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.

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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

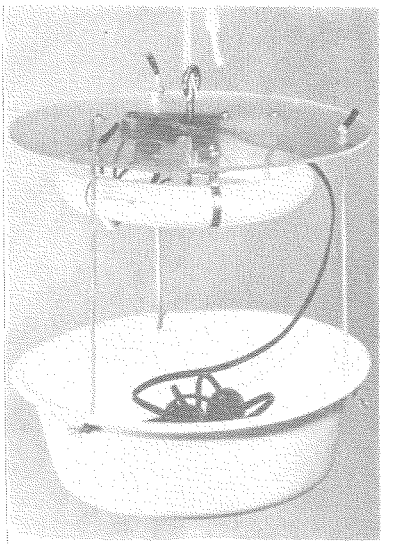

FIG. 1.—Alcohol light trap ready for use.

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above as well as at the side of the trap. In passing over the liquid some are apparently attracted to the reflection of the light in the pan and fly into the alcohol solution. Others fly to the bulb and fall into the liquid below. As pointed out by Madsen and Sanborn (1962), 70 percent alcohol is an excellent trapping medium for all orders of insects.

In view of the fact there are no moving parts contained within this device there is no problem with burned-out motors. Through the use of a small converter (transformer) we are able to operate some traps on 12-volt batteries and others from conventional electrical sources. We have in this way been able to utilize the same devices for insect collecting work in remote areas both in Taiwan and in VietNam.

It is particularly noteworthy that when this trap is operated from batteries it is possible to circumvent typical problems in the use of fan-driven, battery-operated light traps. In this simplified trap, the battery life is much longer because only the light, not a light and motor, is drawing power from the battery. Also with this device the insects trapped in the alcohol have no way of escaping in later evening or morning hours should the battery go dead. In addition, they are prevented from causing wear and tear on each other prior to dying. When *Culicoides* specimens are collected with this alcohol trap, typically 97 percent or more are in excellent condition. On the other hand, similar specimens collected with a New Jersey light trap in the same area characteristically show 10 to 50 percent of them in very poor condition due either to mechanical damage or the difference in handling of the captured specimens. There are many trash insects present in each group collected; however, all specimens collected have been in excellent condition and have lent themselves extremely well to accurate taxonomic identifications. In addition to *Culicoides* we have collected large numbers of mosquitoes in this trap.

As noted in Figure 2, the problem of protecting the electrical lamp and fixtures in transit is, indeed, almost nonexistent. The nylon cords permit total collapse of the trap with the electrical parts settling into the plastic basin. Two bolts with

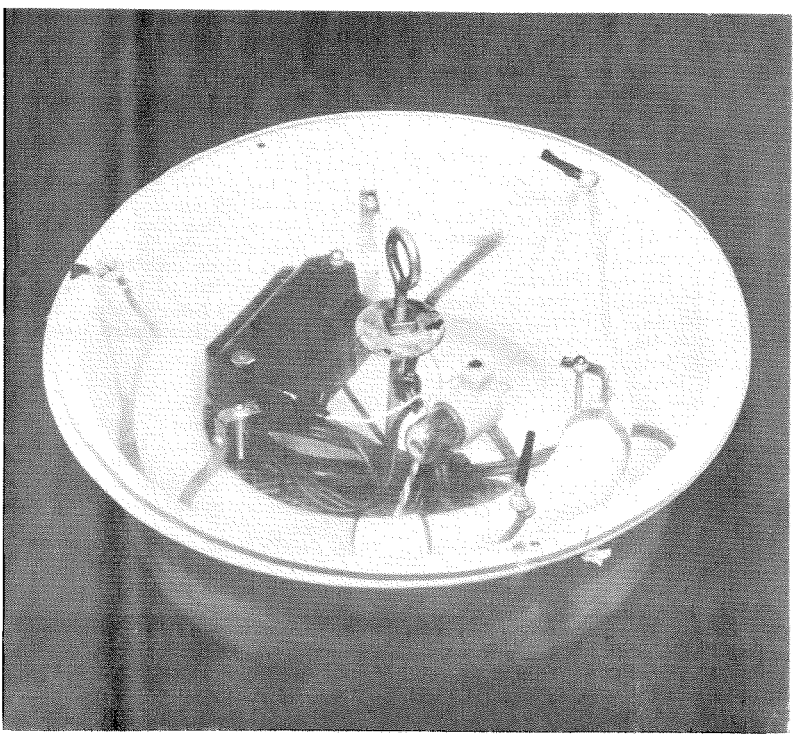

FIG. 2.—Alcohol light trap in collapsed position.

wing-nuts hold the plexiglass cover in place on the basin, and the fragile electrical parts are completely enclosed and protected. Total cost for all parts purchased in Taiwan is approximately US $5.00, less cost of the transformer converter. These parts would be perhaps slightly more expensive if purchased in the U. S.

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A CHECKLIST OF THE BLACKFLIES OF NEW JERSEY (DIPTERA:SIMULIIDAE) [1]

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During 1969, a survey was undertaken by the Department of Entomology and Economic Zoology at Rutgers University to ascertain the number and distribution of blackfly species in New Jersey. Although such information is available from neighboring states (Stone and Jamnback, 1955; Frost, 1949; Dimond and Hart, 1953), New Jersey does not at present have a published list of simuliid species. During a survey conducted in Passaic County in 1957, six species were collected and the identifications were confirmed by the U. S. National Museum (Lake, 1970 personal communication). An additional six species were identified from the Rutgers collection by the junior author. No further records are known for the state.

The checklist given here has been based entirely upon larval and pupal collections made in all counties of New Jersey during 1969. Details of the areas included and the methods employed may be found elsewhere (Crans and McCuiston, 1970). Additions to this list will be reported as new records become available.

The authors are indebted to Dr. Alan Stone of the United States National Museum for confirming each of the identifications included in this report.

Genus *Prosimulium* Roubaud
1. *Prosimulium fuscum* Syme & Davies
2. *Prosimulium magnum* Dyar & Shannon
3. *Prosimulium mixtum* Syme & Davies
4. *Prosimulium multidentatum* (Twinn)
5. *Prosimulium rhizophorum* Stone & Jamnback

Genus *Cnephia* Enderlein
6. *Cnephia dacotensis* (Dyar & Shannon)
7. *Cnephia mutata* (Malloch)

Genus *Simulium* Latreille
8. *Simulium aureum* Fries

[1] Paper of the Journal Series, Department of Entomology and Economic Zoology, Rutgers University—The State University of New Jersey, New Brunswick, N. J.