

ARTICLES

OVERWINTERING LARVAL POPULATIONS OF *CULEX*
ERYTHROTHORAX IN NEVADA

H. C. CHAPMAN

Entomology Research Division, Agr. Res. Serv., U.S.D.A. ¹

In the last few years *Culex erythrothorax* Dyar has been found in several western States and Mexico. Carpenter and LaCasse (1955) reported it from Utah, Idaho, California, and Mexico; Menzies *et al.* (1955) from Texas, and Richards *et al.* (1956) from Arizona and three counties in Nevada. In Utah, Rees (1944) noted that females bit viciously and that larvae sometimes became numerous late in the fall. Small numbers of overwintering females were observed by Loomis and Green (1955) in natural resting places in central California.

The genera *Culiseta*, *Orthopodomyia*, *Wyeomyia*, and *Mansonia* are known to contain some species that overwinter as larvae in the United States. *C. erythrothorax* and other species of *Culex* have been observed overwintering only as adults except in the South, where *salinarius* Coq., *quinquefasciatus* Say, and *nigripalpus* Theob. breed throughout the year.

A large population of fourth instar *erythrothorax* was noted near Reno in Washoe County on October 8, 1958, in a sunlit, flooded area where the common tule (*Scirpus acutus* Muhl.) and common three-square (*Scirpus americanus* Pers.) were the principal plants. Repeated checking during the next few weeks indicated that the population was not pupating as expected. The studies initiated are reported herein.

FIELD OBSERVATIONS. Data from the almost weekly dipping of the Washoe County area from October through the

first week in February and from two areas in Lyon and Churchill Counties from January to early May are presented in Table 1. The data show that in the Washoe area a few pupae were dipped in late October and none after November 3. A few adults were observed and several bites received on November 3. The presence of biting adults and the absence of egg rafts so late in the season probably indicate that a small segment of the population overwintered as adult females. This population was destroyed when the area was drained in early February at the end of the duck-hunting season. Prior to this, two separate populations were located in Lyon County adjacent to Fernley and near Fallon in Churchill County. Larvae of *erythrothorax* were present in sunlit tule ponds with vegetation similar to the Washoe County area. The pH of the ponds in the three areas ranged from 7 to 8.

The populations consisted of many second, third, and fourth instar larvae, with the last instar dominant in latter March. The first pupae were observed on March 31. About 50 percent of the population were pupae on April 16 and 74 to 92 percent by the latter part of April. Only one larva and no pupae were noted on May 13, but biting adults were prevalent.

Surveys during the winter months in areas that had contained water since early fall indicated widespread numbers of *erythrothorax*, especially in seep ponds between Fernley and Fallon. Associated larvae in October and November were *Culex tarsalis* Coq. and *Culiseta inornata* (Will.), whereas only *inornata* was noted

¹In cooperation with the Nevada Agricultural Experiment Station.

TABLE 1.—Larvae and pupae of *Culex erythrothorax* collected in three counties in Nevada during 1959

Month	Washoe			Lyon			Churchill		
	Number of dips	Average number per dip		Number of dips	Average number per dip		Number of dips	Average number per dip	
		Larvae	Pupae		Larvae	Pupae		Larvae	Pupae
October 1958	560	7.7	0.01	—	—	—	—	—	—
November	210	10.2	<.01	—	—	—	—	—	—
December	180 ¹	3.9	0	—	—	—	—	—	—
January 1959	140 ¹	4.4	0	130	3.3	0	160	7.9	0
February	55 ²	0.9	0	180	5.3	0	180	11.9	0
March	—	—	—	240	5.6	0.05	240	12.8	0.01
April	—	—	—	240	2.1	1.4	240	3.1	2.2
May	—	—	—	60	0	0	60	0.02	0

¹ Ice often present with dipping difficult.

² Observations discontinued on February 5 because of lack of water.

TABLE 2.—Temperature (° F.) for three areas in Nevada for October 1958 through April 1959¹

Date and area	Average		Lowest	Number of days 32° F. or below
	Minimum	Maximum		
1958				
October				
Fallon	35.8	75.5	20	9
Fernley	36.4	74.4	22	8
Reno	31.6	73.5	17	15
November				
Fallon	24.6	58.6	5	23
Fernley	25.7	57.0	5	21
Reno	21.3	56.1	1	28
December				
Fallon	20.8	54.4	9	29
Fernley	22.6	52.8	13	29
Reno	21.1	54.2	13	31
1959				
January				
Fallon	22.6	52.7	1	25
Fernley	24.3	50.6	3	27
Reno	22.5	50.5	5	28
February				
Fallon	23.2	51.5	6	25
Fernley	23.4	50.0	10	26
Reno	21.0	46.7	3	26
March				
Fallon	25.5	64.0	15	29
Fernley	28.1	63.2	18	26
April				
Fallon	33.6	73.6	21	14
Fernley	36.1	73.1	21	12

¹ From climatological data of U. S. Weather Bureau.

after November and throughout the winter and early spring. Both *tarsalis* and *Anopheles freeborni* Aitken were companion species after April.

LABORATORY OBSERVATIONS. Samples of larvae were brought in from these three areas and part of each sample was kept in the heated laboratory and the remainder placed in an outside environment. The samples were replenished when necessary owing to accidents and mortality. No pupae or cast skins were noted in the outdoor samples until March 14. Pupae were abundant in early April and the length of the pupal stage in April ranged from 6 to 8 days.

The phenomenon of delayed development of winter-collected larvae of *Culiseta melanura* (Coq.), even when brought indoors, as reported by Smith (1904) and Burbutis and Lake (1956), does not seem to apply to *erythrothorax*. It appears that their overwintering is contingent principally on the temperature, as larvae changed instars, pupated, and emerged as adults when held at room temperature. During the winter a few larvae pupated each day, and the pupation of a sample of fourth instars extended over several weeks. This time was reduced to a week in April. The time in the pupal stage ranged from 2 to 4 days.

GENERAL WEATHER CONDITIONS. The temperatures in the three areas during the period of these observations are given in Table 2. The U. S. Weather Bureau stations were located some distance from the study areas, and the data were taken at the 6-foot rather than ground level. Temperatures as low as 1° F. were

recorded, and ice was present during most nights in November through March. Ice more than an inch thick covered the areas for several successive days, with no apparent adverse effect on the larvae.

CONCLUSION. Even though the continuity of the initial study was unavoidably broken, sufficient data are presented to show the presence of larvae and absence of pupae of *Culex erythrothorax* from early November until late in March. Probably a few adult females overwinter, especially in Washoe County, but the most important overwintering stage is the larva. Since this species was absent from these areas in July, August, and early September, and was not noted in other areas, females may aestivate in Nevada.

Literature Cited

- BURBUTIS, P. P., and LAKE, R. W. 1956. The biology of *Culiseta melanura* (Coq.) in New Jersey. Proc. N. J. Mosquito Extermination Assoc. 43:155-61.
- CARPENTER, S. J., and LACASSE, W. J. 1955. Mosquitoes of North America. 360 pp. Univ. Calif. Press.
- LOOMIS, E. C., and GREEN, D. H. 1955. Resting habits of adult *Culex tarsalis* Coq. in San Joaquin County, California, November 1953 through November 1954. A preliminary report. Proc. 23rd Annual Conference of California Mosquito Control Association, pp. 125-7.
- MENZIES, G. C., EADS, R. B., and HARMSTON, F. C. 1955. The discovery of *Culex erythrothorax* Dyar in Texas. Mosquito News 15(4):235-6.
- REES, D. M. 1943. The mosquitoes of Utah. Bull. Univ. Utah, Biol. Series 33, 99 pp.
- RICHARDS, C. S., NIELSEN, L. T., and REES, D. M. 1956. Mosquito records from the Great Basin and the drainage of the Lower Colorado River. Mosquito News 16(1):10-7.
- SMITH, J. B. 1904. Report N. J. State Agric. Expt. Sta. The mosquitoes occurring within the State, their habits, life history, etc., pp. 319-25.

**Paul Revere had to use a horse, but he got there just the same.
You can do it too—but use a plane or train.**