

SUMMARY OF NEW DISTRIBUTION RECORDS FOR MOSQUITO SPECIES IN THE UNITED STATES AND CANADA FOR THE PERIOD 1981-99

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ABSTRACT. In order to elucidate the recent spread of mosquito species in the United States and Canada, a summary of new records for states and provinces has been prepared to include those reported mostly from 1981 to 1998, although some records before 1989 are also given. We are reporting 132 new records for 58 species of mosquitoes.

KEY WORDS Distribution records, mosquitoes, United States, Canada

In 1989, we reported new distributional records for 29 species of mosquitoes in North America (Darsie and Ward 1989). Now, of the 174 species and subspecies known from North America north of Mexico, 58 have new or revised geographical distributions. These species fall into 3 groups. First, 9 species (marked ¹ in Table 1) have been described as new or have been resurrected from synonymy. Second, 4 species (marked ² in Table 1) have been introduced into the target area during the period. Third, changes in distribution have been reported for 46 valid species that were recognized as members of the American fauna before 1980. We report 132 changes in distribution in 41 states and provinces.

Table 1 contains the complete list of species and political units where mosquito species have been recorded and the references in which they were reported. The abbreviations of the states of the United States and provinces of Canada are those listed in the flyleaf of *Identification and geographical distribution of the mosquitoes of North America, north of Mexico* (Darsie and Ward 1981). Generic abbreviations follow Reinert (1975, 1982, 1991).

The 1st category includes new taxa in the fauna of the United States. *Aedes clivis* Lanzaro and Eldridge and *Aedes washinoi* Lanzaro and Eldridge are sibling species of *Aedes increpitus* Dyar (Lanzaro and Eldridge 1992). *Aedes clivis* occurs primarily on the west slope of the Sierra Nevada; *Ae. washinoi* is widely distributed in California (Eldridge et al. 1998). *Aedes tahoensis* Dyar was removed from synonymy under *Aedes communis* (De Geer) by Brust and Munstermann (1992). Schutz and Eldridge (1993) stated that *Ae. tahoensis* is the only member of the *Ae. communis* species group that has been found California.

Anopheles diluvialis, *An. inundatus*, *An. maverlius*, and *An. smaragdinus*, sibling species of *An. quadrimaculatus* Say, were recently described by

Reinert (1997). They are mostly found in Florida and surrounding states. The final distribution of *An. quadrimaculatus* sensu stricto has yet to be determined as identification of the siblings is carried out wherever *An. quadrimaculatus* sensu lato occurs.

The final new species is the 1st finding of a member of the subgenus *Micraedes* of *Culex* in the United States, *Cx. biscaynensis* (Zavortink and O'Meara 1999). This species was marked in Table 1 as new and exotic. It breeds only in the axils of bromeliad plants and is closely related to several species of the subgenus occurring in the islands of the Caribbean area. O'Meara and Evans (1997) stated, "... it would be premature to consider this mosquito as a nonindigenous species. There is a possibility that we are dealing with a native species that until now has escaped detection."

The 2nd category includes the 4 introduced species. The story of the establishment of *Aedes albopictus* (Skuse) and its spread to 26 states in the eastern half of the United States is well known and recently was summarized by Moore (1999), who acknowledged that it remains a health threat because it is a potential vector of several human diseases. *Toxorhynchites moctezuma* Dyar and Knab was listed as *Tx. sp.* by Darsie and Ward (1981) for a species found in tree holes in southern Arizona and was identified by Zavortink (1985). It is closely related to *Tx. theobaldi* (Dyar and Knab) and is found mainly in the Neotropics. *Culex biscaynensis* and its possible introduction were discussed above. *Aedes japonicus* Theobald is the latest introduction. It is a container breeder, found in discarded tires and rock holes. It has been captured as adults in New Jersey and Long Island, New York, and as larvae breeding in several localities in Connecticut (Peyton et al. 1999; Andreadis, personal communication, 1999).

The 3rd group contains 43 well-established, mostly indigenous species that have been apparently slowly extending their known range (Darsie and Ward 1981, Plates 9-49). They can be mainly divided into 2 groups: the southern species extending their ranges north and west (e.g., *Aedes infirmatus* Dyar and Knab and *Psorophora howardii*

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Table 1. List of new state (USA) and province (Canada) mosquito distribution records, mostly since 1989.

Species	State or province	Reference
<i>Aedes abserratus</i>	WV	Joy et al. 1994
<i>Ae. aegypti</i>	RI	Cookman and LeBrun 1986
	NJ	Donnelly 1993
	AZ	Meyer 1997
<i>Ae. albopictus</i> ²	AL, AR, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, MN, MO, MS, NC, NE, NJ, OH, OK, PA, SC, TN, TX, VA, WV	Moore 1999
<i>Ae. atropalpus</i>	NF	Nielsen and Mokry 1982
	IN	Restifo and Lanzaro 1980
<i>Ae. campestris</i>	MI	Wilmot et al. 1987
<i>Ae. cinereus</i>	WV	Butler and Amrine 1980
<i>Ae. clivis</i> ¹	CA	Lanzaro and Eldridge 1992
<i>Ae. communis</i>	VT	Graham et al. 1991
<i>Ae. decticus</i>	NF	Nielsen and Mokry 1982
<i>Ae. diaantaeus</i>	NF	Nielsen and Mokry 1982
<i>Ae. dorsalis</i>	NH	Burger 1981
<i>Ae. euedes</i>	WY	Nielsen 1982
	MI	Wilmot et al. 1987
<i>Ae. hendersoni</i>	VT	Graham et al. 1991
<i>Ae. hexodontus</i>	NF	Nielsen and Mokry 1982
<i>Ae. implicatus</i>	NJ	Maltais and Daigle 1984
<i>Ae. intrudens</i>	VT	Graham et al. 1991
<i>Ae. japonicus</i> ²	NJ, NY, CT	Peyton et al. 1999; Andreadis, personal communication 1999
<i>Ae. mercurator</i>	PQ	Maire et al. 1980
<i>Ae. nigromaculis</i>	KY	Courtney and Christensen 1982
<i>Ae. pionips</i>	NF	Nielsen and Mokry 1982
<i>Ae. pullatus</i>	MI	Cassani and Newson 1980
<i>Ae. punctor</i>	CT	Andreadis 1986
<i>Ae. sollicitans</i>	WV	Butler and Amrine 1980
<i>Ae. sticticus</i>	NF	Nielsen and Mokry 1982
<i>Ae. taeniorhynchus</i>	NH	Burger 1981
<i>Ae. tahoensis</i> ¹	CA	Brust and Munstermann 1992
<i>Ae. thelcter</i>	AZ	Maloney and Reid 1990
<i>Ae. thibaulti</i>	MI	Copeland 1984
<i>Ae. trivittatus</i>	AL	Johnson and Harrell 1980
<i>Ae. triseriatus</i>	MB	Galloway and Brust 1982
<i>Ae. washinoi</i> ¹	CA	Lanzaro and Eldridge 1992
	OR	Lanzaro and Eldridge 1992
<i>Anopheles diluvialis</i> ¹	FL	Reinert et al. 1997
<i>An. crucians</i>	MI	Cassani and Newson 1980
<i>An. hermsi</i> ¹	CA (extension)	Fritz et al. 1991
	NM	Fritz and Washino 1993
<i>An. inundatus</i> ¹	FL, GA, LA	Reinert et al. 1997
<i>An. maverlius</i> ¹	FL, GA, KY, LA, MS, SC	Reinert et al. 1997
<i>An. quadrimaculatus</i> s.s.	AL, AR, CT, FL, GA, KY, LA, MA, MI, MN, MS, NC, NJ, NY, SC, TN, TX, WI	Reinert et al. 1997
<i>An. smaragdinus</i> ¹	AL, AR, FL, GA, KY, LA, MS, NC, SC, TN	Reinert et al. 1997
<i>Culex biscaynensis</i> ^{1,2}	FL	Zavortink and O'Meara 1999
<i>Cx. erraticus</i>	AZ	Hayes et al. 1976
	CA	Lothrop et al. 1995
<i>Cx. erythrothorax</i>	AZ (extension)	Darsie, personal communication 1999
	CO (extension)	Jakob et al. 1989
<i>Cx. interrogator</i>	AZ	Hayes et al. 1976
<i>Culiseta impatiens</i>	MD	Pagac et al. 1992
<i>Cs. melanura</i>	VT	Graham et al. 1991
	NF	Nielsen and Mokry 1982
<i>Cs. minnesotae</i>	MI	Grimstad and Mandracchia 1985
	NH	Burger 1981
	VT	Graham et al. 1991

Table 1. Continued.

Species	State or province	Reference
<i>Cs. morsitans</i>	CO	West et al. 1994
	WY	Savage et al. 1994
<i>Mansonia dyari</i>	SC	Darsie and Hager 1993
<i>Orthopodomyia alba</i>	SC	Weathersbee and Arnold 1947
	WV	Heaps 1980
<i>Or. signifera</i>	NH	Burger 1981
<i>Psorophora ciliata</i>	VT	Graham et al. 1991
<i>Ps. columbiae</i>	AZ	Hayes et al. 1976
	NM	Hayes et al. 1976
<i>Ps. cyanescens</i>	IA	Ritchie and Rowley 1980
<i>Ps. ferox</i>	VT	Graham et al. 1991
<i>Ps. howardii</i>	NY	Guirgis 1992
<i>Ps. mathesoni</i>	MI	Cassani and Newson 1980
<i>Toxorhynchites moctezuma</i> ²	AZ	Zavortink 1985
<i>Uranotaenia sapphirina</i>	CO	Maloney 1980
<i>Wyeomyia smithii</i>	VT	Graham et al. 1991

¹ Newly described species or those resurrected from synonymy.

² Exotic species that have been introduced into the United States.

Coquillett) and the northern species moving southward (e.g., *Aedes euedes* Howard, Dyar, and Knab and *Culiseta minnesotae* Barr).

Documentation of changes in the distribution of mosquito species in states, provinces, and smaller political units is important so that mosquito control agencies can recognize the presence of these species and understand their natural histories, vector potential, and behavior.

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