

A Mosquito Larval Survey of Vanderburgh County, Indiana

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Introduction

Evansville, with a population of 130,496 (1980 census), is the largest city in southern Indiana. Historically, it has been the site of outbreaks of the mosquito borne disease, St. Louis Encephalitis (SLE). *Culex pipiens* complex is considered to be the main vector of SLE in southwestern Indiana (Newhouse and Siverly, 1966). Although efforts had been directed towards mosquito control in Evansville for several years, an attempt to base a mosquito control program primarily on larvaciding *Culex* breeding sites, was begun in 1974, by the Evansville-Vanderburgh County Health Department. Much information on the mosquitoes of Vanderburgh County was gathered, during the effort to identify *Culex* breeding sites. Only 15 species of mosquito were reported from Vanderburgh County in a list of county records in *Mosquitoes of Indiana* (Siverly, 1972). The objectives of this paper are to update Siverly's list and to summarize the 1974-1979 larval surveys.

Materials and Methods

Vanderburgh County, located in southwestern Indiana, occupies 241 square miles, within the physiographic subdivision known as the Wabash lowland (Kelly, 1976). Much of the terrain is on uplands, with gently sloping to steep soils. Elevation varies from 357 feet above sea level at the Ohio River near the mouth of Bayou Creek, to 600 feet above sea level in the west central part of the county. The bottom lands, including those along the Ohio River, are subject to flooding. The land that is nearly level in the county, is divided between urban uses and grain farming. Most of the larval collections were made in the Greater-Evansville Area. Evansville, with a population of 168,772 (1970 census) sits in the southern part of the county, along the Ohio River.

Larval samples were taken with a standard 460 ml. white dipper and transported to the Evansville-Vanderburgh County Health Department for species determination. Several identifications were made from adults reared from immature stages. Table 1 indicates the period of time when most collections were made during the six seasons, 1974 through 1979. A few collections were made in April in the 1977 through 1979 seasons.

Most breeding sites were located when a mosquito complaint was investigated, during the earlier seasons in this study. Habitats were described in order to identify *Culex* breeding sites for surveillance and control.

Results and Discussion

A total of 1,117 samples was collected as recorded in Table 1. A total of

TABLE 1. *Period of time when larval samples were collected, number of larval samples collected, and number of individual larvae identified in Vanderburgh County, IN, during 1974 through 1979 larval surveys.*

Period of time, when samples collected.			No. of samples collected.	No. of larvae identified.
Year:	From:	To:		
1974	July 10	September 5	37	1677
1975	July 1	October 3	311	6535
1976	May 24	October 1	195	8010
1977	June 2	October 7	276	15875
1978	June 2	September 28	225	8645
1979	June 29	August 24	73	2438
Totals:			1117	43180

TABLE 2. *Species of mosquitoes collected in Vanderburgh County, IN, during 1974 through 1979 larval surveys.*

Species	Year of collection						
	++ 1972	1974	1975	1976	1977	1978	1979
<i>Aedes</i>							
<i>aegypti</i>	—	—	X+	—	X	—	—
<i>canadensis</i>	X	—	—	—	—	—	X
<i>cinereus</i>	—	—	—	—	—	—	X+
<i>dupreei</i>	—	—	—	—	—	—	X+
<i>sollicitans</i>	X	—	X	—	—	X	—
<i>sticticus</i>	X	—	X	—	—	—	—
<i>stimulans</i>	—	—	X+	—	—	—	—
<i>triseriatus</i>	—	—	—	—	X+	X	X
<i>trivittatus</i>	X	—	X	—	X	—	—
<i> vexans</i>	X	X	X	X	X	X	X
<i>Anopheles</i>							
<i>punctipennis</i>	X	X	X	X	X	X	X
<i>quadrimaculatus</i>	X	X	X	X	X	X	X
<i>Culex</i>							
<i>erraticus</i>	X	—	X	—	—	—	—
<i>pipiens complex</i>	X	X	X	X	X	X	X
<i>restuans</i>	X	X	X	X	X	X	X
<i>salinarius</i>	X	—	X	—	X	X	X
<i>tarsalis</i>	—	X+++	X	X	X	X	X
<i>territans</i>	X	X	—	X	X	X	—
<i>Culiseta</i>							
<i>inornata</i>	X	—	—	—	—	X	X
<i>Psorophora</i>							
<i>ciliata</i>	X	—	X	—	X	X	X
<i>columbiae</i>	—	X+	X	X	X	X	X
<i>cyanescens</i>	—	—	—	—	X+	—	X
<i>ferox</i>	—	—	—	X+	X	X	—
<i>howardii</i>	—	—	—	—	X+	—	X
<i>Uranotaenia</i>							
<i>sapphirina</i>	X	X	X	—	—	—	—

+ New records.

++ Reported by Siverly, 1972.

+++ One adult *Cx. tarsalis*, collected from daytime resting site in October, 1964, was reported by Newhouse and Siverly, 1966, but was not reported in Siverly's 1972 publication.

Roadside and drainage ditches, and wheel tracks were the three most frequently described habitats in Vanderburgh County during this study.

Table 4 presents larval associations of the species collected. *Aedes vexans* and *Culex pipiens* complex were found in association with 14 other species. *Anopheles punctipennis* and *An. quadrimaculatus* were found in association with 11 other species. *Culex erraticus* was collected with only one other species, *An. quadrimaculatus*, and *Psorophora howardii* was collected with only one other species, *Ae. vexans*.

Here it would be pertinent to make some comments on the rainfall in Evansville during this study. It is interesting to note that June through August of 1977, was above average in rainfall, with six days of over an inch of rain. That makes 1977, the wettest summer during the six years of this study. *Psorophora* eggs are laid on moist soil and then hatch after summer rains. Five species of *Psorophora* were collected in 1977, making it "The Year of *Psorophora*" in Evansville.

TABLE 4. Larval mosquito associations found in Vanderburgh County, IN during 1974 through 1979 larval surveys.

	No. of associations	<i>Ae. sollicitans</i>	<i>Ae. sticticus</i>	<i>triseriatus</i>	<i>vexans</i>	<i>An. punctipennis</i>	<i>An. quadrimaculatus</i>	<i>Cx. erraticus</i>	<i>pipiens complex</i>	<i>restuans</i>	<i>salinarius</i>	<i>tarsalis</i>	<i>territans</i>	<i>Cs. inornata</i>	<i>Ps. ciliata</i>	<i>columbiae</i>	<i>cyanescens</i>	<i>ferox</i>	<i>howardii</i>	<i>Ur. sapphirina</i>
ASSOCIATED SPECIES																				
<i>Aedes sollicitans</i>	4				X X			X X												
<i>sticticus</i>	2					X X														
<i>triseriatus</i>	4				X			X				X			X					
<i>vexans</i>	14		X	X X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>Anopheles punctipennis</i>	11	X X	X	X X	X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>quadrimaculatus</i>	11	X X	X X	X X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>Culex erraticus</i>	1					X														
<i>pipiens complex</i>	14	X	X	X X X X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X					X	X	
<i>restuans</i>	10	X		X X X X	X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>salinarius</i>	4			X X X X	X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>tarsalis</i>	8			X X X X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X					X	X	
<i>territans</i>	8			X X X X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>Culiseta inornata</i>	3			X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>Psorophora ciliata</i>	6			X X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X					X	X	
<i>columbiae</i>	10			X X X X	X X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X					X	X	
<i>cyanescens</i>	3			X	X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>ferox</i>	3			X	X	X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X					X		
<i>howardii</i>	1			X		X X X X X X	X X X X X X		X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X							
<i>Uranotaenia sapphirina</i>	2					X X	X X		X X	X X	X X	X X	X X							

All the 15 species reported in Siverly's 1972 work, were collected at least once during the larval survey. Several Biting Collections yielded adults of some of these species, also. (*Ae. canadensis*, *Ae. stimulans*, *Ae. trivittatus*, *Ae. triseriatus*, *Ps. ciliata*, *Ps. cyanescens*, and *Ps. ferox*) to name a few.

Among the 25 species collected, besides, *Culex pipiens* complex, several vectors of mosquito-borne diseases were identified. *An. quadrimaculatus*, the major vec-

tor of Malaira, and *Cx. tarsalis*, the major vector of Western Equine Encephalitis, were collected each year of the study. *Ae. aegypti*, a major vector of Yellow Fever and Dengue, was discovered in two out of the six years. *Ae. triseriatus*, the vector of the La Crosse virus of the California Encephalitis Group, was also found in the county at several sites.

In light of the presence of several vectors of mosquito-borne disease in the midst of a large human population it would be advisable for the area to have an ongoing survey of mosquitoes in the county.

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