punctor. No male or larval records exist for this species in Iowa at this time.

Frederika is located in northeastern Iowa, approximately 26 miles north of Waterloo. The trap was set up on a farm ½ mile southeast of the town. The Wapsipinicon River flows approximately ½ mile from the light trap and occasionally floods distal portions of the pasture bordering it.

Aedes punctor is a holarctic species occurring in northern Asia, northern Europe, and throughout Canada (Carpenter and LaCasse, 1955; Carpenter, 1968). In the United States, the species has a northern distribution, having been recorded from Alaska, Colorado, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, New York, North Dakota, Vermont, Wisconsin, and Wyoming (Carpenter and LaCasse, 1955; Carpenter, 1968). Carpenter and LaCasse (1955) reported that *Aedes punctor* has been recorded in Colorado only from higher elevations. Of the states that border Iowa, it has been recorded from Minnesota and Wisconsin and also from Illinois where the species is quite rare.

It is hoped that continued light trap operations in the vicinity of Frederika during the summer of 1970 will yield more specimens of this species.

Literature Cited

CARPENTER, STANLEY J. 1968. Review of recent literature on mosquitoes of North America. California Vector Views 15(8):71–98.

CARPENTER, STANLEY J. AND LACASSE, WALTER J. 1955. *Mosquitoes of North America*. University of California Press, Berkeley.

THE FINE STRUCTURE OF THE DORSAL VAGINAL VALVE OF *Aedes aegypti* (LINNAEUS)

JACK COLVARD JONES [1] AND HARLEY G. SHEFFIELD [2]

In studying the fine structure of the seminal bursa of the Bangkok strain of the mosquito *Aedes (Stegomyia) aegypti* (Linnaeus) at different stages of spermathecal filling (Jones and Sheffield, 1970), sagittal sections were taken through the vagina. The anatomy of the very complex reproductive system of this mosquito has already been described in some detail by Jones and Wheeler (1965). As shown in Figure 1, the vagina is located in the terminal abdominal segment, ventral to the rectum (R) and the bursa, and posterior to the spermathecae (S). When seen in sagittal section, the vagina appears as an S-shaped cavity. The largest and most conspicuous structure within the vaginal cavity is the dorsal valve (Fig. 1, DV). This foot-like organ has a series of teeth on its posterior face which are important in the attachment of the male's aedeagus during coitus (Jones and Wheeler, 1965). The present note gives a brief description of the fine structure of the dorsal vaginal valve.

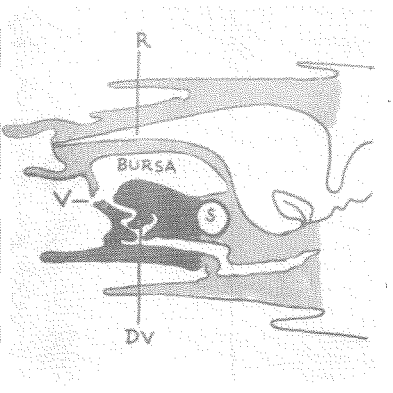

FIG. 1.—Semi-diagrammatic view of a sagittal section through the terminalium of female *Aedes aegypti*, showing the external opening (V) to the S-shaped vagina and the foot-shaped dorsal vaginal valve (DV). Note that this valve is situated ventral to the rectum (R) and the bursa, and lies posterior to the spermathecae (S).

As shown in Figure 2, the cuticle of the dorsal vaginal valve is composed of a thin, electron-dense epicuticle (EP) facing the vaginal lumen (L), a thick, electron dense, finely grained, nonlamellated exocuticle (EX), a thick, lamellated endocuticle (EN), and a very thick, coarsely flocculent subcuticle (SC). As can be seen in the micrograph, the epicuticle and exocuticle form a series of spine-like projections which extend into the vaginal lumen. These structures appear similar to the acanthae found in the proventriculus of some other insects (Richards and Richards, 1969). Beneath the subcuticle of the dorsal vaginal valve are the large hypodermal (epidermal) cells (H) which secreted the cuticular layers during pupal life. In the adult, each cell has a large nucleus and a small amount of cytoplasm containing many fine apical folds, some mitochondria, microtubules, and relatively very little rough endoplasmic reticulum.

It is known that shortly after insemination of the mosquito (that is, when semen is present within the bursa), generally many spermatozoa quickly leave the bursa and enter usually two

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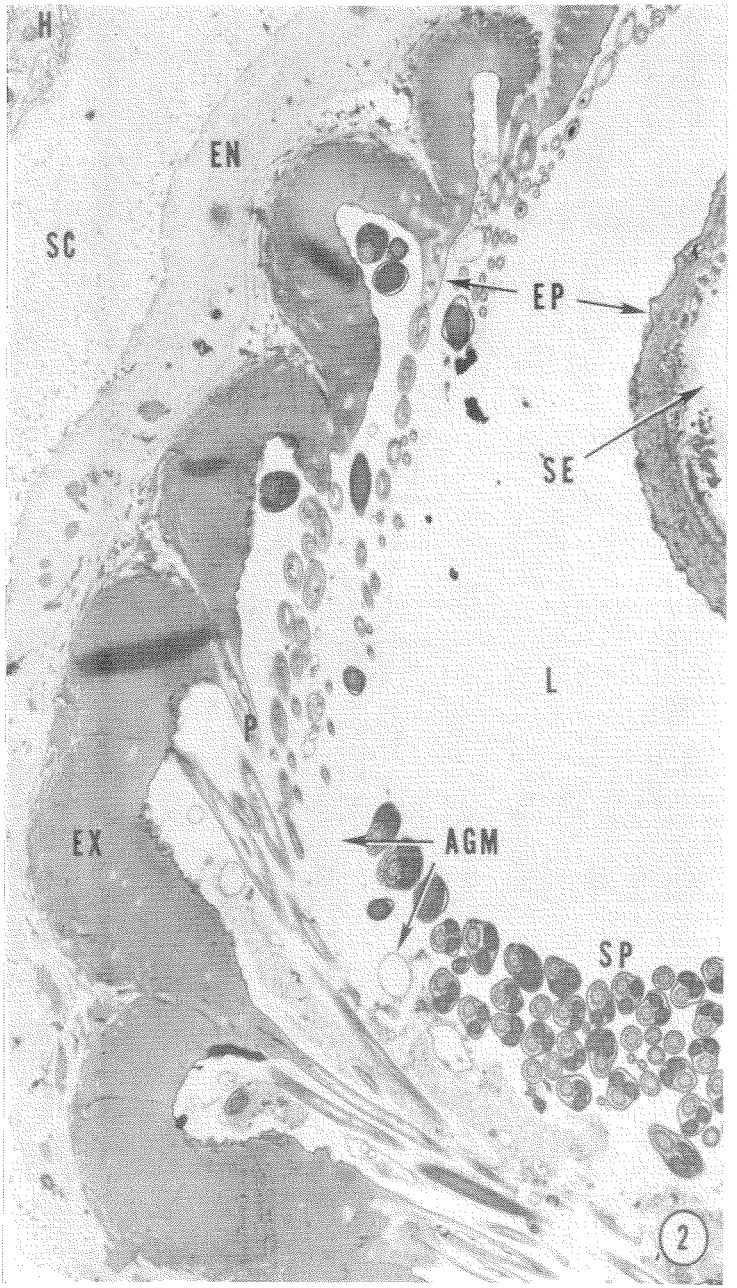

FIG. 2.—An electron micrograph of a portion of the vagina of an inseminated *Aedes aegypti* mosquito, showing the vaginal lumen (L) with numerous spermatozoa (SP) cut in cross section through various portions of the tail section and male accessory gland secretion (AGM). The spermathecal eminence (SE) faces the dorsal vaginal valve structures. Note the long cuticular projections (P), the fine epicuticle (EP), exocuticle (EX),

of the three spermathecae (Jones and Wheeler, 1965), at which time the female may be said to be impregnated. Figure 2 shows many spermatozoa (SP) in the lumen of the vagina, most of them cut in cross sections through various levels of their long tail region. The electron microscope also shows male accessory gland secretory material (AGM) in the vaginal lumen. This material contains an abundance of a very finely granular component intermixed with some membranous remnants of male accessory gland cells.

References

JONES, J. C. and SHEFFIELD, H. G. 1970. The fine structure of the seminal bursa of *Aedes aegypti* (Linnaeus). Mosq. News 30:270–271.

JONES, J. C. and WHEELER, R. E. 1965. An analytical study of coitus in *Aedes aegypti* (Linnaeus). J. Morph. 117:401–424.

RICHARDS, P. A. and RICHARDS, A. G. 1969. Acanthae: a new type of cuticular process in the proventriculus of Mecoptera and Siphonaptera. Zool. Jahrb. Anat. 86:158–176.

A SIMPLE, INEXPENSIVE ALCOHOL LIGHT TRAP FOR COLLECTING *Culicoides*

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The use of light traps for collecting various species of *Culicoides* has been widely explored (James, 1943; du Toit, 1944; Fox and Kohler, 1950; Wirth, 1951; Beck, 1952; Khalaf, 1952; Fox, 1953; Fox and Capriles, 1953; Williams, 1955; Wirth and Bottimer, 1956; Beck, 1958; Belton and Pucat, 1967; Jamnback and Watthews, 1963; Messersmith, 1965; Service, 1969.) The most commonly used traps are the New Jersey light trap (Mulhern, 1934) and the battery powered CDC miniature light trap (Sudia and Chamberlain, 1962) which have fine mesh cloth bags as insect receptacles. Both the New Jersey light trap and the CDC trap operate on the principle that the insects are attracted to a light bulb, then drawn into a kill jar or holding bag by suction created by an electric fan just below the light. Unfortunately, for purposes of taxonomic data as well as for ordinary indices, specimens collected in this type of trap are often damaged by the action of the fan.

The cost of the New Jersey light trap varies between $80.00 and $110.00, which is costly when several traps are required for large scale sampling. Some of the problems connected with the New Jersey trap have been overcome by the CDC Miniature light trap in that it is battery operated; the cost of materials exclusive of labor and battery is approximately $10.00; it weighs only 1.75 lbs (0.8 kg), and it has a much lower injury rate to insects drawn into the holding bag. However, this device has also presented problems. All too often the battery and/or the fan motor fails, which permits captured insects to escape by passing the fan before collection takes place in the morning. To offset these difficulties a rather simplified version of a light trap has been developed.

MATERIALS AND PROCEDURES. As noted in Fig. 1, the trap consists of a 10″ plastic wash basin suspended by 6″ strings from a 10″ circular piece of plexiglass. Attached to the underside of the plexiglass is an 8″ circular fluorescent light, a ballast, and a starter. The plexiglass cover permits vertical as well as lateral emission of light. When the trap is set up, three cups of 95 percent isopropyl alcohol and one cup of water make a roughly 70 percent alcohol solution which is poured into the basin. Insects are attracted from

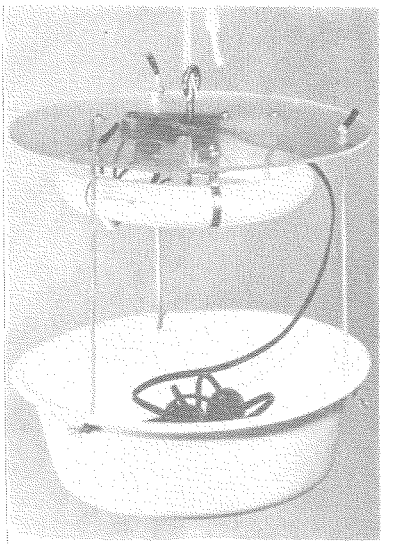

FIG. 1.—Alcohol light trap ready for use.

This study was supported in part through funds provided by the Bureau of Medicine and Surgery, Navy Department, for Work Unit MR005.09.01–0083B.

The opinions and assertions contained herein are those of the authors and are not to be construed as official or as reflecting the views of the Navy Department or the Naval Service at large.

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