

Bibliography and Notes on Florida Mosquitoes
with Limited Distribution in the United States

Samuel G. Breeland
Office of Entomology
Florida Department of Health and Rehabilitative Services
Post Office Box 210
Jacksonville, Florida 32231

ABSTRACT. A bibliography of literature dealing with eleven species of mosquitoes (*Aedes tortilis*, *Culex atratus*, *Cx. bahamensis*, *Cx. iolambdis*, *Cx. latisquama*, *Cx. mulrennani*, *Cx. opisthopus*, *Deniocerites cancer*, *Psorophora johnstonii*, *Ps. pygmaea*, and *Wyeomyia vanduzeei*) reported only from Florida in the United States is presented. References are also provided on six additional Florida mosquito species (*Ae. thelcter*, *Anopheles albimanus*, *Mansonia dyari*, *Ma. titillans*, *Toxorhynchites rutilus rutilus*, and *Wy. mitchellii*) with only limited distribution elsewhere in the United States. Distribution and pertinent notes are given for both groups. References to other taxonomic entities at one time identified with the Florida mosquito fauna, but since synonymized or deleted from distribution lists are also included.

Eleven species of mosquitoes occurring in Florida are not known from any other state of the United States: (*Aedes tortilis*, *Culex atratus*, *Cx. bahamensis*, *Cx. iolambdis*, *Cx. latisquama*, *Cx. mulrennani*, *Cx. opisthopus*, *Deinocerites cancer*, *Psorophora johnstonii*, *Ps. pygmaea*, and *Wyeomyia vanduzeei*). With the possible exception of *Wy. vanduzeei*, all of the above species have a wider neotropical distribution and only this species and *Cx. mulrennani* have a Florida type locality. Belkin et al. (10) only tentatively accept Cuba, Grand Cayman and Jamaica in the record of distribution of *Wy. vanduzeei*.

Cx. latisquama is listed here only because it has been frequently included in published distribution lists including the recent work of Darsie and Ward (32). It is extremely doubtful that the species is indeed represented among the Florida fauna as is noted in the main body of this paper.

Six additional species included in the Florida fauna have a very limited distribution in the United States (Darsie and Ward, 32): *Aedes thelcter* - Florida, Oklahoma, Texas and New Mexico; *Anopheles albimanus* - Florida and Texas; *Mansonia dyari* - Florida and Georgia; *Ma. titillans* - Florida and Texas; *Toxorhynchites rutilus rutilus* - Florida, Georgia and South Carolina; and *Wyeomyia mitchellii* - Florida and Georgia. Except for *Ae. thelcter* and *Tx. r. rutilus*, these species show a rather wide neotropical distribution outside of the United States. *Ae. thelcter* is known also from Mexico, but Arnell (2) questions the Mexico record. The distribution of *Tx. r. rutilus* appears to be restricted to the United States.

Several other taxonomic entities of limited distribution have been associated with the mosquito fauna of Florida and later shown to be synonymous or deleted from records of distribution. Entered into synonymy are *Aedes keyensis* = *Aedes thelcter* (126) and *Culex cedecei* = *Culex opisthopus* (10). *Aedes scapularis* has been identified with the Florida fauna (25, 75) but, according to Arnell (2) and Darsie and Ward (32) this species occurs only in Texas in the United States. It otherwise shows a very wide neotropical distribution. *Culex elevator* was reported by Wirth in 1945 (133) and in later collections by Pritchard et al. (104, 105). These identifications were later corrected to *Cx. iolambdis* by Pratt and Seabrook in 1952 (101).

Since there is no single publication treating the mosquitoes of Florida, the literature dealing with those species unique to Florida or of limited distribution in the United States is somewhat scattered and often scant. However, because a number of the species are well known elsewhere, relatively few references provide a good base of knowledge for workers dealing with these mosquitoes in Florida. Important general references include: Belkin, Heinemann and Page 1970 (10); Carpenter and LaCasse 1955(25); Darsie and Ward 1981 (32); King, Bradley, Smith and McDuffie 1960 (75).

The purpose of this paper is to present in one body a bibliography on Florida mosquito species not generally known elsewhere in the United States and to show their existing taxonomic status and distribution as currently recorded in the literature.

Included are a list of references by species with basic or key references emphasized, pertinent notes on distribution and taxonomy, and a general bibliography covering the subject species.

CITATIONS IN MAIN BIBLIOGRAPHY

AND

GEOGRAPHIC DISTRIBUTIONS BY SPECIES

Species Occurring Only in Florida in the United States

Aedes (Ochlerotatus) tortilis (Theobald)

*References: 2, 10, 16, 25, 32, 39, 44, 55, 59, 66, 68, 69, 72, 75, 80, 89, 90, 93, 96, 97, 104, 119, 123, 125, 126, 128.

*General or key references underlined.

****Distribution in Florida:** Subtropical area (Indian River, Palm Beach, Broward, Dade, Lee and Hendry Counties); Tropical area (Monroe County).

Distribution Elsewhere: Jamaica (type-locality), Bahamas, Virgin Islands, Puerto Rico, Hispaniola, Cayman Islands, Cuba, Mexico, Guatemala, Leeward and northern Windward Islands (10).

Culex (Melanoconion) atratus Theobald

References: 4, 6, 10, 14, 16, 25, 26, 32, 36, 41, 44, 45, 53, 65, 68, 75, 76, 77, 97, 104, 105, 111, 124, 137.

Distribution in Florida: Floridian area - southern portion (Manatee County); Subtropical area (Dade, Lee and Collier Counties); Tropical area (Monroe County).

Distribution Elsewhere: Florida Keys southward through the Antilles, Panama, Trinidad, the Guianas to Brazil. Type locality - Jamaica (10).

Culex (Culex) bahamensis Dyar and Knab

References: 10, 15, 16, 25, 26, 32, 38, 51, 66, 68, 69, 74, 75, 97, 103, 104, 133.

Distribution in Florida: Subtropical area (Broward and Dade Counties); Tropical area (Monroe County).

Distribution Elsewhere: Bahamas (type locality), Cuba, Grand Cayman, Jamaica, Hispaniola, Puerto Rico, Virgin Islands, Leeward Islands, Guadeloupe (10).

Culex (Melanoconion) iolambdis Dyar

References: 10, 16, 25, 32, 43, 52, 53, 68, 75, 77, 94, 97, 101, 104, 112, 133.

Distribution in Florida: Floridian area - southern portion (Manatee County); Subtropical area (Indian River, Martin, Dade, Lee and Collier Counties); Tropical area (Monroe County).

**Florida records from unpublished table compiled by Florida Medical Entomology Laboratory, Institute of Food and Agricultural Sciences, University of Florida, Vero Beach, Florida 32960. For location of faunal areas and counties see Figure 1.

Distribution Elsewhere: Panama (type locality), Puerto Rico, Jamaica, Mexico, Guatemala, Colombia (10).

Culex (Tinolestes) latisquama (Coquillett)

References: 11b, 21, 31, 32, 53, 68, 120.

Distribution in Florida: Subtropical area - southwest (Lee County). This is a highly questionable record. See the following note.

Distribution Elsewhere: Costa Rica (type locality), Panama, Honduras, and Surinam (21, 120).

Note: A single male specimen of *Cx. latisquama* was found in the United States National Museum collection and was reported as a new record by Stone in 1968 (21, 120).

Berlin and Belkin (11b) state that, "the report of *latisquama* from Suriname (Stone, Knight and Starcke 1959:282) is erroneous, and the record of it on the basis of 1 male supposedly collected in 1906 by J. B. Vanduzee in Estero, Lee County, Florida, U. S. A. (Stone 1968:101) is probably due to erroneous labeling (Belkin 1970:57-58), which occurred several times during the course of preparation of material for the studies on the 'Mosquitoes of North and Central America and the West Indies' (Howard, Dyar and Knab)."

The analysis presented by these authors together with the absence of a first-hand collection report anywhere in the literature makes it doubtful that the species should be included among the Florida fauna.

Culex (Melanoconion) mulremani Basham

References: 4, 10, 16, 25, 32, 53, 75, 77, 97.

Distribution in Florida: Tropical area (Monroe County); Big Pine Key (type locality).

Distribution Elsewhere: Cuba, Grand Cayman (10).

Culex (Melanoconion) opisthopus Komp

References: 7, 8, 10, 16, 25, 31, 32, 44, 50, 53, 57, 64, 68, 75, 77, 78, 79, 80, 94, 97, 102, 104, 112, 122, 133.

Distribution in Florida: Floridian area - southern portion (Charlotte County); Subtropical area (Brevard, Indian River, Martin, Palm Beach, Broward, Dade and Collier Counties); Tropical area (Monroe County).

Distribution Elsewhere: Jamaica, Grand Cayman, Central America. Type locality - Honduras (10).

Deinocerites cancer Theobald

References: 1, 10, 11, 12, 16, 25, 26, 32, 34, 40, 50, 68, 74, 75, 97, 102, 113, 126.

Distribution in Florida: Louisianian area (Escambia, Dixie and Duval Counties); Floridian area - northern portion (St. Johns, Flagler, Volusia, Lake and Hernando Counties); southern portion - (Sarasota County); Subtropical area (Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward and Dade Counties); Tropical area (Monroe County).

Distribution Elsewhere: Bahamas, Hispaniola, Jamaica (type locality), Cuba, Cayman and Atlantic coast of Central America from Honduras to northern Panama (10).

Psorophora (Janthinosoma) johnstonii (Grabham)

References: 3, 10, 25, 32, 68, 75, 90, 95, 97, 99, 104, 126, 127.

Distribution in Florida: Tropical area (Monroe County).

Distribution Elsewhere: Jamaica (type locality), Cuba, Cayman, Bahamas, Puerto Rico and Virgin Islands (10).

Note: Possibly two or more forms involved according to Belkin et al. 1970 (10).

Psorophora (Grabhamia) pygmaea (Theobald)

References: 3, 6, 10, 16, 17, 21, 25, 26, 30, 32, 40, 44, 68, 69, 75.

Distribution in Florida: Subtropical area (St. Lucie, Martin, Palm Beach and Dade Counties); Tropical area (Monroe County).

Distribution Elsewhere: Antigua (type locality), Cuba, Cayman Islands, Jamaica, Bahamas, Hispaniola, Puerto Rico, Nevis and St. Kitts (10).

Wyeomyia (Wyeomyia) vanduzeei Dyar and Knab

References: 10, 23, 25, 26, 32, 40, 68, 74, 75, 97, 115.

Distribution in Florida: Floridian area - northern portion (Volusia, Orange, Pasco, Osceola, Polk, Hillsborough and Pinellas Counties); southern portion (Manatee, Highlands, Sarasota and Charlotte Counties); Subtropical area (Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, Dade, Lee and Collier Counties); Tropical area (Monroe County). Type locality - Estero, Florida.

Distribution Elsewhere: Cuba, Grand Cayman and Jamaica. All except Florida listed as tentative by Belkin et al. 1970 (10).

Species Occurring in Florida with Limited Distribution

Elsewhere in the United States

Aedes (Ochlerotatus) theloter Dyar

References: 2, 16, 18, 19, 20, 22, 25, 27, 28, 32, 49, 60, 68, 75, 82, 83, 85, 88, 113, 126, 134.

Distribution in Florida: Tropical area (Monroe County).

Distribution Elsewhere: Texas (type locality), Oklahoma (32), New Mexico (88); Mexico (questionable) (2).

Anopheles (Nyssorhynchus) albimanus Wiedemann

References: 10, 16, 20, 23, 25, 26, 27, 32, 47, 50A, 61, 62, 63, 73, 75, 85, 103, 105, 113, 126, 132.

Distribution in Florida: Subtropical area (Palm Beach, Dade, Lee and Collier Counties); Tropical area (Monroe County).

Distribution Elsewhere: Texas; Lowland middle American distribution on the Pacific side from Mexico to northern Peru (Tumbes), on the Atlantic side from southwest corner of Texas through Mexico, Central America, Panama, Colombia, Venezuela, Greater Antilles, Bahamas, Puerto Rico, Virgin Islands, Leeward Islands, Trinidad, eastern Venezuela and southward (absent from Windward Islands). Type locality - Santo Domingo (10).

Mansonia (Mansonia) dyari Belkin, Heinemann and Page

References: 10, 13, 16, 19, 25, 26, 29, 31, 32, 54, 68, 75, 87, 97, 98, 100, 106, 107, 109, 110, 114, 117, 118, 131.

Distribution in Florida: Statewide.

Distribution Elsewhere: Georgia, Jamaica (type locality), Puerto Rico, Costa Rica, Panama and probably other records of *Ma. indubitans* from Greater Antilles, Mexico and Central America (10).

Note: *Ma. dyari* was described as a new species by Belkin, Heinemann and Page 1970 (10). This deleted *Mansonia indubitans* Dyar and Shannon from the United States fauna. Citations prior to 1970 reference *Ma. indubitans*.

Mansonia (Mansonia) titillans Walker

References: 10, 16, 22, 25, 26, 29, 32, 35, 37, 44, 48, 54, 56, 67, 68, 74, 75, 85, 86, 87, 97, 98, 100, 109, 110, 114, 116, 134.

Distribution in Florida: Louisianian area - western portion (Jackson County), northern portion (Hamilton, Alachua, Duval, Putnam and Marion Counties); Floridian area (all counties except St. Johns, Sumter, Citrus, Orange and Highlands); Subtropical area (all counties, see Fig. 1); Tropical area (Monroe County).

Distribution Elsewhere: Texas; southern United States to Argentina. Type locality - Brazil (10).

Note: According to Belkin 1970 (10) a fauna similar to the Jamaican fauna occurs in Florida, Mexico, Central America, Panama, Greater and Lesser Antilles, Trinidad and the Guianas.

Toxorhynchites (Lynchiella) rutilus rutilus (Coquillett)

References: 5, 24, 25, 26, 32, 68, 70, 71, 74, 75, 92, 115.

Distribution in Florida: Louisianian area (Walton, Jackson, Gadsden, Leon, Gilchrist, Levy, Duval and Clay Counties); Floridian area (Flagler, Volusia, Sumter, Citrus, Hernando and Hillsborough Counties); Subtropical area (Indian River, St. Lucie, Broward, Dade and Collier Counties); Type locality - Georgiana (Brevard County) Florida.

Distribution Elsewhere: Georgia (32) and South Carolina (70).

Wyeomyia (Wyeomyia) mitchellii (Theobald)

References: 6, 9, 10, 22, 25, 26, 32, 40, 42, 46, 58, 66, 68, 74, 75, 81, 91, 97, 104, 115, 121, 129.

Distribution in Florida: Floridian area (all counties except St. Johns, Flagler, Sumter, Citrus, Pasco, De Soto and Glades); Subtropical area (all counties except Lee); Tropical area (Monroe County).

Distribution Elsewhere: Georgia, Jamaica (type locality), Atlantic slope of Mexico, Cuba and Hispaniola (10).

Taxonomic Entities Deleted From
the Florida Mosquito Fauna

Aedes (Ochlerotatus) keyensis Buren

References: 18, 68, 75, 126.

Distribution in Florida: Tropical area (Monroe County, Florida Keys).

Distribution Elsewhere: Unknown, unclear systematics.

Note: Described as a new species by Buren 1947 (18), but synonymized with *Ae. theletor* by Thurman et al. 1959 (126).

Aedes (Ochlerotatus) scapularis (Rondani)

References: 2, 6, 10, 25, 28, 32, 49, 67, 68, 75, 82, 84, 90, 97, 104, 108.

Distribution in Florida: Formerly included in Florida Fauna in basic publications (25) (75), but not represented in Florida fauna according to Arnett (2).

Distribution Elsewhere: Limited to Texas in the United States (32), from Rio Grande Valley of Texas through the Atlantic lowlands of Mexico to Honduras, the Pacific lowlands of Guatemala to northern Costa Rica; the Bahamas and Greater Antilles except for Puerto Rico, throughout South America on low and moderate elevations with the exception of Chile and southern Argentina (2).

Note: Detailed discussion by Arnett (2).

Culex (Melanoconion) cedecei Stone and Hair

References: 7, 8, 10, 21, 31, 64, 102, 122, 133.

Distribution in Florida: From subtropical area (Indian River to Dade Counties). Type Locality - Mahogany Hammock, Dade County (122).

Distribution Elsewhere: Unknown, unclear systematics.

Note: Described as new species by Stone and Hair 1968 (122), synonymized with *Cx. opisthopus* by Belkin et al. 1970 (10). Systematic discussions by Belkin (10) and by Carpenter (21).

Figure 1. THE FAUNAL AREAS OF FLORIDA*



*As proposed by Provost, M. W.
 Undated. Mosquitoes and Climate in Florida.
 Mimeographed (ca. 1955).

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