

A LARVAL MOSQUITO SURVEY IN NORTHEASTERN ARKANSAS INCLUDING A NEW RECORD FOR *Aedes albopictus*

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ABSTRACT. An extensive larval mosquito survey was conducted in Craighead County in northeastern Arkansas in 1990-91. Nineteen species representing 8 genera were collected. *Culex restuans* was the most cosmopolitan species in relation to habitat utilization, being collected in 5 of 7 habitat types sampled. A major range extension of *Aedes taeniorhynchus* in Arkansas was documented as well as the first known collection of *Aedes albopictus* in the northeastern part of the state.

There has been little recently published work regarding mosquito species occurring in northeastern Arkansas. Carpenter (1941) reported 42 species statewide but did not provide a detailed description of their known ranges within the state. Survey work by Brandenburg and Murrill (1947) and Lancaster et al. (1974¹) collectively revealed the presence of only 6 mosquito species in Craighead County in northeastern Arkansas. Meisch et al. (1982) reported finding 5 species in a larval study of Arkansas rice fields that included the northeastern part of the state.

The primary intent of this study was to more precisely determine both the species composition and the location of mosquito breeding sites in Craighead County. It is anticipated that mosquito control personnel, particularly in northeastern Arkansas, will find this information to be of considerable value.

Craighead County, located in northeastern Arkansas (Fig. 1), is nearly rectangular and is approximately 73 km long and 20-30 km wide. According to Ferguson (1979), its total area, including bodies of water, is about 186,000 ha. It is extensively cultivated with rice, soybeans, cotton, and wheat being the most important crops.

Mosquito larval samples were taken from a variety of habitats including woodland pools, roadside ditches, marshes, ephemeral pools, rice fields, artificial containers, and tree holes in order to provide as complete a species list as possible. A total of 102 separate collection sites were sampled. A Clarke larval dipper (Clarke Mosquito Control Products, Inc., Roselle, IL 60172) 10 cm in diam and 5 cm deep (ca. 350 ml) with an extendable handle was used to collect larvae at most sites. All species identifications were determined from larval specimens. Nineteen mos-

quito species representing 8 genera were collected between March 3, 1990 and October 29, 1991, during the study period. *Culex restuans* Theobald was found in the widest variety of larval production sites, being collected in 5 of the 7 habitat types (Table 1).

Aedes vexans (Meigen) was the most commonly collected species in the woodland pool habitat, being found in 55% of the pools sampled. This species overwinters in the egg stage and is one of the first to appear in light traps in the spring (Holman 1989²). Siverly (1972) reported that there may be continual production of this species in Indiana if rainfall is plentiful. It appears to behave similarly in northeastern Arkansas. *Aedes canadensis* (Theobald) was another common inhabitant of woodland pools. However, it was collected only in the spring and thus appears to be univoltine in this region.

Marsh habitats were distinguished from ephemeral pools in pastures by the presence of herbaceous hydrophytes such as cattails (*Typha* spp.) and sedges (*Carex* spp.). Two such areas were sampled during this investigation. *Culex territans* Walker and *Culex salinarius* Coq. were the only species collected and both were found only on one occasion.

Roadside ditches are considered to be a major mosquito production site in northeastern Arkansas. Although frequently flooded, there are periods when ditches are dry, or nearly so, allowing for oviposition by floodwater species such as *Ae. vexans* and *Psorophora columbiae* (Dyar and Knab). Although *Ps. columbiae* larvae were particularly abundant in one roadside ditch in this study, Horsfall (1942) reported that in Arkansas County (another major rice-producing

¹ Lancaster, J. L., G. Barnes and J. E. Roberts. 1974. Mosquito control. Unpublished report. Arkansas Agricultural Extension Service, Fayetteville.

² Holman, R. E. 1989. A light trap survey of the female adult mosquitoes of Craighead County, Arkansas in 1986 and 1987. M.Sc. thesis. Arkansas State University, State University.

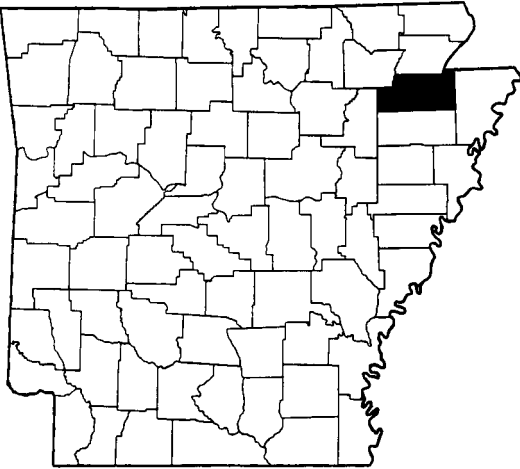


Fig. 1. Location of Craighead County in Arkansas.

county in Arkansas), rice fields are 120 times more likely to produce *Ps. columbiae* larvae. *Anopheles quadrimaculatus* Say larvae were collected from roadside ditches. This species is likely to inhabit most permanent and semipermanent waters in the county if floating or emergent vegetation is present.

Although there was some variation in the mosquito-production sites referred to as ephemeral pools, some general characteristics were shared by all. Typically, ephemeral pools were small shallow bodies of water found in open areas that did or did not contain vegetation or debris and that were dry during prolonged periods without rain. These sites included depressions in pastures and along railroads, as well as automobile tire ruts. In most instances, these temporary pools held water for 2 wk or less following moderate to heavy rains. *Aedes vexans* and *Ps. columbiae*, both floodwater species, dominated this habitat type. These species often were encountered within the same pool. Although most commonly associated with rice fields, *Ps. columbiae* can be produced in large numbers from ephemeral pools such as tire ruts and depressions in pastures. Eight larval specimens of *Aedes taeniorhynchus* (Wied.) (the black salt-marsh mosquito) were collected from an ephemeral pool along a railroad in June 1991. It was the only time *Ae. taeniorhynchus* was encountered during the study. According to Carpenter (1941), Brandenburg and Murrill (1947), and Lancaster et al. (1974), *Ae. taeniorhynchus* occurs only in southern Arkansas with the exception of Sebastian County (in west-central Arkansas). The capture of *Ae. taeniorhynchus* in Craighead County appears to represent a substantial range extension for this species within the state. The pestiferous behavior of this species has been well documented.

Table 1. Mosquito larvae (listed in order of frequency of occurrence) collected in Craighead County, AR, during 1990-91.

	Woodland pools	Marshes	Roadside ditches	Ephemeral pools	Rice fields	Artificial containers	Tree holes
<i>Aedes vexans</i>		<i>Culex territans</i>	<i>Aedes vexans</i>	<i>Aedes vexans</i>	<i>Anopheles</i>	<i>Culex restuans</i>	<i>Aedes triseriatus</i>
<i>Aedes canadensis</i>		<i>Culex salinarius</i>	<i>Psorophora columbiae</i>	<i>Psorophora columbiae</i>	<i>quadrimaculatus</i>	<i>Culex pipiens</i>	<i>Toxorhynchites rutilus</i>
<i>Culex restuans</i>			<i>Anopheles quadrimaculatus</i>	<i>Culex restuans</i>	<i>Psorophora columbiae</i>	<i>Culex salinarius</i>	<i>Orthopodomyia signifera</i>
<i>Culex territans</i>			<i>Culex restuans</i>	<i>Psorophora howardii</i>	<i>Culex erraticus</i>	<i>Culex territans</i>	<i>Culex restuans</i>
<i>Culiseta inornata</i>			<i>Culex pipiens</i>	<i>Anopheles quadrimaculatus</i>	<i>Uranotaenia sapphirina</i>	<i>Anopheles quadrimaculatus</i>	
<i>Psorophora ferox</i>			<i>Culex territans</i>	<i>Culiseta inornata</i>	<i>Culex tarsalis</i>	<i>Aedes triseriatus</i>	
<i>Psorophora columbiae</i>			<i>Culiseta inornata</i>	<i>Psorophora ferox</i>		<i>Toxorhynchites rutilus</i>	
<i>Psorophora howardii</i>				<i>Aedes taeniorhynchus</i>		<i>Aedes albopictus</i>	
<i>Anopheles quadrimaculatus</i>							
<i>Anopheles punctipennis</i>							

Anopheles quadrimaculatus (the malaria mosquito) was the most commonly encountered species in the rice-field habitat. In Arkansas, *An. quadrimaculatus* numbers usually peak in rice-growing regions in August when the fields are being continually flooded (Meisch et al. 1982). It is at this time that the most favorable conditions (stagnant water with floating and emergent vegetation) exist for *An. quadrimaculatus* production. Larvae of this species were collected in 71% of the August rice-field samples. According to Holman (1989²), peak numbers of adult female *An. quadrimaculatus* occurred in light traps in Craighead County during July and August. This species typically is present in such high numbers in Craighead County that Jonesboro Mosquito Control personnel (unpublished data) consider it to be the most important pest species in late summer. *Psorophora columbiae* (the dark rice-field mosquito) was most abundant in July, and was collected in 62% of fields sampled during that month. This species also receives considerable attention by Jonesboro Mosquito Control personnel, particularly in June and July. *Culex erraticus* (Dyar and Knab) and *Uranotaenia sapphirina* (Osten Sacken), although not important pests, were abundant in rice fields from July through September.

The primary type of artificial container sampled in this study was discarded automobile tires. Most tires sampled were located in residential neighborhoods or at commercial tire companies. However, some were encountered in wooded areas. At least one representative of the genus *Culex* was encountered at every artificial container site, with *Cx. restuans* and *Culex pipiens* Linn. being the most frequently collected species. According to Moore et al. (1990), an 8-city survey of container-inhabiting mosquitoes that included Memphis, TN, and Kansas City, MO, found *Cx. pipiens* to be the most cosmopolitan species. In this study, peak *Cx. pipiens* numbers in tires were recorded in late summer. The only anopheline species collected in artificial containers was *An. quadrimaculatus*. It was encountered in tires in late summer (September and October) on 2 occasions. Several authorities including Carpenter (1941), Carpenter et al. (1946), Siverly (1972), and Lancaster et al. (1974¹) did not report the occurrence of *An. quadrimaculatus* in artificial containers. Moore et al. (1990) reported anopheline immatures from automobile tires but did not identify the species. It is speculated that the presence of this species in artificial containers only during late summer may have resulted from a combination of peak adult population numbers, a lack of preferred oviposition sites due to below-normal precipitation, and the preharvest draining of rice fields. The documented estab-

lishment of an *Aedes albopictus* (Skuse) population in Memphis, TN (Moore et al. 1990), was of major concern to Jonesboro Mosquito Control personnel because of the relatively short distance (90 km) between the 2 cities. However, this species was not collected during the most intensive sampling period of this study (March–October 1990), even though all major tire yards in Jonesboro were sampled periodically during this entire time. The first known collection of *Ae. albopictus* larvae was in June 1991 when several specimens were found in rain gutters at a Jonesboro residence. Later that same month, personnel associated with the Jonesboro Mosquito Control Program found numerous *Ae. albopictus* larvae at a small tire yard in the city. Currently, these are the only known production sites for *Ae. albopictus* in northeastern Arkansas. Voucher specimens of *Ae. albopictus* larvae are housed in the insect museum of the Department of Biological Sciences, at Arkansas State University.

Aedes triseriatus (Say) was the most commonly encountered tree-hole mosquito, being collected in 96% of the tree holes sampled. This species overwinters in the egg stage attached to the cavity wall of the tree hole (Siverly 1972). *Toxorhynchites rutilus* (Coq.) and *Orthopodomyia signifera* (Coq.) also were found to be common tree-hole inhabitants, although the 2 species were not encountered until June and July, respectively. *Culex restuans* larvae were collected from a tree hole during April and May 1990 in association with *Ae. triseriatus*. This species was absent from tree holes for the remainder of the study period. Although Shields (1938) reported finding *Cx. restuans* in tree holes, a search of several major literature sources including Carpenter (1941), Carpenter et al. (1946), and Siverly (1972), found no mention of *Cx. restuans* occurring in this habitat. The appearance of this species in tree holes apparently is rather unusual.

The findings of this northeastern Arkansas investigation indicate the presence of at least 19 mosquito species. This represents more than 3 times the number (6) reported by Brandenburg and Murrill (1947) and Lancaster et al. (1974¹). Of the 8 *Culex* species reported by Carpenter and LaCasse (1955) and Darsie and Ward (1981) as occurring in Arkansas, 6 are now known to be found specifically in Craighead County.

We would like to acknowledge the assistance of personnel from the Jonesboro Mosquito Control Program during the sampling period.

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