OPERATIONAL AND SCIENTIFIC NOTES

SEASONAL ABUNDANCE OF *CULEX* SPECIES NEAR CEDAR KEY, FLORIDA

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From April 1971 through September 1972, several large releases of adult *Culex pipiens quinquefasciatus* Say were made on Seahorse Key, an island in the Gulf of Mexico near Cedar Key, Florida (Lowe *et al.*, 1973; Smittle *et al.*, 1973). These releases included normal and sterilized males and radioactively labeled (^{32}P or ^{14}C) males and females and were made as a part of a study of reproductive behavior, longevity, and mating competitiveness. We report here additional studies made concurrently to obtain information concerning the relative abundance of *Culex* species present at various times of the year. The data were obtained from egg raft collections made regularly on Seahorse Key (1–5 per week depending on season), occasionally on Atsena Otie Key, and once or twice a week for 6 months in the nearby town of Cedar Key.

All known breeding sites for *Culex* on Seahorse Key were destroyed, and as many as 14 tubs containing infusion medium were set out and maintained as oviposition sites. Also, one similar tub was used intermittently on Atsena Otie (where there was no natural breeding), and 3 to 7 tubs were monitored during the 6-month collection period on the mainland. The eggs that were collected were placed in individual cups containing infusion and allowed to hatch; then the larvae were reared to the 4th instar for identification. However, after each release for the tests of sterility (cited above), the identification of rafts was suspended because it was necessary to examine them for radioactivity by placing them in a scintillation fluid. When the radioactivity in collected rafts fell to undetectable levels, identifications were resumed. The only rafts kept for identification were those that were not radioactive and were thus known to be a part of the indigenous populations.

TABLE 1.—*Culex* egg rafts collected near Cedar Key, Florida, 1971–72.

Location of collections	No. of *Culex* rafts identified				
	pipiens quinquefasciatus	*nigripalpus*	*restuans*	*salinarius*	Total no. identified
Seahorse Key	630	384	106	15	1135
Cedar Key	460	18	16	0	494
Atsena Otie Key	34	1	0	2	37
Total	1124	403	122	17	1666

Approximately 84 percent of the 1893 indigenous egg rafts were identified (Table 1). The species found to be present at some time during the year were: *C. p. quinquefasciatus*, *C. nigripalpus* Theobald, *C. restuans* Theobald, and *C. salinarius* Coquillett. From these collections, *C. p. quinquefasciatus* was the most prevalent species at all locations; however, in view of the times of the year that collections were made on Atsena Otie Key and on the mainland, the abundance of the other 3 species was comparatively low.

The total number of rafts of each species collected each month from Seahorse Key was divided by the number of days that the tubs were active, and these data were averaged for 1971 and 1972. Averages (Table 2) could then be used to compare the relative abundance of species present for any single month or the abundance of 1 species at various times of the year. As the monthly averages show, *C. p. quinquefasciatus* was present throughout the entire collection period, but the greatest density was present in the warmer months from May to August; *C. nigripalpus* was predominant from September to December and was collected only sporadically from April to August; *C. restuans* was observed only during the winter and spring months except for a single collection during July; and only 15 *C. salinarius* egg rafts were collected, the majority of these in August 1971.

TABLE 2.—Average number of *Culex* egg rafts obtained per collection day from Seahorse Key, 1971–1972.

Month	*Culex* species			
	p. quinquefasciatus	*nigripalpus*	*restuans*	*salinarius*
January	0.4	0.1	0.3	0
February	0.6	0.2	0.5	0
March	0.2	0.6	0.2	0.1
April	0.7	0	0.1	0.1
May	6.0	0	0.3	0.1
June	16.5	0.8	0	0
July	10.0	0	3	0
August	2.5	0	0	5
September	1.1	5.9	0	0.1
October	1.2	8.1	0	0
November	1.4	1.3	1.2	0
December	0.8	2.2	1.4	0

The tubs containing infusion had previously been shown to be excellent oviposition sites for

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.

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THE OCCURRENCE OF *PSOROPHORA SIGNIPENNIS* COQUILLETT IN NEVADA

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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).

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A SIMPLE METHOD FOR ARTIFICIALLY FEEDING MOSQUITOES

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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