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OCCURRENCE OF *CULEX (MELANOCONION) ERRATICUS* (DIPTERA: CULICIDAE) IN CALIFORNIA

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ABSTRACT. *Culex erraticus* is added to the 52 currently recognized mosquito species from California. Four females and one male were collected in a CO_2 trap on August 29, 1994, at the Imperial Wildlife Refuge, Wister Unit, Imperial County, CA. Additional specimens were collected on October 24, and larval habitats were located on October 31, 1994. Possible routes of introduction are discussed.

In late summer 1994, *Culex (Melanoconion) erraticus* (Dyar and Knab) was collected near the southeast shore of the Salton Sea in the Imperial Valley, CA. *Culex erraticus* is a distinctive small *Culex,* with a blue-metallic iridescence on the abdomen and dark-scaled legs with narrow pale knee bands. It is unlikely to be overlooked, but could be confused with a small melanistic *Culex quinquefasciatus* Say. This is the first record of this species in California. The closest distribution records are to the east in southern Arizona (Hayes et al. 1976), and to the south in Mexico from the state of Baja California Sur. The records are from 2 small towns on the Gulf of California, indicating high abundance throughout the year (Palacios 1986). However, Aldrete and Pletsch (1976) listed *Cx. erraticus* as a rare species from Ixtapa in the state of Guerrero, on the Pacific coast. According to Darsie and Ward (1981), the species' range in the USA is north to Michigan and west to South Dakota and New Mexico. The extensive synonymy of the species was discussed by King and Bradley (1937).

Since 1991 mosquitoes have been collected biweekly, from March through November, to monitor arbovirus activity throughout the Imperial Valley (Reisen et al. 1992, Lothrop et al. 1994). In 1994, 22 traps were operated at 11 sites, with 2 traps in the Wister Wildlife Refuge.

The Imperial Waterfowl Management Area was established by the State of California Department of Fish and Game in the early 1960s on the southeast shore of the Salton Sea. Currently, it occupies 2,122 ha, of which 1,820 ha are flooded. Irrigation during the fall and winter provides barley (*Hordeum* sp.), wild millet (*Panicum* sp.), and alkali bulrush (*Scirpus* sp.) to wintering ducks and geese (Nelson 1971). Mean monthly temperatures range from 10 to 35°C, with late summer and winter storms yielding less than 12.7 cm average annual rainfall (Madon et al. 1974).

On the nights of August 29, and October 24, 1994, the CO_2 trap on the east side of Davis Road at the Wister Wildlife Refuge collected specimens of *Cx. erraticus.* The August collection of *Cx. erraticus* consisted of 4 females and one male, among specimens of *Culex tarsalis* Coq., *Anopheles franciscanus* McCracken, *Aedes vexans* Meigen, and *Psorophora columbiae* (Dyar and Knab). In October, 3 females of *Cx. erraticus* were collected among specimens of *Culiseta inornata* (Williston) and *Cx. quinquefasciatus,* in addition to the above other species listed. On October 31, larval habitats were found in the same area. Two types of habitats were sampled: small, shallow pools formed by an overflowed canal along Davis Road and fish ponds. The first site with *Cx. erraticus* immatures was a pool (2.5 × 3.5 × 0.30 m) adjacent to the CO_2 trap site. The larval collection recovered one pupa and 3 larvae of *Cx. erraticus,* with larvae of *An. franciscanus, Cs. inornata,* and *Cx. tarsalis.* The pool was under a canopy of mesquite trees (*Prosopis* sp.), salt cedar (*Tamarix* sp.), and a high canopy of eucalyptus (*Eucalyptus* sp.). Larvae and pupae were found harboring in clumps of annual grasses and woody debris. Similar sites along Davis Road to the north were sampled, but *Cx. erraticus* was not found. The second site where larvae of *Cx. erraticus* were collected was the corner of a fish pond (*ca.* 2.0 ha) in Section Y16C. Fifteen 2nd-instar *Cx. erraticus* larvae were collected with larvae of *Cx. tarsalis* at the shallow steep muddy margin of the fish pond. Water depth at this sampling area was 10 cm, increasing toward the middle of the pond, without submerged, floating, or overhanging vegetation. Portions of the fish pond supported growths of cattail (*Typha* sp). Fish ponds in Sections Y16D and I14A were also sampled, but *Cx. erraticus* immatures were not recorded. On November 1, 3 larvae and 6 pupae were collected only from the first site. The small numbers of *Cx. erraticus* collected indi-

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cate a restricted distribution and low numbers of the species in the Imperial Valley.

The females, male genitalia, and larvae of *Cx. erraticus* from the Wister Wildlife Refuge conformed to the descriptions in Carpenter and LaCasse (1974). Material was compared with *Cx. erraticus* specimens from Texas by R. P. Meyer. Voucher specimens of larvae, females, males, male genitalia, and pupal skins were deposited at the Bohart Museum, University of California at Davis, CA.

Suitable habitats for *Cx. erraticus* in the Imperial Valley may have been created when the Salton Sea was formed in 1907, and have been expanded with the development of wildlife areas. Although the Colorado River Delta provides a natural corridor for the introduction of *Cx. erraticus* from the south into California, the characteristically dry climate of Baja California Norte decreases the probability of this passage. The introduction of *Cx. erraticus* to southern California from the east seems equally improbable. The high plains of Arizona and New Mexico lack suitable habitats and impose a natural barrier to expansion towards the west. This supports the concept that *Cx. erraticus* in southern California is an isolated population, until a more definite link is found.

Absence of suitable habitats for *Cx. erraticus* from the areas surrounding its distribution in southern California suggests transportation by man as an alternative method of introducing the species. Thibault (1910) described mosquito transport by buggies and covered wagons, with *Cx. erraticus* carried 65 km and more per day. With faster vehicles and air transportation, passive transport may be a more frequent and reliable method of introduction. Monsoon storm fronts from the Gulf of Mexico could be another alternative.

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