

RECENT DISTRIBUTION RECORDS OF *CULEX TARSALIS*
IN NEW JERSEY¹

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ABSTRACT. *Culex tarsalis* Coquillett, which was first collected in New Jersey in 1975, reappeared on the eastern coast of the state during the summer of 1977. From August 12 to October 3, 9 specimens were trapped from 3 sepa-

rate counties. The present distribution of *Cx. tarsalis* is adjacent to areas where western encephalitis is known to be endemic in wild birds. The public health significance of these findings is discussed.

INTRODUCTION

Culex tarsalis Coquillett is an important mosquito in the western and central United States. The females are persistent biters, and the species has been documented as a major vector of both Western and St. Louis encephalitis to humans (Hammon and Reeves 1942, Rowley et al. 1971). To date, relatively few collections have been reported east of the Mississippi River. In those cases where the species has been introduced, environmental factors, competition with native mosquito fauna or both have kept the species from becoming a major pest.

In 1975, a single *Cx. tarsalis* was collected in a light trap at Beach Haven, New Jersey (Lesser et al. 1977). Increased surveillance failed to locate additional specimens, and the record was interpreted as an accidental introduction by one of the many tourists who visit the area each summer. Since that time, *Cx. tarsalis* has reappeared in New Jersey, and the range of the species appears to be increasing. The results of these findings are reported in this paper.

ORIGINAL RECORD OF *Cx. tarsalis* IN NEW JERSEY. The initial collection record of *Cx. tarsalis* in New Jersey was made at Beach Haven, a resort community on Long

Beach Island which is one of the many barrier beaches along the New Jersey coast formed by longshore currents. The island is 33 km long, no more than 1 km wide at its widest point and is composed mainly of sandy material that has eroded from the mainland. The eastern side of the island is bordered by the Atlantic Ocean; Barnegat Bay, Manahawkin Bay and Little Egg Harbor separate the island from the mainland of New Jersey. Extensive salt marsh deposits have formed on the mainland side of the bays. At least 6 km of open water and marsh separate the island from coastal upland.

Most of Long Beach Island is heavily developed for tourist trade, and millions of people visit the area each summer to utilize the ocean beaches. Restaurants, shops, summer homes and recreational conglomerates occupy most of the available land. Relatively little freshwater mosquito habitat is left.

The first *Cx. tarsalis* was collected the night of August 25, 1975 by a standard New Jersey light trap on the southern portion of the island. The area is adjacent to a sewage treatment plant and a stand of *Phragmites communis*. Limited *Spartina patens* and *Distichlis spicata* occurred in the immediate vicinity of the trap which often produce small populations of *Aedes vexans*, *Cx. salinarius* and *Ae. cantator* after summer rains.

SUBSEQUENT COLLECTIONS OF *Cx. tarsalis*. The trap at Beach Haven was monitored closely the following year but no *Cx.*

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tarsalis were detected. The results suggested that the species had not been able to establish a successful breeding population on the island. In 1977, however, the species reappeared in the area late in August, and surveillance was intensified to determine if the mosquito had moved to the mainland. County mosquito commissions were alerted to the possibility of finding *Cx. tarsalis* in their light trap collections, and each commission was provided with a complete description of the mosquito and keys for its identification. A trap line of CO₂ supplemented CDC miniature light traps was established in areas where potential *Cx. tarsalis* habitat was known to occur. Larval surveillance was also instituted in the immediate vicinity of light trap collections.

From late August to early October 1977, 9 adult female *Cx. tarsalis* were collected in 3 different counties. Information for each of the collections is listed in Table 1. Associate mosquito species collected by the CDC miniature light traps can be found in Table 2. The geographic distribution of the collections is mapped in Fig. 1. Four of the 9 specimens taken in 1977 were collected on Long Beach Island, the site of the original record. Four more specimens were taken on the mainland, close to the Atlantic coast but distributed over a distance of approximately 60 km. A single specimen was collected at Goshen on the

Delaware Bay coast of Cape May County. The Cape May collection site was separated from the apparent focus on Long Beach Island by more than 75 km, and illustrates how widely the mosquito may be distributed in New Jersey.

DISCUSSION

Data suggest that *Cx. tarsalis* has established a small breeding population in New Jersey. No larvae have been collected to date, but the geographic distribution of the light trap collections and documentation of the species in 2 separate years suggest that the mosquito has been successfully introduced. *Cx. tarsalis* has been introduced in the eastern U. S. on other occasions without having a major impact, but an established breeding population along the New Jersey coast could present a problem of considerable public health significance. Western encephalitis (WE) is endemic in many of the bird populations in New Jersey (Holden 1955). The virus is apparently maintained in an avian cycle by *Culiseta melanura*, a mosquito that breeds prolifically in cedar swamps along the margin of salt marshes in many areas of the state. WE has been isolated from *Cs. melanura* in this area with considerable frequency (Chamberlain et al. 1958, Kandle 1961, 1964) but human cases of WE have never been re-

Table 1. *Culex tarsalis* collections in New Jersey during 1977.¹

County	Date	Town	Collecting Device
Burlington	August 12	New Gretna	Resting box ²
Ocean	August 14	Loveladies	Standard N.J. light trap
	August 22	Beach Haven	Standard N.J. light trap
	August 27	Cattus Island	Standard N.J. light trap
	August 29	Barnegat	CDC miniature light trap with CO ₂ supplement
	August 30	Beach Haven	CDC miniature light trap with CO ₂ supplement
	September 6	Beach Haven	CDC miniature light trap with CO ₂ supplement
Cape May	September 11	Cattus Island	Standard N.J. light trap
	October 3	Goshen	Standard N.J. light trap

¹ Original record taken at Beach Haven on August 25, 1975.

² Collection made by the New Jersey State Department of Health.

ported in New Jersey. Most authorities agree that WE is not a problem on the eastern seaboard because the epidemic vector *Cx. tarsalis* is missing (Chamberlain 1958, Wallis and Hayes 1976).

The present study shows that *Cx. tarsalis* has been introduced to the eastern seaboard, and available data suggest that

the species may be breeding in an area where WE is endemic. Most of the land within this endemic focus is being developed; thus, humans are moving into the area at an increasing rate. The combination of *Cs. melanura*, WE virus and susceptible humans poses a classical epidemiological situation. If *Cx. tarsalis* is

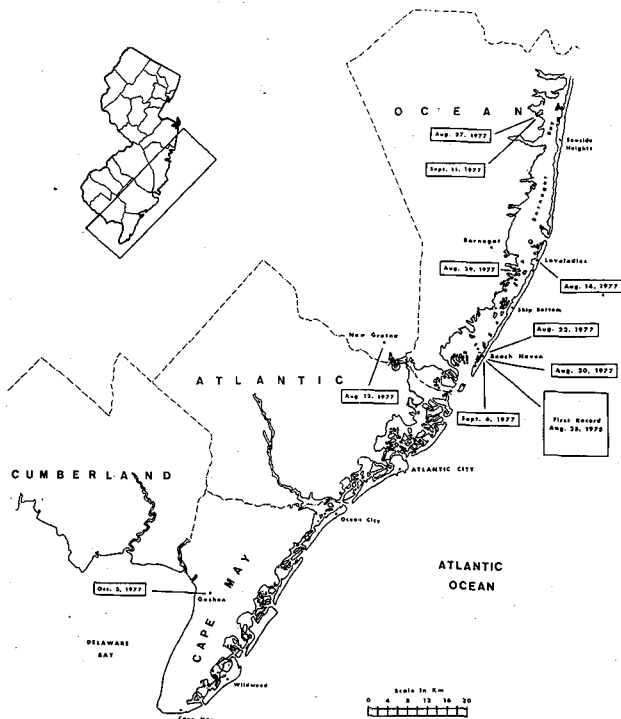


Fig. 1. Geographic distribution of *Culex tarsalis* in New Jersey.

Table 2. Mosquitoes collected by CDC miniature light traps in areas where potential *Cx. tarsalis* habitat was suspected.

	Long Beach Island	Adjacent Mainland
<i>Culex tarsalis</i>	2	1
<i>Culex salinarius</i>	8,919	82,061
<i>Aedes sollicitans</i>	4,716	10,424
<i>Aedes vexans</i>	4,710	1,079
Other <i>Aedes</i> spp. ¹	414	1,259
Other <i>Culex</i> spp. ²	44	211
Other Genera ³	251	1,188

¹ *Ae. cantator*, *Ae. taeniorhynchus*, *Ae. canadensis*, *Ae. trivittatus*, *Ae. atlanticus*, *Ae. triseriatus*.

² *Cx. restuans*, *Cx. territans*, *Cx. pipiens*.

³ *An. bradleyi*, *Cq. perturbans*, *Ps. ciliata*, *Ps. ferox*, *An. punctipennis*, *Ur. sapphirina*, *An. quadrimaculatus*, *Cs. melanura*.

added, all of the ingredients for epidemic transmission will be present.

Whether or not *Cx. tarsalis* will become a problem in New Jersey is unknown at the present time. The state already has 55 documented species, and successful establishment of a newly introduced species is tenuous according to the laws of biological competition. The introduction of this particular species, however, warrants more than scientific curiosity. The fate of *Cx. tarsalis* in New Jersey should be followed closely over the next several years with the hope of instituting immediate

control as soon as its habits are better defined.

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