

CALIFORNIA



Vol. 17 No. 6

June 1970

REVIEW OF RECENT LITERATURE ON MOSQUITOES OF NORTH AMERICA SUPPLEMENT I

Stanley J. Carpenter¹

ABSTRACT: The literature on the taxonomy, distribution, and bionomics of North American mosquitoes is reviewed from 1967 through 1969, supplementing *Mosquitoes of North America (North of Mexico)* by Carpenter and LaCasse (University of California Press, 1955) and *Review of Recent Literature on Mosquitoes of North America* by Carpenter (CALIFORNIA VECTOR VIEWS 15(8):71-98). References to descriptions of eggs, first instar larvae, and pupae of many species are included.

TABLE OF CONTENTS

	Page
<i>Anopheles</i>	40
<i>Toxorhynchites</i>	41
<i>Wyeomyia</i>	42
<i>Uranotaenia</i>	42
<i>Culiseta</i>	42
<i>Orthopodomyia</i>	43
<i>Coquillettidia</i>	44
<i>Mansonia</i>	44
<i>Psorophora</i>	44
<i>Aedes</i>	46
<i>Haemagogus</i>	54
<i>Culex</i>	54
<i>Deinocerites</i>	57

A review of recent literature on the taxonomy, distribution, and bionomics of North American mosquitoes was published by Carpenter (31), supplementing the book entitled *Mosquitoes of North America (North of Mexico)* by Carpenter and LaCasse (33). Additional information, including references to descriptions of eggs,

first instar larvae and pupae, is presented here in Supplement I.

Recent bulletins dealing with the taxonomy, distribution, and bionomics of mosquitoes in this region include *Mosquitoes of Colorado* by Harmston and Lawson (76), *Mosquitoes of Iowa*

¹Bureau of Vector Control and Solid Waste Management, California State Department of Public Health.

by Knight and Wonio (97), and *The Mosquitoes of British Columbia* by Curtis (52). Recent state lists of species include the following: Mississippi (72); Missouri (140); Texas (170); and Utah (113).

Important works have been published during recent years on the taxonomy of eggs of mosquitoes in this region, particularly those of the genera *Aedes* and *Psorophora*. A great amount of interesting work is also being done and reported in the literature on genetics of mosquitoes. The application of numerical taxonomy to the classification of mosquitoes has been discussed by several writers during recent years including Rohlf (131, 132), Hendrickson and Sokel (79), Steward (146), Nielsen (114), and Crovello (50).

Genus *ANOPHELES* Meigen

Anopheles (Anopheles) atropos Dyar and Knab

TAXONOMY. Diagnostic characters and figures of the first instar larva are given by Dodge (57). The pupa is described and figured by Penn (120).

DISTRIBUTION. Mississippi (72, 73); Texas (170).

Anopheles (Anopheles) barberi Coquillett

TAXONOMY. Diagnostic characters and figures of the first instar larva are given by Dodge (57). The pupa is described and figured by Darsie (53) and Penn (120). The species has been redescribed by Zavortink (172), and the fourth instar larva, pupa, and male terminalia are figured to show a clear separation from *A. judithae* Zavortink, a new species of tree-hole breeding *Anopheles* now known to occur in the Southwest, west of the continental divide.

DISTRIBUTION. Indiana (28); Iowa (97); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170). Zavortink (172) verified specimens of *A. barberi* from the following states: Alabama, Arkansas, Maryland, New York, Ohio, Tennessee, and Texas.

BIONOMICS. Petersen et al. (122) describe the feeding of fourth instar larvae of *A. barberi* on early instar larvae of *Culex pipiens quinquefasciatus* and larvae of *Culicoides* spp. in the laboratory.

Anopheles (Anopheles) bradleyi King

TAXONOMY. The pupa is described and figured by Penn (120).

DISTRIBUTION. Mississippi (72, 73); Texas (170).

Anopheles (Anopheles) crucians
Wiedemann

TAXONOMY. The egg is described and figured by Bellamy and Repass (17). Diagnostic characters and figures of the first instar larva are given by Breeland (25) and Dodge (57). The pupa is described and figured by Darsie (53) and Penn (120).

DISTRIBUTION. Iowa (97); Kentucky (44); Mississippi (72, 73); Missouri (140); Oklahoma (89); Texas (170); Virginia (66).

Anopheles (Anopheles) earlei
Vargas

TAXONOMY. Diagnostic characters and figures of the egg are given by Rozeboom (135), and it is figured by Barr (6). The first instar larva is keyed by Dodge (57). The pupa is described and figured by Darsie (53) and Penn (120). It is figured by Vargas (158) and Vargas and Matheson (159). Pratt (125) figured the terminal segments of the pupa.

DISTRIBUTION. United States: Colorado (76); Iowa (97); Michigan (118); Utah (113); Wisconsin (138). Canada: Alberta (70); British Columbia (52).

BIONOMICS. The swarming of males of *A. earlei* in Alberta was observed by Happold (71). The laboratory colonization of the species is reported by Kreutzer and Kitzmiller (98).

Anopheles (Anopheles) freeborni
Aitken

TAXONOMY. The egg is described and figured by Aitken (3). Diagnostic characters and a figure of the first instar larva are given by Dodge (57). The pupa is described and figured by Aitken (3) and Penn (120). Pratt (125) figured the terminal abdominal segments of the pupa.

DISTRIBUTION. United States: California (32); Colorado (76); Texas (170); Utah (113). Canada: British Columbia (52, 144).

Anopheles (Anopheles) georgianus King
TAXONOMY. Diagnostic characters and a

figure of the egg are given by Bellamy and Repass (17). The pupa is described and figured by Penn (120).

DISTRIBUTION. Mississippi (72).

Anopheles (Anopheles) judithae
Zavortink

TAXONOMY. Zavortink (172) found that the treehole breeding *Anopheles* in the Southwest, west of the continental divide, represents a new species, *Anopheles judithae*. The female, male terminalia, pupa, and fourth instar larva are described; and the male terminalia, fourth instar larva, and pupa are figured by Zavortink (172, 174). Diagnostic characters for separating the species from *A. barberi* are also given.

DISTRIBUTION. Arizona, southwestern New Mexico; and Sonora, Mexico (172, 174). Earlier records of *A. barberi* reported in the literature from this region apparently represent *A. judithae*.

BIONOMICS. The bionomics of *A. judithae* are described by Nielsen et al. (115, 116) and Zavortink (172, 174).

Anopheles (Anopheles) occidentalis
Dyar and Knab

TAXONOMY. The egg is described and figured by Aitken (3). The pupa is described and figured by Aitken (3) and Penn (120). It is figured by Vargas (158) and Vargas and Matheson (159). Pratt (125) figured the terminal abdominal segments of the pupa.

Anopheles (Anopheles) pseudopunctipennis
franciscanus McCracken

TAXONOMY. The egg is described and figured by Aitken (3). Penn (120) described and figured the pupa.

DISTRIBUTION. Colorado (76); Texas (170); Utah (113).

Anopheles (Anopheles) pseudopunctipennis
pseudopunctipennis Theobald

TAXONOMY. The egg is described and figured by Aitken (3). Diagnostic characters and a figure of the first instar larva are given by Dodge (57).

DISTRIBUTION. Mississippi (72, 73); Missouri (140); Texas (170).

Anopheles (Anopheles) punctipennis (Say)

TAXONOMY. The egg is described and figured by Aitken (3) and figured by Barr (6). Diagnostic characters and a figure of the first instar larva are given by Breeland (25) and Dodge (57). The pupa is described and figured by Darsie (53) and Penn (120).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Kansas (88); Kentucky (44); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Virginia (66). Canada: British Columbia (52); Ontario (19).

Anopheles (Anopheles) quadrimaculatus Say

TAXONOMY. The egg is figured by Barr (6). Diagnostic characters and figures of the first instar larva are given by Breeland (25) and Dodge (57). The pupa is described and figured by Darsie (53) and Penn (120). An analysis of the pupal chaetotaxy of *A. quadrimaculatus* is given by Penn and Coleman (121).

DISTRIBUTION. United States: Iowa (97); Kentucky (44); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Virginia (66). Canada: Ontario (19).

Anopheles (Anopheles) walkeri Theobald

TAXONOMY. The egg is described and figured by Hurlbut (87) and figured by Barr (6). The chaetotaxy of larval instars is described by Hurlbut (86) and the first instar larva is figured by Dodge (57). The pupa is described and figured by Darsie (53) and Penn (120).

DISTRIBUTION. United States: Iowa (97); Mississippi (72, 73); Missouri (140); Texas (170); Wisconsin (138). Canada: Ontario (19).

Anopheles (Nyssorhynchus) albimanus Wiedemann

TAXONOMY. Diagnostic characters and a figure of the first instar larva are given by Dodge (57). The pupa is described and figured by Penn (120).

DISTRIBUTION. Wiseman (170) says that *A. albimanus* may have disappeared from Texas.

Genus *TOXORHYNCHITES* Theobald

Toxorhynchites rutilus rutilus (Coquillett)

BIONOMICS. Olinger (119) collected *T. r.*

rutilus from large cavities in sweetgum trees and a small cavity in a water oak at Gainesville, Florida, and observed the biology of the species. He describes aerial oviposition and placement of eggs by a female mosquito believed to be *T. r. rutilus*. He found that the females also deposit eggs while in a resting position. He further says that the time required for a male to develop from the egg stage to an adult was 30 days.

Toxorhynchites rutilus septentrionalis
(Dyar and Knab)

TAXONOMY. The egg is figured by Breland (26) and described by Dodge (56).

DISTRIBUTION. Indiana (77); Kentucky (44); Mississippi (72, 73); Missouri (140); Oklahoma (89); Texas (170); Virginia (66).

Genus *WYEOMYIA* Theobald

Wyeomyia (Wyeomyia) smithii (Coquillett)
DISTRIBUTION. Michigan (118).

BIONOMICS. The egg and oviposition of the females of *W. smithii* are described by Barr and Barr (8).

Genus *URANOAEINIA* Lynch Arribálzaga

Peyton and Hochman (123) published a revised interpretation of the proctiger of male *Uranotaenia*.

Uranotaenia anhydor anhydor Dyar

TAXONOMY. The egg is described and figured by Belkin and McDonald (16).

Uranotaenia anhydor syntheta Dyar and Shannon

TAXONOMY. A description of the first instar larva is given by Dodge (57). The pupa is described and figured by Belkin and McDonald (16).

DISTRIBUTION. Texas (170). The species was reported from eastern Arkansas by Brandenburg and Murrill (24), McNeel and Ferguson (106), and Hill et al. (80). The records appear to be based on collections made at military bases. An attempt was made recently to recheck the specimens but they could not be found in the specimen collections maintained in the Fourth United States Army Medical Laboratory. The records should probably be deleted until further collections are made.

Uranotaenia lowii Theobald

TAXONOMY. Diagnostic characters and figures of the first instar larva are given by Dodge (57).

DISTRIBUTION. Mississippi (72, 73); Texas (170).

Uranotaenia sapphirina (Osten Sacken)

TAXONOMY. Diagnostic characters and figures of the first instar larva are given by Dodge (57). The pupa is described and figured by Darsie (54).

DISTRIBUTION. Iowa (97); Kentucky (44); Massachusetts (107); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Virginia (66).

Genus *CULISETA* Felt

A key to the female *Culiseta* at Flatbush, Alberta, is given by Happold (71). Keys to the males, females, and fourth instar larvae of *Culiseta* in California are given by Carpenter (30).

Culiseta (Culiseta) alaskaensis (Ludlow)

TAXONOMY. The pupa is described and figured by Barr (7).

DISTRIBUTION. United States: Colorado (76). Canada: Alberta (70); British Columbia (52).

BIONOMICS. The blood feeding and egg production of *C. alaskaensis* in captivity in Alaska are described by Sommerman (145).

Culiseta (Culiseta) impatiens (Walker)

TAXONOMY. The pupa is described by Barr (7).

DISTRIBUTION. United States: California (30); Colorado (76); Connecticut (163); Iowa (97); Utah (113). Canada: Alberta (70); British Columbia (52).

Culiseta (Culiseta) incidens (Thomson)

TAXONOMY. The pupa is figured by Knight and Chamberlain (96) and described and figured by Barr (7).

DISTRIBUTION. United States: California (30); Colorado (76); Texas (170); Utah (113). Canada: Alberta (70); British Columbia (52).

Culiseta (Culiseta) inornata (Williston)

TAXONOMY. Diagnostic characters and a figure of the first instar larva are given by Dodge (57). The pupa is described and figured by Darsie (54), figured by Barr and Myers (10), and described by Barr (7).

DISTRIBUTION. United States: California (30); Colorado (76); Iowa (97); Kansas (88); Kentucky (44); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Utah (113); Virginia (66). Canada: Alberta (70); British Columbia (52).

BIONOMICS. Mating of *C. inornata* is described by Kliever et al. (94, 95).

Culiseta (Culiseta) particeps (Adams)

TAXONOMY. Diagnostic characters and figures of the first instar larva are given by Dodge (57). The pupa is described and figured by Barr (7).

BIONOMICS. The colonization of *C. particeps* in the laboratory is reported by Chapman and Barr (38).

Culiseta (Culicella) morsitans dyari (Coquillett)

TAXONOMY. See Stone (147) for change of status. The first instar larva is described by Dodge (57). The pupa is described and figured by Barr (7) and Darsie (54).

DISTRIBUTION. United States: Connecticut (163); Iowa (97); Massachusetts (107); Ohio (160); Utah (113); Wisconsin (137, 138). Harmston and Lawson (76) are of the opinion that records of *C. morsitans* reported in the literature for Colorado are probably based on misidentifications. Canada: Alberta (67, 70); British Columbia (52).

BIONOMICS. Wallis and Whitman (162) described the life cycle and oviposition of the North American form of *C. morsitans* in which the eggs are deposited as egg rafts placed on a moist substrate above the water line. An egg raft is illustrated with a photograph. These authors believe that unlike most other *Culiseta* this mosquito may not overwinter in the adult stage.

Culiseta (Culicella) silvestris minnesotae Barr

TAXONOMY. See Stone (147) for change of status.

DISTRIBUTION. United States: Connecticut (163); Massachusetts (107); Utah (113); Wisconsin (137, 138). Canada: Alberta (67).

Culiseta (Climacura) melanura (Coquillett)

TAXONOMY. The eggs are described and figured by Chamberlain et al. (35). Diagnostic characters and figures of the first instar larva are given by Dodge (57).

DISTRIBUTION. Connecticut (163); Indiana (136); Iowa (97); Kentucky (44); Massachusetts (107); Mississippi (72, 73); Missouri (140); Texas (170); Wisconsin (137, 138). Harmston and Lawson (76) expressed the opinion that records of *C. melanura* reported in the literature for Colorado are probably based on misidentifications.

BIONOMICS. Larvae of *C. melanura* were found in old automobile and tractor tires in Connecticut by Wallis and Whitman (161). Joseph and Bickley (91) published a comprehensive review of the species on the eastern shore of Maryland. The colonization of *C. melanura* in the laboratory in Connecticut is reported by Wallis and Whitman (165). Means (108), in a study of host preferences of mosquitoes, found that the females of the species were attracted to birds, amphibians, reptiles, and mammals in decreasing numbers.

Genus *ORTHOPODOMYIA* Theobald

Zavortink (171) published a comprehensive study of the genus *Orthopodomyia* including synonymy, detailed descriptions and illustrations, systematics, and distribution records. He considers *O. californica* Bohart to be a synonym of *O. signifera* (Coquillett).

Orthopodomyia alba Baker

TAXONOMY. Diagnostic characters and figures of the first instar larva are given by Dodge (57). The pupa is described and figured by Darsie (54). The morphological and biometrical differentiation of the larval instars of *O. alba* are described by Eddleman (62). Descriptions and figures are given of the second, third, and fourth instar larvae; and a key is included for separating the 4 larval instars. The female, male terminalia, pupa, and fourth instar larva are described and figured by Zavortink (171).

DISTRIBUTION. Arkansas, District of Columbia, and Georgia (171); Indiana (28);

Maryland (171); Mississippi (72, 73); Missouri (140, 171); New Jersey (171); New Mexico (116, 171); New York (171); Ohio (157, 160, 171); Oklahoma (89, 171); Texas (170, 171); Virginia (171).

Orthopodomyia kummi Edwards

TAXONOMY. The female, male and male terminalia, pupa, and fourth instar larva are described and figured by Zavortink (171).

DISTRIBUTION. Arizona (116, 171); New Mexico (116).

BIONOMICS. Zavortink (171) reports that the larvae of *O. kummi* have been found in tree-holes, bamboo internodes, artificial containers, and an abandoned cesspool. He further states that nothing is known of the habits of the adults except that they are active during darkness and will take avian blood.

Orthopodomyia signifera (Coquillett)

TAXONOMY. Diagnostic characters and figures of the first instar larva are given by Dodge (57). The pupa is described and figured by Darsie (54). Eddleman (62) described and figured the second, third, and fourth instar larvae of *O. signifera* and included a key for separating the 4 larval instars. Zavortink (171) made a detailed taxonomic study of the genus *Orthopodomyia* and found *O. signifera* to be a highly variable species. He did not find any reliable larval or adult characters to separate it from *O. californica* and therefore *O. californica* is reduced to synonymy with *O. signifera*. The female, male terminalia, pupa, and fourth instar larva are described and figured by Zavortink (171).

DISTRIBUTION. Alabama (171); Arizona (116, 171); Arkansas, California, Delaware, District of Columbia, Florida, Georgia and Illinois (171); Indiana (28, 171); Iowa (97, 171); Kansas (88, 171); Kentucky (44); Louisiana, Maryland, and Massachusetts (171); Mississippi (72, 73, 171); Missouri (139, 140, 171); Nebraska and New Jersey (171); New Mexico (116, 171); New York, North Carolina, and Ohio (171); Oklahoma (89, 171); Oregon, Pennsylvania, South Carolina, and Tennessee (171); Texas (170, 171); Utah (4, 113, 116, 171); Virginia (171).

BIONOMICS. The overwintering of *O. californica* (= *signifera*) in California is described by Baerg (5).

Genus *COQUILLETIDIA* Dyar

See Stone (147) for authority for genus *Coquillettidia*.

Coquillettidia (*Coquillettidia*)
perturbans (Walker)

TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Indiana (136); Iowa (97); Kentucky (44); Massachusetts (107); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Utah (113); Virginia (66); Wisconsin (138). Canada: Alberta (70); British Columbia (52); Ontario (19).

BIONOMICS. Hagmann (68) figured an egg raft of *C. perturbans* and described oviposition and hatching. The larval development of the species in Florida is described by Bidlingmayer (20). Swarming of males and mating were observed and described by Thompson (154).

Genus *MANSONIA* Blanchard

Mansonia (*Mansonia*) *indubitans*
Dyar and Shannon

TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is figured by Pratt (124).

BIONOMICS. The larval development of *M. indubitans* in Florida is described by Bidlingmayer (20).

Mansonia (*Mansonia*) *titillans* (Walker)

TAXONOMY. The pupa is figured by Pratt (126).

DISTRIBUTION. Texas (170). Hill et al. (80) reported *M. titillans* from Pine Bluff, Arkansas, and the identification was later confirmed by Alan Stone.

Genus *PSOROPHORA* Robineau-Desvoidy

Horsfall et al. (84) published figures, diagnostic characters, and a key for the recognition of the eggs of 7 species of *Psorophora* found in this region. Ross and Horsfall (134) included a key and figures for the eggs of 8 species of *Psorophora* found in Illinois. Barr and Barr (9) published a key to the pupae of North American *Psorophora*

which includes descriptions of the species.

Psorophora (Psorophora) ciliata (Fabricius)

TAXONOMY. Diagnostic characters and figures of the egg are given by Horsfall et al. (84). The pupa is figured by Knight and Chamberlain (96) and described and figured by Barr and Barr (9).

DISTRIBUTION. United States: Delaware (100); Iowa (97); Kansas (88); Kentucky (44); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Pennsylvania (167); Texas (170); Virginia (66). Canada: Ontario (19, 92).

Psorophora (Psorophora) howardii Coquillett

TAXONOMY. Diagnostic characters and figures of the egg are given by Horsfall et al. (84). The pupa is described and figured by Barr and Barr (9).

DISTRIBUTION. Delaware (100); Mississippi (72, 73); Missouri (140); Oklahoma (89).

Psorophora (Janthinosoma) cyanescens
(Coquillett)

TAXONOMY. The pupa is described and figured by Barr and Barr (9).

DISTRIBUTION. Delaware (100, 101); Kansas (88); Kentucky (44); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Virginia (66).

Psorophora (Janthinosoma) ferox (Humboldt)

TAXONOMY. Diagnostic characters and a figure of the egg are given by Horsfall et al. (84). The pupa is described by Barr and Barr (9).

DISTRIBUTION. Delaware (100); Iowa (97); Kentucky (44); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Virginia (66).

BIONOMICS. Laboratory colonization of *P. ferox* is reported by Chapman and Barr (38).

Psorophora (Janthinosoma) horrida
(Dyar and Knab)

TAXONOMY. Diagnostic characters and a figure of the egg are given by Horsfall et al. (84). The pupa is described by Barr and Barr (9).

DISTRIBUTION. Delaware (100, 101); Iowa

(97); Kentucky (44); Mississippi (72, 73); Missouri (140); Texas (170).

Psorophora (Janthinosoma) johnstonii (Grabham)

TAXONOMY. The pupa is described by Barr and Barr (9).

Psorophora (Janthinosoma) longipalpus
Randolph and O'Neil

TAXONOMY. The pupa is described and figured by Barr and Barr (9).

DISTRIBUTION. Missouri (140); Texas (170).

Psorophora (Janthinosoma) mexicana
(Bellardi)

DISTRIBUTION. Wiseman (170) says *P. mexicana* may have disappeared from Texas.

Psorophora (Janthinosoma) varipes
(Coquillett)

TAXONOMY. Diagnostic characters and a figure of the egg are given by Horsfall et al. (84). The pupa is described by Barr and Barr (9).

DISTRIBUTION. Delaware (100, 101); Kentucky (44); Mississippi (72, 73); Missouri (140); Texas (170).

BIONOMICS. Aboualy and Horsfall (2) describe the colonization of *P. varipes* in the laboratory and include an account of bionomic details essential for maintaining colonies. The species has also been colonized in Louisiana (38).

Psorophora (Grabhamia) confinnis
(Lynch Arribáizaga)

TAXONOMY. Diagnostic characters and a figure of the egg are given by Horsfall et al. (84). The pupa is described and figured by Barr and Barr (9).

DISTRIBUTION. Colorado (76); Delaware (100); Iowa (97); Kentucky (44); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Virginia (66).

Psorophora (Grabhamia) discolor (Coquillett)

TAXONOMY. Diagnostic characters and a figure of the egg are given by Horsfall et al. (84). The pupa is described and figured by Barr and Barr (9).

DISTRIBUTION. Delaware (100); Iowa (97);

Kentucky (44); Mississippi (72, 73); Missouri (140); Oklahoma (89); Texas (170).

BIONOMICS. The biology of *P. discolor* in Mississippi is described by Edmunds (63).

Psorophora (Grabhamia) pygmaea (Theobald)

TAXONOMY. The pupa is described and figured by Barr and Barr (9).

DISTRIBUTION. Harden et al. (72) list the species as occurring in the coastal, central, and delta regions of Mississippi but do not give any additional information on the collections. Previous records of this mosquito in the United States are from southern Florida. If the Mississippi specimens assigned to *P. pygmaea* are still available they should be re-examined and their identity confirmed. If they are not available for rechecking the records should probably be deleted.

Psorophora (Grabhamia) signipennis (Coquillett)

TAXONOMY. The pupa is described by Barr and Barr (9).

DISTRIBUTION. Colorado (76); Iowa (97); Missouri (140); Oklahoma (89); Texas (170); Utah (113).

Genus *Aedes* Meigen

Significant works on the eggs of *Aedes* of North America have been published in recent years following the description of a method of preparation of the chorion of aedine eggs for microscopy by Craig (45). An improved method of illumination and photography of mosquito eggs is described by Brust and Giardino (29).

Recent studies of *Aedes* eggs in this region are found in the following publications. Craig (46) describes and figures the eggs of 35 nearctic *Aedes*. Horsfall and Craig (83) include descriptions and figures of the eggs of 7 species of *Aedes* common in Illinois. Craig and Horsfall (47) give descriptions and figures of 9 species of *Aedes* common in the southeastern United States. Ross and Horsfall (134) include figures and a key for the eggs of *Aedes* species found in Illinois. Myers (110) gives descriptions, figures, and a key for the eggs of *Aedes* in California and Nevada. Kalpage and Brust (93) present a key, descriptions, and figures for the eggs of *Aedes* in Manitoba. Descriptions, figures, and keys are now available for the eggs of most of the *Aedes* species in North

America (north of Mexico), and they provide an adequate means of identifying the species.

Keys to larval instars and to species, exclusive of first instar, of the *Aedes* of New England are given by Smith (142). The saddle hair position in second and third instar larvae of *Aedes* in New England with particular reference to instar recognition and species relationships are described by Smith (143). An illustrated key for the pupae of mosquitoes commonly found breeding in receptacles in the southeastern United States is given by Tinker and Stojanovich (156). Happold (71) gives a key to female *Aedes* at Flatbush, Alberta.

Lunt and Nielsen (104) made a study of the setal characteristics of 63 species of *Aedes* occurring in North America. These species represent all the subgenera of *Aedes* known to occur in the area. They found that in some cases setal characteristics are sufficiently different to reliably separate species, and that subgenera and groups of species within subgenera can be characterized on the basis of number and arrangement of thoracic setae. They concluded that the setal characteristics appear to be of some value in studying phylogenetic relationships among the subgenera and groups of mosquitoes.

Aedes (Ochlerotatus) aboriginis Dyar

DISTRIBUTION. Canada: British Columbia (52).

Aedes (Ochlerotatus) abserratus
(Felt and Young)

TAXONOMY. The egg is described and figured by Kalpage and Brust (93). The pupa is described and figured by Darsie (54) and partly redescribed by Darsie (55).

DISTRIBUTION. Indiana (136); Massachusetts (107); Michigan (118); Pennsylvania (167); Wisconsin (137, 138).

Aedes (Ochlerotatus) aloponotum Dyar

TAXONOMY. The species was described by Dyar (59) based on female specimens collected at Lake Cushman, Washington. It was subsequently considered to be a synonym of *A. excrucians* (Walker) by several authors. Stone et al. (150) included *A. aloponotum* as a valid species and list it as occurring in Oregon, Washington, and British Columbia. Gjullin et al. (65) published additional records of the species from Oregon and Washington and described characters for separating the females and

larvae of *A. aloponotum* and *A. excrucians*.

DISTRIBUTION. United States: Oregon (65); Washington (60, 65). Canada: British Columbia (60, 65).

BIONOMICS. The larvae of *A. aloponotum* were found by Gjullin et al. (65) in a marshy herbaceous or pest-covered area and in the grassy edges of a small shallow-water lake at elevations of 3,500 and 3,800 feet on the western slope of the Oregon Cascades.

Aedes (Ochlerotatus) atlanticus

Dyar and Knab

TAXONOMY. The egg is described and figured by Craig and Horsfall (47). The first instar larva is described and figured by Dodge (57).

DISTRIBUTION. Kentucky (44); Mississippi (72, 73); Missouri (140); Texas (170); Virginia (66).

BIONOMICS. The feeding of females of *A. atlanticus* on turtles in New Jersey is described by Crans (48).

Aedes (Ochlerotatus) aurifer (Coquillett)

TAXONOMY. The egg is figured and keyed by Ross and Horsfall (134). The first instar larva is described and figured by Lake (99). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Iowa (97); Massachusetts (107); Michigan (118); Wisconsin (137, 138). Canada: Ontario (19).

Aedes (Ochlerotatus) barri Rueger

TAXONOMY. The egg is described and figured by Kalpage and Brust (93). The first instar larva is described and figured by Price (129).

Aedes (Ochlerotatus) bicristatus

Thurman and Winkler

TAXONOMY. The egg is described by Myers (110). The first instar larva is described and figured by Bohart (22). The pupa is figured by Thurman and Winkler (155).

DISTRIBUTION. California (34).

BIONOMICS. The bionomics of *A. bicristatus* are described by Carpenter and Womeldorf (34).

Aedes (Ochlerotatus) bimaculatus (Coquillett)

DISTRIBUTION. Texas (170).

Aedes (Ochlerotatus) campestris

Dyar and Knab

TAXONOMY. The egg is described and figured by Kalpage and Brust (93) and Myers (110).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Texas (170); Utah (113). Canada: British Columbia (52).

Aedes (Ochlerotatus) canadensis canadensis

(Theobald)

TAXONOMY. The egg is described and figured by Craig (46), Horsfall and Craig (83), and Kalpage and Brust (93). The first instar larva is described and figured by Dodge (57) and Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Alaska (144); Indiana (136); Iowa (97); Kentucky (44); Massachusetts (107); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Pennsylvania (167); Texas (170); Virginia (66). Harmston (74) reported collections he made of larvae and females of the species in 2 localities in Colorado during 1947, but these are not included in the recent publication *Mosquitoes of Colorado* (76). The species was reported from New Mexico by McNeel and Ferguson (106), but no specific locality was given. It was reported again for the state by Hill et al. (80) based on a collection at a military base. An unsuccessful attempt was recently made to locate the specimen for examination. The above records from New Mexico need to be confirmed by further collecting in the area. Canada: Alberta (70).

BIONOMICS. The feeding of females of *A. canadensis* on turtles is described by Crans (48) and Crans and Rockel (49). During a study of host preferences of mosquitoes Means (108) found that *A. canadensis* showed a slight preference for mammals over either birds or reptiles but was attracted to all host classes in large numbers.

Aedes (Ochlerotatus) cantator (Coquillett)

TAXONOMY. The egg is described and figured by Craig (46) and Craig and Horsfall (47).

DISTRIBUTION. Massachusetts (107).

Aedes (Ochlerotatus) cataphylla Dyar

TAXONOMY. The egg is described and figured by Craig (46). The first instar larva is

described and figured by Bohart (22).

DISTRIBUTION. United States: Colorado (76); Utah (113). Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) communis communis
(DeGeer)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Bohart (22) and Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Utah (113); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) communis nevadensis
Chapman and Barr

TAXONOMY. The typical form, *A. communis communis*, has been described by Chapman and Barr (37) as having the comb scales of the larva with apex rounded and fringed with subequal spinules. The atypical form, *A. communis nevadensis*, was described as having comb scales with weak subapical spinules, less than half as long as the strong median spine. Gjullin et al. (65) found some larvae of *A. communis* in their collections from the Northwest (Oregon, Washington, and Idaho) with comb scales of typical *communis*, others of atypical *nevadensis*, and still others with comb scales intermediate between the 2 described forms. These 3 forms are figured in their article. The authors said, "Although the spinules were mostly of the three lengths shown, some intergrades suggest that all lengths may be present in larger samples of larvae from some locations." The authors further state, "The examination of this limited group of larvae from these three states indicates that the larval comb scales in most populations of this species in the area are probably of the type shown in Figure 2." This is the type intermediate between typical *communis* and atypical *nevadensis*.

Aedes (Ochlerotatus) decticus
Howard, Dyar, and Knab

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The pupa of *A. pseudodiantaeus* Smith (= *decticus*) is described and figured by Smith (141).

DISTRIBUTION. Pennsylvania (167).

Aedes (Ochlerotatus) deserticola Zavortink

TAXONOMY. The female, male, male terminalia, pupa, and fourth instar larva of *A. deserticola* are described; and the male terminalia, fourth instar larva, and pupa are figured by Zavortink (173). The species is interpreted as belonging to the *A. varipalpus* complex which is now known to have 4 species (*A. deserticola*, *A. monticola*, *A. sierrensis*, and *A. varipalpus*) in the southwestern United States. All 4 species of the complex are very similar morphologically; and diagnostic characters for separating the adults, male terminalia, pupae, and larvae are given in keys presented by Zavortink (173).

DISTRIBUTION. Zavortink (173) first collected the species in the San Gabriel Mountains. He has taken specimens of *A. deserticola* from the western portions of both the Mojave and Colorado deserts, on the interior slopes of the Transverse and Peninsular ranges, and in the Little San Bernardino Mountains in southern California. County and locality records are listed by Zavortink (173).

BIONOMICS. Zavortink (173) found *A. deserticola* in rot cavities in sycamores (*Platanus racemosa*), cottonwood (*Populus fremontii*), Engelmann oaks (*Quercus engelmannii*), and in scrub oaks (*Quercus turbinella*). Breeding associates in some of the collections were *Aedes sierrensis* and *Orthopodomyia signifera*. When larvae of *A. deserticola* and *A. sierrensis* were reared in the same container, the development of *A. deserticola* was much slower than that of *A. sierrensis* (173). Zavortink (173) says that nothing is known of the habits of the adults of *A. deserticola*.

Aedes (Ochlerotatus) diantaeus
Howard, Dyar, and Knab

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Price (129). The pupa is described and figured by Smith (141).

DISTRIBUTION. United States: Pennsylvania (167); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) dorsalis (Meigen)

TAXONOMY. The egg is described and figured by Craig (46), Kalpage and Brust (93), and Myers (110). The first instar larva is described and figured by Bohart (22) and Price (129).

DISTRIBUTION. United States: California (32); Colorado (76); Indiana (136); Iowa (97); Kansas (88); Michigan (118); Mississippi (72); Missouri (139, 140); Oklahoma (89); Texas (170); Utah (113); Wisconsin (138). Canada: Ontario (19); British Columbia (52).

BIONOMICS. Swarming of the males of *A. dorsalis* is described by Romney and Nielsen (133).

Aedes (Ochlerotatus) dupreei (Coquillett)

TAXONOMY. The egg is described and figured by Craig (46) and Horsfall and Craig (83). The first instar larva is described and figured by Dodge (57).

DISTRIBUTION. Indiana (136); Maryland (151); Mississippi (72, 73); Missouri (140); Ohio (160); Texas (170).

Aedes (Ochlerotatus) excrucians (Walker)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Indiana (136); Massachusetts (107); Michigan (118); Utah (113); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) fitchii
(Felt and Young)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Bohart (22) and Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Massachusetts (107); Michigan (118); Utah (113); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) flavescens (Müller)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described by Hearle (78) and Dodge (57).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Missouri (140); Utah (113); Wisconsin (138). Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) fulvus pallens Ross
DISTRIBUTION. Mississippi (72, 73); Texas (170).

Aedes (Ochlerotatus) grossbecki Dyar and Knab

TAXONOMY. The egg is figured and keyed by Ross and Horsfall (134). The first instar larva is described and figured by Lake (99).

DISTRIBUTION. Kentucky (44); Mississippi (72); Missouri (140); Pennsylvania (167); Virginia (66).

Aedes (Ochlerotatus) hexodontus Dyar

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Bohart (22).

DISTRIBUTION. United States: Colorado (76); Utah (113). Canada: British Columbia (52); Northwest Territories (153). The locality given by Swales (153) is Frobisher Bay, Baffin Island, N.W.T.

BIONOMICS. The swarming of the males of *A. hexodontus* is described by Downes (58).

Aedes (Ochlerotatus) impiger (Walker)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93).

DISTRIBUTION. United States: Colorado (76); Utah (113). Canada: Northwest Territories (153). The locality given by Swales (153) is Frobisher Bay, Baffin Island, N.W.T.

BIONOMICS. Corbet (42) observed that the females of *A. impiger* at Hazen Camp, northern Ellesmere Island, can mature eggs with or without a blood meal, but that females that obtained blood matured markedly more eggs. The biology of *A. impiger* at Lake Hazen is described by Corbet (41). Corbet and Downe (43) concluded that musk oxen and birds were the most likely animals to provide blood for this mosquito at Lake Hazen.

Aedes (Ochlerotatus) implicatus Vockeroth

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described by Dodge (57). The pupa is figured by Barr (6).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Ohio (160); Utah (113); Wisconsin

(137, 138). Canada: Alberta (70).

BIONOMICS. The swarming of the males of *A. implicatus* in Alberta was observed by Happold (71).

Aedes (Ochlerotatus) increpitus Dyar

TAXONOMY. The egg is described and figured by Myers (110). The first instar larva is described and figured by Bohart (22).

DISTRIBUTION. United States: Colorado (76); Utah (113). Canada: British Columbia (52).

Aedes (Ochlerotatus) infirmatus Dyar and Knab

TAXONOMY. The egg is described and figured by Craig and Horsfall (47). The first instar larva is described and figured by Dodge (57). All 4 larval instars are described and figured by Breland (27).

DISTRIBUTION. Arizona (130); Mississippi (72, 73); Missouri (140); Texas (170).

Aedes (Ochlerotatus) intrudens Dyar

TAXONOMY. The egg is described and figured by Kalpage and Brust (93). The first instar larva is described and figured by Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Utah (113); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52); Ontario (19).

Aedes (Ochlerotatus) melanimon Dyar

TAXONOMY. The egg is described and figured by Myers (110). The first instar larva is described by Dodge (57).

DISTRIBUTION. United States: Colorado (76); Nebraska (151); New Mexico (151); Utah (113). Canada: Saskatchewan (82).

BIONOMICS. The swarming of the males of *A. melanimon* is described by Kliever et al. (95).

Aedes (Ochlerotatus) mitchellae (Dyar)

TAXONOMY. The egg is described and figured by Craig and Horsfall (47). The first instar larva is described and figured by Dodge (57).

DISTRIBUTION. Kentucky (44); Mississippi (72, 73); Ohio (160); Texas (170).

Aedes (Ochlerotatus) monticola

Belkin and McDonald

DISTRIBUTION. New Mexico (116).

Aedes (Ochlerotatus) muelleri Dyar

DISTRIBUTION. New Mexico (116); Texas (170).

Aedes (Ochlerotatus) nigripes (Zetterstedt)

TAXONOMY. The egg is described and figured by Kalpage and Brust (93).

DISTRIBUTION. Canada: Northwest Territories (153). The locality given by Swales (153) is Frobisher Bay, Baffin Island, N.W.T.

BIONOMICS. Corbet (42) observed at Hazen Camp, northern Ellesmere Island, that females of *A. nigripes* mature eggs with or without a blood meal, but slightly more eggs were matured after blood feeding. After studying the blood feeding of the species at Lake Hazen, Corbet and Downe (43) concluded that musk oxen and birds were the most likely animals to provide blood. The reproduction of *A. nigripes* and oviposition sites at Lake Hazen are described by Corbet (41).

Aedes (Ochlerotatus) nigromaculis (Ludlow)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Bohart (22), Dodge (57) and Price (129).

DISTRIBUTION. Colorado (76); Iowa (97); Kansas (88); Missouri (139,140); Oklahoma (89); Texas (170); Utah (113). Records of *A. nigromaculis* were reported for Arkansas and Louisiana by Hill et al. (80). Alan Stone later confirmed records of the species from Camp Robinson, near Little Rock, Arkansas and Camp Polk, Louisiana.

BIONOMICS. The swarming of the males of *A. nigromaculis* is described by Kliever et al. (95).

Aedes (Ochlerotatus) niphadopsis

Dyar and Knab

TAXONOMY. The egg is described and figured by Myers (110).

DISTRIBUTION. Utah (113).

Aedes (Ochlerotatus) pionips Dyar

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93).

DISTRIBUTION. United States: Colorado (76). Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) pullatus (Coquillett)

TAXONOMY. The egg is described and figured by Craig (46).

DISTRIBUTION. United States: Colorado (76); Utah (113). Canada: British Columbia (52); Northwest Territories (153). The locality given by Swales (153) is Frobisher Bay, Baffin Island, N.W.T.

Aedes (Ochlerotatus) punctodes Dyar

TAXONOMY. The egg is described and figured by Craig (46).

Aedes (Ochlerotatus) punctor (Kirby)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described by Dodge (57) and described and figured by Price (129).

DISTRIBUTION. United States: Colorado (76); Indiana (136); Michigan (118); Wisconsin (137, 138). Canada: Alberta (70).

BIONOMICS. The swarming of the males of *A. punctor* is described by Happold (71).

Aedes (Ochlerotatus) rempeli Vockeroth

BIONOMICS. According to Downes (58) mating in *A. rempeli* occurs on the ground without prior dispersal.

Aedes (Ochlerotatus) riparius Dyar and Knab

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93).

DISTRIBUTION. United States: Iowa (97); Michigan (118); Missouri (140); Ohio (160). According to Harmston and Lawson (76) specimens reported as *A. riparius* for Colorado have been re-identified as *A. excrucians*, and the record of *A. riparius* should be deleted. Canada: Alberta (70); British Columbia (52).

Aedes (Ochlerotatus) scapularis (Rondani)

DISTRIBUTION. The species was reported for Louisiana by Hill et al. (80) based on collections made at military bases. An unsuccessful attempt was made to locate the specimens for reexamination in the insect collections maintained in the Fourth United States Army Medical Laboratory, and I feel the record should be deleted until further collections are made.

Aedes (Ochlerotatus) schizopinax Dyar

TAXONOMY. The egg is described and figured by Myers (110).

DISTRIBUTION. Colorado (76); Utah (113).

Aedes (Ochlerotatus) sierrensis (Ludlow)

TAXONOMY. The egg is described and figured by Myers (110). The first instar larva is described and figured by Bohart (22). Cupp and Horsfall (51) proposed placement of *A. sierrensis* in the subgenus *Finlaya* Theobald.

DISTRIBUTION. United States: California (32); Idaho (116); Montana (116); Oregon (116); Utah (4, 113). Canada: British Columbia (52).

BIONOMICS. The occurrence of larvae of *A. sierrensis* in stump cavities of the California coastal redwood (*Sequoia sempervirens*) is described by Strickland (152). Mortenson (109) found the immature stages of *A. sierrensis* in accumulations of water in stump holes of red fir in logged areas near Huntington Lake in the Sierra Nevada in California.

Aedes (Ochlerotatus) sollicitans (Walker)

TAXONOMY. The egg is described and figured by Craig (46) and Craig and Horsfall (47). The pupa is described and figured by Darsie (54).

DISTRIBUTION. Kansas (88); Kentucky (44); Massachusetts (107); Mississippi (72, 73); Missouri (140); Texas (170).

Aedes (Ochlerotatus) spencerii idahoensis
(Theobald)

TAXONOMY. The egg is described and figured by Myers (110). Harmston and Lawson (76) questioned the interpretation of Nielsen and Rees (117) that *A. idahoensis* is a synonym of *A. spencerii* and based on adult characters and number and shape of comb scales on the larvae consider *A. idahoensis* as a valid species. It is apparent that the complex needs further study.

DISTRIBUTION. United States: Colorado (76); New Mexico (76); Utah (113). Canada: British Columbia (52).

Aedes (Ochlerotatus) spencerii spencerii (Theobald)

TAXONOMY. The egg is described and figured by Kalpage and Brust (93).

DISTRIBUTION. United States: Iowa (97); Ohio (160). Canada: British Columbia (52).

Aedes (Ochlerotatus) squamiger (Coquillett)

TAXONOMY. The egg is described and figured by Craig (46). The first instar larva is described and figured by Bohart (22).

Aedes (Ochlerotatus) sticticus (Meigen)

TAXONOMY. The egg is described and figured by Craig (46), Horsfall and Craig (83), and Kalpage and Brust (93). The first instar larva is described and figured by Bohart (22) and Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Indiana (136); Iowa (97); Kentucky (44); Michigan (118); Mississippi (72, 73); Missouri (140); Texas (170); Utah (113); Wisconsin (138). Canada: Alberta (70); British Columbia (52).

BIONOMICS. Horsfall and Trpiš (85) reported that *A. sticticus* often appears as more than one brood each spring in the same locality. They say that eggs are placed at different horizons across flood plains of rivers and around woodland pools. Those eggs along low horizons are flooded any time the rivers rise above their channels during the spring and inundate low places in the flow plains. Eggs at the higher horizons become submerged and hatch only when the rivers are in full flood. When early floods reach maximum heights all eggs hatch as one brood.

Aedes (Ochlerotatus) stimulans (Walker)

TAXONOMY. The egg is described and figured by Craig (46), Horsfall and Craig (83), and Kalpage and Brust (93). The first instar larva is described and figured by Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Pennsylvania (167); Wisconsin (137). The species is not included for Colorado by Harmston and Lawson (76), and earlier records for the state are apparently of questionable validity. Canada: Ontario (19).

Aedes (Ochlerotatus) taeniorhynchus
(Wiedemann)

TAXONOMY. The egg is described and figured by Craig (46) and Craig and Horsfall (47). The first instar larva is described and figured by Bohart (22). The pupa is described and figured by Darsie (54).

DISTRIBUTION. Mississippi (72, 73); Texas

(170). The species was reported for New Mexico and Oklahoma by Hill et al. (80) based on collections at military installations. An unsuccessful attempt was made to locate the specimens in the insect collections at the Fourth United States Army Medical Laboratory and the records need to be confirmed by additional collecting in the areas.

Aedes (Ochlerotatus) thelcter Dyar
DISTRIBUTION. Texas (170).

Aedes (Ochlerotatus) thibaulti Dyar and Knab

TAXONOMY. The egg is described and figured by Craig (46) and Craig and Horsfall (47). The first instar larva is described and figured by Dodge (57).

DISTRIBUTION. United States: Kentucky (44); Mississippi (72, 73); Missouri (140); Texas (170). Canada: Ontario (18).

Aedes (Ochlerotatus) tormentor Dyar and Knab

TAXONOMY. The first instar larva is described and figured by Dodge (57).

DISTRIBUTION. Missouri (140); Texas (170).

BIONOMICS. Laboratory colonization of *A. tormentor* is reported by Chapman and Barr (38).

Aedes (Ochlerotatus) trichurus (Dyar)

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Price (129) and described by Dodge (57). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Michigan (118); Wisconsin (137, 138). Canada: British Columbia (52); Ontario (19).

Aedes (Ochlerotatus) trivittatus (Coquillett)

TAXONOMY. The egg is described and figured by Craig (46) and Horsfall and Craig (83). The first instar larva is described and figured by Dodge (57) and Price (129). All 4 larval instars and the pupa are described and figured by Abdel-Malek (1). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Kentucky (44); Michigan (118); Missouri (139, 140); Oklahoma (89); Texas (170); Utah (113); Virginia (66). Canada: Ontario (19).

Aedes (Ochlerotatus) varipalpus (Coquillett)

TAXONOMY. Myers (110) figured the egg of *A. varipalpus* and says that it is apparently inseparable from that of *A. sierrensis*.

DISTRIBUTION: Utah (4, 110, 113).

Aedes (Ochlerotatus) ventrovittis Dyar

TAXONOMY. The egg is described and figured by Myers (110). The first instar larva is described and figured by Bohart (22). Nielsen (114a) has shown that *Aedes cacothius* Dyar is a synonym of *A. ventrovittis* Dyar.

DISTRIBUTION. Utah (113); Wyoming (114a).

BIONOMICS. The swarming of the males and activities of the females of *A. ventrovittis* are described by Kliever et al. (95).

Aedes (Kompia) purpureipes Aitken

TAXONOMY. Stone (147) cites the authority for returning *Kompia* to subgeneric status.

Aedes (Finlaya) atropalpus atropalpus
(Coquillett)

TAXONOMY. After studying specimens collected in the field and from laboratory colonies, O'Meara and Craig (119a, 119b) concluded that *A. atropalpus* is composed of at least 4 subspecies: *A. atropalpus atropalpus* (Coquillett), *A. atropalpus epactius* Dyar and Knab, *A. atropalpus nielseni* O'Meara and Craig, and *A. atropalpus perichares* Dyar. The latter subspecies is known only from Costa Rica and El Salvador. Diagnostic characters are given for the adult female and fourth instar larva of *A. a. atropalpus* by O'Meara and Craig (119b).

DISTRIBUTION. The known range of *A. a. atropalpus* as given by O'Meara and Craig (119a, 119b) is along the Appalachians from Labrador to Georgia, extending to the Atlantic, and with a western extension along the Great Lakes to Ontario, Minnesota, Wisconsin, and the upper peninsula of Michigan.

BIONOMICS. According to O'Meara and Craig (119b) the females of *A. a. atropalpus* display autogenous egg development and seldom feed on blood. They found that the females become sexually receptive within 24 hours after emergence and that the adults require humid conditions for survival. These writers also state that the larvae were found only in rockpools.

Aedes (Finlaya) atropalpus epactius
Dyar and Knab

TAXONOMY. Diagnostic characters for the adult female and fourth instar larva of *A. a. epactius* are given by O'Meara and Craig (119b).

DISTRIBUTION. Southern United States: Arkansas, Colorado, Missouri, Oklahoma, Texas, and Mexico (119a, 119b).

BIONOMICS. According to O'Meara and Craig (119b) the larvae of *A. a. epactius* have been found in rockpools, treeholes, artificial containers, ground pools, and borrow pits. The females are described as being anagenous, avid blood feeders and do not become sexually receptive until 4 days after emergence. They also say the adults require humid conditions for survival.

Aedes (Finlaya) atropalpus nielseni
O'Meara and Craig

TAXONOMY. Descriptions of the adult female, male, male terminalia, and larva are given by O'Meara and Craig (119a). Diagnostic characters of the adult female and fourth instar larva are given by O'Meara and Craig (119b).

DISTRIBUTION. *A. a. nielseni* has been collected in the southwestern United States in Arizona and Utah (119a, 119b).

BIONOMICS. The bionomics of *A. a. nielseni* are described by O'Meara and Craig (119a, 119b). The immature stages have been found in rockpools. The females are anagenous and are avid blood feeders. The adults display a relatively high level of drought resistance and are well adapted to survival in a desert environment.

Aedes (Finlaya) hendersoni Cockerell

TAXONOMY. Harmston (75) figured and used the female tarsal claws for separating *A. hendersoni* and *A. triseriatus*. He found that *A. hendersoni* has the fore and middle tarsal claws more abruptly curved than the corresponding claws in *A. triseriatus*. The tooth of each claw in *A. hendersoni* is much longer and is inserted at a more acute angle than in *A. triseriatus*. The hybridization of *A. hendersoni* and *A. triseriatus* in a laboratory colony is described by Truman and Craig (157), and characters are given for separating the larvae and adults of the 2 species.

DISTRIBUTION. Indiana (157); Kansas (76); Louisiana (36); Michigan (157); Missouri (140); Montana (116); Nebraska (75, 76); New Mexico (116); Ohio (157); South Dakota (75, 76); Texas (170). Harmston and Lawson (76) consider all published records of *A. triseriatus* in Colorado as actually referring to *A. hendersoni*.

Aedes (Finlaya) triseriatus (Say)

TAXONOMY. The egg is described and figured by Horsfall and Craig (83). The first instar larva is described and figured by Dodge (57) and Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Indiana (157); Iowa (97); Kentucky (44); Massachusetts (107); Michigan (118, 157); Minnesota (157); Mississippi (72, 73); Missouri (139, 140); Ohio (157); Oklahoma (89); Texas (170); Virginia (66); Wisconsin (138). Canada: Ontario (19).

BIONOMICS. Oviposition site selection by the females of *A. triseriatus* is described by Wilton (168). He also reports that the larvae were abundant in discarded automobile tires in many localities near Savannah, Georgia.

Aedes (Finlaya) zoosophus Dyar and Knab

DISTRIBUTION. Oklahoma (89); Texas (170). The species was reported for Arkansas by Hill et al. (80) based on collections made at military installations. Alan Stone confirmed identification of specimens of *A. zoosophus* from Fort Chaffee and Pine Bluff, Arkansas. The specimens from New Mexico could not be found in the Fourth United States Army Medical Laboratory, and the record should be deleted until further collecting is done in the area.

Aedes (Stegomyia) aegypti (Linnaeus)

TAXONOMY. The egg is described and figured by Craig (46) and Craig and Horsfall (47). The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Darsie (54). A comprehensive study of the life history, bionomics, and structure of *A. aegypti* was published by Christophers (40).

DISTRIBUTION. Mississippi (72, 73); Missouri (140); Texas (170).

BIONOMICS. The anatomy of the external and internal reproductive system of *A. aegypti* is given by Hodapp and Jones (81), and the physi-

ology and behavior of reproduction is described by Jones (90).

Aedes (Aedimorphus) vexans (Meigen)

TAXONOMY. The egg is described and figured by Craig (46), Horsfall and Craig (83), and Kalpage and Brust (93). The first instar larva is described and figured by Bohart (22), Dodge (57), and Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Alaska (144); California (32); Colorado (76); Indiana (136); Iowa (97); Kansas (88); Kentucky (44); Massachusetts (107); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Utah (113); Virginia (66); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52); Ontario (19).

Aedes (Aedes) cinereus Meigen

TAXONOMY. The egg is described and figured by Craig (46) and Kalpage and Brust (93). The first instar larva is described and figured by Price (129). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Alaska (144); Colorado (76); Indiana (136); Iowa (97); Kentucky (44); Louisiana (36); Massachusetts (107); Michigan (118); Mississippi (72, 73); Missouri (140); Utah (113); Virginia (66); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52).

Genus *HAEMAGOGUS* Williston

Haemagogus (Longipalpifer) equinus Theobald

DISTRIBUTION. Texas (170).

Genus *CULEX* Linnaeus

Bram (23) reviewed the *Culex* of the subgenus *Culex* in the New World and included descriptions and figures of the species. Keys to the male terminalia and the fourth instar larvae of the species are also given.

Culex (Culex) chidesteri Dyar

TAXONOMY. The pupa is described and figured by Lane (102).

DISTRIBUTION. Texas (170).

Culex (Culex) coronator Dyar and Knab

TAXONOMY. The pupa is described and figured by Lane (102).

DISTRIBUTION. Texas (170). The species was reported from Louisiana by Hill et al. (80) based on collections made at military bases. An unsuccessful attempt was made to locate the specimens for reexamination. I believe the record should be deleted until it can be confirmed by additional collections.

Culex (Culex) declarator Dyar and Knab
DISTRIBUTION. Texas (170).

Culex (Culex) erythrothorax Dyar
DISTRIBUTION. Colorado (76); Texas (170); Utah (113).

Culex (Culex) interrogator Dyar and Knab
DISTRIBUTION. Texas (170).

Culex (Culex) nigripalpus Theobald
TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Lane (102).

DISTRIBUTION. Kentucky (44); Mississippi (72, 73); Texas (170). The species was reported for Arkansas and New Mexico by Hill et al. (80) based on collections made at military installations. An unsuccessful attempt was made to locate the specimens for reexamination. The records should probably be deleted until they can be confirmed by additional collections from these states.

BIONOMICS. Studies of the biology of *C. nigripalpus* are reported by Nayar (111, 112).

Culex (Culex) peus Speiser
DISTRIBUTION. Texas (170).

Culex (Culex) pipiens pipiens Linnaeus
TAXONOMY. Dodge (57) compared the first instar larva with that of *C. p. quinquefasciatus* and was unable to find any significant differences between them. The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Kansas (88); Massachusetts (107); Michigan (118); Mississippi (72); Utah (113). Canada: British Columbia (52); Ontario (19).

Culex (Culex) pipiens quinquefasciatus Say
TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Darsie (54).

DISTRIBUTION. Iowa (97); Mississippi (72, 73); Nevada (39); Oklahoma (89); Texas (170); Utah (113).

BIONOMICS. The swarming and mating behavior of *C. p. quinquefasciatus* is described by Williams and Patterson (166).

Culex (Culex) restuans Theobald
TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Darsie (54).

DISTRIBUTION. United States: Colorado (76); Iowa (97); Kentucky (44); Massachusetts (107); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Utah (113); Virginia (66); Wisconsin (138). Canada: Ontario (19).

BIONOMICS. During a study of host preferences of mosquitoes Means (108) found that *C. restuans* was attracted to birds and mammals in about equal numbers, and that warm-blooded animals were more attractive for blood-feeding than cold-blooded animals.

Culex (Culex) salinarius Coquillett
TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Darsie (54).

DISTRIBUTION. Colorado (76); Iowa (97); Kentucky (44); Massachusetts (107); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Virginia (66). After reviewing existing material Nielsen (113) considered records of the species in Utah as invalid and removed the species from the list of mosquitoes known to occur in the State.

BIONOMICS. The colonization of *C. salinarius* in the laboratory is described by Wallis and Whitman (164).

Culex (Culex) tarsalis Coquillett
TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is figured by Lungstrom (103).

DISTRIBUTION. United States: California (32); Colorado (76); Iowa (97); Kansas (88); Kentucky (44); Mississippi (72, 73); Missouri (139, 140); Ohio (160); Oklahoma (89); Texas (170); Wisconsin (138). Canada: British Columbia (52).

BIONOMICS. The biting habits of *C. tarsalis* in Utah are described by Beadle (12).

Culex (Culex) thriambus Dyar
DISTRIBUTION. Texas (170); Utah (113).

Culex (Melanoconion) abominator
Dyar and Knab

DISTRIBUTION. Texas (170). The species was reported from Camp Polk, Louisiana, by Hill et al. (80). These writers state that the specimens are not available for confirmation. I believe the record for Louisiana should be deleted until it can be confirmed by additional collections.

Culex (Melanoconion) atratus Theobald
TAXONOMY. The pupa is described and figured by Foote (64).

Culex (Melanoconion) cedecei
Stone and Hair

TAXONOMY. Stone and Hair (149) described this species from specimens collected in southern Florida, and these writers say that specimens collected in Florida, described by Wirth (169) and Pratt et al. (128), and assigned to *C. opisthopus* appear to be the same species. Stone and Hair (149) further state that *C. opisthopus* apparently does not occur in the United States, and all records herein refer to the new species. Stone and Hair (149) described the female and male of *C. cedecei* and stated that descriptions and figures of the larva and pupa given by Pratt et al. (128) should serve for either *C. cedecei* or *C. opisthopus*, since no characters have been found in the immature stages to distinguish between them. The egg of *C. cedecei* is figured by Hair (69). Belkin (13, 14) reviewed specimens and information available to him and says that he is provisionally using *C. opisthopus* as the valid name of the species. He further states that others may prefer *C. cedecei* for populations from Jamaica and Florida and *C. opisthopus* for the Central American populations until their immature stages can be compared.

DISTRIBUTION. Florida (69, 149).

BIONOMICS. Blood feeding, oviposition, hatching of eggs, larval development, and adult habits of *C. cedecei* are described by Hair (69). A colony of the species was successfully maintained in the laboratory (69).

Culex (Melanoconion) erraticus
(Dyar and Knab)

TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Foote (64).

DISTRIBUTION. Iowa (97); Kentucky (44); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Virginia (66).

Culex (Melanoconion) iolambdis Dyar

TAXONOMY. The pupa is described and figured by Foote (64) and figured by Pratt and Seabrook (127).

Culex (Melanoconion) mulrennani Basham

TAXONOMY. The pupa is described and figured by Basham (11) and Foote (64).

Culex (Melanoconion) peccator
Dyar and Knab

TAXONOMY. The first instar larva is described and figured by Dodge (57).

DISTRIBUTION. Maryland (151); Mississippi (72); Missouri (140); Texas (170); Virginia (66).

BIONOMICS. Chapman and Barr (38) reported the establishment of a laboratory colony of *C. peccator* in Louisiana and described the mating, oviposition, and feeding habits of the adults.

Culex (Mochlostyrax) pilosus
(Dyar and Knab)

TAXONOMY. The first instar larva is described and figured by Dodge (57). The pupa is described and figured by Foote (64).

DISTRIBUTION. Mississippi (72, 73); Texas (170).

BIONOMICS. Notes on the biology of *C. pilosus* in the laboratory are given by Hair (69).

Culex (Aedinus) latisquama (Coquillett)

DISTRIBUTION. A single male specimen of *C. latisquama* from Lee County, Florida, was found in the United States National Museum and is reported by Stone (148). The species was originally described from Costa Rica and has also been found in Panama, Honduras, and Surinam (148).

BIONOMICS. According to Stone (148) the species breeds in crabholes.

Culex (Neoculex) apicalis Adams

TAXONOMY. The pupa is described by Bohart (21).

DISTRIBUTION. Texas (170); Utah (113).

BIONOMICS. A laboratory colony of *C. apicalis* is reported by Chapman and Barr (38).

Culex (Neoculex) arizonensis Bohart

TAXONOMY. The pupa is described by Bohart (21).

Culex (Neoculex) boharti Brookman and Reeves

TAXONOMY. The pupa is described by Bohart (21).

BIONOMICS. A laboratory colony of *C. boharti* is reported by Chapman and Barr (38).

Culex (Neoculex) reevesi Wirth

BIONOMICS. The colonization of *C. reevesi* in the laboratory is reported by Chapman and Barr (38).

Culex (Neoculex) territans Walker

TAXONOMY. The first instar larva is described and figured by Dodge (57). A morphological and biometrical study of the larval instars of *C. territans* was made by Eddleman (61), and the second, third, and fourth instars are described and figured and a key for separating the 4 instars is included. The pupa is described by Bohart (21) and described and figured by Darsie (54).

DISTRIBUTION. United States: California (32); Colorado (76); Iowa (97); Kentucky (44); Massachusetts (107); Michigan (118); Mississippi (72, 73); Missouri (139, 140); Oklahoma (89); Texas (170); Utah (113); Virginia (66); Wisconsin (137, 138). Canada: Alberta (70); British Columbia (52); Ontario (19).

BIONOMICS. The biology of *C. territans*, as observed in the laboratory, is described by McIver (105). The females readily took blood from several species of frogs suspended from the cage ceiling. The writer also states that the mosquitoes made no attempt to feed on humans who spent long periods of time in the cage. During a study of host preferences of mosquitoes, Means (108) observed that, when

given a choice of a warm-blooded or cold-blooded vertebrate, *C. territans* always preferred the latter. The colonization of the species in the laboratory is reported by Chapman and Barr (38).

Genus *DEINOCERITES* Theobald

Deinocerites cancer Theobald

TAXONOMY. The first instar larva is figured by Dodge (57).

Deinocerites mathesoni Belkin and Hogue

TAXONOMY. The pupa is figured by Knight and Chamberlain (96) and described by Belkin and Hogue (15).

DISTRIBUTION. Texas (170).

Deinocerites pseudus Dyar and Knab

DISTRIBUTION. Texas (170).

REFERENCES CITED

1. Abdel-Malek, Albert. 1949. A study of the morphology of the immature stages of *Aedes trivittatus* (Coquillett) (Diptera: Culicidae). Ann. Ent. Soc. Amer. 42(1):19-37.
2. Aboualy, Aly and W. R. Horsfall. 1968. Bionomics of *Psorophora varipes*, a model laboratory mosquito. Jour. Econ. Ent. 61(6):1657-1660.
3. Aitken, T. H. G. 1945. Studies on the anopheline complex of Western North America. Univ. Calif. Publ. Ent. 7(11):273-364.
4. Arnell, J. H. and L. T. Nielsen. 1967. Notes on the distribution and biology of treehole mosquitoes in Utah. Utah Mosquito Abatm. Assoc. Proc. 20:28-29.
5. Baerg, D. C. 1968. Overwintering habits of *Orthopodomyia californica* Bohart (Diptera: Culicidae). Mosquito News 28(2):234-235.
6. Barr, A. R. 1958. The mosquitoes of Minnesota (Diptera: Culicidae: Culicinae). Univ. Minn. Agr. Exp. Sta. Tech. Bull. 228. 154 p.
7. Barr, A. R. 1963. Pupae of the genus *Culiseta* Felt. II. Descriptions and a key to the North American species (Diptera: Culicidae). Ann. Ent. Soc. Amer. 56(3):324-330.

8. Barr, A. R. and Sylvia Barr. 1969. The egg of *Wyeomyia smithii* (Coquillett) and a review of knowledge of the eggs of the Sabethini. *Mosquito News* 29(2):193-198.
9. Barr, A. R. and Sylvia Barr. 1969. Mosquito studies (Diptera, Culicidae). XIII. Pupae of the genus *Psorophora* in North America and Puerto Rico. *Contrib. Amer. Ent. Inst.* 4(4):1-20.
10. Barr, A. R. and C. M. Myers. 1962. Pupae of the genus *Culiseta* Felt. I. The homology of larval and pupal setae (Diptera: Culicidae). *Ann. Ent. Soc. Amer.* 55(1):94-98.
11. Basham, E. H. 1948. *Culex (Melanoconion) mulrennani*, a new species from Florida (Diptera: Culicidae). *Ann. Ent. Soc. Amer.* 41(1):1-7.
12. Beadle, L. D. 1959. Field observations on the biting habits of *Culex tarsalis* at Mitchell, Nebraska and Logan, Utah. *Amer. Jour. Trop. Med. and Hyg.* 8(2):134-140.
13. Belkin, J. N. 1969. The problem of the identity of the species of *Culex (Melanoconion)* related to *opisthopus*. *Mosquito Syst. Newsletter* 1(2):26-28.
14. Belkin, J. N. 1969. *Culex (Melanoconion) annulipes* invalid. *Mosquito Syst. Newsletter* 1(3):68.
15. Belkin, J. N. and C. L. Hogue. 1959. A review of the crabhole mosquitoes of the genus *Deinocerites* (Diptera, Culicidae). *Univ. Calif. Publ. Ent.* 14(6):411-458.
16. Belkin, J. N. and W. A. McDonald. 1956. A population of *Uranotaenia anhydor* from Death Valley, with descriptions of all stages and discussion of the complex (Diptera, Culicidae). *Ann. Ent. Soc. Amer.* 49:105-132.
17. Bellamy, R. E. and R. P. Repass. 1950. Notes on the ova of *Anopheles georgianus* King. *Jour. Nat. Mal. Soc.* 9(1):84-88.
18. Belton, P. and D. E. French. 1967. A specimen of *Aedes thibaulti* collected near Belleville, Ontario, Canada. *Ent.* 99(12):1336.
19. Benedict, W. G. 1962. Mosquitoes in and about Windsor, Ontario. *Proc. Ent. Soc. Ont.* 93: 82-84.
20. Bidlingmayer, W. L. 1968. Larval development of *Mansonia* mosquitoes in central Florida. *Mosquito News* 28(1):51-57.
21. Bohart, R. M. 1948. The subgenus *Neoculex* in America north of Mexico (Diptera, Culicidae). *Ann. Ent. Soc. Amer.* 41(3):330-345.
22. Bohart, R. M. 1954. Identification of first stage larvae of California *Aedes* (Diptera, Culicidae). *Ann. Ent. Soc. Amer.* 47(2): 355-366.
23. Bram, R. A. 1967. Classification of *Culex* subgenus *Culex* in the New World (Diptera: Culicidae). *Proc. U.S. Nat. Mus.* 120(3557): 1-122.
24. Brandenburg, J. F. and R. D. Murrill. 1947. Occurrence and distribution of mosquitoes in Arkansas. *Arkansas Hlth. Bull.* 4(8):4-6.
25. Breeland, S. G. 1951. The identification of the early instars of three common anophelines of southern Georgia, U.S.A. *Jour. Nat. Mal. Soc.* 10(3):224-232.
26. Breland, O. P. 1949. The biology and the immature stages of the mosquito, *Megarhinus septentrionalis* Dyar and Knab. *Ann. Ent. Soc. Amer.* 42(1):38-47.
27. Breland, O. P. 1951. The immature stages of *Aedes infirmatus* Dyar and Knab, with notes on related species. *Ann. Ent. Soc. Amer.* 44(3):362-371.
28. Brooks, I. C. 1947. Tree-hole mosquitoes in Tippecanoe County, Indiana. *Proc. Ind. Acad. Sci.* 56:154-156.
29. Brust, R. A. and J. Giardino. 1968. Illumination and photography of mosquito eggs. *Ann. Ent. Soc. Amer.* 61(4):1039-1041.
30. Carpenter, S. J. 1965. *Culiseta impatiens* (Walker), with keys to the species of *Culiseta* in California. *Calif. Vector Views* 12(11):61-66.
31. Carpenter, S. J. 1968. Review of recent literature on mosquitoes of North America. *Calif. Vector Views* 15(8):71-98.

32. Carpenter, S. J. 1969. Observations on the distribution and ecology of mountain *Aedes* mosquitoes in California. XII. Other species found in the mountains. Calif. Vector Views. 16(4):27-32.
33. Carpenter, S. J. and W. J. LaCasse. 1955. Mosquitoes of North America. Univ. Calif. Press, Berkeley, California. 360 p.
34. Carpenter, S. J. and D. J. Womeldorf. 1968. Distribution and ecology of *Aedes bicristatus* Thurman and Winkler. Calif. Vector Views 15(4):37-41.
35. Chamberlain, R. W., W. D. Sudia, and D. B. Nelson. 1955. Laboratory observations on a mosquito, *Culiseta melanura* (Coquillett). Mosquito News 15(1):18-21.
36. Chapman, H. C. 1968. Some notes on the mosquitoes of Louisiana, including the addition of *Aedes hendersoni* Cockerell. Mosquito News 28(4):650-651.
37. Chapman, H. C. and A. R. Barr. 1964. *Aedes communis nevadensis*, a new subspecies of mosquito from western North America (Diptera: Culicidae). Mosquito News 24(4):439-447.
38. Chapman, H. C. and A. R. Barr. 1969. Techniques for successful colonization of many mosquito species. Mosquito News 29(4):532-535.
39. Chapman, H. C. and R. C. Bechtel. 1969. Occurrence of *Culex pipiens quinquefasciatus* Say in Nevada. Mosquito News 29(1):137.
40. Christophers, S. R. 1960. *Aedes aegypti* (L.) the yellow fever mosquito: its life history, bionomics and structure. Cambridge University Press. 739 p.
41. Corbet, P. S. 1965. Reproduction in mosquitoes of the High Arctic. Internat. Cong. Ent. (London) Proc. 12:817-818.
42. Corbet, P. S. 1967. Facultative autogeny in arctic mosquitoes. Nature (London) 215 (5101):662-663.
43. Corbet, P. S. and A. E. R. Downe. 1966. Natural hosts of mosquitoes in northern Ellesmere Island. Arctic 19(2):153-161.
44. Covell, C. V., Jr. 1968. Mosquito control and survey in Jefferson County, Kentucky. Mosquito News 28(4):526-529.
45. Craig, G. B., Jr. 1955. Preparation of the chorion of eggs of aedine mosquitoes for microscopy. Mosquito News 15(4):228-231.
46. Craig, G. B., Jr. 1956. Classification of eggs of nearctic aedine mosquitoes (Diptera: Culicidae). Doctoral Thesis, University of Illinois, Urbana.
47. Craig, G. B., Jr. and W. R. Horsfall. 1960. Eggs of floodwater mosquitoes. VII. Species of *Aedes* common in the southeastern United States (Diptera: Culicidae). Ann. Ent. Soc. Amer. 53(1):11-18.
48. Crans, W. J. 1968. *Aedes atlanticus* Dyar and Knab, feeding on turtles. Mosquito News 28(2):239.
49. Crans, W. J. and E. G. Rockel. 1968. The mosquitoes attracted to turtles. Mosquito News 28(3):332-337.
50. Crovello, T. J. 1969. Numerical taxonomy: its value to mosquito systematics. Mosquito Syst. Newsletter 1(3):63-67.
51. Cupp, E. W. and W. R. Horsfall. 1969. Biological bases for placement of *Aedes sierrensis* (Ludlow) in the subgenus *Finlaya* Theobald. Mosquito Syst. Newsletter 1(3):51-52.
52. Curtis, L. C. 1967. The mosquitoes of British Columbia. B. C. Provincial Mus. Occasional Paper No. 15. 90 p.
53. Darsie, R. F., Jr. 1949. Pupae of the anopheline mosquitoes of the northeastern United States (Diptera, Culicidae). Rev. de Ent. 20(1-3): 509-530.
54. Darsie, R. F., Jr. 1951. Pupae of the culicine mosquitoes of the northeastern United States (Diptera, Culicidae, Culicini). Mem. Cornell Agric. Exp. Sta. 304. 67 p.
55. Darsie, R. F., Jr. 1957. Notes on American mosquito pupae. II. The *Aedes* (*Ochlerotatus*) *punctor* subgroup, with key to known nearctic *Aedes* pupae (Diptera, Culicidae). Ann. Ent. Soc. Amer. 50(6):611-620.
56. Dodge, H. R. 1964. Larval chaetotaxy and notes

- on the biology of *Toxorhynchites rutilus septentrionalis* (Diptera: Culicidae). Ann. Ent. Soc. Amer. 57(1):46-53.
57. Dodge, H. R. 1966. Studies on mosquito larvae II. The first-stage larvae of North American Culicidae and of world Anophelinae. Canadian Ent. 98(4):337-393.
58. Downes, J. A. 1969. The swarming and mating flight of Diptera. Ann. Rev. Ent. 14:271-298.
59. Dyar, H. G. 1917. The mosquitoes of the Pacific Northwest (Diptera, Culicidae). Ins. Ins. Mens. 5(7-9):97-102.
60. Dyar, H. G. 1928. The mosquitoes of the Americas. Carnegie Inst. Wash. Publ. 387. 616 p.
61. Eddleman, C. D. 1967. Morphological and biometrical differentiation of the larval instars of mosquitoes. I. *Culex territans*. Ann. Ent. Soc. Amer. 60(1):33-41.
62. Eddleman, C. D. 1968. Morphological and biometrical differentiation of the larval instars of mosquitoes. II. *Orthopodomyia alba* and *O. signifera*. Ann. Ent. Soc. Amer. 61(6):1372-1380.
63. Edmunds, L. R. 1957. A note on the biology of the mosquito, *Psorophora discolor* (Coquillett), in Mississippi (Diptera: Culicidae). Ohio Jour. Sci. 57(5):313-314.
64. Foote, R. H. 1954. The larvae and pupae of the mosquitoes belonging to the *Culex* subgenera *Melanoconion* and *Mochlostyrax*. U.S. Dept. Agr. Tech. Bull. No. 1091. 126 p.
65. Gjullin, C. M., L. F. Lewis, and D. M. Christenson. 1968. Notes on the taxonomic characters and distribution of *Aedes aloponotum* Dyar and *Aedes communis* (DeGeer) (Diptera: Culicidae). Proc. Ent. Soc. Wash. 70(2):133-136.
66. Gladney, W. J. and E. C. Turner, Jr. 1968. Mosquito control on Smith Mountain Reservoir by pumped storage water level management. Mosquito News 28(4):606-618.
67. Graham, P. 1969. *Culiseta silvestris minnesotae* Barr and *C. morsitans dyari* (Coquillett) (Diptera: Culicidae) in Alberta. Mosquito News 29(2):261-262.
68. Hagmann, L. E. 1952. *Mansonia perturbans* recent studies in New Jersey. Proc. N.J. Mosq. Exterm. Assoc. 39:60-65.
69. Hair, J. A. 1968. Observations on two species of *Culex* of the subgenus *Melanoconion*. Mosquito News 28(3):425-429.
70. Happold, D. C. D. 1965. Mosquito ecology in Central Alberta I. The environment, the species, and studies of the larvae. Canadian Jour. Zool. 43(5):795-819.
71. Happold, D. C. D. 1965. Mosquito ecology in Central Alberta II. Adult populations and activities. Canadian Jour. Zool. 43(5):821-846.
72. Harden, F. W., H. R. Hepburn, and B. J. Ethridge. 1967. A history of mosquitoes and mosquito-borne diseases in Mississippi 1699-1965. Mosquito News 27(1):60-66.
73. Harden, F. W. and B. J. Poolson. 1969. Seasonal distribution of mosquitoes of Hancock County, Mississippi, 1964-1968. Mosquito News 29(3):407-414.
74. Harmston, F. C. 1949. An annotated list of mosquito records from Colorado. Great Basin Nat. 9(3-4):65-75.
75. Harmston, F. C. 1969. Separation of the females of *Aedes hendersoni* Cockerell and *Aedes triseriatus* (Say) (Diptera: Culicidae) by the tarsal claws. Mosquito News 29(3):490-491.
76. Harmston, F. C. and F. A. Lawson. 1967. Mosquitoes of Colorado. U.S. Dept. Hlth. Education and Welfare. 140 p.
77. Hart, J. W. 1968. Occurrence of *Toxorhynchites rutilus septentrionalis* (Dyar and Knab) in Indiana. Mosquito News 28(1):118.
78. Hearle, Eric. 1929. The life history of *Aedes flavescens* Müller. Trans. Royal Soc. Canada, Third Series 23:85-101.
79. Hendrickson, J. A., Jr. and R. R. Sokal. 1968. A numerical taxonomic study of the genus *Psorophora* (Diptera: Culicidae). Ann. Ent. Soc. Amer. 61(2):385-392.

80. Hill, S. O., B. J. Smittle, and F. M. Philips. 1958. Distribution of mosquitoes in the Fourth U.S. Army Area. Ent. Div. 4th U.S. Army Med. Lab. 155 p.
81. Hodapp, C. J. and J. C. Jones. 1961. The anatomy of the adult male reproduction system of *Aedes aegypti* (Linnaeus) (Diptera, Culicidae). Ann. Ent. Soc. Amer. 54(6):832-844.
82. Holmberg, R. G. and D. Trofimenkoff. 1968. *Aedes melanimon* in Saskatchewan. Mosquito News 28(4):651-652.
83. Horsfall, W. R. and G. B. Craig, Jr. 1956. Eggs of floodwater mosquitoes. IV. Species of *Aedes* common in Illinois (Diptera: Culicidae). Ann. Ent. Soc. Amer. 49(4):368-374.
84. Horsfall, W. R., R. C. Miles, and J. J. Sokatch. 1952. Eggs of floodwater mosquitoes. I. Species of *Psorophora*. Ann. Ent. Soc. Amer. 45(4):618-624.
85. Horsfall, W. R. and M. Trpiš. 1967. Eggs of floodwater mosquitoes. X. Conditioning and hatching of winterized eggs of *Aedes sticticus* (Diptera: Culicidae). Ann. Ent. Soc. Amer. 60(5):1021-1025.
86. Hurlbut, H. S. 1938. A study of the larval chaetotaxy of *Anopheles walkeri* Theobald. Amer. Jour. Hyg. 28(2):149-173.
87. Hurlbut, H. S. 1938. Further notes on the overwintering of the eggs of *Anopheles walkeri* Theobald with a description of the eggs. Jour. Parasitol. 24:521-526.
88. Janovy, J. J. 1966. Mosquitoes of the Cheyenne Bottoms Waterfowl Management Area, Barton County, Kansas. Jour. Kans. Ent. Soc. 39(4):557-561.
89. Johnson, W. E., Jr. 1968. Ecology of mosquitoes in the Wichita Mountains Wildlife Refuge. Ann. Ent. Soc. Amer. 61(5):1129-1141.
90. Jones, J. C. 1968. The sexual life of a mosquito. Scientific American 218(4):108-116.
91. Joseph, S. R. and W. E. Bickley. 1969. *Culiseta melanura* (Coquillett) on the eastern shore of Maryland (Diptera: Culicidae). Md. Agr. Exp. Sta. Bull. A-161. 84 p.
92. Judd, W. W. 1969. Further records of the mosquito, *Psorophora ciliata* (Fabr.) in the vicinity of London, Ontario. Mosquito News 29(4):689-690.
93. Kalpage, K. S. and R. A. Brust. 1968. Mosquitoes of Manitoba. I. Descriptions and a key to *Aedes* eggs (Diptera: Culicidae). Canadian Jour. Zool. 46:699-718.
94. Kliever, J. W., T. Miura, R. C. Husbands, and C. H. Hurst. 1966. Sex pheromones and mating behavior of *Culiseta inornata* (Diptera: Culicidae). Ann. Ent. Soc. Amer. 59(3):530-533.
95. Kliever, J. W., B. Rosay, T. Miura, C. M. Myers, and M. M. Boreham. 1967. Swarming and mating of some California mosquitoes. Jour. Med. Ent. 4(4):490-494.
96. Knight, K. L. and R. W. Chamberlain. 1948. A new nomenclature for the chaetotaxy of the mosquito pupa, based on a comparative study of the genera (Diptera: Culicidae). Proc. Helminth. Soc. Wash. 15(1):1-10.
97. Knight, K. L. and M. Wonio. 1969. Mosquitoes of Iowa (Diptera: Culicidae). Iowa State University, Special Report No. 61. 79 p.
98. Kreutzer, R. D. and J. B. Kitzmiller. 1969. Colonization of *Anopheles earlei* Vargas. Mosquito News 29(4):589-590.
99. Lake, R. W. 1968. Descriptions of first-instar larvae of *Aedes aurifer* (Coquillett) and *Aedes grossbecki* Dyar and Knab (Diptera: Culicidae). Ent. News 79(2):44-48.
100. Lake, R. W., F. J. Murphey, and C. J. Stachecki, Jr. 1968. Distribution and abundance of *Psorophora* species in Delaware, 1967. N.J. Mosquito Exterm. Assoc. Proc. 55:139-142.
101. Lake, R. W., F. J. Murphey, and C. J. Stachecki, Jr. 1968. The occurrence of *Psorophora cyanescens* (Coquillett), *P. horrida* (Dyar and Knab) and *P. varipes* (Coquillett) in Delaware. Mosquito News 28(3):470.
102. Lane, J. 1953. Neotropical Culicidae. Sao Paulo, Brazil. 1112 p.
103. Lungstrom, Leon. 1955. Additional observations

- on the recognition features of the *Culex tarsalis* larva and pupa (Culicidae: Diptera). Trans. Kans. Acad. Sci. 58:68-74.
104. Lunt, S. R. and L. T. Nielsen. 1968. Systematic entomology - setal characteristics and the identification of adult *Aedes* mosquitoes. Proc. North Central Branch Ent. Soc. Amer. 23(2):122-125.
105. McIver, S. B. 1969. Notes on the biology of *Culex territans* Walker. Mosquito News 29 (1):135-136.
106. McNeel, T. E. and F. F. Ferguson. 1954. Mosquito distribution and abundance in the Arkansas - White - Red River Basins. U.S. Publ. Hlth. Rpts. 69(4):385-390.
107. Main, A. J., R. O. Hayes, and R. J. Tonn. 1968. Seasonal abundance of mosquitoes in south-eastern Massachusetts. Mosquito News 28(4): 619-626.
108. Means, R. G. 1968. Host preferences of mosquitoes (Diptera: Culicidae) in Suffolk County, New York. Ann. Ent. Soc. Amer. 61(1):116-120.
109. Mortenson, E. W. 1969. Observations on the occurrence of *Aedes sierrensis* (Ludlow) in red fir stumps in a Sierran conifer forest. Calif. Mosquito Control Assoc. Proc. and Papers 37:92.
110. Myers, C. M. 1967. Identification and descriptions of *Aedes* eggs from California and Nevada (Diptera: Culicidae). Canadian Ent. 99(8):795-806.
111. Nayar, J. K. 1968. Biology of *Culex nigripalpus* Theobald (Diptera: Culicidae) Part 1: Effects of rearing conditions on growth and the diurnal rhythm of pupation and emergence. Jour. Med. Ent. 5(1):39-46.
112. Nayar, J. K. 1968. The biology of *Culex nigripalpus* Theobald (Diptera: Culicidae). Part 2. Adult characteristics at emergence and adult survival without nourishment. Jour. Med. Ent. 5(2):203-210.
113. Nielsen, L. T. 1968. A current list of mosquitoes known to occur in Utah with a report of new records. Utah Mosquito Abatm. Assoc. Proc. 21-34-37.
114. Nielsen, L. T. 1969. A critique on numerical taxonomy. Mosquito Syst. Newsletter 1(2): 23-25.
- 114a. Nielsen, L. T. 1969. *Aedes cacothius* Dyar, a synonym of *Aedes ventrovittis* Dyar (Diptera: Culicidae). Proc. Ent. Soc. Wash. 71(4):530.
115. Nielsen, L. T., J. H. Arnell, and J. H. Linam. 1967. A report on the distribution and biology of the treehole mosquitoes in the western United States. Calif. Mosquito Control Assoc. Proc. and Papers 23:72-76.
116. Nielsen, L. T., J. H. Linam, J. H. Arnell, and T. J. Zavortink. 1968. Distributional and biological notes on the treehole mosquitoes of the western United States. Mosquito News 28(3):361-365.
117. Nielsen, L. T. and D. M. Rees. 1959. The mosquitoes of Utah - a revised list. Mosquito News 19(2):45-47.
118. Obrecht, C. B. 1967. New distribution records of Michigan mosquitoes, 1948-1963. Mich. Ent. 1(5):153-158.
119. Olinger, L. D. 1957. Observations on the mosquito, *Toxorhynchites rutilus rutilus* (Coquillett), in Alachua County, Florida. Fla. Ent. 40(2):51-52.
- 119a. O'Meara, G. F. and G. B. Craig, Jr. 1970. A new subspecies of *Aedes atropalpus* (Coquillett) (Diptera: Culicidae) from the southwestern United States. Proc. Ent. Soc. Wash. (in press).
- 119b. O'Meara, G. F. and G. B. Craig, Jr. 1970. Geographical variation in *Aedes atropalpus* (Coq.). Ann. Ent. Soc. Amer. (in press).
120. Penn, G. H. 1949. Pupae of the nearctic anopheline mosquitoes north of Mexico. Jour. Nat. Mal. Soc. 8(1):50-69.
121. Penn, G. H. and S. A. Coleman. 1949. An analysis of the pupal chaetotaxy of *Anopheles quadrimaculatus* (Say). Mosquito News 9(4): 174-175.
122. Petersen, J. J., H. C. Chapman, and O. R. Willis. 1969. Predation of *Anopheles barberi* Coquillett on first instar mosquito larvae. Mosquito News 29(1):134-135.

123. Peyton, E. L. and R. H. Hochman. 1968. A revised interpretation of the proctiger of male *Uranotaenia* with a related note on *Hodgesia* (Diptera: Culicidae). Proc. Ent. Soc. Wash. 70(4):376-382.
124. Pratt, H. D. 1945. *Mansonia indubitans* Dyar and Shannon - a new mosquito addition to the United States fauna. Jour. Kans. Ent. Soc. 18(4):121-129.
125. Pratt, H. D. 1952. Notes on *Anopheles earlei* and other American species of the *Anopheles maculipennis* complex. Amer. Jour. Trop. Med. and Hyg. 1:484-493.
126. Pratt, H. D. 1953. Notes on American *Mansonia* mosquitoes (Diptera, Culicidae). Proc. Ent. Soc. Wash. 55(1):9-19.
127. Pratt, H. D. and E. L. Seabrook. 1952. The occurrence of *Culex iolambdis* Dyar in Florida and Puerto Rico, with a description of the larva (Diptera, Culicidae). Proc. Ent. Soc. Wash. 54(1):27-32.
128. Pratt, H. D., W. W. Wirth, and D. G. Denning. 1945. The occurrence of *Culex opisthopus* Komp in Puerto Rico and Florida, with a description of the larva (Diptera, Culicidae). Proc. Ent. Soc. Wash. 47(8):245-251.
129. Price, R. D. 1960. Identification of first instar aedine mosquito larvae of Minnesota (Diptera: Culicidae). Canadian Ent. 92(7):544-560.
130. Rigby, P. T. 1968. Occurrence of *Aedes infirmatus* D. and K. in Arizona. Mosquito News 28(2):239.
131. Rohlf, F. J. 1963. Classification of *Aedes* by numerical taxonomic methods (Diptera: Culicidae). Ann. Ent. Soc. Amer. 56(6):798-804.
132. Rohlf, F. J. 1963. Congruence of larval and adult classifications in *Aedes*. Syst. Zool. 12(3):97-117.
133. Romney, S. V. and L. T. Nielsen. 1968. An ecological study of *Aedes* mosquitoes in uncontrolled areas in Tooele County, Utah. Utah Mosquito Abatm. Assoc. Proc. 21:37-44.
134. Ross, H. H. and W. R. Horsfall. 1965. A synopsis of the mosquitoes of Illinois (Diptera: Culicidae). Ill. Nat. Hist. Survey Biol. Notes No. 2. 50 p.
135. Rozeboom, L. E. 1952. *Anopheles (A.) earlei* Vargas, 1943, in Montana: identity and adaptation to laboratory conditions (Diptera: Culicidae). Amer. Jour. Trop. Med. and Hyg. 1(3):477-483.
136. Siverly, R. E. 1969. Occurrence of *Aedes dorsalis* (Meigen), *A. dupreei* (Coquillett) and *A. punctor* in Indiana. Mosquito News 29(4):689.
137. Siverly, R. E. and G. R. DeFoliart. 1968. Mosquito studies in northern Wisconsin I. Larval studies. Mosquito News 28(2):149-154.
138. Siverly, R. E. and G. R. DeFoliart. 1968. Mosquito studies in northern Wisconsin II. Light trapping studies. Mosquito News 28(2):162-167.
139. Smith, L. W., Jr. 1969. The relationship of mosquitoes to oxidation lagoons in Columbia, Missouri. Mosquito News 29(4):556-563.
140. Smith, L. W., Jr. and W. R. Enns. 1968. A list of Missouri mosquitoes. Mosquito News 28(1):50-51.
141. Smith, M. E. 1952. A new northern *Aedes* mosquito, with notes on its close ally, *Aedes diantaeus* H., D. and K. (Diptera, Culicidae). Bull. Brooklyn Ent. Soc. 47:19-28; 29-40.
142. Smith, M. E. 1969. The *Aedes* mosquitoes of New England (Diptera: Culicidae) II. Larvae: keys to instars, and to species exclusive of first instar. Canadian Ent. 101(1):41-51.
143. Smith, M. E. 1969. The *Aedes* mosquitoes of New England. III. Saddle hair position in second and third instar larvae, with particular reference to instar recognition and species relationships. Mosquito Syst. Newsletter 1(3):57-62.
144. Sommerman, K. M. 1968. Notes on Alaskan mosquito records. Mosquito News 28(2):233-234.
145. Sommerman, K. M. 1969. Blood meals and egg production of *Culiseta alaskaensis* (Ludlow)

- in captivity (Diptera: Culicidae). Mosquito News 29(1):65-69.
146. Steward, C. C. 1968. Numerical classification of the Canadian species of the genus *Aedes* (Diptera: Culicidae). Syst. Zool. 17(4): 426-437.
147. Stone, Alan. 1967. A synoptic catalog of the mosquitoes of the World, Supplement III (Diptera: Culicidae). Proc. Ent. Soc. Wash. 69(3):197-224.
148. Stone, Alan. 1968. A new mosquito record for the United States (Diptera: Culicidae). Proc. Ent. Soc. Wash. 70(4):384.
149. Stone, Alan and J. A. Hair, 1968. A new *Culex* (*Melanoconion*) from Florida (Diptera, Culicidae). Mosquito News 28(1):39-41.
150. Stone, Alan, K. L. Knight, and H. Starcke, 1959. A synoptic catalog of the mosquitoes of the World (Diptera, Culicidae). Thomas Say Found. (Ent. Soc. Amer.) 6:1-358.
151. Stone, Alan, C. W. Sabrosky, W. W. Wirth, R. H. Foote, and J. R. Coulson, Jr. 1965. A catalog of the Diptera of America North of Mexico. U.S. Dept. Agr. Handbook No. 276. 1696 p.
152. Strickland, W. B. 1969. The occurrence of *Aedes sierrensis* in stump cavities of the California coastal redwood, *Sequoia sempervirens*. Calif. Vector Views 16(4):33-34.
153. Swales, D. E. 1966. Species of insects and mites collected at Frobisher Bay, Baffin Island, 1964 and Inuvik, N.W.T., 1965, with brief ecological and geographical notes. Ann. Soc. Ent. Quebec 11(3):189-199.
154. Thompson, P. H. 1967. Swarming behavior of *Mansonia perturbans* (Walker). Amer. Mid. Nat. 77(2):533-535.
155. Thurman, E. B. and E. C. Winkler. 1950. A new species of mosquito in California, *Aedes* (*Ochlerotatus*) *bicristatus* (Diptera, Culicidae). Proc. Ent. Soc. Wash. 52(5): 237-250.
156. Tinker, M. E. and C. J. Stojanovich. 1962. Identification of the pupae of receptacle-breeding mosquitoes. Ann. Ent. Soc. Amer. 55(5):577-582.
157. Truman, J. W. and G. B. Craig, Jr. 1968. Hybridization between *Aedes hendersoni* and *Aedes triseriatus*. Ann. Ent. Soc. Amer. 61(4):1020-1025.
158. Vargas, Luis. 1943. El "grupo *maculipennis*" del nuevo mundo y el *Anopheles earlei*. Rev. Inst. Salub. Enf. Trop. 4(3):279-286.
159. Vargas, Luis and Robert Matheson. 1948. Estado actual del *Anopheles earlei* Vargas, 1943, y *Anopheles occidentalis* Dyar and Knab, 1906, con claves para larvas, pupas y adultos del llamado complejo *maculipennis* de Norteamérica. Rev. Inst. Salub. Enf. Trop. 9(1):27-33.
160. Venard, Carl. 1968. List of mosquitoes found in Ohio. 3 p. (Letter communication from P. B. Brockway, Jr.).
161. Wallis, R. C. and L. Whitman. 1967. *Culiseta melanura* (Coquillett) breeding in artificial containers. Jour. Med. Ent. 4(3):273-274.
162. Wallis, R. C. and L. Whitman. 1968. Oviposition of *Culiseta morsitans* (Theobald) and comments on the life cycle of the American form. Mosquito News 28(2):198-200.
163. Wallis, R. C. and L. Whitman. 1968. Mosquitoes of the genus *Culiseta* in Connecticut (Diptera: Culicidae). Proc. Ent. Soc. Wash. 70(2):187-188.
164. Wallis, R. C. and L. Whitman. 1968. Colonization of *Culex salinarius* in the laboratory. Mosquito News 28(3):366-368.
165. Wallis, R. C. and L. Whitman. 1969. Colonization of *Culiseta melanura* (Coquillett) in the laboratory. Mosquito News 29(2):255-258.
166. Williams, F. M. and R. S. Patterson. 1969. Swarming and mating behavior in *Culex pipiens quinquefasciatus* Say. Mosquito News 29(4): 662-666.
167. Wills, W. and V. McElhattan. 1968. Additions to the list of *Aedes* species in Pennsylvania. Mosquito News 28(1):108-109.
168. Wilton, D. P. 1968. Oviposition site selection by the tree-hole mosquito, *Aedes triseriatus*

169. Wirth, W. W. 1945. The occurrence of *Culex (Melanoconion) elevator* Dyar and Knab in Florida, with keys to the *Melanoconions* of the United States (Diptera, Culicidae). Proc. Ent. Soc. Wash. 47:199-210.
170. Wiseman, J. S. 1965. A list of mosquito species reported from Texas. Mosquito News 25(1): 58-59.
171. Zavortink, T. J. 1968. Mosquito studies (Diptera, Culicidae). VIII. A prodome of the genus *Orthopodomyia*. Contrib. Amer. Ent. Inst. 3(2):1-221.
172. Zavortink, T. J. 1969. Mosquito studies (Diptera, Culicidae). XV. A new species of treehole breeding *Anopheles* from the south-western United States. Contrib. Amer. Ent. Inst. 4(4):27-34.
173. Zavortink, T. J. 1969. Mosquito studies (Diptera, Culicidae). XVI. A new species of treehole breeding *Aedes (Ochlerotatus)* from southern California. Contrib. Amer. Ent. Inst. 5(1):1-7.
174. Zavortink, T. J. 1970. Mosquito studies (Diptera, Culicidae). XIX. The treehole *Anopheles* of the New World. Contrib. Amer. Ent. Inst. 5(2):1-35.

Homestudy courses of the National Communicable Disease Center, Atlanta, Georgia 30333, cover all aspects of the sanitary sciences that pertain to the control of communicable diseases. These courses entail no loss of time from work and require no instructor or training facilities. It is preferable that official health agencies or educational institutions arrange for these courses and handle their administration; however, individuals engaged in health activities may be enrolled by special arrangement with the National Communicable Disease Center.

Course number 3013-G entitled *Vectorborne Disease Control* consists of 11 lessons (2 to 6 hours per lesson) and a final examination. It is largely descriptive in nature with no special projects or laboratory exercises required. Only descriptive taxonomy is covered, but taxonomic keys and other aids will be furnished.

Comprehensive coverage of the vector control field is obtained through NCDC training material, which is furnished students at no cost. Titles of the lessons describe the subjects covered: *Arthropods of Public Health Importance; Insecticides; Insecticidal Equipment; Sanitation in Vector Control; Biology and Control of Flies; Biology and Control of Mosquitoes; Biology and Control of Fleas and Lice; Biology and Control of Ticks and Mites; Household and Stored-Food Insects; Biological Factors in Domestic Rodent Control; and Control of Domestic Rats and Mice.*

An open-book examination must be satisfactorily completed after each lesson and before the next lesson is undertaken. A final examination is given after all lessons are completed or other requirements are satisfied. No reference material is available to the student during the final examination, which is given under the supervision of a monitor.

URBAN RAT CONTROL COURSE

A course on urban rat control will be presented by the Insect and Rodent Control Branch, Environmental Control Administration, Environmental Health Service, Public Health Service in Atlanta, Georgia from September 14 to 18, 1970.

For additional information and enrollment forms contact:

Chief, Insect and Rodent Control Branch
Room 313
3384 Peachtree Street, NE
Atlanta, Georgia 30326

CORRECTION

CALIFORNIA VECTOR VIEWS 17(3):14 column 1, lines 28 and 42 should read "Bishop Creek recreational region" instead of "Rock Creek recreational region."

NCDC COURSES ON VECTOR CONTROL

The Vector-borne Disease Training Unit of the U.S. Public Health Service National Communicable Disease Center has scheduled the following courses for FY 1970-1971.

Course 2011-C. Epidemiology and Control of Vector-borne Diseases: Part I - Basic Vector-borne Disease Control. (This course includes basic information on various vectors and vector-borne diseases and their control and provides laboratory training in vector identification.) September 8-18, 1970.

Course 2012-C. Epidemiology and Control of Vector-borne Diseases: Part II - Advanced Epidemiology and Ecology of Vector-borne Diseases. (This course includes advanced concepts of vector-borne disease ecology and

epidemiology including zoonotic relationships.) September 21-25, 1970.

Course 2770-C. Malaria. October 5-6, 1970.

Course 2310-C. Control of Mosquito-borne Diseases. May 17-21, 1971.

Course 2750-C. Arthropod-borne Encephalitis. June 7-11, 1971.

For additional information and enrollment forms contact:

Dr. Paul L. Rice, Chief
Vector-borne Disease Training Unit
Laboratory Training Section - NCDC
Atlanta, Georgia 30333

Vol. 17 No. 6

CALIFORNIA VECTOR VIEWS

June 1970

Published Monthly by the CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH

Bureau of Vector Control & Solid Waste Management

2151 Berkeley Way, Berkeley, California 94704

Donald D. Linsdale, Editor

Thomas D. Peck, Managing Editor

James Cornelius, Associate Editor

Gretchen A. Neilson, Production Assistant

SECOND-CLASS POSTAGE PAID at Berkeley, California USA

90155