

## **List of mosquitoes (Diptera: Culicidae) with published illustrations and/or descriptions of second- and third-instar larvae**

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### **Abstract**

Species of Culicidae with published illustrations and/or morphological descriptions of the second- and third-instar larvae are listed with their literature citations.

**Key words:** Diptera, Culicidae, Anophelinae, Culicinae, Aedini, Culicini, Culisetini, Mansoniini, Orthopodomyiini, Sabethini, Toxorhynchitini, Uranotaeniini, *Aedes*, *Aedimorphus*, *Allotheobaldia*, *Anopheles*, *Armigeres*, *Cellia*, *Climacura*, *Coquillettidia*, *Culex*, *Culicada*, *Culicella*, *Culicelsa*, *Culiseta*, *Empihals*, *Fredwardsius*, *Georgecraigius*, *Grabhamia*, *Hulecoeteomyia*, *Jarnellius*, *Lutzia*, *Lynchiella*, *Melanoconion*, *Metalutzia*, *Neoculex*, *Nyssorhynchus*, *Ochlerotatus*, *Orthopodomyia*, *Protomacleaya*, *Pseudoficalbia*, *Psorophora*, *Rusticoidus*, *Sabethes*, *Sabethoides*, *Stegomyia*, *Tanakaius*, *Toxorhynchites*, *Tricholeptomyia*, *Tripteroides*, *Uranotaenia*, *Woodius*, *Wyeomyia*, mosquito, second-instar larva, third-instar larva

### **Introduction**

Most taxonomic descriptions of mosquito species include morphological descriptions and/or illustrations of the fourth-instar larvae. A number of species have partial descriptions and/or illustrations of the first-instar larvae (Reinert, 2010). Sometimes the second- or third-instar larvae are described and/or illustrated in publications.

A listing of mosquito species in the dipteran family Culicidae with published illustrations and/or descriptions of the second- and third-instar larvae is provided below. The latest listing of currently valid taxa reported in the Mosquito Taxonomic Inventory (<http://mosquito-taxonomic-inventory.info>, accessed 7 September 2010) was utilized. Many of the published articles on second- and third-instar larvae of Culicidae provide only brief descriptions and/or incomplete illustrations which usually include the head and appendages and/or abdominal segments VIII and X, and the siphon. A few articles have detailed illustrations and/or descriptions of the entire second- and third-instar larvae, e.g. Hurlbut (1938), Belkin & McDonald (1956), Service (1970), Floore *et al.* (1976) and Harbach (1991).

The following list includes mosquitoes with the second-instar larva illustrated (denoted by 2i) and/or described (denoted by 2d) and the third-instar larva illustrated (denoted by 3i) and/or described (denoted by 3d). Literature citations follow each species. Abbreviations of genera and subgenera follow Reinert (2009).

### Subfamily Anophelinae Grassi, 1900

- Anopheles (Anopheles) bradleyi* King: Floore *et al.*, 1976 (2i, 3i).  
*An. (Ano.) brevipalpis* Roper: Strickland, 1915 (2i, 2d).  
*An. (Ano.) claviger* (Meigen): Lang, 1920 (2i, 2d, 3i, 3d, as *bifurcatus* (Linnaeus), see Stone & Knight, 1957 and Cranston *et al.*, 1987); la Face, 1930 (2i, 2d, 3i, 3d, as *bifurcatus*).  
*An. (Ano.) crucians* Wiedemman *s.l.*: Breeland, 1951 (2i, 2d, 3i, 3d); Floore *et al.*, 1976 (2i, 3i).  
*An. (Ano.) earlei* Vargas: Savignac & Maire, 1981 (2i, 3i).  
*An. (Ano.) freeborni* Aitken: Belkin, 1953 (2i, 2d, 3i, 3d).  
*An. (Ano.) maculipennis* Meigen: Lang, 1920 (2i, 2d, 3i, 3d); Langeron, 1928 (3i); la Face, 1930 (2i, 2d, 3i, 3d); Gutsevich *et al.*, 1974 (2i, 3i).  
*An. (Ano.) nigerrimus* Giles: Baisas, 1947 (2i, as *hyrcanus* (Pallas) subspecies *nigerrimus*).  
*An. (Ano.) plumbeus* Stephens: Lang, 1920 (2i, 2d, 3i, 3d).  
*An. (Ano.) pseudopictus* Grassi: la Face, 1930 (2i, 2d, 3i, 3d).  
*An. (Ano.) punctipennis* (Say): Breeland, 1951 (2i, 2d, 3i, 3d).  
*An. (Ano.) quadrimaculatus* Say *s.l.*: Abdel-Malek & Goulding, 1948 (2d, 3d); Breeland, 1951 (2i, 2d, 3i, 3d); Jones, 1953 (2d, 3d); Shalaby, 1956 (2i, 2d, 3i, 3d).  
*An. (Ano.) sinensis* Wiedemann: Makiya, 1969 (2d, 3d, as *hyrcanus* (Pallas) subspecies *sinensis*).  
*An. (Ano.) walkeri* Theobald: Hurlbut, 1938 (2i, 2d, 3i, 3d).
- Anopheles (Cellia) aconitus* Dönitz: Stanton, 1912 (2i, 2d, as *albirostris* Theobald).  
*An. (Cel.) flavirostris* (Ludlow): Baisas, 1947 (2i, as *minimus* Theobald subspecies *flavirostris*).  
*An. (Cel.) gambiae* Giles *s.l.*: Soper & Wilson, 1943 (2i, 3i).  
*An. (Cel.) superpictus* Grassi: la Face, 1930 (2i, 2d, 3i, 3d).  
*An. (Cel.) willmori* (James): Puri, 1931 (2i, 3i, as *maculatus* Theobald variety *willmori*).
- Anopheles (Nyssorhynchus) albitarsis* Lynch Arribálzaga: Galvão & Lane, 1936 (2i, 2d, 3i, 3d).  
*An. (Nys.) strodei* Root: Galvão & Lane, 1936 (2i, 2d, 3i, 3d).

### Subfamily Culicinae Meigen, 1818

#### Tribe Aedini Neveu-Lemaire, 1902

- Aedes cinereus* Meigen: Dyar, 1902 (2d, 3d, as *fuscus* Osten Sacken); Barr, 1958 (3d); Smith, 1969a (2i, 2d, 3i, 3d), 1969b (2d, 3d).  
*Aedimorphus vexans* (Meigen): Barr, 1958 (3d); Smith, 1969a (2d, 3d), 1969b (2d, 3d).  
*Armigeres (Armigeres) subalbatus* (Coquillett): Makiya, 1969 (3d).

*Fredwardsius vittatus* (Bigot): Service, 1970 (2i, 2d, 3i, 3d).

*Georgecraigius* (*Georgecraigius*) *atropalpus* (Coquillett): Barr, 1958 (3d); Smith, 1969a (3i), 1969b (2d, 3d).

*Hulecoeteomyia japonica* (Theobald): Makiya, 1969 (2d, 3d).

*Jarnellius varipalpus* (Coquillett): Dyar, 1904b (2i, 2d, 3d).

*Ochlerotatus abserratus* (Felt & Young): Barr, 1958 (3d); Smith, 1969a (2i, 3i), 1969b (2d, 3d).

*Oc. aurifer* (Coquillett): Smith, 1969a (2d, 3d), 1969b (2d, 3d).

*Oc. cantans* (Meigen): Dyar, 1904a (2i, 2d, 3d).

*Oc. cantator* (Coquillett): Smith, 1969a (2i), 1969b (2d, 3d).

*Oc. communis* (de Geer): Smith, 1965 (2d, 3d), 1969b (2d, 3d).

*Oc. decticus* (Howard, Dyar & Knab): Smith, 1952 (2d, 3d, as *pseudodiantaeus* Smith), 1969b (3d).

*Oc. dorsalis* (Meigen): Barr, 1958 (3d).

*Oc. euedes* (Howard, Dyar & Knab): Barr, 1958 (3d, as *barri* Rueger).

*Oc. excrucians* (Walker): Smith, 1969a (2d, 3d), 1969b (2d, 3d).

*Oc. fitchii* (Felt & Young): Smith, 1969a (2d, 3d), 1969b (2d, 3d).

*Oc. impiger* (Walker): Danks & Corbet, 1973 (2d, 3d).

*Oc. implicatus* (Vockeroth): Barr, 1958 (3d); Smith, 1965 (2d, 3d), 1969b (3d).

*Oc. nigripes* (Zetterstedt): Danks & Corbet, 1973 (2d, 3d).

*Oc. pulcritarsis* (Rondani): Montchadsky, 1926 (2i, 2d, 3i, 3d, as *pulchritarsis* variety *stegomyina* Stackelberg & Montchadsky).

*Oc. punctor* (Kirby): Smith, 1969b (2d, 3d).

*Oc. riparius* (Dyar & Knab): Dyar, 1923 (3d); Barr, 1958 (3d).

*Oc. sticticus* (Meigen): Smith, 1969a (2d, 3d), 1969b (3d).

*Oc. stimulans* (Walker): Smith, 1969a (2i, 3i, 3d), 1969b (2d, 3d).

*Ochlerotatus* (*Culicada*) *canadensis* (Theobald): Smith, 1969a (3i), 1969b (2d, 3d); Savignac & Maire, 1981 (2i, 2d, 3i, 3d).

*Ochlerotatus* (*Culicelsa*) *mittchellae* (Dyar): Smith, 1969b (3d).

*Oc.* (*Cul.*) *sollicitans* (Walker): Knight, 1964 (2i, 2d, 3i, 3d); Smith, 1969b (2d, 3d).

*Oc.* (*Cul.*) *taeniorhynchus* (Wiedemann): Knight, 1964 (3d); Smith, 1969b (3d).

*Ochlerotatus* (*Empihals*) *vigilax* (Skuse): Shinkarenko *et al.*, 1986 (2d, 3d).

*Ochlerotatus* (*Ochlerotatus*) *infirmatus* (Dyar & Knab): Breland, 1951 (2i, 2d, 3i, 3d).

*Oc.* (*Och.*) *trivittatus* (Coquillett): Abdel-Malek & Goulding, 1948 (2d, 3d); Abdel-Malek, 1949 (2i, 2d, 3i, 3d).

‘*Ochlerotatus* (*Protomacleaya*)’ *triseriatus* (Say): Knab, 1904 (2i, 2d, 3i, 3d); Smith, 1969a (2d), 1969b (2d, 3d); Teng & Apperson, 1996 (2d, 3d).

*Ochlerotatus (Rusticoidus) provocans* (Walker): Dyar, 1904c (2i, 2d, 3i, 3d, as *trichurus* (Dyar)); Barr, 1958 (3d, as *trichurus*); Smith, 1969b (2d, 3d, as *trichurus*).

*Ochlerotatus (Woodius) diantaeus* (Howard, Dyar & Knab): Smith, 1952 (2d, 3d), 1969a (2i, 3i), 1969b (2d, 3d); Barr, 1958 (3d).

*Oc. (Woo.) intrudens* (Dyar): Smith, 1969a (2d), 1969b (2d, 3d).

*Psorophora (Grabhamia) columbiae* (Dyar & Knab): Hedeem, 1959 (2d, 3d, as *confinnis* (Lynch Arribálzaga)).

*Ps. (Gra.) discolor* (Coquillett): Hedeem, 1959 (2d, 3d).

*Ps. (Gra.) signipennis* (Coquillett): Hedeem, 1959 (2i, 2d, 3i, 3d).

*Psorophora (Psorophora) ciliata* (Fabricius): Shalaby, 1957c (2i, 2d, 3i, 3d).

*Stegomyia albopicta* (Skuse): Makiya, 1969 (2d, 3d); Teng & Apperson, 1996 (2d, 3d).

*St. seatoi* (Huang): Harrison & Rattanarithikul, 1973 (2i, 2d, 3i, 3d).

*Stegomyia (Stegomyia) aegypti* (Linnaeus): Martini, 1930 (2i, 3i, as *fasciatus* Fabricius); Abdel-Malek & Goulding, 1948 (2d, 3d); Hopkins, 1952 (2i, 3i); Smart *et al.*, 1956 (2i, 2i); Shalaby, 1957a (2i, 2d, 3i, 3d); Christophers, 1960 (2i, 2d, 3i, 3d); Harrison & Rattanarithikul, 1973 (2i, 2d, 3i, 3d); Wood & Dalingwater, 1975 (2d, 3d).

*Tanakaius togoi* (Theobald): Makiya, 1969 (2d, 3d).

### Tribe Culicini Meigen, 1818

*Culex (Culex) annulus* Theobald: Yan, 1977 (2i, 2d, 3i, 3d).

*Cx. (Cux.) erythrothorax* Dyar: Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Cux.) fuscocephala* Theobald: Yan, 1977 (2i, 2d, 3i, 3d).

*Cx. (Cux.) orientalis* Edwards: Makiya, 1969 (2d, 3d).

*Cx. (Cux.) pseudovishnui* Colless: Yan, 1977 (2i, 2d, 3i, 3d, as *neovishnui* Lien).

*Cx. (Cux.) pipiens* Linnaeus: Dyar, 1905 (2d, 3d); Bohart & Washino, 1957 (2i, 2d, 3d); Makiya, 1969 (2d, 3d, as *pipiens* subspecies *molestus* Forskål); Krida *et al.*, 1998 (2i, 2d, 3i, 3d).

*Cx. (Cux.) quinquefasciatus* Say: Shalaby, 1957b (2i, 2d, 3i, 3d); Bohart & Washino, 1957 (2i, 2d, 3d); Yan, 1977 (2i, 2d, 3i, 3d, as *pipiens* subspecies *fatigans* Wiedemman).

*Cx. (Cux.) restuans* Theobald: Dyar, 1902 (2d, 3d); Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Cux.) stigmatosoma* Dyar: Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Cux.) tarsalis* Coquillett: Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Cux.) thriambus* Dyar: Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Cux.) tritaeniorhynchus* Giles: Makiya, 1969 (2d, 3d); Yan, 1977 (2i, 2d, 3i, 3d, as *tritaeniorhynchus* subspecies *summosus* Dyar).

*Cx. (Cux.) vishnui* Theobald: Makiya, 1969 (2d, 3d).

*Culex (Melanoconion) anips* Dyar: Bohart & Washino, 1957 (2i, 2d).

*Culex (Neoculex) apicalis* Adams: Natvig, 1948 (2i, 2d, 3i, 3d); Abdel-Malek & Goulding, 1948 (2d, 3d); Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Ncx.) boharti* Brookman & Reeves: Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Ncx.) reevesi* Wirth: Bohart & Washino, 1957 (2i, 2d, 3d).

*Cx. (Ncx.) territans* Walker: Knab, 1904 (2i, 2d, 3i, 3d); Bohart & Washino, 1957 (2i, 2d, 3d); Eddleman, 1967 (2i, 2d, 3i, 3d); de Oliveira & Durand, 1978 (2d, 3d); Savignac & Maire, 1981 (2i, 2d, 3i, 3d).

*Lutzia (Metalutzia) vorax* Edwards: Makiya, 1969 (2d, 3d).

### **Tribe Culisetini Belkin, 1962**

*Culiseta (Allotheobaldia) longiareolata* (Macquart): Maslov, 1989 (2i, 2d, 3i, 3d).

*Culiseta (Climacura) melanura* (Coquillett): Dyar, 1902 (3d); Savignac & Maire, 1981 (2i, 2d, 3i, 3d).

*Culiseta (Culicella) amurensis* Maslov: Maslov, 1989 (2d, 3d, as *silvestris* (Shingarev) subspecies *amurensis*).

*Cs. (Cuc.) morsitans* (Theobald): Barr, 1958 (3d); Maslov, 1989 (2i, 2d, 3i, 3d, as *morsitans* subspecies *morsitans*).

*Culiseta (Culiseta) alaskaensis indica* (Edwards): Maslov, 1989 (2d, 3d).

*Cs. (Cus.) annulata* (Schrank): Marshall, 1938 (2d, 3d).

*Cs. (Cus.) bergrothi* (Edwards): Maslov, 1989 (2d, 3d); Stojanovich & Scott, 1995a (2i, 3i), 1995b (2i, 3i), 1995c (2i, 3i), 1996 (2i, 3i), 1997 (2i, 3i).

*Cs. (Cus.) subochrea* (Edwards): Maslov, 1989 (2d, 3d, as *annulata* (Schrank) subspecies *subochrea*).

### **Tribe Mansoniini Belkin, 1962**

*Coquillettidia (Coquillettidia) perturbans* (Walker): Barr, 1953 (3d).

### **Tribe Orthopodomyiini Belkin & Heinemann, 1970**

*Orthopodomyia alba* Baker: Wilkins & Breland, 1951 (2i, 2d, 3i, 3d).

### **Tribe Sabethini Blanchard, 1905**

*Sabethes (Sabethoides) chloropterus* (van Humboldt): Harbach, 1991 (2i, 2d, 3i, 3d).

*Tripteroides (Tricholeptomyia) microcala* (Dyar): Baisas & Ubaldo-Pagayon, 1952 (2i, 3i).

*Tripteroides (Tripteroides) bambusa* (Yamada): Makiya, 1969 (2d, 3d).

*Wyeomyia (Wyeomyia) haynei* Dodge: Dodge, 1947 (2d, 3d).

*Wy. (Wyo.) smithii* (Coquillett): Dodge, 1947 (2d, 3d); Savignac & Maire, 1981 (2i, 2d, 3i, 3d).

#### **Tribe Toxorhynchitini Lahille, 1904**

*Toxorhynchites (Lynchiella) rutilus septentrionalis* (Dyar & Knab): Breland, 1949 (2i, 2d, 3i, 3d, as *Megarhinus septentrionalis*); Dodge, 1964 (2i, 2d, 3i, 3d).

*Toxorhynchites (Toxorhynchites) brevipalpis conradti* Grünberg: Corbet, 1963 (2i, 2d, 3i).

*Tx. (Tox.) splendens* (Wiedemann): Chan, 1968 (2d, 3d); Furumizo & Rudnick, 1978 (2d, 3d).

#### **Tribe Uranotaeniini Lahille, 1904**

*Uranotaenia (Pseudoficalbia) anhydor* Dyar: Belkin & McDonald, 1956 (2i, 2d, 3i, 3d).

*Ur. (Pfc.) bimaculata* Leicester: Makiya, 1969 (2d, 3d).

*Uranotaenia (Uranotaenia) sapphirina* (Osten Sacken): Dyar, 1901 (2d, 3d).

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