

A SURVEY AND BIBLIOGRAPHY OF THE MOSQUITO FAUNA OF MEXICO (DIPTERA: CULICIDAE)

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ABSTRACT. A revised list of the mosquito species known to occur in Mexico contains 20 genera, 37 subgenera, and 225 species. Several supraspecific categories have been described and species reassigned since the last list was published in 1956. Based on present knowledge, there are 29 species that are known only from Mexico. Eight species are deleted from the Mexican fauna. An extensive bibliography is included.

INTRODUCTION

As far as can be determined Howard, Dyar, and Knab (1915, 1917) and Dyar (1920, 1928) were the first to record the mosquito species that occur in Mexico. The former recorded 74 species and the latter, 72 species. However, changes have been made in the status and nomenclature of some taxa reported by them. For example, Dyar (1928) incorrectly recorded *Aedes terrens* (Walker) from Mexico. Schick (1970a) stated that at the time much confusion surrounded this taxon so that it could have been one of the 9 species of the *Terrens* group described by him. Table 1 is a list of the species names that have been changed and the currently accepted designate.

In the 1930s Dampf (1935, 1936, 1939), Hoffman (1929, 1935, 1936, 1937, 1938, 1939), and Martini (1932, 1935) contributed to the knowledge of the Mexican fauna; in the 1940s, Vargas and his colleagues made substantial progress in the distribution and taxonomy of Mexican mosquitoes (see 34 articles in the bibliography); in the 1950s Vargas and Martinez-Palacios (1949, 1950, 1953a, 1953b, 1953c, 1954, 1956) continued their work, and Lane (1953) published his extensive treatment of Neotropical mosquitoes. Vargas (1956b) listed 136 species of non-anophelines. Eight of these taxa are now in different genera, 10 are in different subgenera, 14 without subgeneric placement by Vargas have been assigned to subgenera, 9 have been synonymized, and 6 do not occur in Mexico, *viz.*, *Aedes impiger* (Walker), *Aedes punctor* (Kirby), *Aedes fulvithorax* Lutz, *Culiseta impatiens* (Walker), *Deinocerites epitedeus* Knab, and *Deinocerites spanius* (Dyar and Knab), resulting in a net number of 121. Vargas and Martinez-Palacios (1956) treated 26 taxa of anophelines. Since then only 2 species have been added, *Anopheles judithae* Zavortink and *Anopheles evansae* (Brethes), and one has been deleted, *Anopheles pseu-*

dopunctipennis willardi Vargas, which is now a synonym of *Anopheles franciscanus* McCracken (Russell et al. 1963).

Important contributors in the 1960s were Diaz Najera (1960, 1963, 1966a, 1966b, 1967) and Bram (1967). Additions to the fauna in the 1970s were primarily due to the work on the "Mosquitoes of Middle America" project in which Belkin (1970) Adames (1971), Arnell (1973, 1976), Berlin (1969a, 1969b), Schick (1970a, 1970b), Valencia (1973), and Zavortink (1968, 1970, 1972, 1973, 1979a, 1979b) all provided important additions to the fauna. Heine-mann and Belkin (1977) published collection records from Mexico and listed 124 species. During this period Vargas (1976) listed *Anopheles mediopunctatus* (Theobald) from Mexico but now it is known to occur no farther north than Panama (Knight and Stone 1977). In the 1980s and 1990s Faran (1980) and Faran and Linthicum (1981) as well as Strickman (1988, 1989) and Wilkerson and Peyton (1990) made helpful additions, especially in the form of identification keys. Harbach (1991), Harbach and Peyton (1990, 1991), Peyton and Harbach (1991), and Pecor et al. (1992) added to the knowledge of the sabethine genera and *Culex* (*Melanoconion*) species.

The large number of species found in Mexico, 225, as compared to the contiguous country to the south, Guatemala, with 139 (Darsie 1994), can be explained by the topography of the country. According to Folsom and Wardle (1934) the highlands of Mexico are in the Nearctic Region, whereas the lowlands are Neotropical. Thus, Nearctic and Neotropical mosquito species both find suitable climatic conditions for survival and reproduction. Indeed, 32% (73 of 225) of the fauna also occurs in the United States; however, of the 73, 18 have extreme southern distributions, just barely qualifying as United States fauna (Darsie and Ward 1981). Table 2 is a system-

Table 1. Corrections in the mosquito species names used by Howard, Dyar, and Knab (1915, 1917) and Dyar (1928).

Prior name	Current name
Howard, Dyar, and Knab (1915, 1917)	
<i>Aedes calopus</i> Meigen	<i>Aedes aegypti</i> (Linnaeus)
<i>Aedes cuneatus</i> Dyar and Knab	<i>Aedes angustivittatus</i> Dyar and Knab
<i>Aedes oswaldi</i> Lutz	<i>Aedes terrens</i> (Walker)
<i>Anopheles strigimacula</i> Dyar and Knab	<i>Anopheles punctimacula</i> Dyar and Knab
<i>Culex eumimetes</i> Dyar and Knab	<i>Culex stigmatosoma</i> Dyar
<i>Culex factor</i> Dyar and Knab	<i>Culex nigripalpus</i> Theo.
<i>Culex investigator</i> Dyar and Knab	<i>Culex inhibitor</i> Dyar and Knab
<i>Culex proclamator</i> Dyar and Knab	<i>Culex declarator</i> Dyar and Knab
<i>Culicella maccrackenae</i> Dyar and Knab	<i>Culiseta particeps</i> (Adams)
<i>Culiseta dugesi</i> Dyar and Knab	<i>Culiseta particeps</i> (Adams)
<i>Joblotia digitatus</i> (Rondani)	<i>Trichoprosopon digitatum</i> (Rondani)
<i>Lutzia bigoti</i> Bellardi	<i>Culex bigoti</i> Bellardi
<i>Megarhinus grandiosa</i> (Williston)	<i>Toxorhynchites grandiosa</i> (Williston)
<i>Megarhinus longipes</i> Theo.	<i>Toxorhynchites grandiosa</i> (Williston)
<i>Megarhinus moctezuma</i> Dyar and Knab	<i>Toxorhynchites theobaldi</i> (Dyar and Knab)
<i>Megarhinus superbus</i> Dyar and Knab	<i>Toxorhynchites haemorrhoidalis superbus</i> Dyar and Knab
<i>Psorophora discruciens</i> (Walker)	<i>Psorophora varipes</i> (Coquillett)
<i>Psorophora posticatus</i> (Wiedemann)	<i>Psorophora ferox</i> (Von Humboldt)
<i>Psorophora toltecum</i> Dyar and Knab	<i>Psorophora columbiae</i> (Dyar and Knab)
<i>Psorophora virescens</i> Dyar and Knab	<i>Psorophora howardii</i> Coquillett
<i>Sabethoides nitidus</i> Theo.	<i>Sabethes chloropterus</i> (Von Humboldt)
<i>Uranotaenia basalis</i> Howard, Dyar, and Knab	<i>Uranotaenia coatzaocalcos</i> Dyar and Knab
<i>Wyeomyia ablabes</i> Dyar and Knab	<i>Wyeomyia adelpha</i> Dyar and Knab
Dyar 1928	
<i>Aedes alleni</i> Turner	<i>Aedes zoosophus</i> Dyar and Knab
<i>Anopheles cruzii</i> Dyar and Knab	<i>Anopheles neivai</i> Howard, Dyar, and Knab
<i>Culex federalis</i> Dyar	<i>Culex erythrothorax</i> Dyar
<i>Culicella maccrackenae</i> Dyar and Knab	<i>Culiseta particeps</i> (Adams)
<i>Joblotia digitata</i> (Rondani)	<i>Trichoprosopon digitatum</i> (Rondani)
<i>Megarhinus grandiosus</i> (Williston)	<i>Toxorhynchites grandiosa</i> (Williston)
<i>Megarhinus superbus</i> Dyar and Knab	<i>Toxorhynchites haemorrhoidalis superbus</i> Dyar and Knab
<i>Psorophora tolteca</i> Dyar and Knab	<i>Psorophora columbiae</i> (Dyar and Knab)
<i>Sabethoides chloropterus</i> (Von Humboldt)	<i>Sabethes chloropterus</i> (Von Humboldt)

atic index of the mosquitoes of Mexico. The list has been derived from the literature.

The following 29 species are known only from Mexico: *Aedes amabilis* Schick, *Aedes atactavittatus* Arnell, *Aedes chionotum* Zavortink, *Aedes diazi* Schick, *Aedes gabriel* Schick, *Aedes guerrero* Berlin, *Aedes idanus* Schick, *Aedes knabi* (Coquillett), *Aedes laguna* Arnell and Nielsen, *Aedes lorrainaea* Berlin, *Aedes niveoscutum* Zavortink, *Aedes ramirezi* Vargas and Downs, *Aedes schicki* Zavortink, *Aedes schroederi* Schick,

Aedes shannoni Vargas and Downs, *Aedes sumidero* Schick, *Aedes tehuantepec* Schick, and *Aedes vargasi* Schick; and in the minor genera: *Anopheles aztecus* Hoffman, *Culex diamphidius* Peyton and Harbach, *Culex jalisco* Berlin, *Culex rejector* Dyar and Knab, *Culex sandrae* Berlin, *Culex schicki* Berlin, *Deinocerites mcdonaldii* Belkin and Hogue, *Psorophora pruniosa* Martini, *Psorophora stonei* Vargas, *Sabethes ortizi* Vargas and Diaz Najera, and *Wyeomyia stonei* Vargas and Martinez-Palacios.

Table 2. Systematic index to the mosquitoes of Mexico.

ANOPHELES Meigen 1818

Subg. *Anopheles* Meigen 1818

apicimacula Dyar and Knab 1906

aztecus Hoffman 1935

bradleyi King 1939

crucians Wiedemann 1828

eiseni Coquillett 1902

fausti Vargas 1943

franciscanus McCracken 1904

freeborni Aitken 1939

gaboldoni Vargas 1941

hectoris Giaquinto-Mira 1931

judithae Zavortink 1969

neomaculipalpus Curry 1931

parapunctipennis Martini 1932

parapunctipennis guatemalensis De Leon 1938

pseudopunctipennis Theobald 1901

punctimacula Dyar and Knab 1906

punctipennis Say 1823

quadrinaculatus Say 1824

vestitipennis Dyar and Knab 1906

walkeri Theobald 1901

xelajuensis De Leon 1938

Subg. *Kerteszia* Theobald 1905

neivai Howard, Dyar, and Knab 1912 (1913)

Subg. *Nyssorhynchus* Blanchard 1902

albimanus Weidemann 1820

argyritarsis Robineau-Desvoidy 1827

darlingi Root 1926

evansae Brethes 1926

strodei Root 1926

CHAGASIA Cruz 1906

bathana Dyar 1928

AEDEOMYIA Theobald 1901

Subg. *Aedeomyia* Theobald 1901

squamipennis (Lynch Arribalzaga 1878)

AEDES Meigen 1818

Subg. *Aedimorphus* Theobald 1903

vexans (Meigen 1830)

Subg. *Aztecaedes* Zavortink 1972

ramirezi Vargas and Downs 1950

Subg. *Howardina* Theobald 1903

allotecnon Kumm, Komp, and Ruiz 1940

cozumelensis Diaz Najera 1966

guerrero Berlin 1969

lorraineae Berlin 1969

quadrivittatus (Coquillett 1902)

sexlineatus (Theobald 1901)

Subg. *Kompia* Aitken 1941

purpureipes Aitken 1941

Table 2. Continued.

Subg. *Ochlerotatus* Lynch Arribalzaga 1891

angustivittatus Dyar and Knab 1907

atactavittatus Arnell 1976

bimaculatus (Coquillett 1902)

campestris Dyar and Knab 1907

canadensis (Theobald 1901)

condolenscens Dyar and Knab 1907

dorsalis (Meigen 1830)

dupreei (Coquillett 1904)

epactius Dyar and Knab 1908

euplocamus Dyar and Knab 1906

fluviatilis (Lutz 1904)

fulvus (Wiedemann 1828)

hastatus Dyar 1922

infirmitus Dyar and Knab 1906

laguna Arnell and Nielsen 1972

mitchellae (Dyar 1905)

monticola Belkin and McDonald 1957

muelleri Dyar 1920

nigromaculis (Ludlow 1906)

scapularis (Rondani 1848)

serratus Theobald 1901

shannoni Vargas and Downs 1950

sollicitans (Walker 1856)

spencerii (Theobald 1901)

squamiger (Coquillett 1902)

stigmaticus Edwards 1922

taeniorhynchus (Wiedemann 1821)

thelcter Dyar 1918

tormentor Dyar and Knab 1906

tortilis (Theobald 1903)

trivittatus (Coquillett 1902)

Subg. *Protomacleaya* Theobald 1907

amabilis Schick 1970

brelandi Zavortink 1972

burgeri Zavortink 1972

chionotum Zavortink 1972

diasi Schick 1970

gabriel Schick 1970

homoeopus Dyar 1922

idanus Schick 1970

knabi (Coquillett 1906)

kompia Vargas and Downs 1950

niveoscutum Zavortink 1972

podoglyphicus Dyar and Knab 1906

sandrae Zavortink 1972

schicki Zavortink 1972

schroederi Schick 1970

sumidero Schick 1970

tehuantepec Schick 1970

vargasi Schick 1970

zoosophus Dyar and Knab 1917 (1918)

Subg. *Stegomyia* Theobald 1901

aegypti (Linnaeus 1762)

albopictus (Skuse 1894 [1895])

Table 2. Continued.

HAEMAGOGUS Williston 1896

- Subg. *Haemagogus* Williston 1896
anastasionis Dyar 1921
equinus Theobald 1903
mesodentatus Komp and Kumm 1938
regalis Knab 1906

PSOROPHORA Robineau-Desvoidy 1827

- Subg. *Grabhamia* Theobald 1903
cingulata (Fabricius 1805)
confinnis (Lynch Arribalzaga 1891)
discolor (Coquillett 1903)
pruniosa Martini 1935
signipennis (Coquillett 1904)
- Subg. *Janthinosoma* Lynch Arribalzaga 1891
albipes (Theobald 1907)
champerico (Dyar and Knab 1906)
cyanescens (Coquillett 1902)
ferox (Von Humboldt 1819)
lutzii (Theobald 1901)
mexicana (Bellardi 1859)
tononaci Lassman 1951
varipes (Coquillett 1904)

Subg. *Psorophora* Robineau-Desvoidy 1827

- ciliata* (Fabricius 1794)
cilipes (Fabricius 1805)
howardii (Coquillett 1901)
lineata (Von Humboldt 1819)
stonei Vargas 1956

CULEX Linnaeus 1758

- Subg. *Anoedioparpa* Dyar 1923
conservator Dyar and Knab 1906
- Subg. *Carrollia* Lutz 1905
bihaicola Dyar and Nunez Tovar 1927
- Subg. *Culex* Linnaeus 1758
bidens Dyar 1922
chidesteri Dyar 1921
coronator Dyar and Knab 1906
declarator Dyar and Knab 1906
erythrothorax Dyar 1907
inflictus Theobald 1901
interrogator Dyar and Knab 1906
mollis Dyar and Knab 1906
nigripalpus Theobald 1901
ousqua Dyar 1918
pinarocampa Dyar and Knab 1908
quinquefasciatus Say 1823
restuans Theobald 1901
salinarius Coquillett 1904
stenolepis Dyar and Knab 1908
stigmatosoma Dyar 1907
tarsalis Coquillett 1896
thriambus Dyar 1921
usquatus Dyar 1918

Table 2. Continued.

Subg. *Lutzia* Theobald 1903

- allostigma* (Howard, Dyar, and Knab 1915)
bigoti Bellardi 1862

Subg. *Melanoconion* Theobald 1903

- anips* Dyar 1916
bastagarius Dyar and Knab 1906
conspirator Dyar and Knab 1913
diamphidius Peyton and Harbach 1991
dunni Dyar 1918
eastor Dyar 1920
educator Dyar and Knab 1906
elevator Dyar and Knab 1906
erraticus (Dyar and Knab 1906)
flabellifer Komp 1936
gravitator Dyar and Knab 1906
inhabitor Dyar and Knab 1906
iolambdis Dyar 1918
limacifer Komp 1936
mutator Dyar and Knab 1906
panocossa Dyar 1923
peccator Dyar and Knab 1909
pedroi Sirivanakarn and Belkin 1980
pilosus (Dyar and Knab 1906)
rooti Rozeboom 1935
spissipes (Theobald 1903)
taeniopus Dyar and Knab 1907
theobaldi (Lutz 1904)
trifidus Dyar 1921

Subg. *Micraedes* Coquillett 1906

- jalisco* Berlin 1970
sandrae Berlin 1970
schicki Berlin 1970

Subg. *Microculex* Theobald 1907

- imitator* Theobald 1903
rejector Dyar and Knab 1906
restrictor Dyar and Knab 1906

Subg. *Neoculex* Dyar 1905

- arizonensis* Bohart 1949
derivator Dyar and Knab 1906
reevesi Wirth 1948

Subg. *Phenacomyia* Harbach and Peyton 1992

- corniger* Theobald 1903
lactator Dyar and Knab 1906

DEINOCERITES Theobald 1904

- belkini* Adames 1971
cancer Theobald 1901
howardi Belkin and Hogue 1959
mathesoni Belkin and Hogue 1959
mcdonaldii Belkin and Hogue 1959
pseudes Dyar and Knab 1909

CULISETA Felt 1904Subg. *Culiseta* Felt 1904

- incidens* (Thomson 1868)
inornata (Williston 1893)
particeps (Adams 1903)

Table 2. Continued.

COQUILLETIDIA Dyar 1905
 Subg. *Coquillettidia* Dyar 1905
perturbans (Walker 1856)
 Subg. *Rhynchoaenia* Brethes 1910
nigricans (Coquillett 1904)
venezuelensis (Theobald 1912)

MANSONIA Blanchard 1901
 Subg. *Mansonia* Blanchard 1901
dyari Bekin, Heinemann, and Page 1970
titillans (Walker 1848)

ORTHOPODOMYIA Theobald 1904
kummi Edwards 1939
signifera (Coquillett 1896)

JOHNBELKINIA Zavortink 1979
ulopus (Dyar and Knab 1906)

LIMATUS Theobald 1901
durhamii Theobald 1901

SABETHES Robineau-Desvoidy 1827
 Subg. *Sabethes* Robineau-Desvoidy 1827
cyaneus (Fabricius 1805)
gymnothorax Harbach and Petersen 1992
ortizi Vargas and Diaz Najera 1961
tarsopus Dyar and Knab 1908
 Subg. *Sabethoides* Theobald 1903
chloropterus (Von Humboldt 1819)

SHANNONIANA Lane and Cerqueira 1942
moralesi (Dyar and Knab 1919)
schedocyclium (Dyar and Knab 1908)

TRICHOPROSOPON Theobald 1901
 Subg. *Trichoprosopon* Theobald 1901
digitatum (Rondani 1848)
soaresi Lane and Cerqueira 1942

WYEOMYIA Theobald 1901
 Subg. *Decamyia* Dyar 1919
pseudopecten (Dyar and Knab 1906)
 Subg. *Dendromyia* Theobald 1903
aporonoma Dyar and Knab 1906
jocosa (Dyar and Knab 1908)
personata (Lutz 1904)
 Subg. *Wyeomyia* Theobald 1901
abebela Dyar and Knab 1908
adelpha Dyar and Knab 1906
arthrostigma (Lutz 1905)
celaenocephala Dyar and Knab 1906
guatemala (Dyar and Knab 1906)
melanopus Dyar 1919
mitchellii (Theobald 1905)
nigritubus Galindo, Carpenter, and Trapido 1951
pertinans (Williston 1896)
stonei Vargas and Martinez-Palacios 1953

Table 2. Continued.

URANOTAENIA Lynch Arribalzaga 1891
 Subg. *Pseudoficalbia* Theobald 1912
anhydor anhydor Dyar 1907
anhydor syntheta Dyar and Shannon 1924
 Subg. *Uranotaenia* Lynch Arribalzaga 1891
apicalis Theobald 1903
coatzacoalcos Dyar and Knab 1906
geometrica Theobald 1901
leucoptera (Theobald 1907)
lowii Theobald 1901
pulcherrima Lynch Arribalzaga 1891
sappharina (Osten Sacken 1868)
socialis Theobald 1901

TOXORHYNCHITES Theobald 1901
 Subg. *Lynchiella* Lahille 1904
grandiosus (Williston 1900)
superbus (Dyar and Knab 1906)
theobaldi (Dyar and Knab 1906)

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