During the past 7 years, 24 species of Nearctic mosquitoes have had extensions to their known distribution in the form of 32 new state and province records in the United States and Canada. They are included in this report along with relevant references. Additionally, 3 new United States country records have been established, 3 species have had name changes, a new species of Anopheles and sibling species of another anopheline have been described. Details of these occurrences are covered.
REVIEW OF NEW NEARCTIC MOSQUITO DISTRIBUTIONAL RECORDS NORTH OF MEXICO, WITH NOTES ON ADDITIONS AND TAXONOMIC CHANGES OF THE FAUNA, 1982–89

RICHARD F. DARSIE, JR. and RONALD A. WARD

ABSTRACT. During the past 7 years, 24 species of Nearctic mosquitoes have had extensions to their known distribution in the form of 32 new state and province records in the United States and Canada. They are included in this report along with relevant references. Additionally, 3 new United States country records have been established, 3 species have had name changes, a new species of Anopheles and sibling species of another anopheline have been described. Details of these occurrences are covered.

INTRODUCTION

The publication of Darsie and Ward (1981) included distributional records for the 166 species of mosquitoes known at that time to occur in the Neai.otic Region, north of Mexico. It also reflected the taxonomic changes in the specific and superspecific categories which had been delineated since the publication of Carpenter and LaCasse (1955). Ward and Darsie (1982) also accounted for other distributional changes up to and including 1982.

Since many new state and province records in the United States and Canada have been published over the last 7 years, it seemed appropriate to summarize them as well as enumerate new country records and pertinent taxonomic changes for the convenience of those interested in the field.


NEW STATE AND PROVINCE RECORDS

There have been extensions of the known distribution of 25 species in 16 of the political subdivisions of United States, Canada and Bermuda. They are listed in Table 1 along with the species and the reference first reporting the finding.

Two geographical areas which have heretofore been excluded by us in considering the indigenous mosquito fauna, but which are clearly colonized by Nearctic species, are here being added. They are Greenland and Bermuda, insular territories in the Atlantic Ocean.

NEW COUNTRY RECORDS

Aedes (Stegomyia) albopictus (Skuse): This species was apparently introduced into Harris County, TX, prior to 1986 in used tires shipped from Asia. It was first reported by Sprenger and Wuthiranyagool (1986) and Barnett and Davis (1986). It has since spread to many other states. Its known distribution now includes Alabama, Delaware, Georgia, Indiana, Kentucky, Mississippi, Missouri, North Carolina and Tennessee (Craven et al. 1988, Moore et al. 1988). Other states reporting its presence are Florida (Peacock et al. 1988), Illinois (Rightor et al. 1987), Louisiana (Darsie 1986), Maryland (Sweeney et al. 1988) and Ohio (Berry et al. 1988). It is also known from South Carolina (R. F. Darsie and S. Ferguson, unpublished data).

The discovery by Foster (1989) that Ae. albo-pictus has colonized tree holes is most significant because that is the natural habitat in its indigenous Oriental region. Also, Nawrocki and Hawley (1987) discussed its eventual distribution in North America.

Aedes (Howardina) bahamensis Berlin: This species was recognized as new (1969) by Berlin. The immature stages occur in the containers in...
Table 1. List of new state (USA), province (Canada) and Bermuda records which have occurred between 1980 and 1989.

<table>
<thead>
<tr>
<th>Species</th>
<th>Location</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ae. aegypti</em></td>
<td>Rhode Island</td>
<td>Cookman and LeBrun (1986)</td>
</tr>
<tr>
<td><em>Ae. albopictus</em></td>
<td>Eastern USA.</td>
<td>Sprenger and Wuihiranyagool (1986), Moore et al. (1988)</td>
</tr>
<tr>
<td><em>Ae. bahamensis</em></td>
<td>Florida</td>
<td>Pafume et al. (1988)</td>
</tr>
<tr>
<td><em>Ae. communis</em></td>
<td>Connecticut</td>
<td>Andreadis (1986)</td>
</tr>
<tr>
<td><em>Ae. diantaeus</em></td>
<td>New Brunswick</td>
<td>Maltais and Daigle (1984)</td>
</tr>
<tr>
<td><em>Ae. dupreei</em></td>
<td>Michigan</td>
<td>Cassani and Newson (1980)</td>
</tr>
<tr>
<td><em>Ae. hendersoni</em></td>
<td>Rhode Island</td>
<td>LeBrun et al. (1983)</td>
</tr>
<tr>
<td><em>Ae. inermus</em></td>
<td>New Jersey</td>
<td>McNelly (1989)</td>
</tr>
<tr>
<td><em>Ae. leucocelia</em></td>
<td>New Jersey</td>
<td>Maltais and Daigle (1984)</td>
</tr>
<tr>
<td><em>Ae. melanocephalus</em></td>
<td>North Dakota</td>
<td>Darsie and Anderson (1985)</td>
</tr>
<tr>
<td><em>Ae. mictrahae</em></td>
<td>Indiana</td>
<td>Copeland (1984)</td>
</tr>
<tr>
<td><em>Ae. punctor</em></td>
<td>Connecticut</td>
<td>Andreadis (1986)</td>
</tr>
<tr>
<td><em>Ae. purpureipennis</em></td>
<td>California</td>
<td>Meyer et al. (1987)</td>
</tr>
<tr>
<td><em>Ae. sollicitans</em></td>
<td>Michigan</td>
<td>Cassani and Newson (1980)</td>
</tr>
<tr>
<td><em>Ae. s. spenceri</em></td>
<td>New Jersey</td>
<td>Ehrenberg (1983)</td>
</tr>
<tr>
<td><em>Ae. sticticus</em></td>
<td>Rhode Island</td>
<td>LeBrun et al. (1983)</td>
</tr>
<tr>
<td><em>Ae. thelcter</em></td>
<td>Arizona</td>
<td>Maloney and Reid (1988)</td>
</tr>
<tr>
<td><em>Ae. thibaulti</em></td>
<td>New Jersey</td>
<td>McNelly (1984)</td>
</tr>
<tr>
<td><em>Ae. triseriatus</em></td>
<td>Rhode Island</td>
<td>Cookman et al. (1985)</td>
</tr>
<tr>
<td><em>An. barbieri</em></td>
<td>Manitoba</td>
<td>Gallaway and Brust (1982)</td>
</tr>
<tr>
<td><em>An. hermsi</em></td>
<td>California</td>
<td>Cassani and Newson (1980)</td>
</tr>
<tr>
<td><em>Cx. tarsalis</em></td>
<td>Louisiana</td>
<td>Wilmot et al. (1987)</td>
</tr>
<tr>
<td><em>Cx. impatiens</em></td>
<td>Rhode Island</td>
<td>Chapman and Johnson (1986)</td>
</tr>
<tr>
<td><em>Ps. ferox</em></td>
<td>Rhode Island</td>
<td>Jakob et al. (1986)</td>
</tr>
<tr>
<td><em>Ps. howardi</em></td>
<td>New Jersey</td>
<td>Gebara and de Oliveira (1986)</td>
</tr>
<tr>
<td></td>
<td>Iowa</td>
<td>Darsie and Ward (present work)</td>
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<td></td>
<td></td>
<td>Mokry (1984)</td>
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<tr>
<td></td>
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<td>Darsie and Anderson (1985)</td>
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<tr>
<td></td>
<td></td>
<td>LeBrun et al. (1983)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>McNelly and Crans (1983)</td>
</tr>
</tbody>
</table>

The Bahamas Islands. Pafume et al. (1988) reported that it has been present in Florida since 1986 from eggs deposited in ovitraps; now it has been collected in tires with water from 37 locations in Dade and Broward counties (O'Meara et al. 1989). It is notable because it is the first species belonging to the subgenus *Howardina* to be reported from the United States.

**MOSQUITO FAUNA OF GREENLAND AND BERMUDA**

Greenland: The first report of mosquitoes on this arctic island was made by Henricksen and Lundbeck (1917). They recorded the presence of *Ae. nigripes* (Zetterstedt) as *Culex nigripes* Zett. Some 50 years later Nielsen and Nielsen (1966) added *Ae. impiger* (Walker) as *Ae. nearcticus* Dyar and stated that is locally more abundant than *Ae. nigripes*. A third species, *Ae. triseriatus* (Say) was collected by Messersmith (1971).
BERMUDA: The following species have been collected in the islands of Bermuda: Ae. aegypti (Linn.) (Mayers 1983), Ae. sollicitans (Walker), Ae. taeniorhynchus (Wiedemann), Cx. salinarius Coq., Cx. quinquefasciatus Say (Williams 1956) and Culiseta inornata (Williston). One female of the last named species was identified by one of us (R.A.W.) and is here being reported from Bermuda for the first time. The specimen was collected from a house on Middle Road, Devonshire Parish, March 8, 1966, and has been deposited in the collection of the Bermuda Department of Agriculture, Hamilton.

TAXONOMIC CHANGES

Aedes (Ochlerotatus) leucomelas (Meigen): This species was formerly known as Ae. (Ochlerotatus) implicatus Vockeroth, until it was synonymized by Mezenev (1980) under leucomelas. Anopheles (Anopheles) quadrimaculatus Say: This species is the traditional malaria vector in the eastern United States. Recently it was found to consist of at least 4 sibling species. They have been characterized both genetically and cytogenetically by Kaiser and Seawright (1987), Kaiser et al. (1988a, 1988b, 1988c), Lanzaro et al. (1988a, 1988b) and Narang and Seawright (1988) and Narang et al. (1989a, 1989b). They are now designated as species A, B, C and D.

Culex (Melanoconion) cedecei Stone and Hair: This species was described by Stone and Hair (1968). It was subsequently synonymized with Cx. apistopus Komp by Belkin (1969a, 1969b). Then Sirivanakarn and Belkin (1980) determined that Cx. apistopus was conspecific with Cx. taeoniopus Dyar and Knab so that its synonym, Cx. cedecei, was automatically transferred to synonymy under Cx. taeoniopus. Recently, Weaver et al. (1986), as the result of isoenzyme and cross-mating experiments, have concluded that Cx. cedecei is indeed a distinct, incipient species.

Culex (Culex) stigmatosoma Dyar: This species was formerly called Cx. peus Speiser before Strickman (1988a) discovered that the holotype of Cx. peus is conspecific with Cx. thriambus Dyar. With the realization that Cx. peus was not a valid name for this species, the next available name was Cx. stigmatosoma, by which it was known in older literature (e.g., Dyar 1928).

Culex (Culex) peus Speiser: This is now the valid name for the species which was formerly known as Cx. thriambus Dyar, because Strickman (loc. cit.) found that the holotype of Cx. peus is identical to that of Cx. thriambus. He has described the holotype in detail. In order to assist in the use of the keys in Darsie and Ward (1981), Strickman (1988b) has provided a necessary couplet and name changes, as well as an illustration of the salient adult female character, to distinguish Cx. peus from Cx. stigmatosoma.

The name Cx. thriambus has been used in the literature related to mosquitoes of the western United States for 67 years (1921-88). Eldridge and Harbach (1989) believe that there is good reason to preserve the name thriambus. They are proposing to suppress the name peus under the plenary powers of the International Commission of Zoological Nomenclature.

Culex (Culex) picipus Linnaeus: Important studies on Cx. picipus by Harbach et al. (1984, 1985) have resulted in neotype designations for Cx. picipus and Cx. molestus Forskål. A thorough investigation of the latter, a physiological and behavioral variant, concluded that the name molestus has no taxonomic validity. It has been applied to populations which exhibit autogeny, stenogamy and anthropophily. Brodgon (1984) has determined that characters of the siphon can be used to distinguish larvae of the 2 taxa, Cx. picipus and Cx. quinquefasciatus Say.

ACKNOWLEDGMENTS

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REFERENCES CITED


Berlin, O. G. W. 1969. Mosquito studies (Diptera,
Importation of *Aedes albopictus* and other exotic mosquito species into the United States in used tires from Asia. J. Am. Mosq. Control Assoc. 4:138-142.


DECEMBER 1989

NEARCTIC MOSQUITO DISTRIBUTION RECORDS


