C. p. quinquefasciatus (Patterson *et al.*, 1970), but they may be less attractive to the other species. Thus the other species may have been present in greater numbers than was indicated by the collections. Also, the winter of 1971–1972 was unseasonably warm for this area of Florida, and *C. p. quinquefasciatus* was probably able to breed throughout the year without a prolonged diapause.

Literature Cited

Lowe, R. E., Ford, H. R., Smittle, B. J. and Weidhaas, D. E. 1973. Reproductive behavior of *Culex pipiens quinquefasciatus* released into a natural population. Mosq. News 33(2):221–227.

Patterson, R. S., Ford, H. R., Lofgren, C. S. and Weidhaas, D. E. 1970. Sterile males: Their effect on an isolated population of mosquitoes. Mosq. News 30(1):23–27.

Smittle, B. J., Lowe, R. E., Ford, H. R. and Weidhaas, D. E. 1973. Techniques for ^{32}P labeling and assay of egg rafts from field-collected *Culex pipiens quinquefasciatus* Say. Mosq. News 33 (2):215–220.

THE OCCURRENCE OF *PSOROPHORA SIGNIPENNIS* COQUILLETT IN NEVADA

RICHARD C. HICKS

Clark County Animal and Vector Control, 5825 E. Monson Road, Las Vegas, Nevada 89122

Collections of biting *Psorophora signipennis* Coquillett females have been made by the author at two different locations near Las Vegas, Clark County, Nevada. On August 15, 1969 and August 22, 1972, collections were made at a transient dry lake pool 30 miles north of Searchlight on Highway 95, 25 miles southeast of Las Vegas. The landing count rate was 6 per minute. Collections were also made at the Valley of Fire exit, junction of Interstate 15 and Highway 40, 34 miles northeast of Las Vegas at a rain catch basin on July 26 and September 20, 1972. The landing rate was estimated at 50 per minute.

These 2 collection sites are dry most of the year. The adults appeared within a week after rainfall.

A larval collection of *P. signipennis* was made at the Moapa Indian Reservation, Moapa, Clark County, Nevada on August 11, 1972. The larvae were taken in irrigation runoff water.

This represents a new state record and brings the total number of mosquito species recorded for Nevada to 32 (Chapman, 1966: Chapman and Bechtel, 1969).

ACKNOWLEDGMENT: Appreciation is expressed to Gail Grodhaus, Bureau of Vector Control, State of California, for the initial identification of the first collection of this species. The assistance of James R. Earnist, Animal & Vector Control Director, and Robert Meighen, Vector Control Supervisor, is gratefully acknowledged.

References

Chapman, H. C. 1966. The mosquitoes of Nevada. U. S. Dept. Agric. and Univ. Nevada Bull. T–2:1–43.

Chapman, H. C. and Bechtel, R. C. 1969. Occurrence of *Culex pipiens quinquefasciatus* Say in Nevada. Mosq. News 29(1):137.

A SIMPLE METHOD FOR ARTIFICIALLY FEEDING MOSQUITOES

WILLIAM WILLS, DAVID F. CARROLL AND GARY E. JONES

Pennsylvania Department of Environmental Resources, Bureau of Community Environmental Control, Entomology Laboratory, P.O. Box 2351, Harrisburg, Pennsylvania 17105

Artificial feeding methods have varied from sophisticated apparatus such as that designed by Gerberg and Kara (1971), Greenberg (1949), and Tarshis (1958) to simpler methods such as those described by Tarshis (1959), and the rat-tail method used by D. K. Lvov and described to W. D. Sudia (1971).

The rat-tail method using the skin of the tail as the blood holding membrane has been used successfully by this laboratory to feed *Anopheles stephensi*, but in recent experiments it was found that *Culex pipiens quinquefasciatus* could not, or would not, probe the skin of the tail to feed on human blood.

A new and simple method of artificial feeding has been developed by this laboratory using the Baudruche membrane as a feeding surface for the mosquito. Whole human or animal blood, approximately 2–3 ml, was placed in 12 x 100 mm test tubes, each covered with approximately 2 $in.^2$ of the membrane that was stretched over the tube opening and secured with a rubber band. The tubes, while still in a vertical position, were placed into a holding-rack constructed of ½ in. hardware-cloth (Figure 1) that was temporarily tilted back 90° to hold the tubes upright. The rack containing the tubes was then placed into a warming oven or shallow water bath to bring the temperature of the blood up to 98–100° F. The tubes were maintained in a vertical position while warming the blood in order that expanding air could escape through the membrane.

The rack containing the test tubes was then placed in the normal position (Figure 1) in order that the tubes would be tilted at a 45° angle and

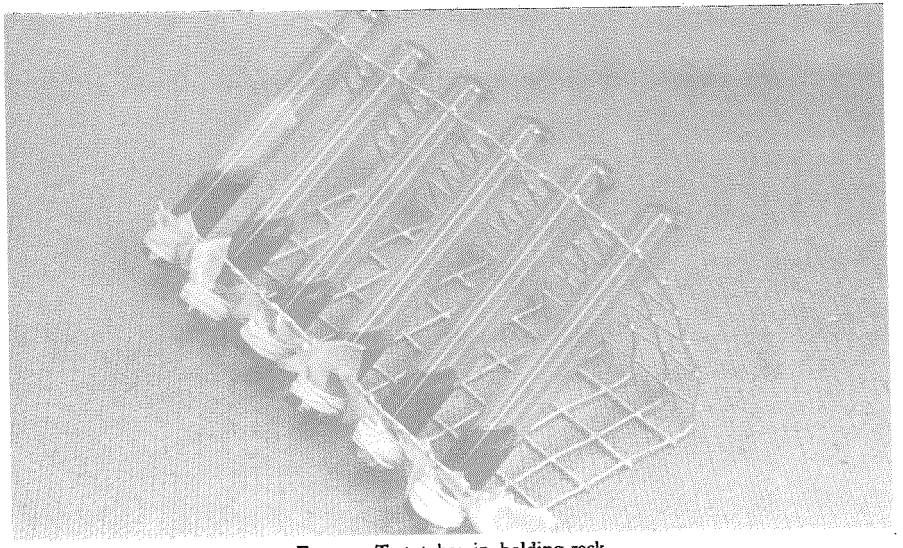

FIG. 1.—Test tubes in holding-rack.

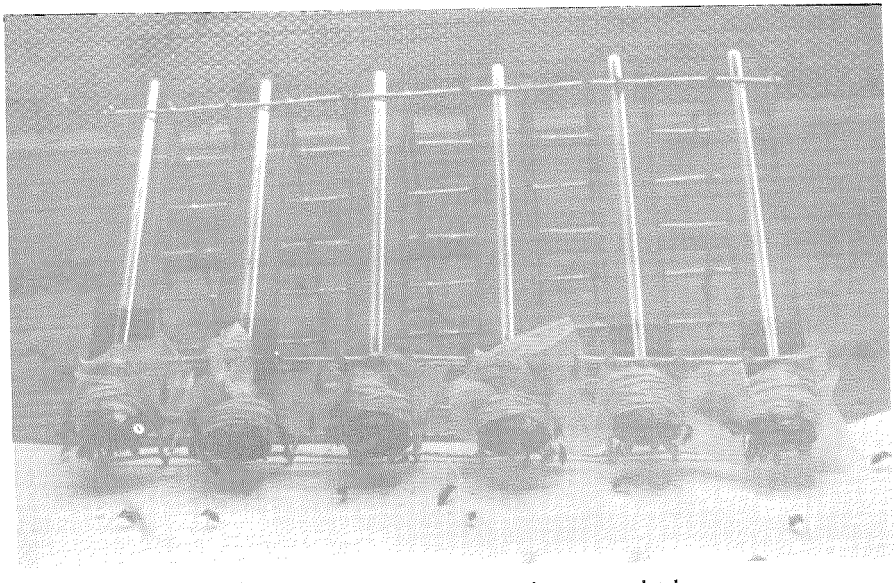

FIG. 2.—*C. pipiens* feeding on membrane-covered tubes.

the blood would come into contact with the membrane. The rack was then placed into the cage containing the mosquitoes. Figure 2 illustrates *C. pipiens* feeding on the membrane-covered tubes.

It has been estimated that feeding success using this method was greater than 90 percent using either human or animal blood. Although we have only fed *C. pipiens,* we feel that this method can possibly be used with equal success for other species.

Literature Cited

Gerberg, G. J. and Kara, F. W. 1971. A large-scale artificial feeding technique for infecting mosquitoes and its application to screening antimalarial chemicals. J. Med. Ent., Vol. 8, No. 5:610–612.

Greenberg, J. 1949. A method for artificially feeding mosquitoes. Mosq. News Vol. 9, No. 2:48–50.

Sudia, W. D. 1971. Personal communication. Center for Disease Control, Atlanta, Georgia.

Tarshis, I. B. 1959. Feeding *Culex tarsalis* on outdated whole human blood through animal derived membranes (Diptera:Culicidae). Ann. Entomol. Soc. Am. 52:681–687.

Tarshis, I. B. 1958. Feeding techniques for blood-sucking arthropods. Proc. 10th Intern. Cong. Entomol. 3:767–784.

NEW INSECTICIDES THAT SHOW RESIDUAL TOXICITY TO *ANOPHELES QUADRIMACULATUS* SAY [1]

H. G. WILSON, G. C. LABRECQUE AND J. A. THOMAS

Insects Affecting Man Research Laboratory, Agr. Res. Serv., USDA, Gainesville, Florida 32604

The development of resistance to insecticides in many strains of *Anopheles* has focused attention on the need for new insecticides that can be used as residual sprays in malaria control and eradication programs.

In the screening tests reported here, 146 compounds were tested in duplicate against susceptible (Gainesville regular) and DDT-resistant (Hartwell Dam) strains of *Anopheles quadrimaculatus* Say. The susceptible strain was obtained in 1936 and has been reared in the laboratory since that time without exposure to insecticides. The DDT-resistant strain, received in 1965 from the Public Health Service in Savannah, was then moderately resistant to DDT and has been maintained for the last 3 years in cages coated inside with DDT.

Acetone solutions of each insecticide were sprayed on plywood panels at the rate of 1 g/m^2. Then 20 female mosquitoes were exposed under half sections of petri dishes on the treated panels for 60 minutes, transferred to cylindrical cages, provided a sugar-water solution in pads of absorbent cotton, and held for 24 hours. At this time, mortality counts were made. The panels were tested 1 week after treatment, again at 4 weeks, and every 4 weeks thereafter until they became ineffective. Panels were considered ineffective when they failed to produce at least 70 percent mortality. A sufficient number of panels was sprayed with each insecticide to avoid using any surface twice.

Fifteen compounds (Table 1) and the DDT and malathion (standards) remained effective throughout the 24 weeks of the test against susceptible mosquitoes. The 3 compounds in this group that were not equally effective against the resistant strain were BAY 88941, which failed at 20 weeks; Hoffman-La Roche RO 3-5571, which failed after 1 week; and American Hoechst Corporation HOE 2960. Also, DDT was ineffective against this strain. The 15 compounds with the chemical or common names are shown in Table 1.

[1] This paper reflects the results of research only. Mention of a pesticide or a commercial or proprietary product in this paper does not constitute a recommendation or an endorsement of this product by the USDA.