1967). Before and after excision, the mouthparts were cleansed with saline (Ephrussi and Beadle, 1936), buffered with M/150 potassium phosphate to pH 6.8 (Bradford and Ramsey, 1949). The mosquitoes were then held at 85 percent relative humidity, 25° C. for postoperative recovery of one day, (Wellington, 1946).

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FIELD TESTS WITH BED NETS TREATED WITH REPELLENTS TO PREVENT MOSQUITO BITES [1]

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Bed nets are used as protection against the attack of mosquitoes particularly in areas where mosquito-borne diseases are prevalent or populations of mosquitoes are extremely high. Recent research (Gouck *et al.*, 1967) showed that 4-mesh-per-inch cotton netting treated with repellents gave a high degree of protection against the black salt-marsh mosquito, *Aedes taeniorhynchus* Wiedemann. Bed nets made from wide-mesh netting to permit better air passage, but treated with repellents to exclude mosquitoes, could be very useful and more satisfactory than the standard bed net. Therefore, from August to December, 1966, we tested similar repellent-treated bed nets in Bangkok, Thailand against natural populations of *Culex pipiens quinquefasciatus* Say (=*fatigans* Wiedemann) and *Aedes aegypti* (L.).

The bed nets were made of 4-mesh-per-inch pressed cotton netting treated at a rate of 0.5 g deet or M–1960 (a mixture of 30 percent benzyl benzoate, 30 percent *N*-butylacetanilide, 30 percent 2-butyl-1,3-propanediol, and 10 percent emulsifier) per 1 g of netting. All tests were made in 2 houses in the Klong Toey section of Bangkok. One set of nets A (treated with M–1960) and one set G (treated with deet) were used between 7 and 9 a.m. for tests against *C. p. quinquefasciatus*; another set E (treated with M–1960) and a fourth set F (treated with deet) were used between 1 and 3 p.m. for tests against

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[1] These tests were made in cooperation with Lt. Col. John E. Scanlon, Walter Reed Army Institute of Research, and Dr. Douglas J. Gould of the U. S. Army Medical Component, SEATO, APO San Francisco 96346.

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