



Identification Guide to Adult Mosquitoes in Mississippi

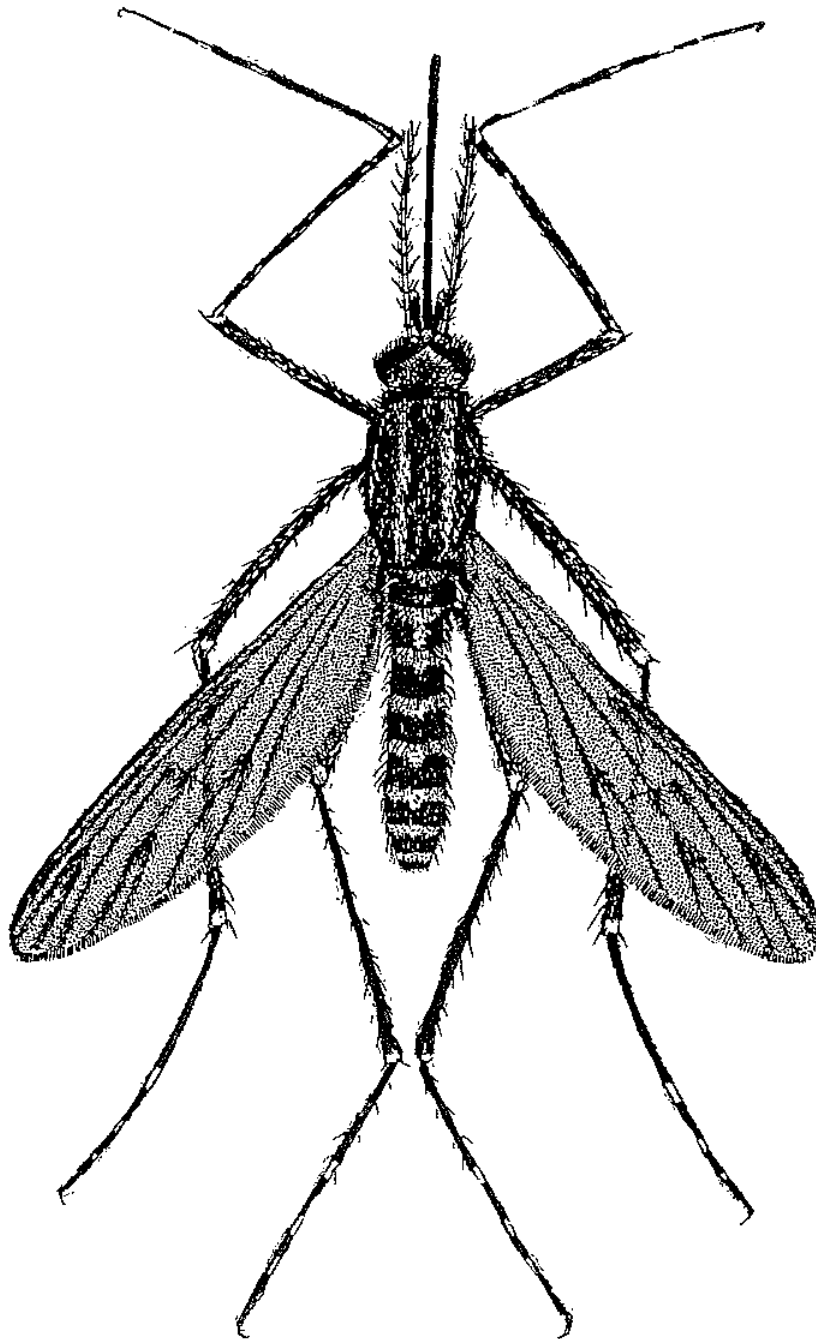
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Identification Guide to Adult Mosquitoes in Mississippi

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Cover photo by Dr. Blake Layton, Mississippi State University Extension Service.



Preface

Mosquitoes and the diseases they transmit are increasing in frequency and geographic distribution. As many as 1,000 people were exposed recently to dengue fever during an outbreak in the Florida Keys. “New” mosquito-borne diseases such as West Nile and Chikungunya have increased public awareness about disease potential from these notorious pests.

This book was written to provide citizens, public health workers, school teachers, and other interested parties with a hands-on, user-friendly guide to Mississippi mosquitoes. The book’s utility may vary with each user group, and that’s OK; some will want or need more detail than others. Nonetheless, the information provided will allow you to identify mosquitoes found in Mississippi with a fair degree of accuracy. For more information about mosquito species occurring in the state and diseases they may transmit, contact the entomology staff at the Mississippi State Department of Health or the medical entomologist at Mississippi State University.

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Entomology, and Plant Pathology at Mississippi State University, provided helpful comments and other support for publication of this book. Most figures used in this book are from Darsie, R. F. and Ward, R. A., *Identification and Geographical Distribution of the Mosquitoes of North America, North of Mexico*, University Press of Florida, Gainesville, FL, 2005, and Carpenter, S. and LaCasse, W., *Mosquitoes of North America*, University of California Press, Berkeley, CA, 1955. None of these figures are protected under current copyrights.

Introduction and Background

There has never been a systematic, statewide study of mosquitoes in Mississippi. Various authors have reported mosquito collection records as a result of surveys of military installations in the state and/or public health malaria inspections. The first published mosquito records from Mississippi resulted from an anopheline survey (malaria-related) in 1927 in which the authors reported *Anopheles crucians*, *An. punctipennis*, *An. pseudopunctipennis*, and *An. quadrimaculatus* (Carley and Balfour 1929). Two years later, another malaria study in the Mississippi Delta reported *An. quadrimaculatus*, *An. punctipennis*, and *An. crucians* (Perez 1930). A paper published in 1940 by the State Board of Health discussed *Anopheles* population densities in Mississippi but reported no specific species names (Bradley, Bellamy et al. 1940). During the 1940s, several military-related studies in Mississippi provided further records of mosquitoes (King and Bradley 1941; King, Roth et al. 1943; Middlekauff and Carpenter 1944; Carpenter, Chamberlain et al. 1945; Miles and Rings 1946; Michener 1947; Rings and Richmond 1953). Michener’s work was the most complete, revealing 47 species from the Camp Shelby (Hattiesburg) vicinity of South Mississippi (Michener 1947). In addition, a study on chemical control of rice field mosquitoes in 1952 and 1953 in Bolivar County mentioned *Psorophora confinnis* (as *columbiae*) (Mathis et al. 1954). Later, the results of these earlier records were summarized and provided a total of 53 species occurring in Mississippi (King et al. 1960).

In 1969, the U.S. Department of Agriculture conducted mosquito surveillance in Hancock County as part of a pest-monitoring program. All collections were made in February and March and yielded only 10 relatively common species (USDA 1969). In the mid-1960s, Harden and Poolson (1969) published a study to determine the seasonality of mosquitoes in Hancock County. During a 4-year collection period (1964–1968), a total of 33 species was recorded. Almost all records from the 1970s, 1980s, and early 1990s resulted from collections made by U.S. Air Force personnel at installations in Harrison and Lowndes counties (USAF 1971; USAF 1975; USAF 1977; USAF 1978; USAF 1979; USAF 1980; USAF 1981; USAF 1983; USAF 1984; USAF 1986; USAF 1987; USAF 1988).

Records from 1989 show the first known presence of the introduced species *Aedes albopictus* in Mississippi (USAF 1989). A master's thesis in 1974 by Harry Fulton determined the seasonality of mosquitoes in Clay, Lowndes, and Oktibbeha counties. A total of 39 species was collected from March 1972 to November 1973 during his study. Some of the most interesting findings in his survey included *Anopheles walkeri*, *Orthopodomyia alba*, *Culex pilosus*, and *Cx. peccator* (Fulton 1974; Fulton et al. 1974). In 1977 and 1983, Bradshaw published two papers on the pitcher-plant mosquito *Wyeomyia smithii* in Mississippi, with both papers reporting collections from George County. He noted that the mosquito was found associated with the purple pitcher-plant, *Sarracenia purpurea*, and its hybrids (Bradshaw and Lounibos 1977; Bradshaw 1983). In 1982, Nelson conducted a small study at Mays Lake in Jackson, Mississippi, to determine the relative abundance and species composition of the mosquito population (Nelson et al. 1985). During the months of March through September 1982, a total of 13 species from five genera were recorded. In the late 1990s, research was conducted in northeast Mississippi to determine arbovirus activity in the adult mosquito population. Traps were set in a wetland in Tishomingo County to collect mosquitoes for arboviral testing and to determine species diversity. A total of 23 species was collected (Cupp et al. 2004).

Unusual Mosquito Records from Mississippi

There are several unusual mosquito collection records from Mississippi. King et al. (1960) mentioned a record of two *Ae. stimulans* from Electric Mills in Kemper County, Mississippi. Finding these two specimens several hundred miles south of their normal range is quite strange; however, the record has been confirmed and accepted as a valid Mississippi record (Goddard and Harrison 2005).

There is also a collection record of *Ae. dorsalis* from Como, Mississippi (Miles and Rings 1946). *Aedes dorsalis* is ordinarily only found in the western United States. Even though we have no voucher available, the specimen was apparently identified by Alan Stone, one of the foremost diptera experts in the country, so we must accept this as a valid Mississippi record.

Harden et al. (1967) mentioned *Ps. pygmea* from Horn Island, Mississippi. Again, we have no specimen available. Goddard and Harrison (2005) addressed this issue and determined that since this species is restricted to southern Florida and no voucher specimen is available, the record must be deleted.

There is one record of *Ae. nigromaculis* from Harrison County, Mississippi (USAF 1990). The distribution of *Ae. nigromaculis* borders the western edge of Mississippi (Darsie and Ward 2005), so finding this species in Mississippi is certainly possible. Nonetheless, we have no voucher specimen and thus no positive verification of this species from Mississippi.

Mosquito Taxonomy and Reclassification Issues

For mosquito identification/surveillance, we use the illustrations in Carpenter and LaCasse (1955) and the keys of Darsie and Ward (2005), Slaff and Apperson (1989), and Darsie and Morris (2000). We have accepted the recent changes in *Aedes* nomenclature by Reinert (2000) and recognize *Ochlerotatus* as the genus for certain species that were formerly in the genus *Aedes*. Abbreviations for genera follow Reinert (2001). As for species complex, *Anopheles quadrimaculatus* s.l., we have

accepted the Reinert et al. (1997) classification that there are five species in this complex consisting of *An. diluvialis*, *An. inundatus*, *An. maverlius*, *An. quadrimaculatus*, and *An. smaragdinus*. Three of these species (*An. maverlius*, *An. quadrimaculatus*, and *An. smaragdinus*) have been recorded from Mississippi (Reinert et al. 1997).

Recent Mosquito Work in Mississippi

In 2000, the Mississippi State Department of Health received a West Nile surveillance grant from the Centers for Disease Control. This grant provided funding for more intensive mosquito collecting and West Nile testing in selected areas around the state. As a result, several new state records for mosquitoes have been found.

In 2005, Goddard and Harrison (2005) described two of these new state records. One was *Mansonia tittilans*, which was recorded from Madison (2000), Copiah (2000), and Rankin counties (2003), and the other was *Ochlerotatus trivittatus* from Marshall County.

The most recent new Mississippi mosquito records are *Culex coronator*, collected in November 2004 from Copiah County (Varnado et al. 2005), and *Ochlerotatus japonicus*, collected in 2011 from Itawamba County (Thorn et al. 2012). *Culex coronator* is typically located in Central and South America. Previously, this species was only collected in the United States from Arizona, New Mexico, and Texas.

Many gaps remain in our knowledge of Mississippi mosquitoes. Despite increased mosquito surveillance, thanks to CDC funding, there remains a need for a systematic statewide mosquito survey.

This publication summarizes the knowledge on mosquitoes occurring in Mississippi. Many of the distribution records used to generate this list of species are the result of extensive collecting conducted by the authors from 2003 to 2007 throughout much of the state. In addition, a contract mosquito surveillance technician (M'Lee Loe) collected several thousand records from around the state from 2001 to 2003. The collection records and literature show 61 species occurring or having occurred in Mississippi. Voucher specimens

representing 57 of the 61 species discussed are deposited in the Mississippi Entomological Museum or in the Smithsonian Institution. Nine species have been reported for which specimens have not been examined by the authors or verified as valid.

Basic Mosquito Biology and Ecology

Mosquitoes undergo complete metamorphosis, having egg, larval, pupal, and adult stages. Larvae are commonly referred to as "wigglers" and pupae as "tumblers." Larvae and pupae of mosquitoes are always found in water. Breeding sites may be anything from water in discarded automobile tires and the axils of plants, to pools, puddles, swamps, and lakes. It is very important to note that mosquito species differ in their breeding habits, biting behavior, flight range, and so forth. However, a generalized description of their life cycle is presented here as a basis for understanding mosquito biology and ecology.

There are two subfamilies in the mosquito family (Culicidae): Anophelinae and Culicinae. Most larvae in the subfamily Culicinae hang down just under the water surface by the siphon, whereas anopheline larvae lie horizontally just beneath the water surface supported by small notched organs of the thorax and clusters of float hairs along the abdomen. They have no prominent siphon. Mosquito larvae feed on suspended particles in the water as well as microorganisms. However, there are a few species that capture and eat other species. They undergo four molts (each successively larger), the last of which results in the pupal stage. With optimal food and temperature, the time required for development from larva to adult can be as short as 7 days.

The pupal stage of mosquitoes does not feed. Pupae give rise to adult mosquitoes in 2 to 4 days. The emergence process begins with splitting of the pupal skin along the back. An emerging adult must dry its wings and groom its head appendages before flying away. Accordingly, this is a critical stage in the survival of mosquitoes. If there is too much wind or wave action, the emerging adult will fall over, becoming trapped on the water surface to die. This is the reason that little if any mosquito

breeding occurs in open water; it occurs at the water's edge among weeds.

Adult mosquitoes of both sexes obtain nourishment for basic metabolism and flight by feeding on nectar. In addition, females of most species need a blood meal from birds, mammals, or other vertebrates for egg development. They suck blood via specialized piercing-sucking mouthparts.

Breeding sites selected for egg-laying differ by species, but generally mosquitoes can be divided into three major groups: permanent water breeders, floodwater breeders, and artificial container/tree hole breeders. *Anopheles* and many *Culex* mosquitoes select permanent water bodies, such as swamps, ponds, lakes, and ditches, that do not usually dry up. Floodwater mosquitoes lay eggs on the ground in low areas subject to repeated flooding. During heavy rains, water collecting in these low areas covers the eggs, which hatch from within minutes to a few hours. Salt marsh mosquitoes (*Ochlerotatus sollicitans*), inland floodwater mosquitoes (*Aedes vexans*), and dark rice field mosquitoes (*Psorophora columbiae*) are included in this group. Artificial container/tree hole breeders are represented by yellow fever mosquitoes (*Ae. aegypti*), Asian tiger mosquitoes (*Ae. albopictus*), tree hole mosquitoes (*Oc. triseriatus*), and others. However, several species of *Anopheles* and *Culex* may also occasionally oviposit in these areas. Some of these container-breeding species lay eggs on the walls of a container just above the water line. The eggs are flooded when rainfall raises the water level. Other species oviposit directly on the water surface.

Female *Anopheles* mosquitoes generally lay eggs on the surface of the water at night. Each batch usually contains 100 to 150 eggs. Each *Anopheles* egg is cigar-shaped and about 1 mm long, and bears a pair of air-filled floats on the sides. Under favorable conditions, hatching occurs within 72 hours. *Anopheles* mosquitoes may occur in extremely high numbers. In the Mississippi Delta, mosquito trapping has yielded as many as 9,000 *An. quadrimaculatus* per trap, per night!

Aedes and *Ochlerotatus* mosquitoes lay their eggs on moist ground around the edge of the water or, as previously mentioned, on the inside walls of artificial containers just above the water line. *Aedes/Ochlerotatus* eggs will desiccate and perish

easily when first laid. However, after embryo development with each egg, the eggs can withstand dry conditions for long periods of time. This trait has allowed *Aedes/Ochlerotatus* mosquitoes to use temporary water bodies for breeding, such as artificial containers, periodically flooded salt marshes or fields, tree holes, and storm water pools. Also, *Aedes/Ochlerotatus* mosquitoes have inadvertently been carried to many parts of the world as dry eggs in tires, water jars, or other containers.

Salt marsh mosquitoes, such as *Ochlerotatus taeniorhynchus* and *Oc. sollicitans*, breed in salt marsh pools flooded by tides and/or rain and periodically emerge in great swarms, making outdoor activity in large areas of seacoast unbearable. Their flight range is between 5 and 10 miles, but they can travel 40 miles or more. *Psorophora* mosquitoes also lay dry-resistant eggs. These mosquitoes are a major problem species in rice fields. Eggs are laid on the soil and hatch once the rice field is irrigated. *Psorophora* mosquitoes may also emerge in huge swarms. In 1932, *Ps. columbiae* is reported to have caused a great loss of livestock in the Everglades, and the milk supply was greatly reduced during the 4 days of the infestation (Harwood and James 1979).

Culex mosquitoes lay batches of eggs attached together to form little floating rafts. On close inspection of a suitable breeding site, these egg rafts can often be seen floating on the water's surface. Where breeding conditions are favorable, *Culex* mosquitoes also occur in enormous numbers. Several *Culex* species are notorious for their aggravating high-pitched hum when flying about the ears.

In tropical areas, mosquito breeding may continue year-round, but in temperate climates, many species undergo a diapause in which the adults enter a dormant state similar to hibernation. In preparation for this, females become reluctant to feed, cease ovarian development, and develop fat body. In addition, they may seek a protected place to pass the approaching winter. Some species, instead of passing the winter as hibernating adults, produce dormant eggs or have larvae that can survive the harsh effects of winter.

Mosquitoes vary in their biting patterns. Most species are nocturnal in activity, biting mainly in the early evening. However, some species, especially *Ae. aegypti* and *Ae. albopictus*, bite in broad day-

light (although there may be a peak of biting early and late in the day). Others, such as salt marsh species and many members of the genus *Psorophora* ordinarily bite during the night but will attack if disturbed during the day (such as walking through high grass harboring resting adults).

Mosquitoes and Human Disease

Mosquitoes may impact human health directly through nuisance biting (and sometimes secondary infection afterwards) or indirectly through disease transmission (Goddard 1994; McHugh 1994; Goddard 2004). Although malaria, yellow fever, and dengue could possibly return to the United States and begin spreading, the primary threat from mosquito-borne disease comes from the encephalitis viruses. There are several such viruses circulating in the United States, leading to thousands of cases each year.

St. Louis Encephalitis

St. Louis Encephalitis (SLE) virus circulates naturally among birds and is transmitted by *Culex* mosquitoes. Humans can become infected only if bitten by an infected mosquito. Humans are actually “dead end” hosts, meaning that the virus in human blood never reaches a level high enough to infect a biting female mosquito to continue the cycle. Not all people infected with the virus develop clinical disease. However, SLE may produce abrupt fever, nausea, vomiting, and severe headache in humans within 5 to 7 days after being bitten. Fatality rates range from 2 to 20 percent, with most deaths occurring in people 60 years of age or older (Monath 1980).

Outbreaks of SLE usually occur in midsummer to early fall. Since wild birds and domestic fowl are the reservoirs of this virus, urban areas where large bird populations and abundant *Culex* mosquitoes are found together are prime sites for a disease outbreak. A major SLE outbreak occurred in Mississippi in 1975 (Powell and Blakey 1976; Powell and Blakey 1977; Monath 1980). Numerous people were affected and many cases resulted in death. The threat for this to happen again is real.

West Nile Virus Encephalitis

West Nile virus (WNV) was introduced into the United States in 1999 and has since spread across the country (CDC 1999; CDC 2007a). The disease is maintained in nature in a manner similar to St. Louis Encephalitis, in a bird-mosquito cycle, although humans and horses are incidental hosts. Several *Culex* spp., including the common mosquitoes *Culex quinquefasciatus*, *Cx. pipiens*, *Cx. tarsalis*, and *Cx. salinarius* and possibly *Cx. restuans*, are the principal vectors to people (Hayes et al. 2005). WNV appears to be most dangerous to elderly or immune-compromised patients. Since WNV has been demonstrated to amplify in the Asian tiger mosquito in the laboratory and WNV-positive pools of this mosquito have been detected, it is possible that this mosquito could also be involved in WNV transmission. In contrast to other mosquito-borne viruses, WNV also kills many birds in the United States, especially crows, blue jays, and raptors.

Surveillance efforts to detect the presence of WNV in Mississippi, therefore, sometimes targets the reporting and testing of those three types of dead birds. WNV does not generally cause as serious illness as some other arboviral diseases (e.g., EEE, SLE). In fact, only one out of every 150 to 200 people exposed to the virus will become ill, and less than 10 percent of clinically ill patients will die (Hayes et al. 2005). Still, the public’s perception and reaction to local reports of WNV cases causes much anxiety and fear in communities. Local officials are, then, pressured by the public to provide mosquito control to protect them.

Eastern Equine Encephalitis

Eastern Equine Encephalomyelitis (EEE) is the most severe of all the mosquito-borne encephalitis diseases in Mississippi (Morris 1988). As with SLE and WNV, birds are the primary hosts, and mosquitoes, particularly *Culiseta melanura*, are the vectors from bird to bird. However, *Cs. melanura* rarely feeds on humans. People usually become infected with EEE as dead-end hosts when fed upon by infected salt marsh mosquitoes (*Ochlerotatus sollicitans*), inland floodwater mosquitoes (*Aedes vexans*), *Coquillettidia perturbans*, and a few other species.

The disease will affect people of any age, with young children and infants being the most susceptible. The mortality rate is more than 50 percent, and children surviving the disease often suffer from some degree of mental retardation or paralysis. Horses are often severely affected by the disease during outbreaks. However, a horse vaccine is available.

LaCrosse Encephalitis

In contrast to most other mosquito-borne viruses in Mississippi, LaCrosse (LAC) maintains its cycle in nature via a small mammal-mosquito cycle. Usually, the mosquito vector is the tree-hole mosquito *Ochlerotatus triseriatus*, and the reservoir is the gray squirrel. However, chipmunks may also be involved. Mississippi recorded its first confirmed cases of LAC in 1967, but the disease was not often diagnosed until eight cases were identified in 2001. LAC most often occurs in children younger than 16 and can cause convulsive disorders in affected children (McJunkin et al. 2001). These facts may lead parents to demand that local officials implement control measures.

Malaria

Malaria is the most common and devastating infectious mosquito-borne disease in the world today, with hundreds of millions of cases reported annually from tropical and sub-tropical countries (Sturmer 1989). Historically, the disease also occurred in the temperate zone including Mississippi (Goddard and Hataway 2011); however, intensive mosquito control efforts in the 1930s through 1950s, along with improvements in the standard of living (air conditioning and screening), eliminated the malady from the United States. Imported cases still occur, and even occasional outbreaks of locally transmitted malaria, but they are usually quickly contained (Bradley et al. 1940; Harden et al. 1967; Zucker 1996; CDC 2004).

Classic malaria includes symptoms such as fever, chills, sweats, headache, muscle pain, and malaise. There may be a repeating cycle of high fever and sweating. Infants may display only lethargy, irritability, and anorexia. In rare forms of falciparum malaria (there are five different species of malaria; see below), chills and fever may be absent, and the patient may present with medical shock, delirium,

or coma (Cunliffe et al. 1984; Gilles and Warrell 1993). Falciparum malaria may also produce complications such as renal failure, hemolytic anemia, hypoglycemia, and acute pulmonary edema.

Human malaria is caused by any one of five species (four primary ones) of microscopic protozoan parasites in the genus *Plasmodium*: *Plasmodium vivax*, *P. malariae*, *P. ovale*, *P. falciparum*, and *P. knowlesi*. The infective sporozoites are transmitted to humans only by mosquitoes in the genus *Anopheles*. However, not every species of *Anopheles* is a vector; less than half of the 300 or so known species are considered vectors. In fact, only 30 species are important vectors. Not all species of *Plasmodium* occur in all places. Generally, *P. vivax* is prevalent throughout all malarious areas, except sub-Saharan Africa; *P. ovale* is found chiefly in tropical areas of western Africa (occasionally western Pacific and southeast Asia); *P. malariae* is widely distributed around the world, but often spotty; *P. falciparum* predominates in sub-Saharan Africa but also occurs in southeast Asia and South America; *P. knowlesi* occurs in southeast Asia.

It is believed that there are at least four malaria mosquito vectors in the United States: *Anopheles freeborni* (in the western U.S.), *An. hermsi* (a recently described species in the West), *An. punctipennis* (western U.S.), and *An. quadrimaculatus* (eastern U.S.). As mentioned earlier, *An. quadrimaculatus* is actually a complex of five species consisting of *An. diluvialis*, *An. inundatus*, *An. maverlii*, *An. quadrimaculatus*, and *An. smaragdinus*. Three of these subspecies (*An. maverlii*, *An. quadrimaculatus*, and *An. smaragdinus*) have been recorded from Mississippi (Reinert et al. 1997). Other *Anopheles* species may also be involved in malaria transmission in the United States but are considered vectors of minor importance (Jensen et al. 1998). All four of the main vector species breed in permanent freshwater sites, such as ponds, pools, and rice fields, and are avid human biters. Accordingly, there is always the possibility of reintroduction of the malaria parasite into the United States and resumption of indigenously acquired cases.

Dengue

Dengue is a serious mosquito-borne human disease occurring in Asia and Africa, as well as in the

Caribbean and in Central and South America. It is caused by a flavivirus related to yellow fever virus, which has four serotypes (Den 1, Den 2, Den 3, and Den 4). As far as is known, humans are the main vertebrate reservoir of the virus, although there may be a monkey-mosquito cycle in some areas. The disease is characterized by fever, headache, retro-orbital pain, and intense aching; it is sometimes referred to as “breakbone fever.” Occasionally, a more severe form of the disease occurs, dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS), which may result in a hemorrhagic shock syndrome with a fatal outcome.

Dengue is not an insignificant disease entity—there are approximately 50 million to 100 million cases each year (Gubler and Clark 1995; Spira 2005). Currently, it is not widespread in this country (except in the Florida Keys), but it is literally “knocking at the door” awaiting further spread. Hundreds of cases occurred in the summer of 1995 along the Texas–Mexico border, especially in the Reynosa area. A few cases were acquired on the U.S. side. Recently, there was a report of DHF in a resident of Brownsville, Texas (CDC 2007b), and about 60 cases of dengue in the Florida Keys. There is always the possibility of a widespread dengue epidemic in the United States since there is an abundance of the mosquito vectors in the south-central United States. Also, with the thousands of people returning home from cruises to the Caribbean each month (especially during the summer), there is a good chance of infected people returning and infecting local mosquitoes with the virus.

Dengue virus can be transmitted from person to person by the yellow fever mosquito (*Aedes aegypti*) and the Asian tiger mosquito (*Ae. albopictus*) (Goddard 1996; Gubler 1998). Generally, other than humans, no bird or mammal reservoirs exist for dengue. A mosquito can become infected with the virus by feeding on a person with the disease, then the virus must go through an 8- to 10-day incubation period in the mosquito before it becomes infective. The mosquito will then remain infective for the rest of its life.

Dog Heartworm

Dog heartworm is a serious canine disease in the midwestern and eastern United States (Harwood and James 1979). Almost 100 percent of unprotected dogs more than 5 years old are infected. Mosquito vectors that feed on an infected dog take in immature worms (first stage larvae) with the dog’s blood. The immature worms undergo development within the mosquito, reaching an infective state (third stage larvae) in 9 to 14 days after entering the mosquito. These infective larvae can then be transmitted to an uninfected dog when the mosquito feeds. The worms migrate to the dog’s heart and grow into adults. These adult worms produce first stage larvae that circulate within the dog’s blood and are taken up by feeding mosquitoes to continue the cycle. The southern house mosquito (*Culex quinquefasciatus*) is the primary vector of dog heartworm in Mississippi, although several other mosquitoes are involved.

Additional Resources

American Mosquito Control Association www.mosquito.org

Florida Mosquito Control Association www.floridamosquito.org

Mississippi State University, Mosquito Webpage <http://mississippientomologicalmuseum.org.msstate.edu/Researchtaxapages/Mosquitoes/Introduction.html>

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Mosquito Species in Mississippi, with Authors and Dates

Genus *Aedes* (*Ae.*)¹

- *aegypti* (Linnaeus), 1762
- *albopictus* (Skuse), 1895
- *cinereus* Meigen, 1818
- *vexans* (Meigen), 1830

Genus *Anopheles* (*An.*)

- *atropos* (Dyar & Knab), 1906
- *barberi* (Coquillett), 1903
- *bradleyi* (King), 1939
- *crucians* (Wiedemann), 1828
[see Wilkerson et al. 2004]
- *georgianus* (King), 1939
- *maverlius* (Reinert), 1997
- *pseudopunctipennis* (Theobald), 1901
- *punctipennis* (Say), 1823
- *quadrimaculatus* (Say), 1824
- *smaragdinus* (Reinert), 1997
- *walker* (Theobald), 1901

Genus *Coquillettidia* (*Cq.*)

- *perturbans* (Walker), 1856

Genus *Culex* (*Cx.*)

- *coronator* (Dyar & Knab), 1906
- *erraticus* (Dyar & Knab), 1906
- *nigripalpus* (Theobald), 1901
- *peccator* (Dyar & Knab), 1909
- *pilosus* (Dyar & Knab), 1906
- *quinquefasciatus* (Say), 1823
- *restuans* (Theobald), 1901
- *salinarius* (Coquillett), 1904
- *tarsalis* (Coquillett), 1896
- *territans* (Walker), 1856

Genus *Culiseta* (*Cs.*)

- *inornata* (Williston), 1893
- *melanura* (Coquillett), 1902

Genus *Mansonia* (*Ma.*)

- *titillans* (Walker), 1848

Genus *Ochlerotatus* (*Oc.*)¹

- *atlanticus* (Dyar & Knab), 1906
- *canadensis* (Theobald), 1901
- *dorsalis* (Meigen), 1830
- *dupreei* (Coquillett), 1904

- *fulvus pallens* (Ross), 1943
- *grossbecki* (Dyar & Knab), 1906
- *hendersoni* (Cockerell), 1918
- *infirmatus* (Dyar & Knab), 1906
- *japonicus* (Theobald), 1901
- *mitchellae* (Dyar), 1905
- *sollicitans* (Walker), 1856
- *sticticus* (Meigen), 1838
- *stimulans* (Walker), 1848
- *taeniorhynchus* (Wiedemann), 1821
- *thibaulti* (Dyar & Knab), 1910
- *tormentor* (Dyar & Knab), 1906
- *triseriatus* (Say), 1823
- *trivittatus* (Coquillett), 1902

Genus *Orthopodomyia* (*Or.*)

- *alba* (Baker), 1936
- *signifera* (Coquillett), 1896

Genus *Psorophora* (*Ps.*)

- *ciliata* (Fabricius), 1794
- *columbiae* (Dyar & Knab), 1906
- *cyanescens* (Coquillett), 1902
- *discolor* (Coquillett), 1903
- *ferox* (von Humboldt), 1819
- *horrida* (Dyar & Knab), 1908
- *howardii* (Coquillett), 1901
- *mathesoni* (Belkin & Heinemann), 1975

Genus *Toxorhynchites* (*Tx.*)

- *rutilus septentrionalis* (Dyar & Knab), 1906

Genus *Uranotaenia* (*Ur.*)

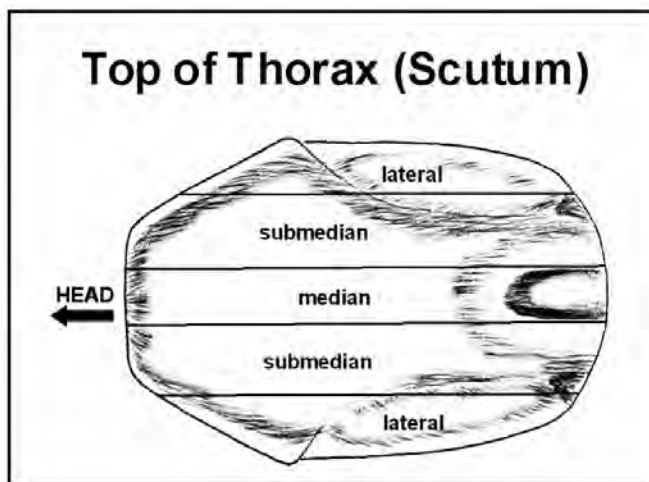
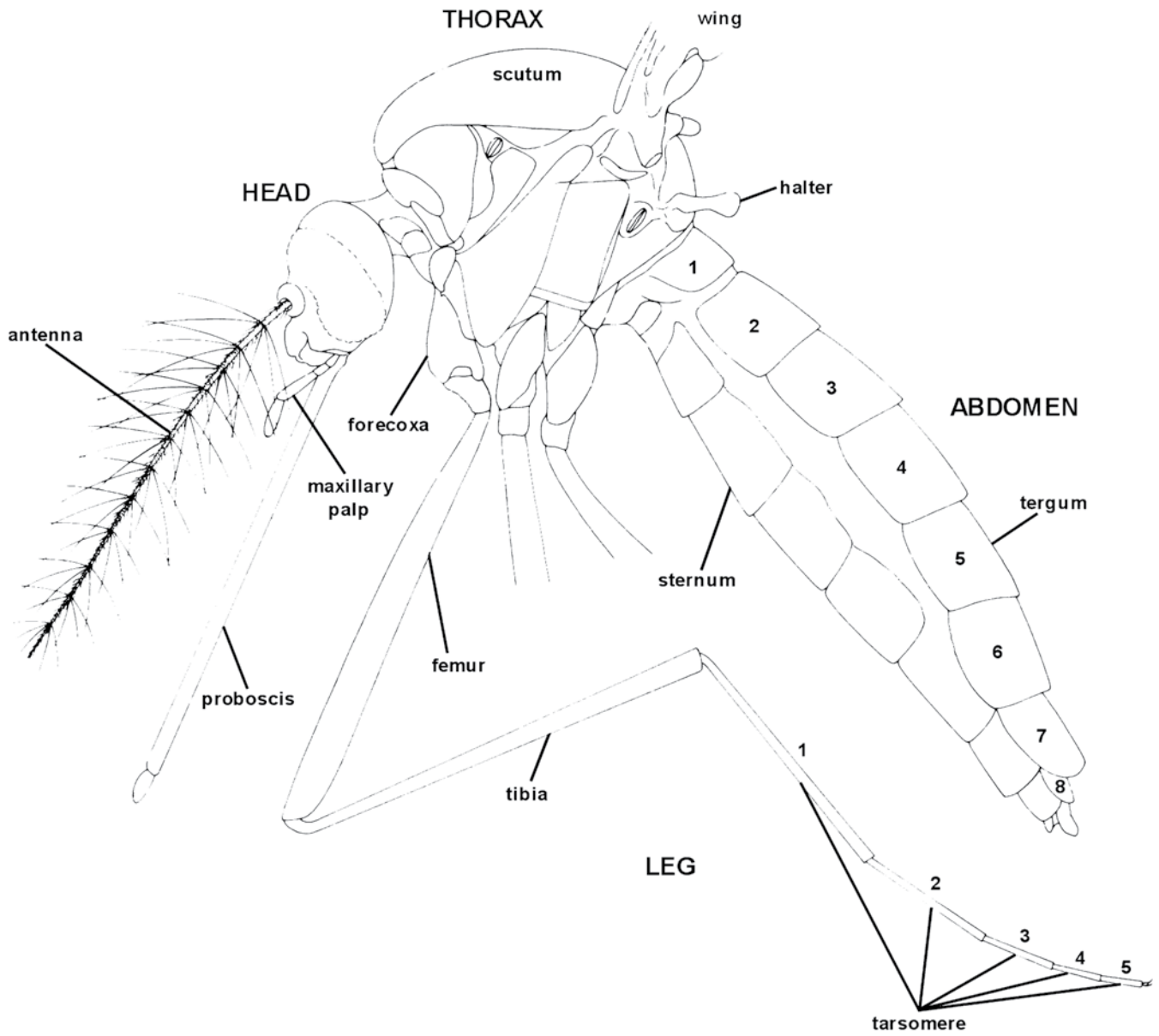
- *lowii* (Theobald), 1901
- *sapphirina* (Osten Sacken), 1868

Genus *Wyeomyia* (*Wy.*)

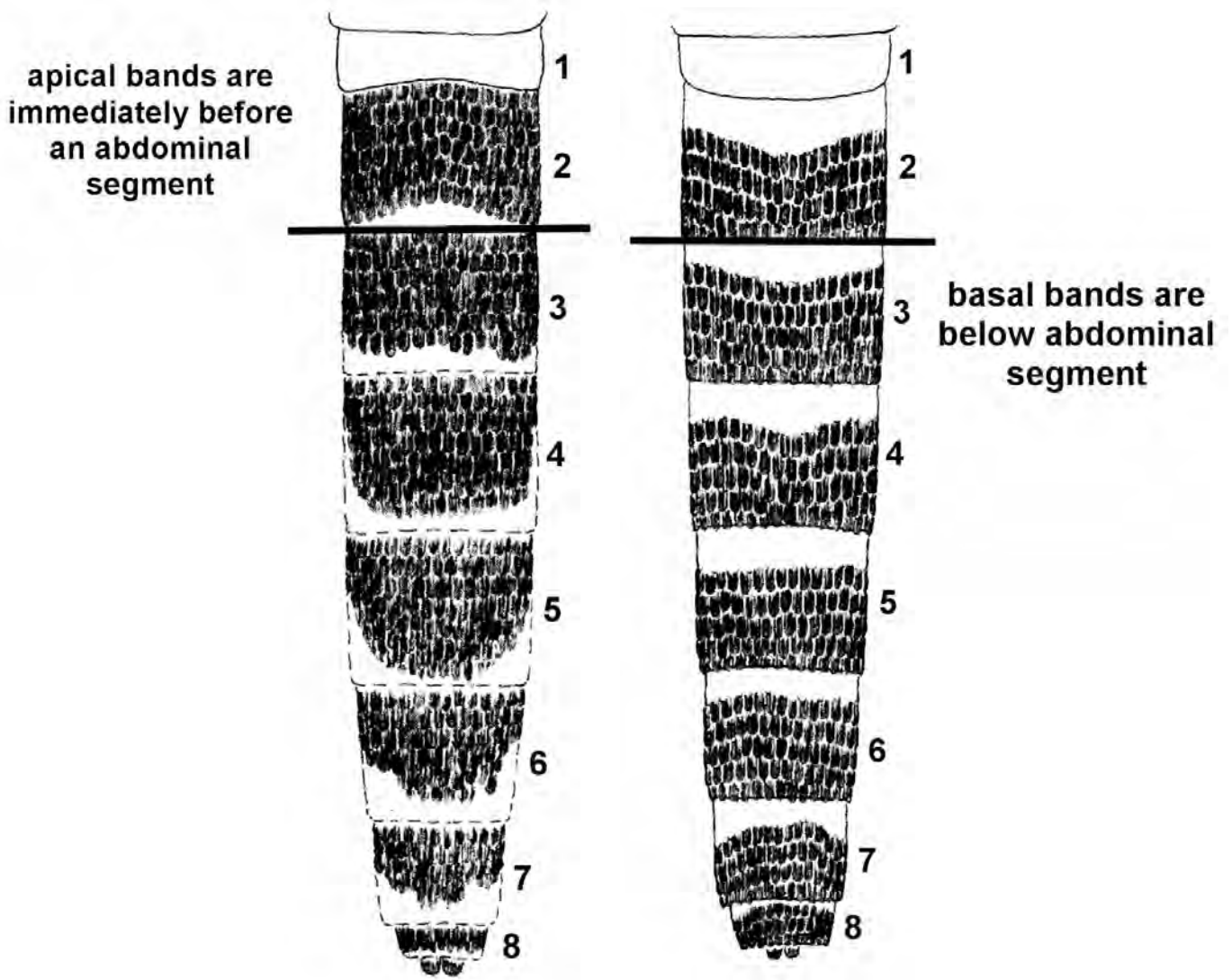
- *smithii* (Coquillett), 1901

¹ We have accepted the proposed changes in *Aedes* nomenclature (Reinert et al. 1997, Reinert 2000) and recognize *Ochlerotatus* as the genus for certain species that were formerly in the genus *Aedes*. It should be noted that many scientists still call all *Ochlerotatus* species *Aedes*.

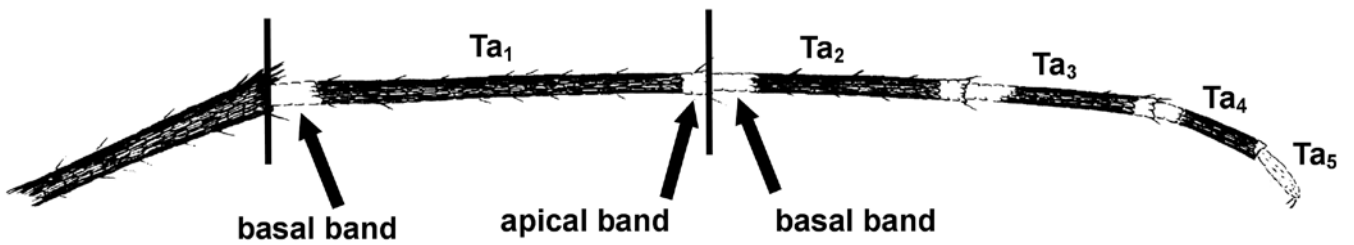
Adult Female



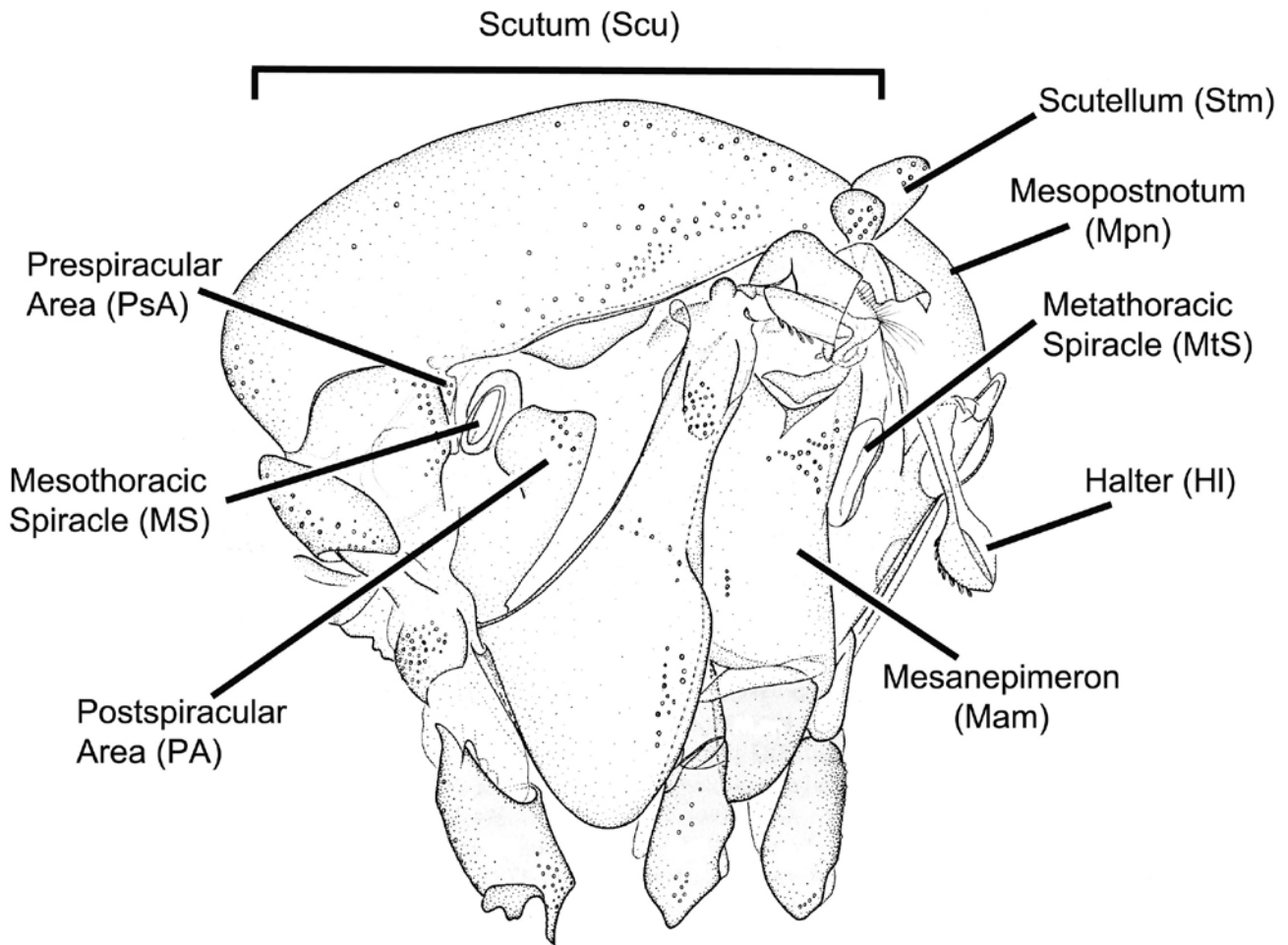
Female Abdomen



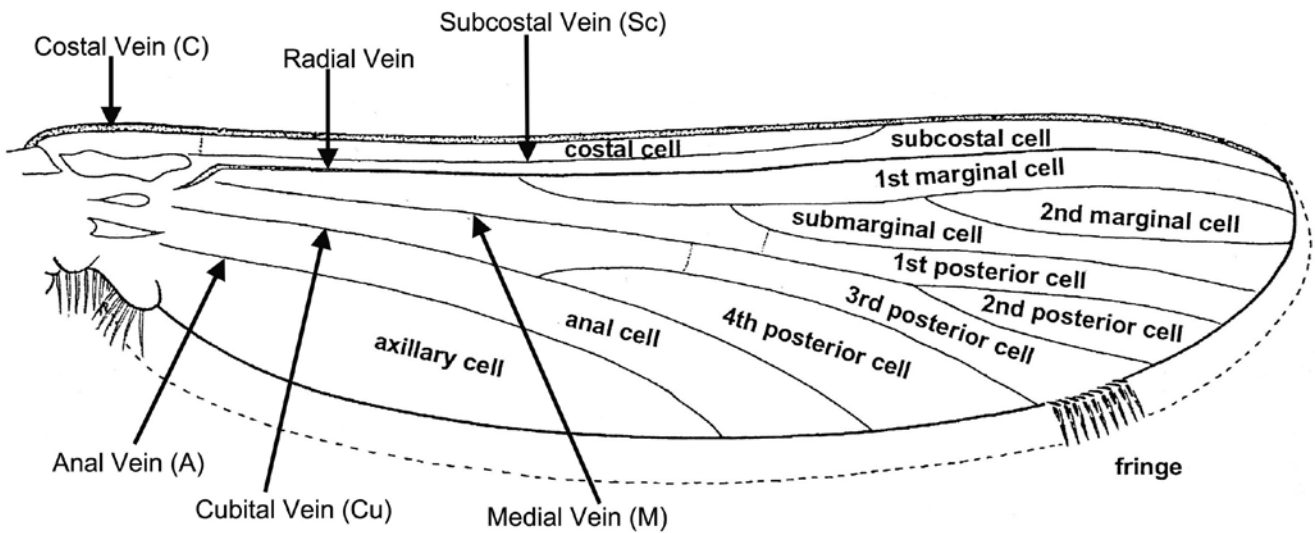
Hind Leg



Lateral View of Female Thorax



Wing Structure



Key to Genera of Adult Female Mosquitoes

1. Proboscis (P) strongly curved (Fig. 1a) with apical half much narrower than the basal half *Toxorhynchites rutilus septentrionalis*
 Proboscis not strongly curved (Fig. 1b) with apical half nearly equal width of base 2

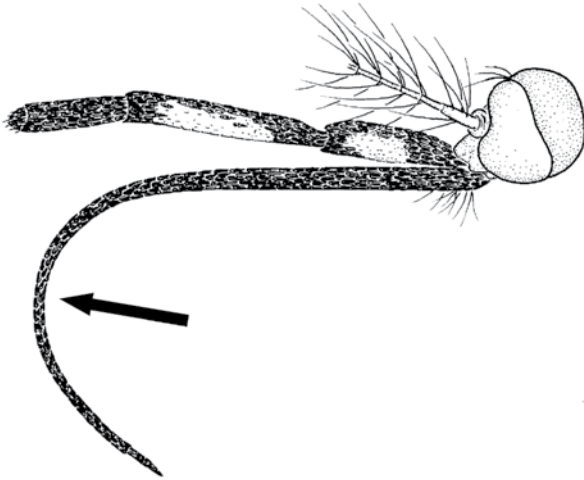


Fig. 1a *Tx. rutilus septentrionalis*

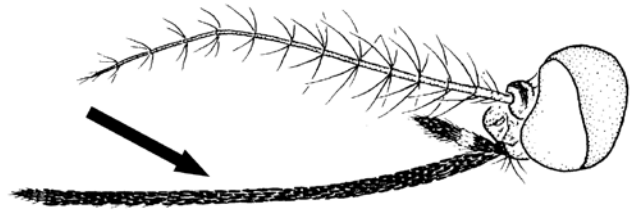


Fig. 1b *Ae. vexans*

- 2(1). Maxillary palps (Mp) about same length as proboscis (Fig. 2a) *Anopheles*
 Maxillary palps much shorter than proboscis (Fig. 2b) 3

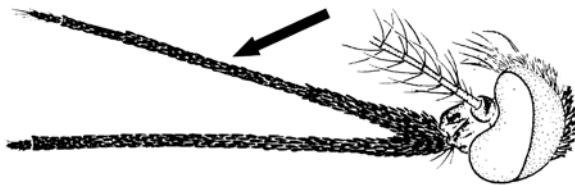


Fig. 2a *An. quadrimaculatus*

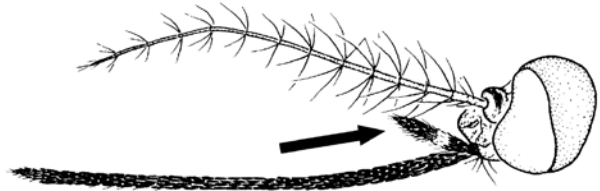


Fig. 2b *Ae. vexans*

- 3(2). Abdomen with all dark scales dorsally and pale scales ventrally, which meet to form a straight line (Fig. 3a); mesopostnotum (Mpn) with setae (Fig. 3c) *Wyeomyia smithii*
 Abdominal segments with pale bands or pale lateral patches not forming a straight line (Fig. 3b); mesopostnotum without setae (Fig. 3d) 4

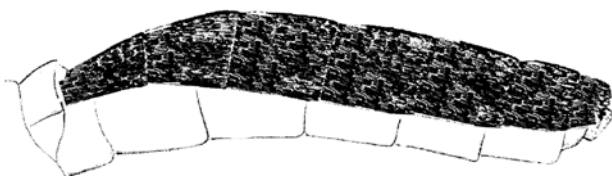


Fig. 3a *Wy. smithii*



Fig. 3b *Cx. quinquefasciatus*

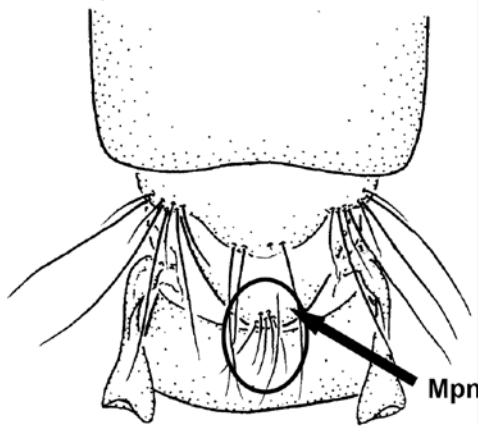


Fig. 3c *Wy. smithii*

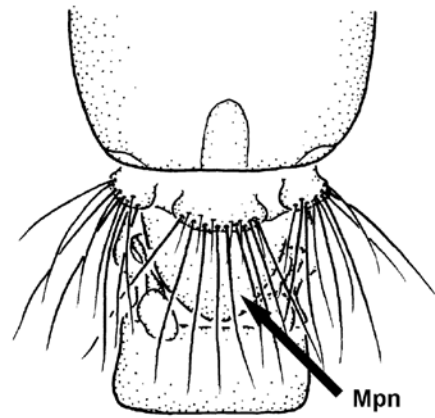


Fig. 3d *Ae. vexans*

4(3). Second marginal wing cell shorter than vein R_{2+3} (Fig. 4a); side of thorax with lines of iridescent blue scales (Fig. 4c) *Uranotaenia*

Second marginal wing cell at least as long as vein R_{2+3} (Fig. 4b); side of thorax without iridescent blue scales (Fig. 4d) 5

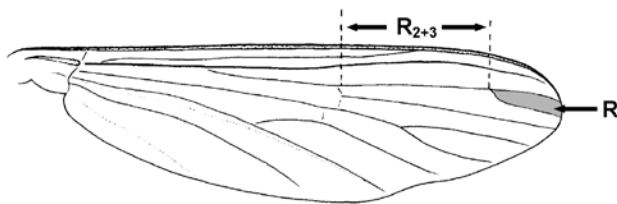


Fig. 4a *Ur. sapphirina*

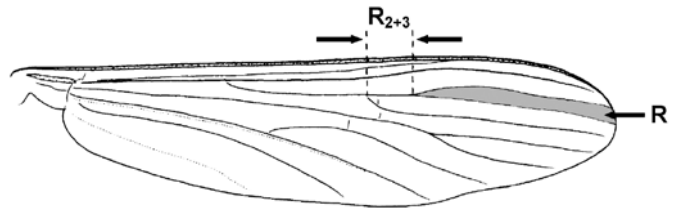


Fig. 4b *Cx. quinquefasciatus*

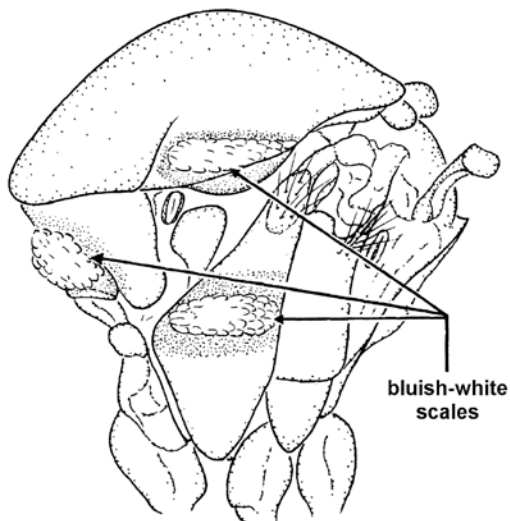


Fig. 4c *Ur. sapphirina*

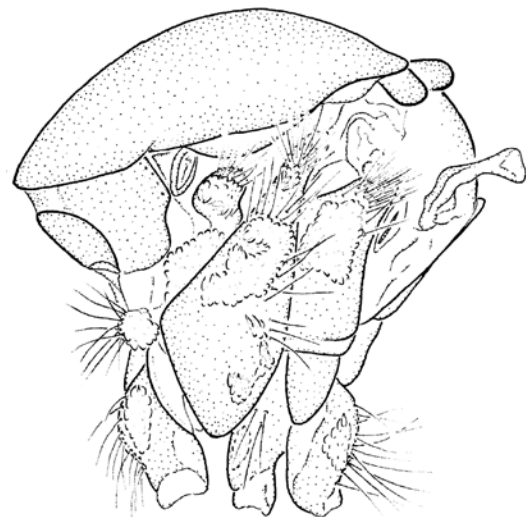


Fig. 4d *Ae. vexans*

- 5(4). Postspiracular setae present (Fig. 5a) 6
 Postspiracular setae absent (Fig. 5b) 8

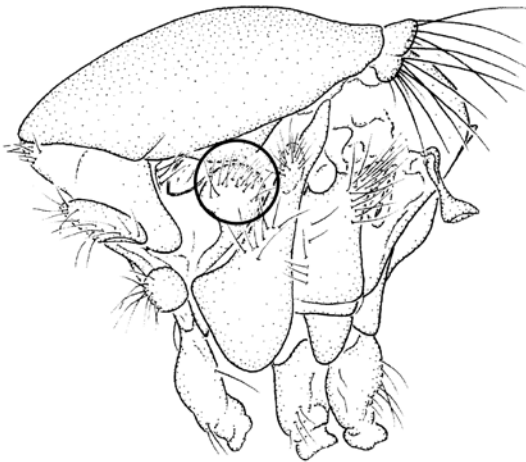


Fig. 5a *Ps. ciliata*



Fig. 5b *Cs. inornata*

- 6(5). Abdomen bluntly rounded with row of tiny spines on apex of segment 7 (Fig. 6a); most scales on dorsal surface of wing very broad (Fig. 6c) *Mansonia titillans*

Abdomen pointed at tip, segment 7 markedly narrower than 6 (Fig. 6b); dorsal wing scales long and slender, at least on veins Rs and M (except for *Oc. grossbecki*) (Fig. 6d) 7

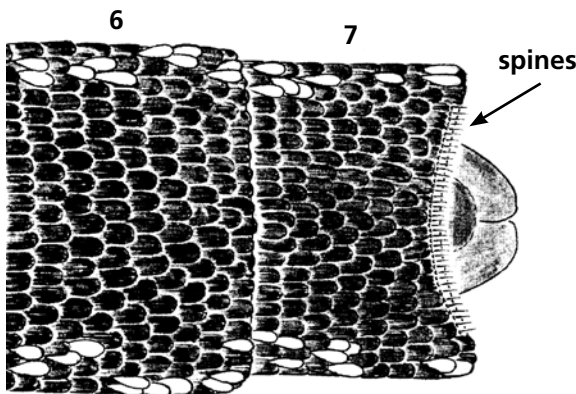


Fig. 6a *Ma. titillans*

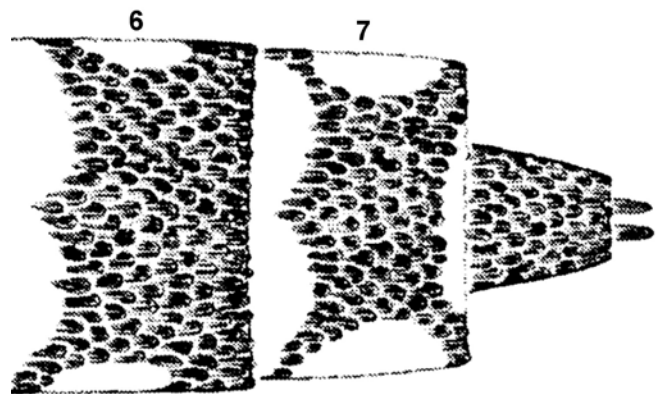


Fig. 6b *Ae. vexans*



Fig. 6c *Ma. titillans*

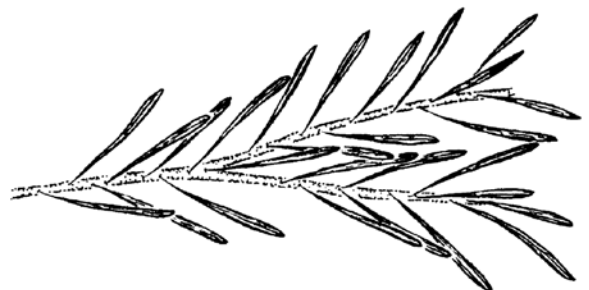


Fig. 6d *Ae. vexans*

7(6). Prespiracular setae present (Fig. 7a); abdominal segments with pale apical bands or lateral patches (Fig. 7c) *Psorophora*

Prespiracular setae absent (Fig. 7b); abdominal segments with pale basal bands or lateral patches (Fig. 7d) *Aedes/Ochlerotatus*

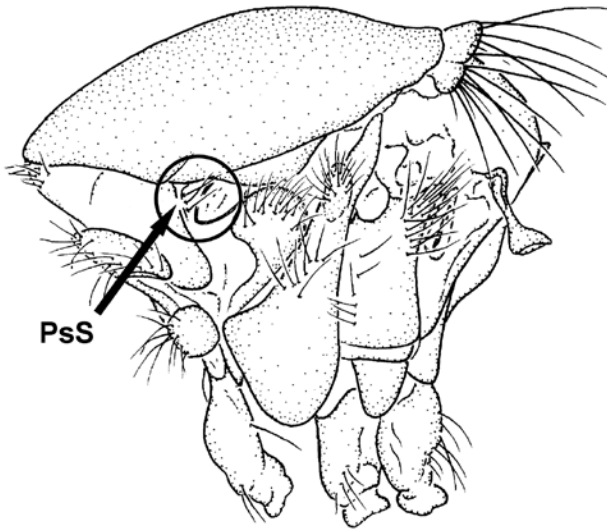


Fig. 7a *Ps. ciliata*

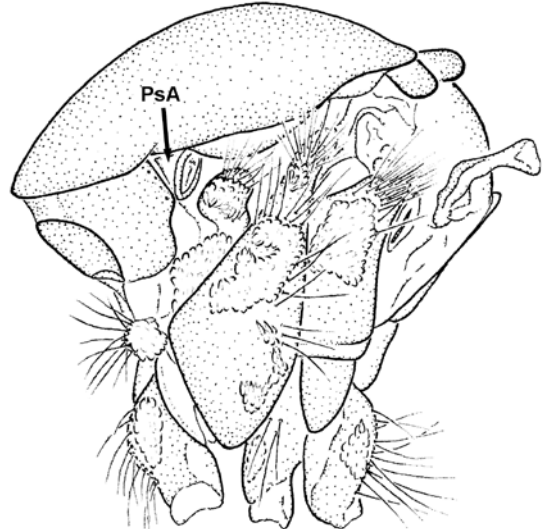


Fig. 7b *Ae. vexans*

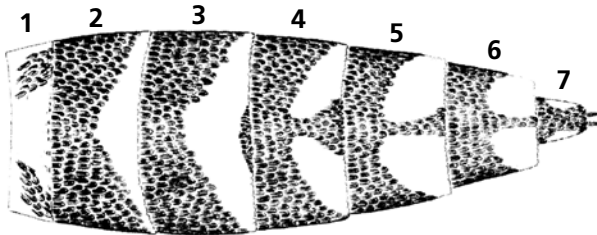


Fig. 7c *Ps. cyanescens*

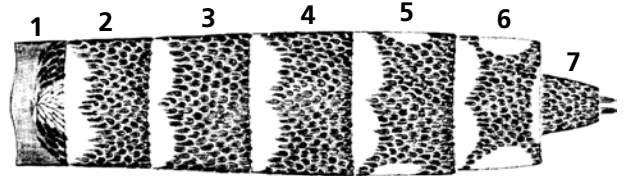


Fig. 7d *Ae. vexans*

8(5). Prespiracular setae present (Fig. 8a); wing vein Sc (at base of wing on underside) with small patch of setae (Fig. 8c) *Culiseta*

Prespiracular and vein Sc setae absent (Figs. 8b, 8d) 9

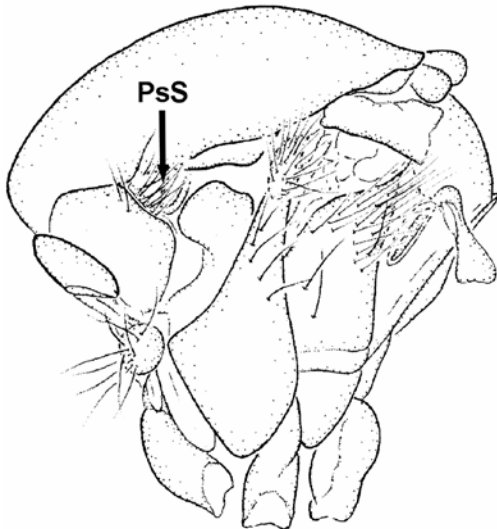


Fig. 8a *Cs. inornata*

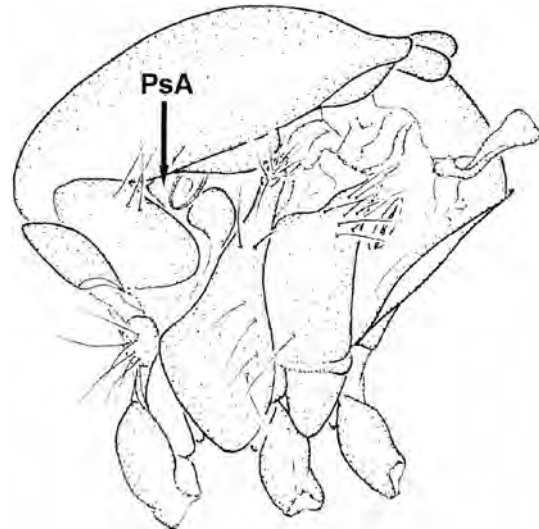


Fig. 8b *Cx. pipiens*



Fig. 8c *Cs. inornata*



Fig. 8d *Cx. pipiens*

9(8). Scales on dorsal surface of wing long and narrow, and black or brown (except *Cx. tarsalis* with a few pale scales on the base of the costa) (Fig. 9a) *Culex*

Scales on dorsal surface of wing very broad and dark and pale (Fig. 9b) 10

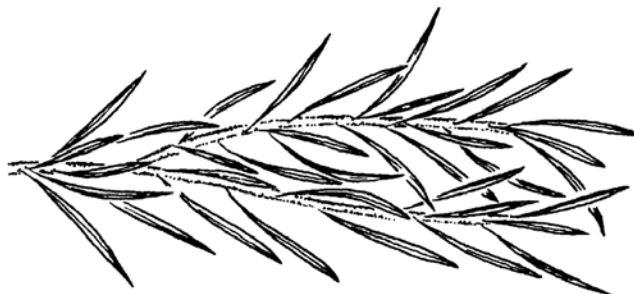


Fig. 9a *Cx. pipiens*



Fig. 9b *Cq. perturbans*

10(9). Scutum black with narrow stripes of white scales (Fig. 10a); pale bands on hindtarsomeres basal and apical (Fig. 10c) *Orthopodomyia*

Scutum with mixed brown and yellow scales without a pattern (Fig. 10b); pale bands on hindtarsomeres basal (Fig. 10d) *Coquillettidia perturbans*

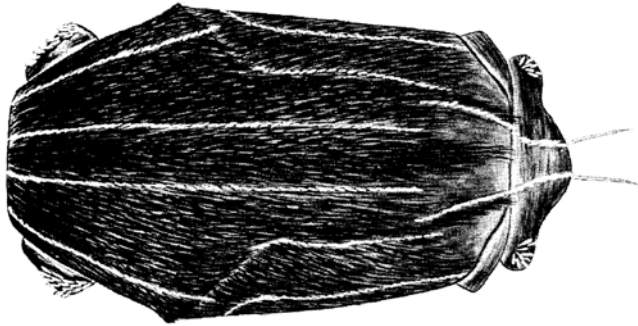


Fig. 10a *Or. signifera*

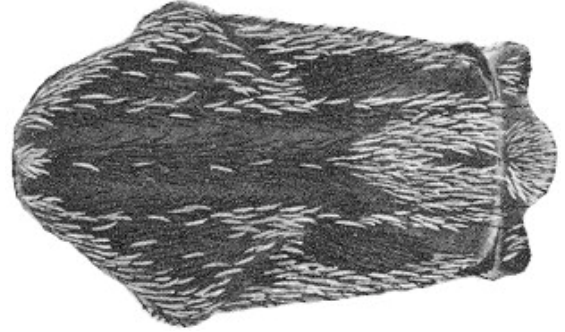


Fig. 10b *Cq. perturbans*



Fig. 10c *Or. signifera*

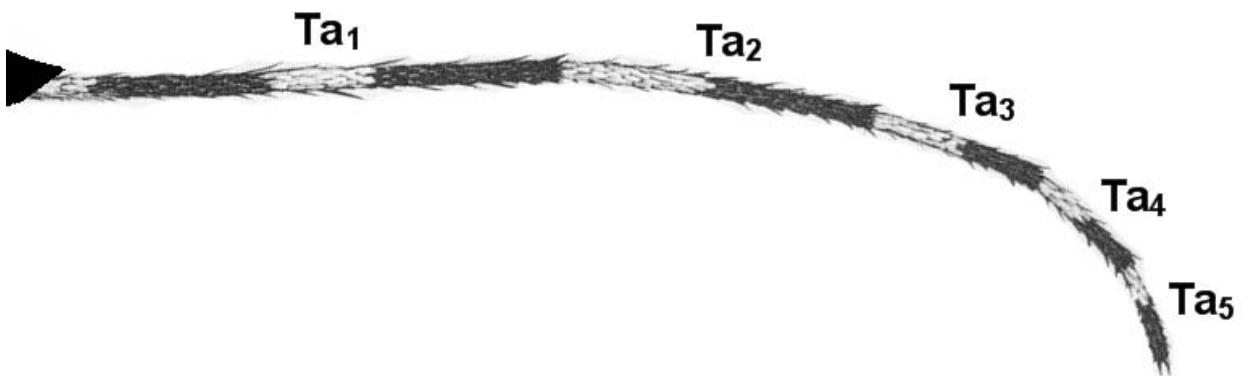


Fig. 10d *Cq. perturbans*

Key to Adult Female *Anopheles*

1. Wing with pale-scaled spots (Fig. 11a) 2
 Wing entirely dark-scaled (Fig. 11b) 4

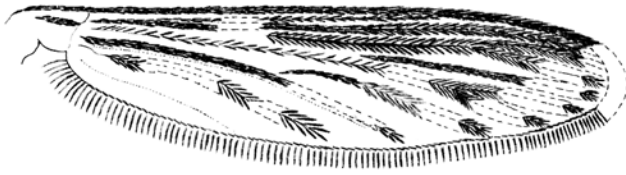


Fig. 11a *crucians*

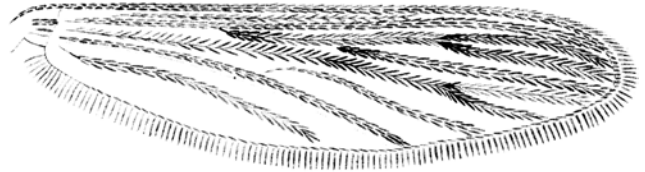


Fig. 11b *quadrimaculatus*

- 2(1) Wing with apical pale spot (AP), otherwise vein C (or costal vein) dark-scaled; vein 1A with 3 dark spots (Fig. 12a) *crucians* complex including *crucians*, *bradleyi*, *georgianus*
 Vein C with apical and subcostal pale spots; vein 1A with 1 or 2 dark-scaled spots (Fig. 12b) 3

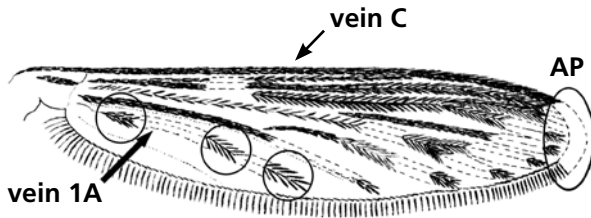


Fig. 12a *crucians*

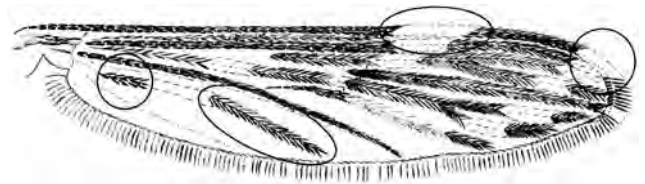


Fig. 12b *punctipennis*

- 3(2). Maxillary palps entirely dark-scaled (Fig. 13a); wing veins R_{4+5} and CuA with only dark scales (Fig. 13c) *punctipennis*
 Maxillary palps with rings of pale scales (Fig. 13b); veins R_{4+5} and CuA with long sections of pale scales centrally (Fig. 13d) *pseudopunctipennis*

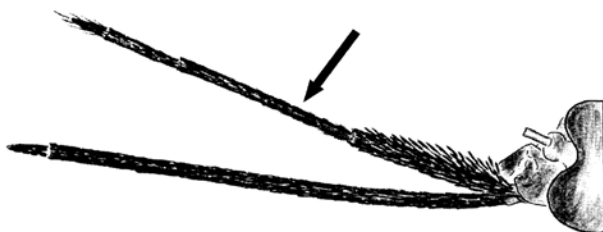


Fig. 13a *punctipennis*

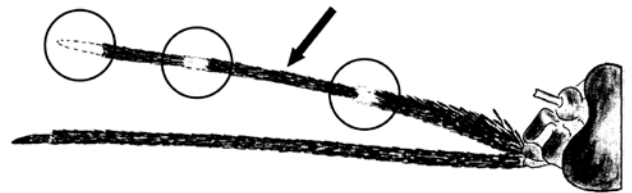


Fig. 13b *pseudopunctipennis*

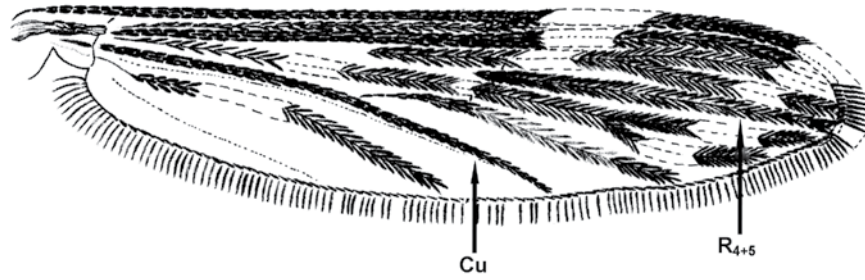


Fig. 13c *punctipennis*

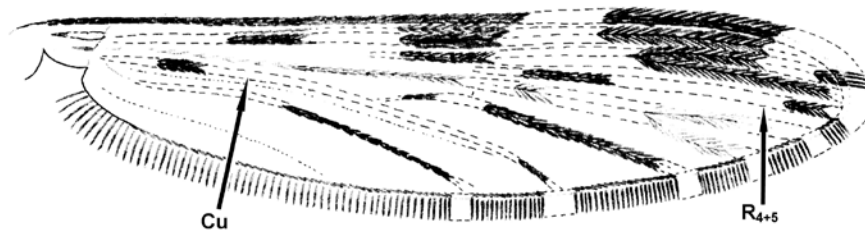


Fig. 13d *pseudopunctipennis*

4(1). Wing unspotted (Fig. 14a); scutal setae about 0.5 width of scutum (Fig. 14c); small species, wing length about 3.0 mm *barberi*

Wings with 4 spots of distinct dark scales (Fig. 14b); scutal setae mostly shorter than 0.5 width of scutum (Fig. 14d); medium to large species, wing length 4.0 mm or more 5

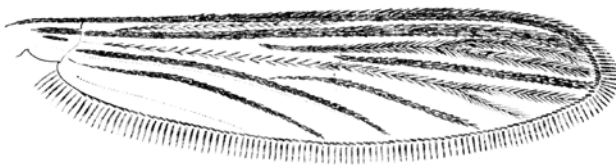


Fig. 14a *barberi*

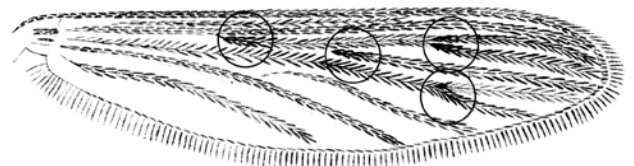


Fig. 14b *quadrimaculatus*

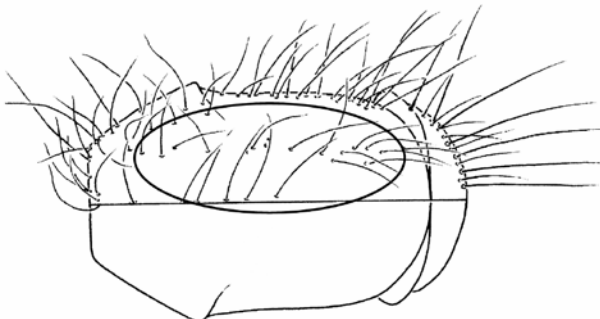


Fig. 14c *barberi*

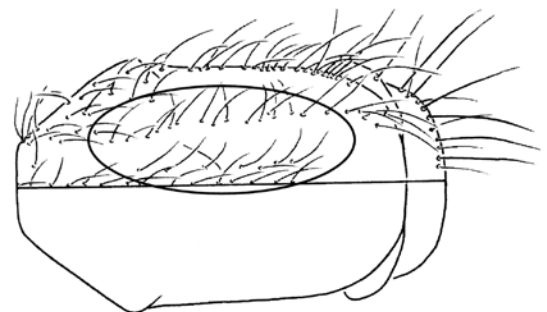


Fig. 14d *quadrimaculatus*

5(4). Frontal tuft with some pale setae (Fig. 15a); wing with 4 distinct dark spots (Fig. 15c); palpi with all dark scales (Fig. 15a) *quadrimaculatus complex**

Frontal tuft with all dark setae (Fig. 15b); dark spots on wings indistinct or absent (Fig. 15d); palpi with or without pale rings (Fig. 15b) 6

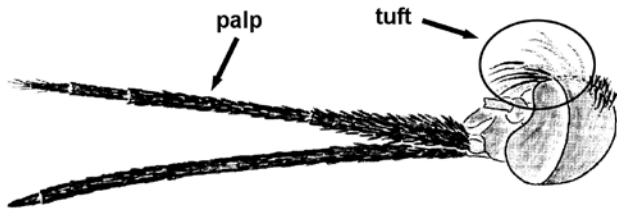


Fig. 15a *freeborni*

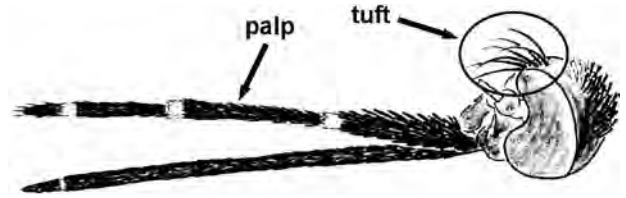


Fig. 15b *walkeri*

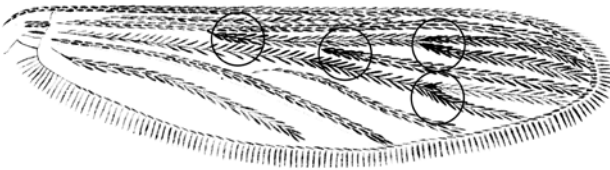


Fig. 15c *quadrimaculatus*

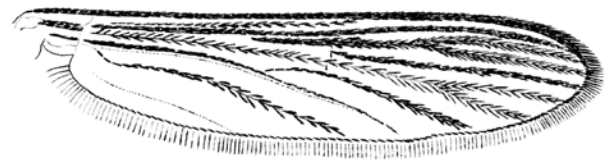


Fig. 15d *atropos*

6(5). Capitellum of halter usually pale-scaled (Fig. 16a); occiput with patch of pale scales medioanteriorly (Fig. 16c); femur with apical patch of pale scales (Fig. 16e) *walkeri*

Capitellum of halter entirely dark-scaled (Fig. 16b); occiput without patch of pale scales medioanteriorly (Fig. 16d); femur with few or no pale scales apically (Fig. 16f) *atropos*

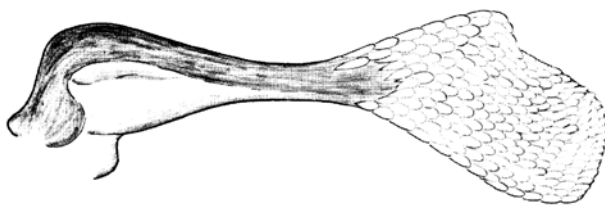


Fig. 16a *walkeri*

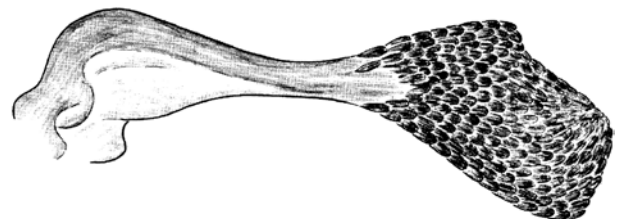


Fig. 16b *atropos*



Fig. 16c *walkeri*



Fig. 16d *atropos*

* *quadrimaculatus*, *maverlius*, and *smaragdinus* in Mississippi

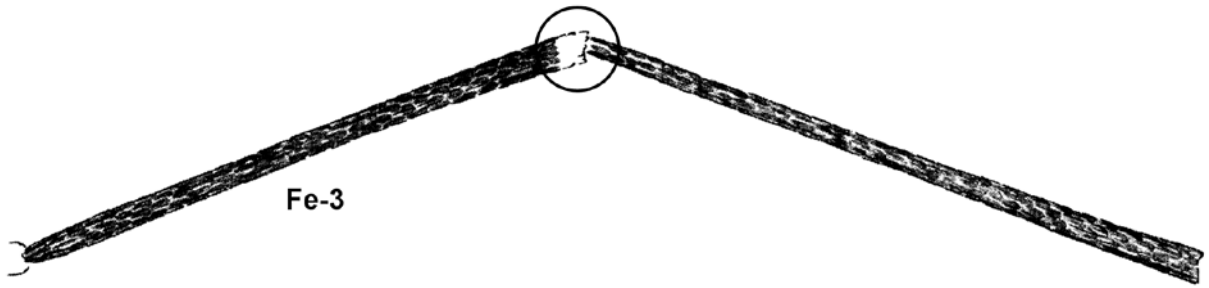


Fig. 16e *walkeri*



Fig. 16f *atropos*

Some Common Female *Anopheles*



punctipennis

Fig. 17a



*pseudo-
punctipennis*

Fig. 17b



barberi

Fig. 17c



quadrimaculatus

Fig. 17d



walkeri

Fig. 17e



atropos

Fig. 17f

Key to Adult Females of *Aedes* and *Ochlerotatus*

1. Scutum golden-orange with two large posterolateral black spots on posterior end (Fig. 18a) *Oc. fulvus pallens*

Scutum not golden-orange in appearance, usually appears brown, black, or pale and dark (Fig. 18b) 2

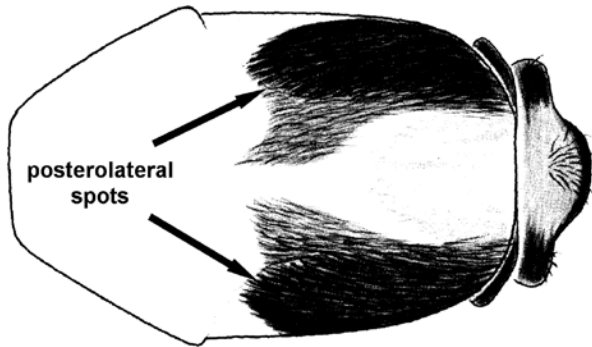


Fig. 18a *Oc. fulvus pallens*

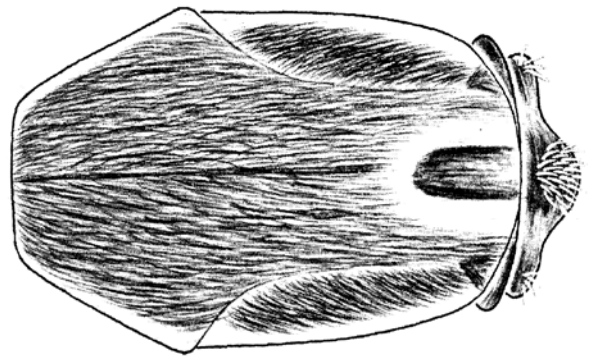


Fig. 18b *Oc. canadensis*

2(1). Hindtarsomeres with pale bands (Fig. 19a) 3

Hindtarsomeres entirely dark (Fig. 19b) 13



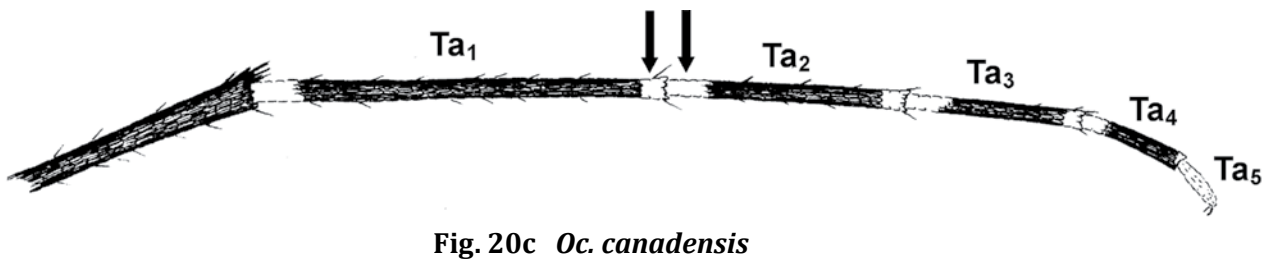
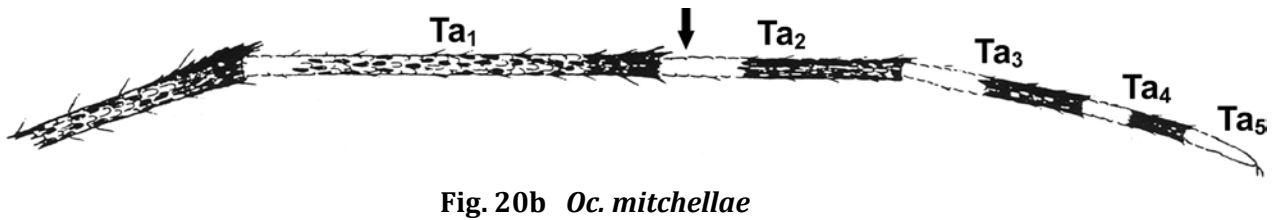
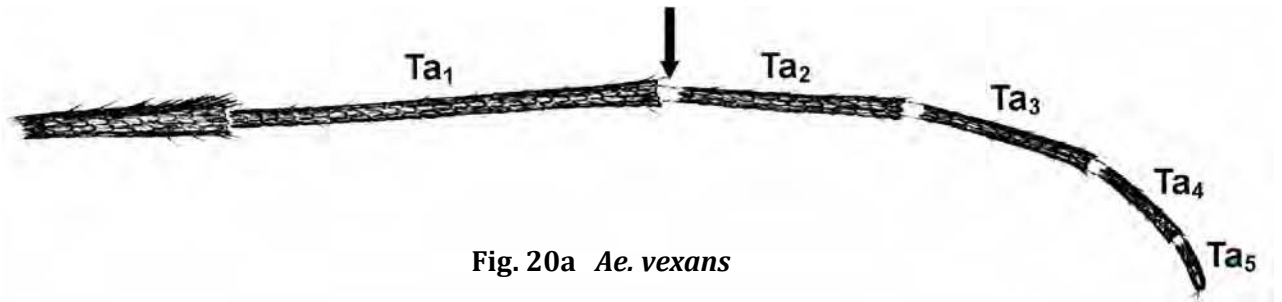
Fig. 19a *Oc. sollicitans*



Fig. 19b *Oc. triseriatus*

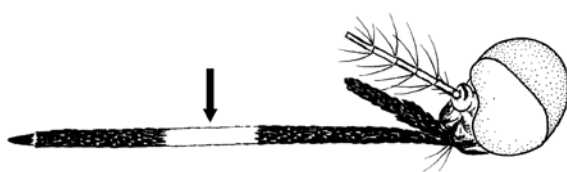
3(2). Hindtarsomeres with pale bands basally (Figs 20a, 20b) 4

Hindtarsomeres with pale bands apically and basally (Fig. 20c) 12



4(3). Proboscis with complete pale band (Fig. 21a) 5

Proboscis lacking a defined pale band (Fig. 21b) 7



5(4). Abdominal segments with basal pale bands but no median longitudinal pale stripe (Fig 22a); wings with all dark scales (Fig. 22c) *Oc. taeniorhynchus*

Abdominal segments with basal pale bands and median longitudinal pale stripe or row of pale spots (Fig. 22b); wings with all dark scales or intermixed with pale and dark scales (Fig. 22d) 6

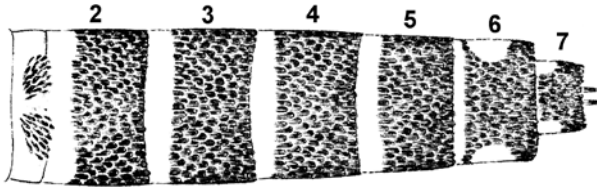


Fig. 22a *Oc. taeniorhynchus*

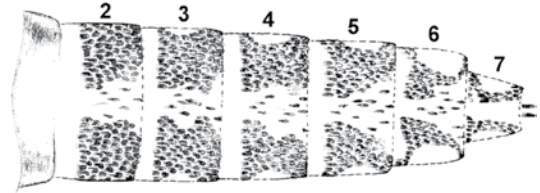


Fig. 22b *Oc. sollicitans*

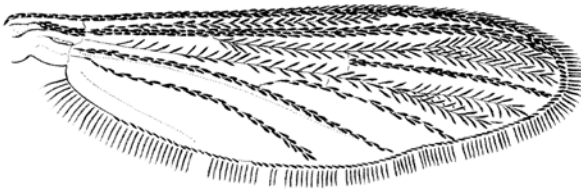


Fig. 22c *Oc. taeniorhynchus*

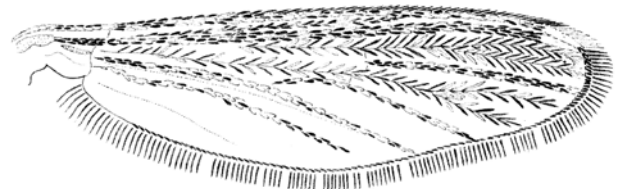


Fig. 22d *Oc. sollicitans*

6(5). Wing scales all dark (Fig. 23a) *Oc. mitchellae*

Wing scales intermixed with pale and dark scales (Fig. 23b) *Oc. sollicitans*

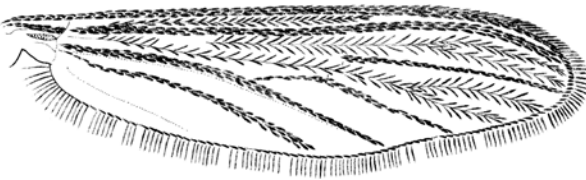


Fig. 23a *Oc. mitchellae*



Fig. 23b *Oc. sollicitans*

- 7(4). Scutum with lyre or lyre-like marking composed of either white or golden scales (Fig. 24a) 8
 Scutum with other markings or no markings (Figs. 24b and 24c) 9

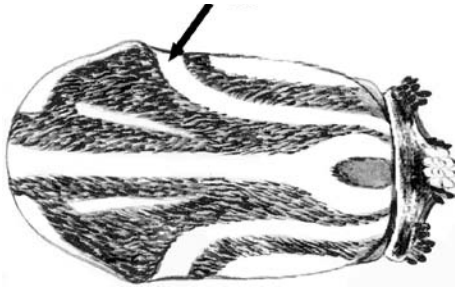


Fig. 24a *Oc. japonicus*

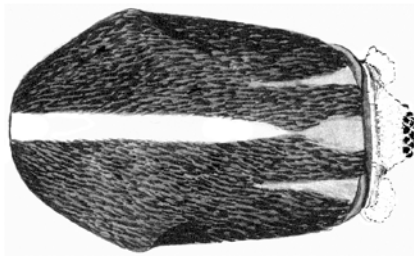


Fig. 24b *Ae. albopictus*

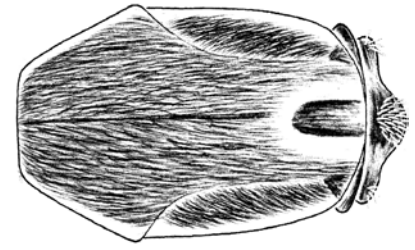


Fig. 24c *Oc. canadensis*

- 8(7). Scutum with thick median longitudinal stripe of golden scales (Fig. 25a); abdominal segments lacking pale bands (Fig 25c); last tarsal segment on hind leg covered with all dark scales (Fig. 25e) *Oc. japonicus*

Scutum with two thin submedian longitudinal stripes of white scales (Fig. 25b); abdomen with pale bands (Fig. 25d); last tarsal segment on hind leg covered with all pale scales (Fig. 25f) ... *Ae. aegypti*

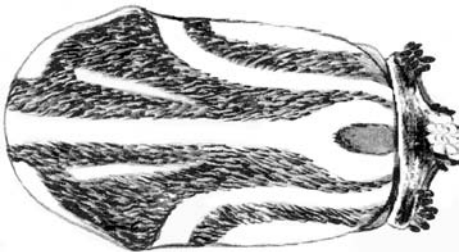


Fig. 25a *Oc. japonicus*

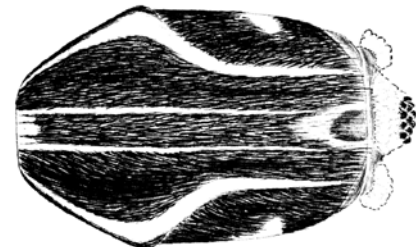


Fig. 25b *Ae. aegypti*

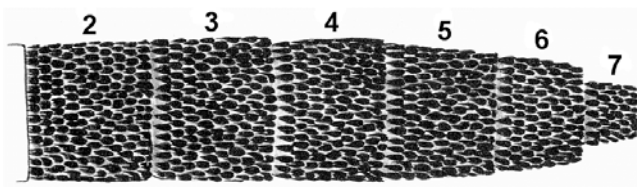


Fig. 25c *Oc. japonicus*

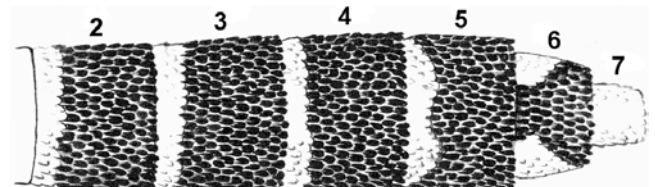


Fig. 25d *Ae. aegypti*

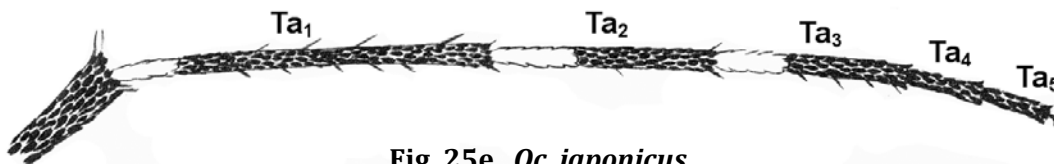


Fig. 25e *Oc. japonicus*

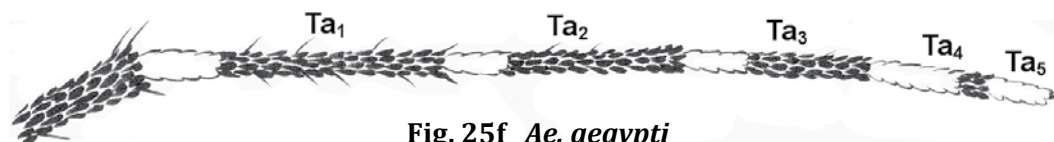


Fig. 25f *Ae. aegypti*

- 9(7). Basal pale bands on hindtarsomeres 2-4 very narrow, less than $\frac{1}{5}$ length of tarsomere (Fig. 26a) *Ae. vexans*
- Basal pale bands on hindtarsomeres 2-4 at least $\frac{1}{4}$ length of tarsomere (Fig.26b) 10

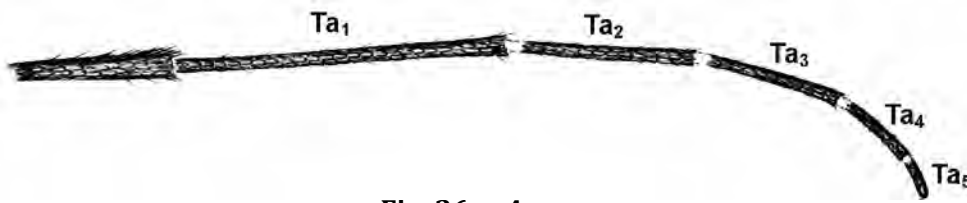


Fig. 26a *Ae. vexans*

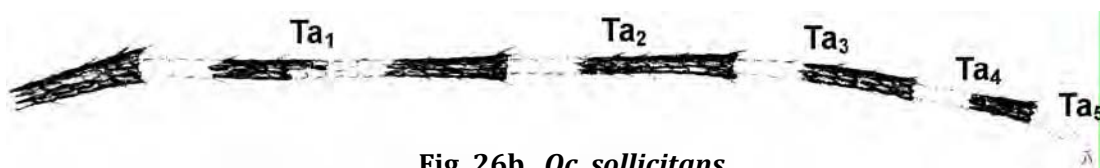


Fig. 26b *Oc. sollicitans*

- 10(9). Scutum black with narrow median longitudinal white stripe (Fig. 27a); wing scales narrow and all dark (Fig. 27c) *Ae. albopictus*
- Scutum without median longitudinal white stripe (Fig. 27b); wing scales intermixed pale and dark (Fig. 27d) 11

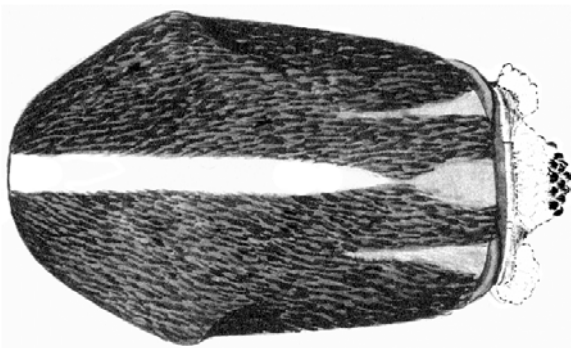


Fig. 27a *Ae. albopictus*

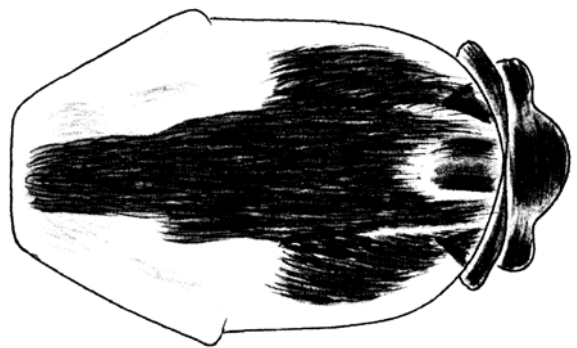


Fig. 27b *Oc. grossbecki*

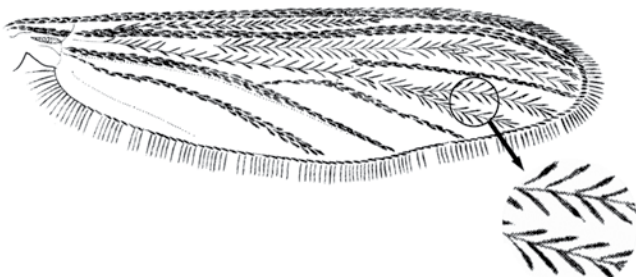


Fig. 27c *Oc. mitchellae*

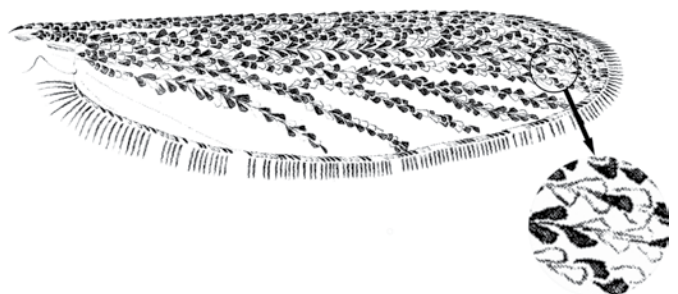


Fig. 27d *Oc. grossbecki*

11(10). Proboscis with few scattered pale scales limited to basal half (Fig. 28a); wing scales very large, triangular, and mixed pale and dark (Fig. 28c) *Oc. grossbecki*

Proboscis covered with scattered pale scales (Fig. 28b); wing scales long and lobed (not triangular), and mixed pale and dark (Fig. 28d) *Oc. stimulans*

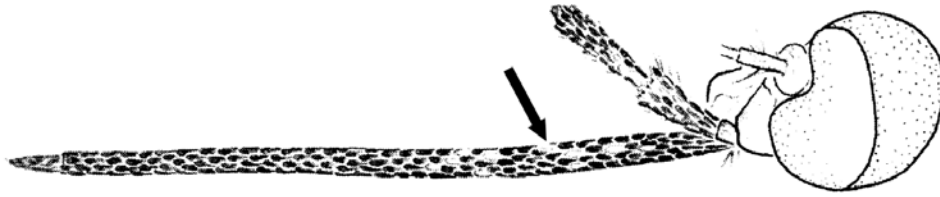


Fig. 28a *Oc. grossbecki*



Fig. 28b *Oc. stimulans*

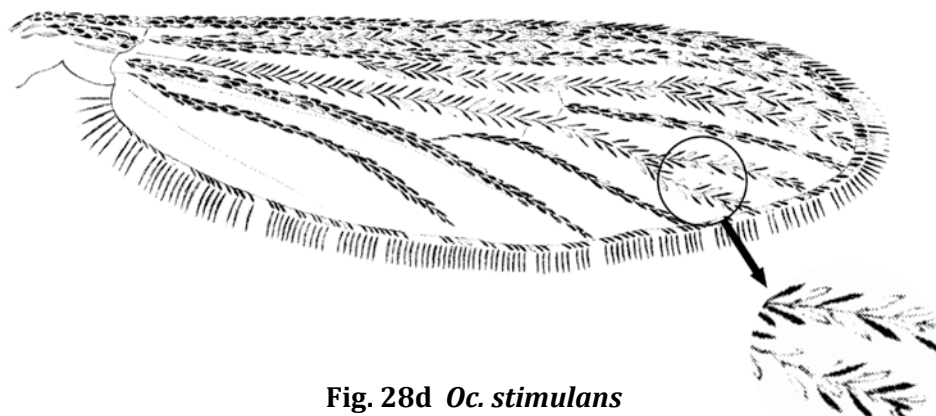
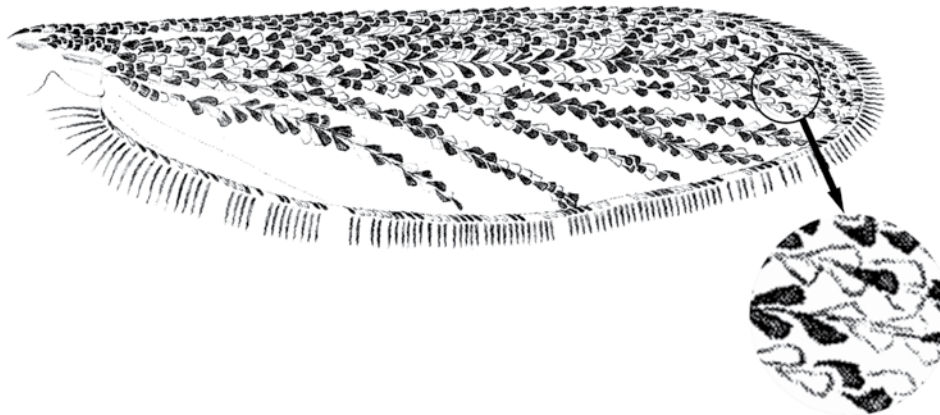


Fig. 28d *Oc. stimulans*

- 12(3). Wing with intermixed pale and dark scales, but mostly pale (Fig. 29a) *Oc. dorsalis*
 Wing scales entirely dark (Fig. 29b) *Oc. canadensis*

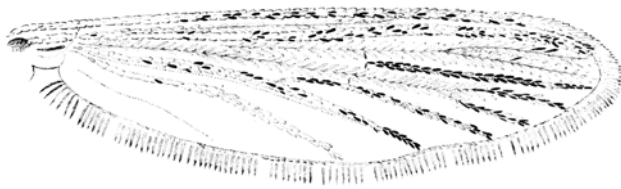


Fig. 29a *Oc. dorsalis*

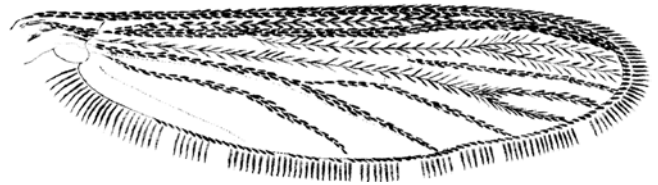


Fig. 29b *Oc. canadensis*

- 13(2). Scutum entirely red-brown and lacking pale or dark stripes (Fig. 30a) *Ae. cinereus*
 Scutum with pale and dark areas or lines (Fig. 30b) 14

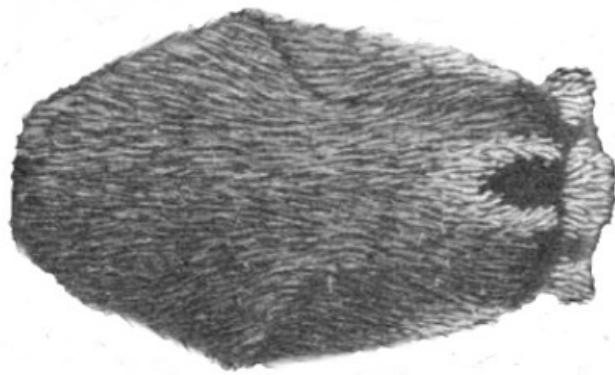


Fig. 30a *Ae. cinereus*

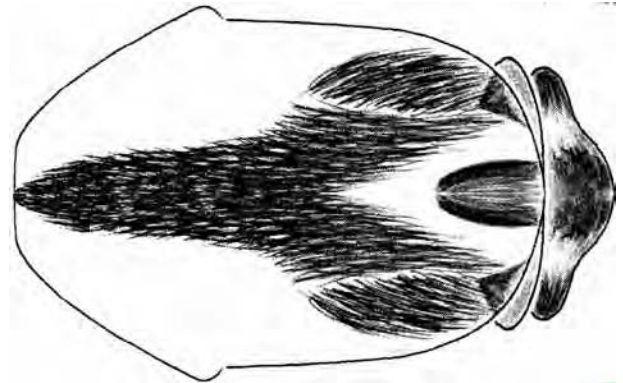


Fig. 30b *Oc. hendersoni*

- 14(13). Scutum with narrow median dark stripe and 2 submedian pale stripes (Fig. 31a) ... *Oc. trivittatus*
 Scutum without two submedian pale stripes (Fig. 31b) 15

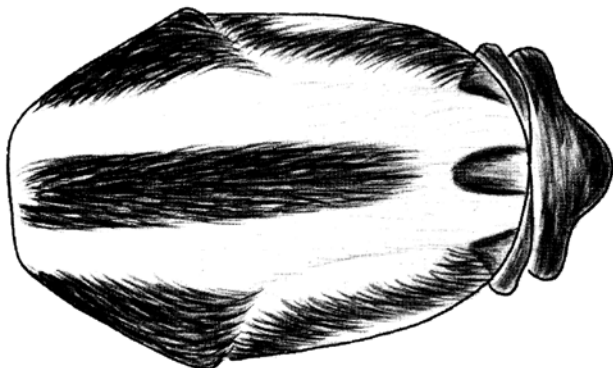


Fig. 31a *Oc. trivittatus*

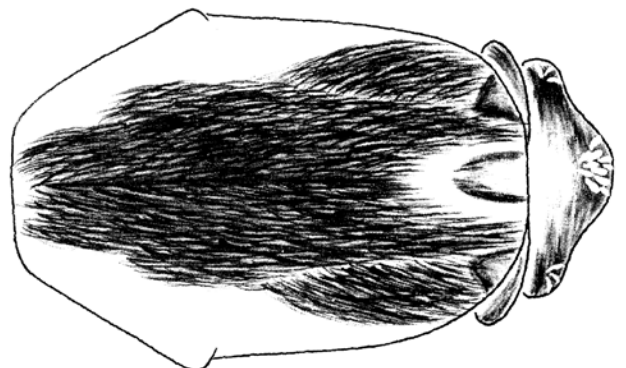


Fig. 31b *Oc. triseriatus*

- 15(14). Median area of scutum with distinct area of dark scales (Fig. 32a) 16
 Median area of scutum with distinct area of pale scales (Fig. 32 b) 19

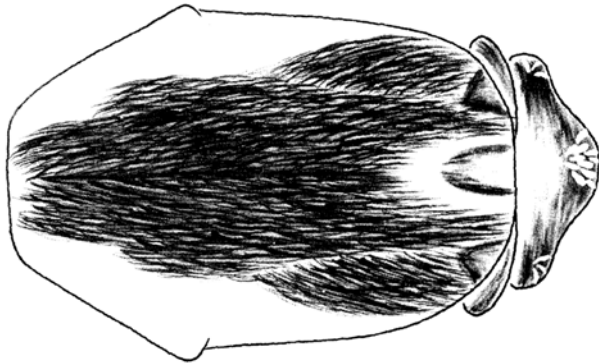


Fig. 32a *Oc. triseriatus*

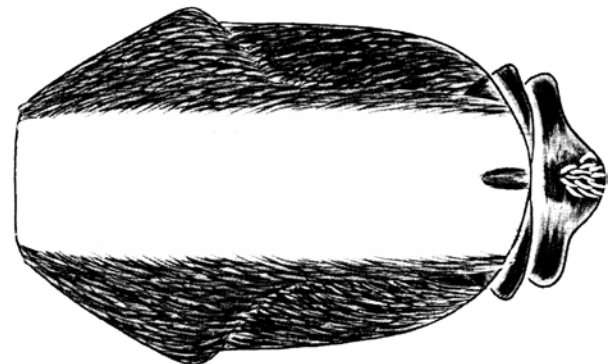


Fig. 32b *Oc. dupreei*

- 16(15). Abdominal segments with complete, well defined pale basal bands on abdominal segments 2-7 (Fig. 33a); scutum with median broad dark stripe with 2 lateral dark spots on posterior end (Fig. 33c) *Oc. sticticus*

Abdominal segments with no complete pale bands or very thin pale bands on less than half of segments (Fig. 33b); scutum lacking 2 lateral dark spots on posterior end (Fig. 33d) 17

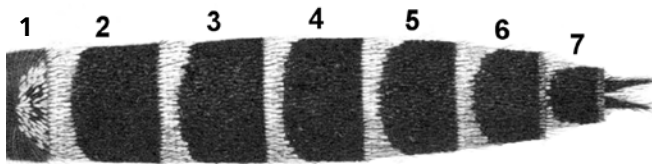


Fig. 33a *Oc. sticticus*

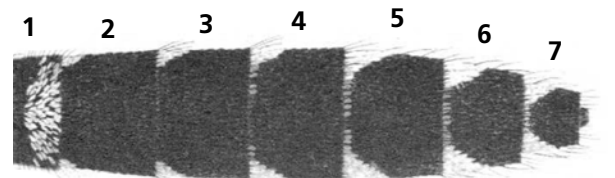


Fig. 33b *Oc. thibaulti*

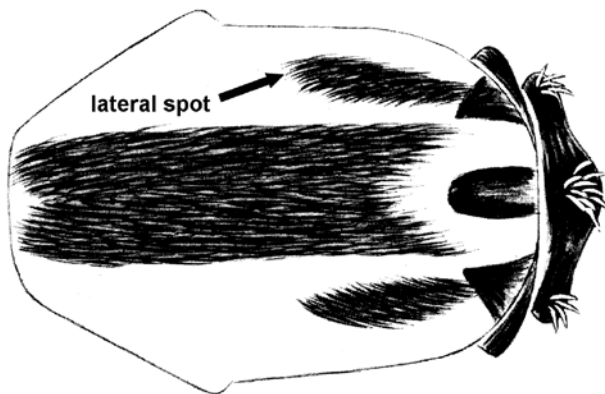


Fig. 33c *Oc. sticticus*

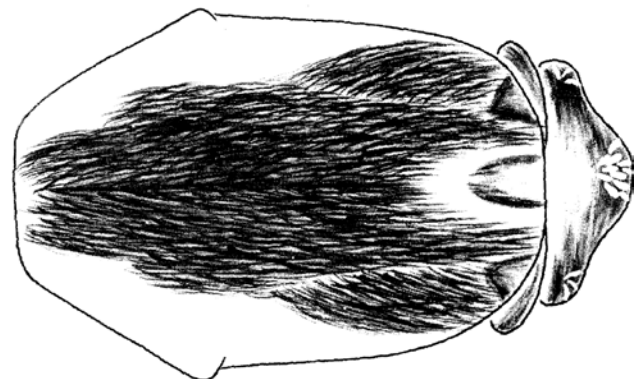


Fig. 33d *Oc. triseriatus*

17(16). Abdomen with complete basal pale bands on at least segments 5-7 (Fig. 34a) *Oc. thibaulti*

Abdomen with no complete basal pale bands on segments 5-7 (Fig. 34b) 18

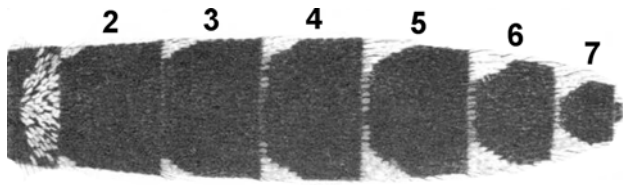


Fig. 34a *Oc. thibaulti*

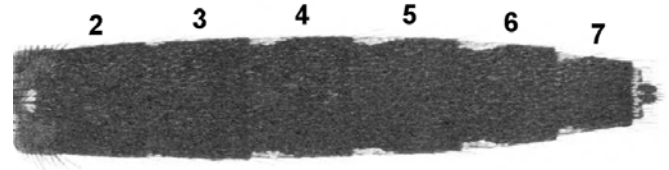


Fig. 34b *Oc. triseriatus*

18(17). Scutal fossa with silvery scales restricted laterally and having few setae (Fig. 35a) *Oc. triseriatus*

Scutal fossa entirely covered with silvery scales and having multiple setae (Fig. 35b) *Oc. hendersoni*

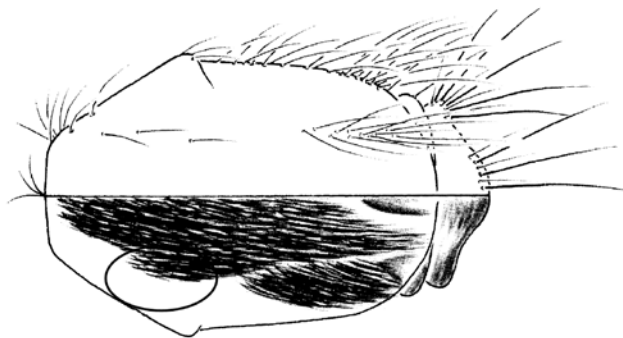


Fig. 35a *Oc. triseriatus*

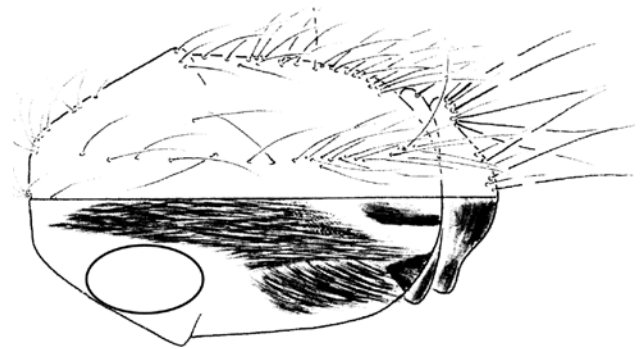


Fig. 35b *Oc. hendersoni*

19(15). Scutum with wide pale area that extends two-thirds its length (Fig. 36a) *Oc. infirmatus*

Scutum with median longitudinal stripe of pale scales extending its full length (Fig. 36b) 20

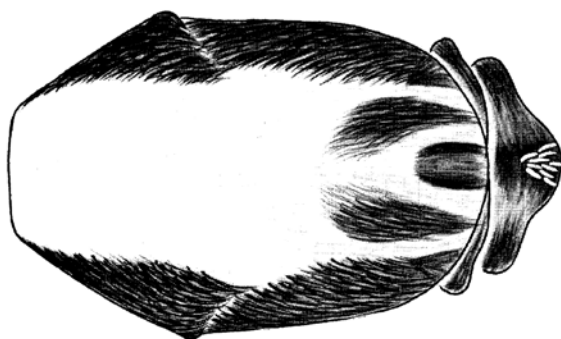


Fig. 36a *Oc. infirmatus*

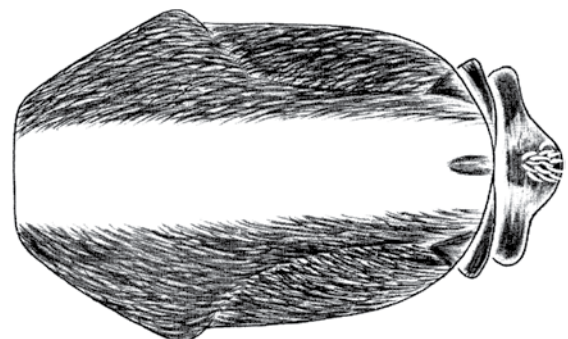


Fig. 36b *Oc. atlanticus/tormentor*

20(19). Occiput covered with silvery white scales with few to no lateral dark scales (Fig.37 a)... *Oc. dupreei*

Occiput with pale median stripe and dark stripes laterally (Fig. 37b) *Oc. atlanticus/tormentor*

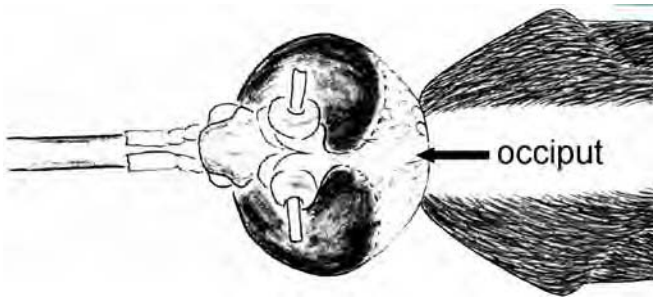


Fig. 37a *Oc. dupreei*

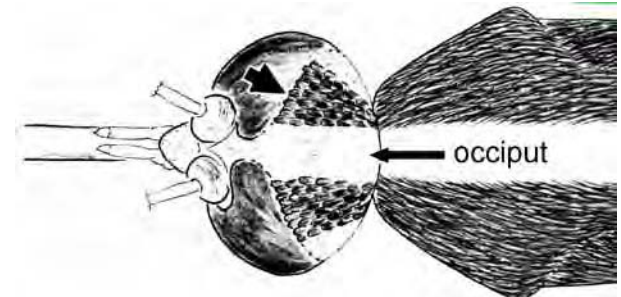


Fig.37b *Oc. atlanticus/tormentor*

* Females of *Oc. atlanticus* and *Oc. tormentor* are difficult to separate, but larvae and male genitalia are easy to separate.

Some Common Female *Aedes/Ochlerotatus*



Oc. mitchellae
Fig. 38a



Ae. vexans
Fig. 38b



Oc. grossbecki
Fig. 38c



Oc. dorsalis
Fig. 38d



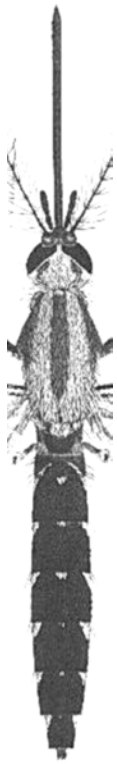
Oc. triseriatus
Fig. 38e



Oc. dupreei
Fig. 38f



Oc. sticticus
Fig. 38g



Oc. trivittatus
Fig. 38h



Oc. infirmatus
Fig. 38i



Oc. canadensis
Fig. 38j



Oc. atlanticus
Fig. 38k



Oc. thibaulti
Fig. 38l



Oc. fulvus pallens
Fig. 38m

Key to Adult Female *Culex*

1. Scutum with middorsal acrostichal setae (Fig. 39a); occiput with narrow scales dorsally (Fig. 39c) 2

Scutum without middorsal acrostichal setae (Fig. 39b); occiput with broad, appressed scales dorsally, sometimes limited to borders of eyes (Fig. 39d) (subgenus *Melanoconion*) 8

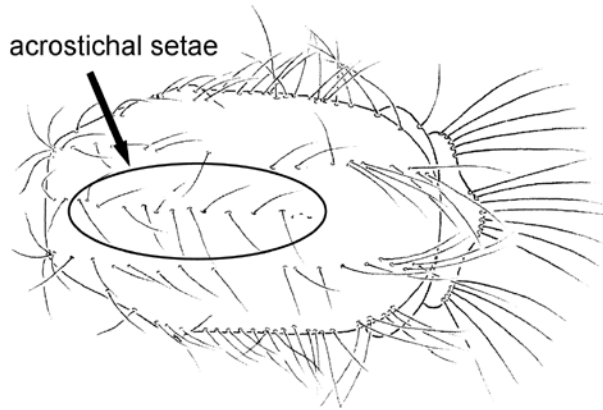


Fig. 39a *pipiens*

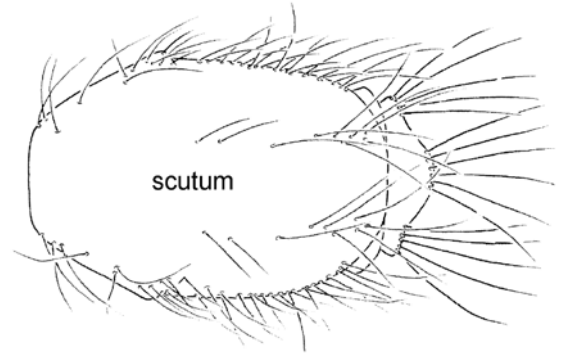


Fig. 39b *erraticus*

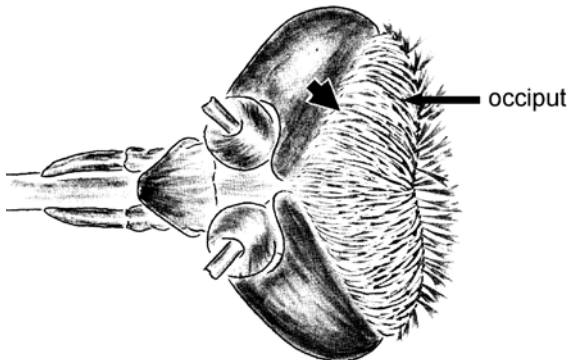


Fig. 39c *pipiens*

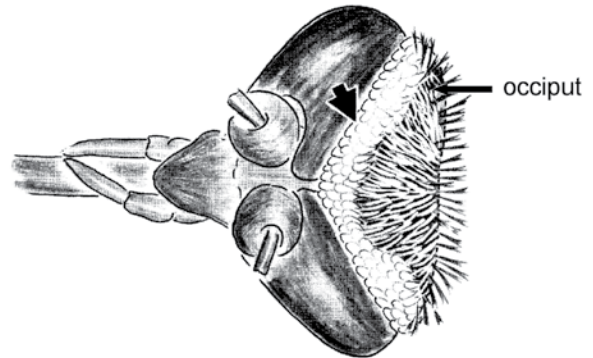


Fig. 39d *erraticus*

2(1). Abdominal terga with bands or lateral spots of pale scales along basal border (Fig. 40a) (subgenus *Culex*) 3

Abdominal terga with bands or lateral spots of pale scales along apical border (Fig. 40b) (subgenus *Neoculex*) *territans*

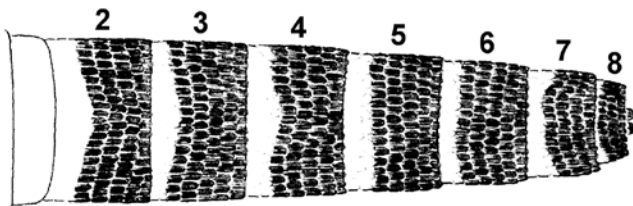


Fig. 40a *restuans*

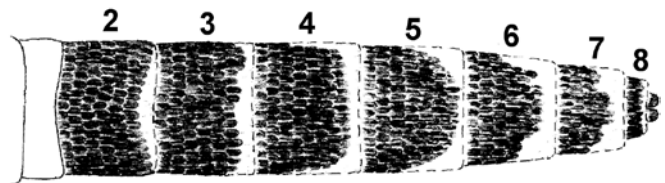


Fig. 40b *territans*

- 3(2). Hindtarsomeres with rather distinct, basal and apical rings of pale scales (Fig. 41a) 4
 Hindtarsomeres dark-scaled, or if with pale scales, then as very narrow, basal rings (Fig. 41b) 5

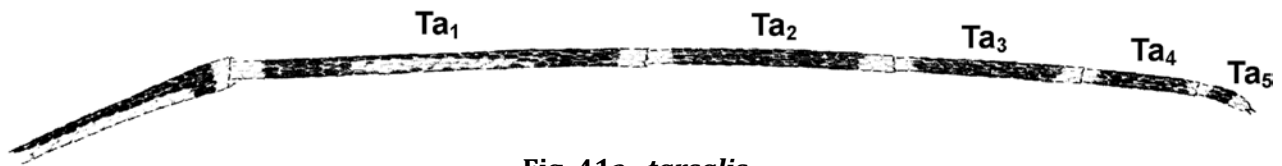


Fig. 41a *tarsalis*



Fig. 41b *restuans*

- 4(3). Proboscis with complete, distinct ring of pale scales (Fig. 42a); V-shaped, dark-scaled marks on abdominal sterna (Fig. 42c) *tarsalis*
 Proboscis without complete, distinct ring of pale scales (Fig. 42b); abdominal sterna without V-shaped marks and mostly pale scaled (Fig. 42d) *coronator*



Fig. 42a *tarsalis*



Fig. 42b *coronator*

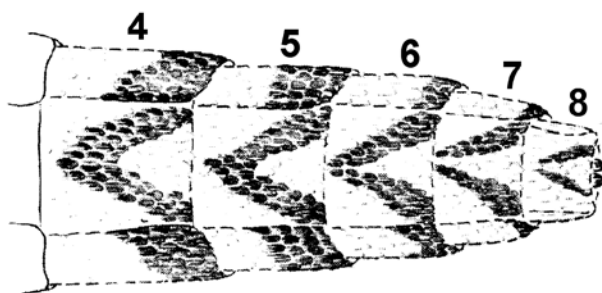


Fig. 42c *tarsalis*

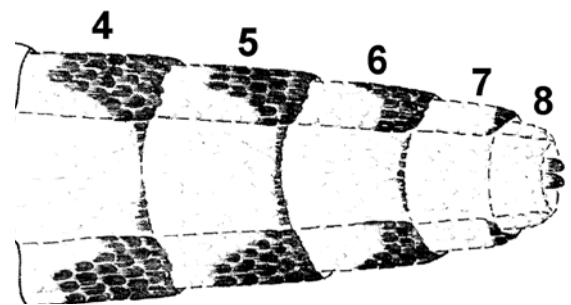


Fig. 42d *coronator*

- 5(4). Abdominal terga 2 and 3 not banded or with narrow, basal, pale bands (Fig. 43a) 6
 Abdominal terga 2 and 3 with conspicuous basal bands of pale scales (Fig. 43b) 7

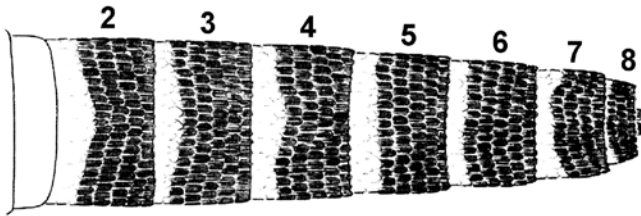


Fig. 43a *nigripalpus*

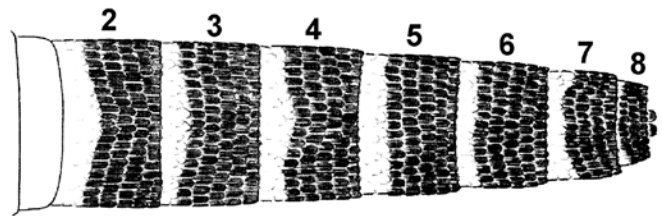


Fig. 43b *restuans*

- 6(5). Scale patches on thoracic pleura absent, or if present, in groups of fewer than 6 scales; no median patch of pale scales on mesanepimeron (Fig. 44a); abdominal terga usually without basal bands of pale scales (Fig. 44c) *nigripalpus*

Thoracic pleura with several groups of pale scales with 6 or more scales each; with distinct median patch of pale scales on mesanepimeron (Fig. 44b); abdominal tergum 7 mostly with dingy yellow scales; terga 2-6 with only basolateral patches or with narrow, basal bands of dingy yellow scales, sometimes blended with similar scales on apex of previous segment (Fig. 44d) *salinarius*

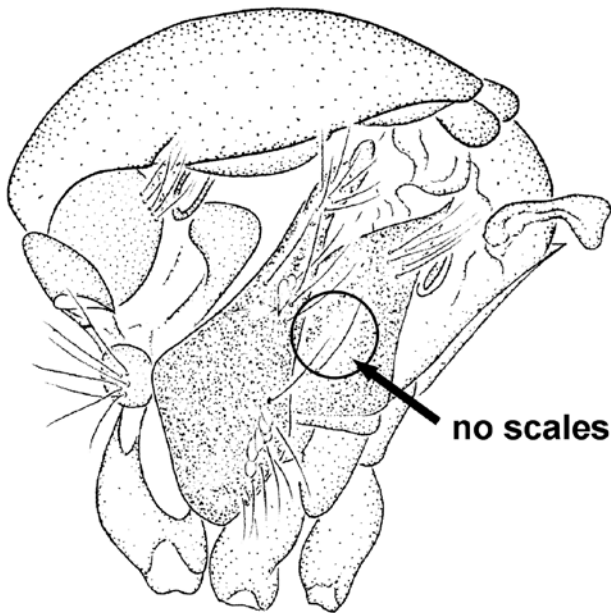


Fig. 44a *nigripalpus*

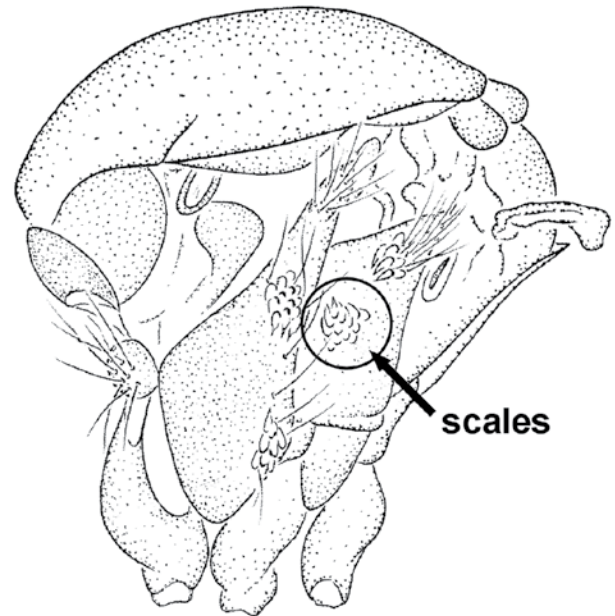


Fig. 44b *salinarius*

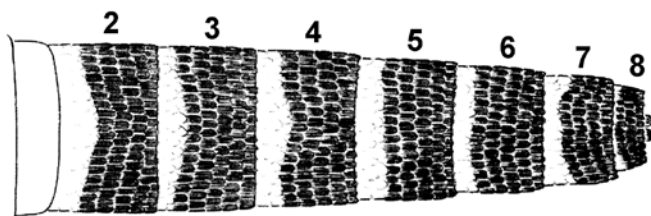


Fig. 44c *nigripalpus*

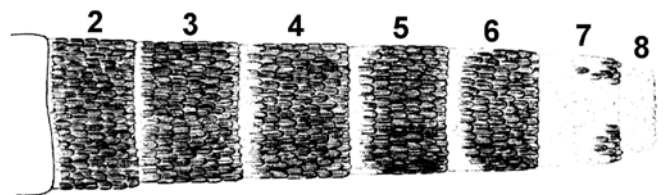


Fig. 44d *salinarius*

7(5). Basal pale bands of abdominal terga rounded posteriorly, with marked sublateral constrictions, narrowly joined to lateral pale patches (Fig. 45a); scutum without pale-scaled spots (Fig. 45c) *quinquefasciatus*

Basal pale bands of abdominal terga not rounded posteriorly, broadly joined to lateral pale patches with only slight sublateral constrictions, most evident on tergum 4 (Fig. 45b); scutum usually with pair of pale, submedian spots (Fig. 45d); medium-sized species, wing length 4.0 mm or greater *restuans*

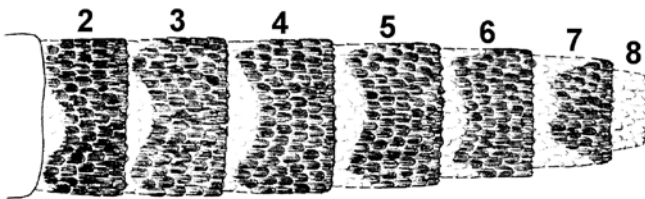


Fig. 45a *quinquefasciatus*

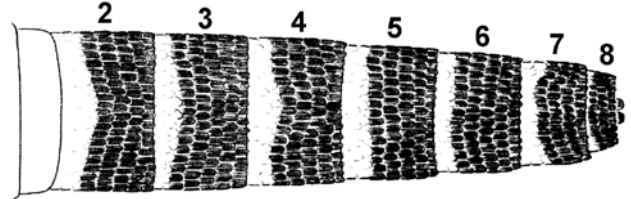


Fig. 45b *restuans*

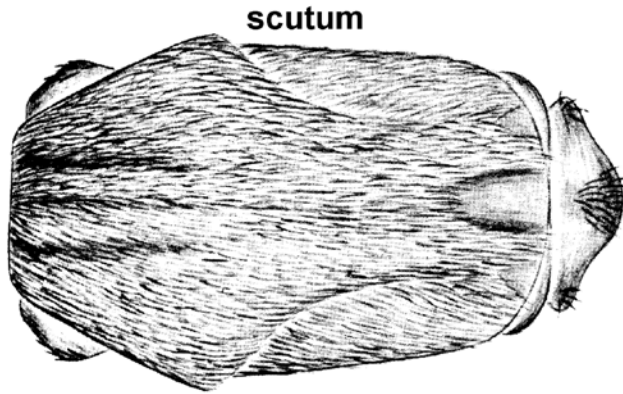


Fig. 45c *quinquefasciatus*

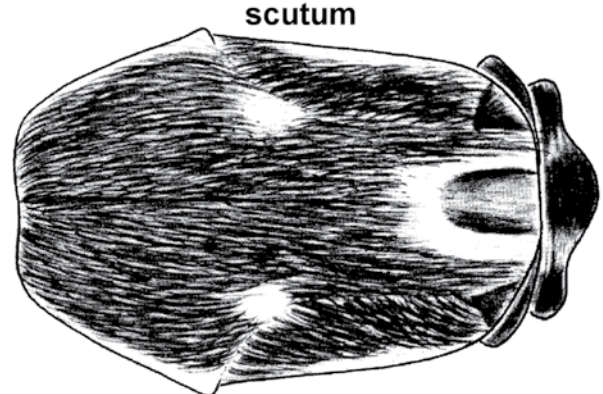


Fig. 45d *restuans*

8(1) Mesanepimeron with large patch of broad, pale scales (Fig. 46a) *erraticus*

Mesanepimeron usually unscaled, or with only few narrow scales (Fig. 46b) 9

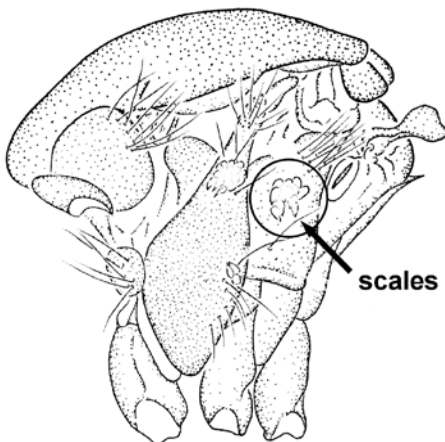


Fig. 46a *erraticus*

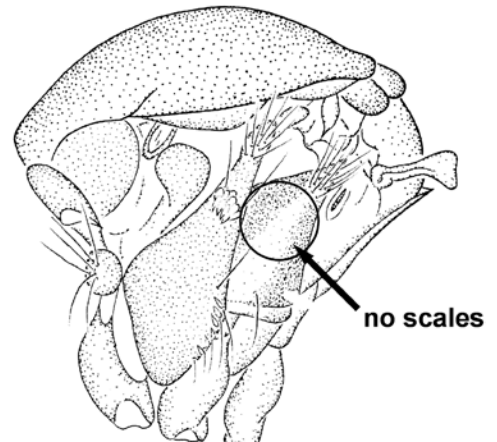


Fig. 46b *peccator*

9(8). Upper mesokatepisternum with patch of more than 5 pale scales; mesanepimeron with light, integumental area (Fig. 47a) *peccator*

Upper mesokatepisternum without scales or with fewer than 6; mesanepimeron with or without light, integumental area (Fig. 47b) *pilosus*

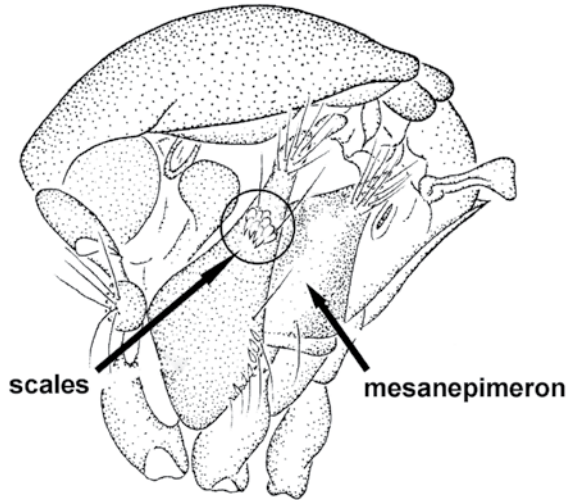


Fig. 47a *peccator*

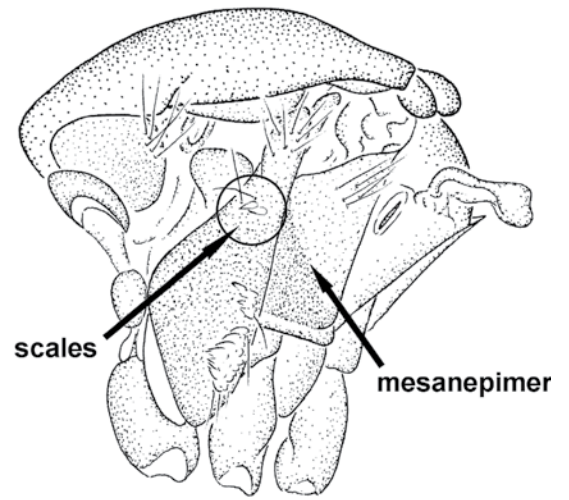


Fig. 47b *pilosus*

Some Common Female *Culex*



coronator
Fig. 48a



nigripalpus
Fig. 48b



quinquefasciatus
Fig. 48c



restuans
Fig. 48d



salinarius
Fig. 48e



tarsalis
Fig. 48f



erraticus
Fig. 48g



peccator
Fig. 48h



pilosus
Fig. 48i



territans
Fig. 48j

Key to Adult Females of *Psorophora*

1. Wing scales mixed dark and pale on all veins (Fig. 49a); hindfemur with preapical pale band (Fig. 49c) 2
- Wing scales all dark or with only a few pale scales on vein C and Sc (Fig. 49b); hindfemur without preapical pale band (Fig. 49d) 3

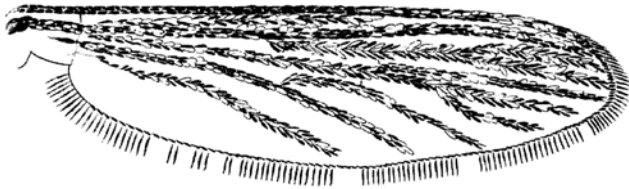


Fig. 49a *columbiae*

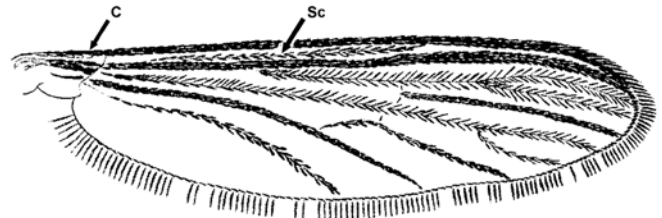


Fig. 49b *discolor*



Fig. 49c *columbiae*



Fig. 49d *cyanescens*

- 2(1). Hindtarsomere 1 with pale bands at base and middle (Fig. 50a); black and white wing and white wing scales in no definite pattern (Fig. 50c) *columbiae*

Hindtarsomere 1 with basal 80% pale-scaled (Fig. 50b); wing scales brown and white, with definite areas of pale or dark scales (Fig. 50d) *discolor*

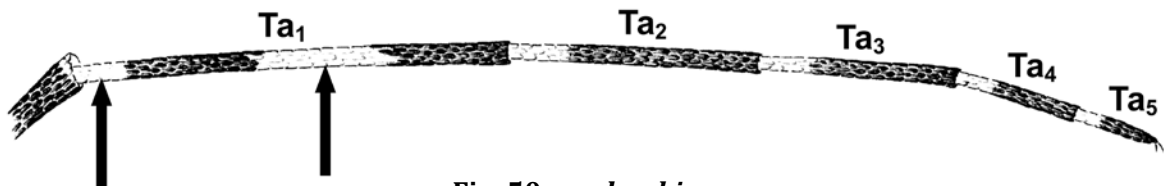


Fig. 50a *columbiae*



Fig. 50b *discolor*

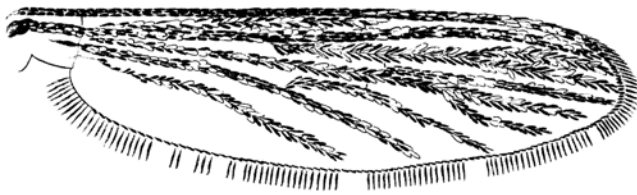


Fig. 50c *columbiae*

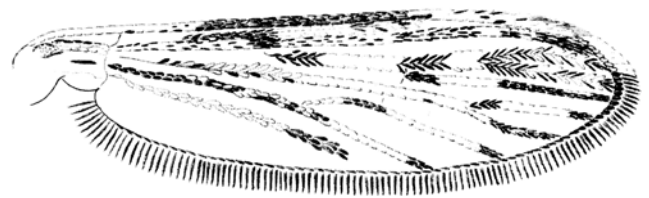


Fig. 50d *discolor*

- 3(1). Giant species, with long erect black scales near tip of hind femur (Fig. 51a) 4
 Medium to large species, hind femur without erect black scales near tip (Fig. 51b) 5

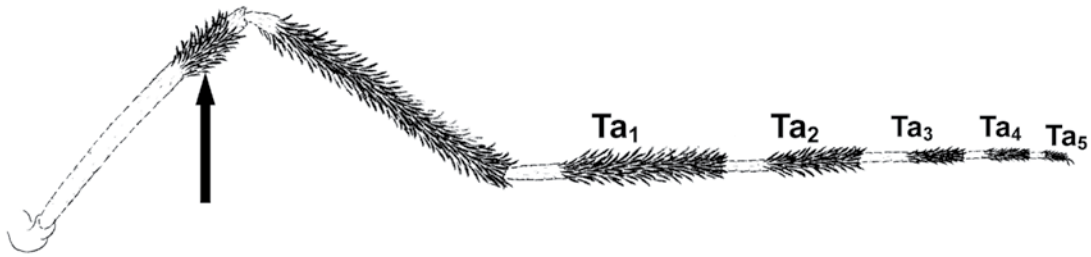


Fig. 51a *ciliata*

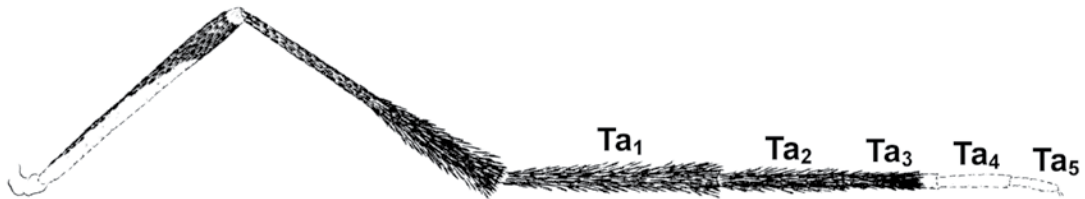


Fig. 51b *ferox*

- 4(3). Scutum with narrow median longitudinal stripe of golden scales (Fig. 52a); proboscis with yellow scales on distal half (Fig. 52c) *ciliata*
 Scutum with broad median longitudinal stripe of dark brown scales (Fig. 52b); proboscis dark scaled (Fig. 52d) *howardii*

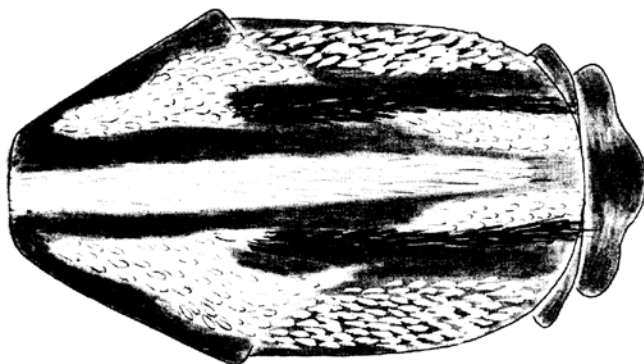


Fig. 52a *ciliata*

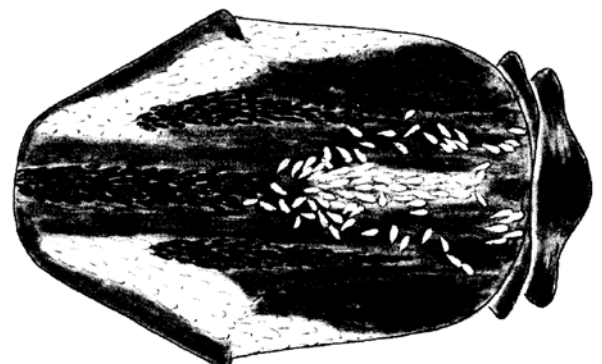


Fig. 52b *howardii*



Fig. 52c *ciliata*



Fig. 52d *howardii*

5(3). Hindtarsomeres entirely dark scaled (Fig. 53a); abdominal segments 2-3 usually with apical pale bands (Fig 53c) *cyanescens*

Hindtarsomeres with pale scales on at least one of tarsomeres 3-5 (Fig. 53b); abdominal segments 2-3 dark with apical lateral pale patches (Fig. 53d) 6

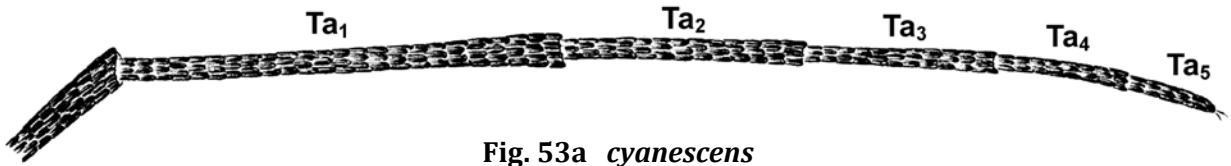


Fig. 53a *cyanescens*

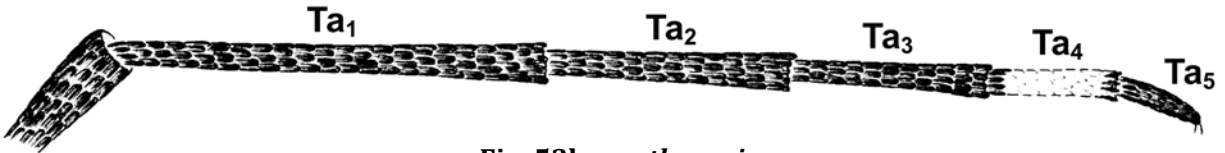


Fig. 53b *mathesoni*

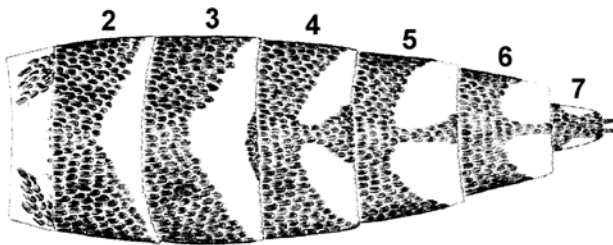


Fig. 53c *cyanescens*

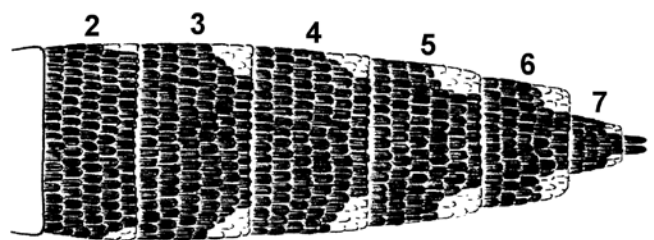


Fig. 53d *ferox*

6(5). Scutum with dark brown and pale scales mixed in no definite pattern (Fig. 54a); abdominal segment 1 with median patch of purple scales (Fig. 54c) *ferox*

Scutum with broad median longitudinal stripe of dark scales, pale scales laterally (Fig. 54b); abdominal segment 1 with white scale patches (Fig. 54d) 7

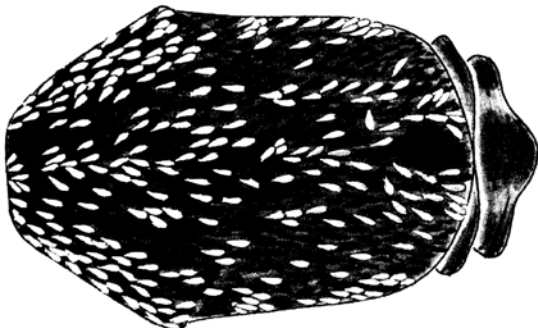


Fig. 54a *ferox*

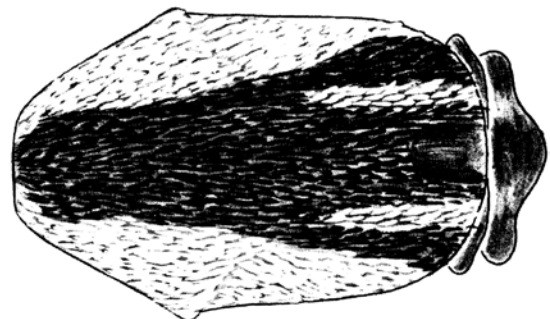


Fig. 54b *horrida*

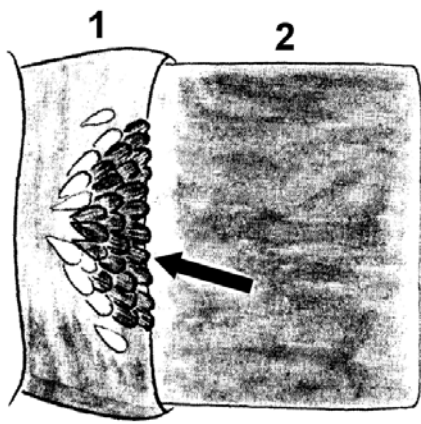


Fig. 54c *ferox*

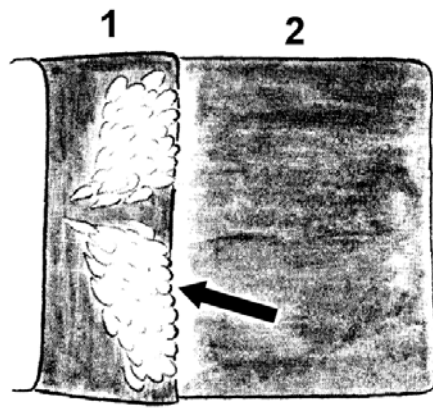


Fig. 54d *horrida*

7(6). Hindtarsomere 5 white (Fig. 55a) *horrida*

Hindtarsomere 5 dark scaled (Fig. 55b) *mathesoni*

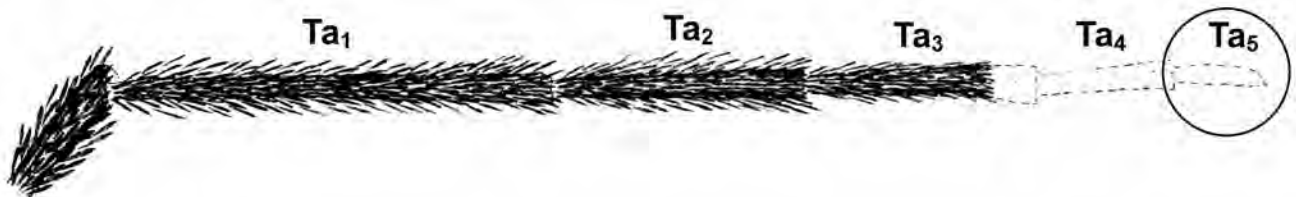


Fig. 55a *horrida*



Fig. 55b *mathesoni*

Some Common Female *Psorophora*



ciliata
Fig. 56a



howardii
Fig. 56b



cyanescens
Fig. 56c



ferox
Fig. 56d



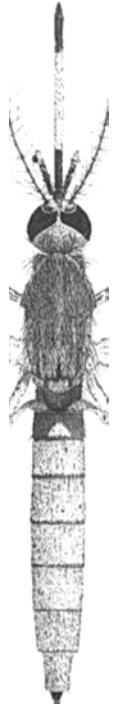
horrida
Fig. 56e



*mathesoni**
Fig. 56f



*columbiae***
Fig. 56g



discolor
Fig. 56h

* taken from Carpenter and Lacasse (1955); labeled as *varipes*

** taken from Carpenter and Lacasse (1955); labeled as *confinnis*

Key to Adult Female *Uranotaenia*

1. Scutum without median longitudinal row of iridescent scales (Fig. 57a); hindtarsomeres 4, 5, and part of 3 pale-scaled (Fig. 57c) *lowii*

Scutum without median longitudinal row of iridescent scales (Fig. 57b); hindtarsomeres all dark-scaled (Fig. 57d) *sapphirina*

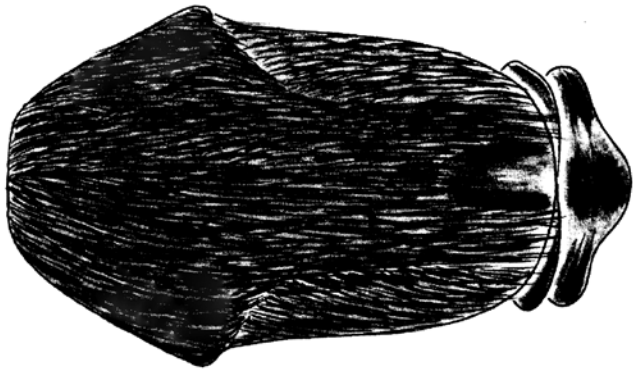


Fig. 57a *lowii*

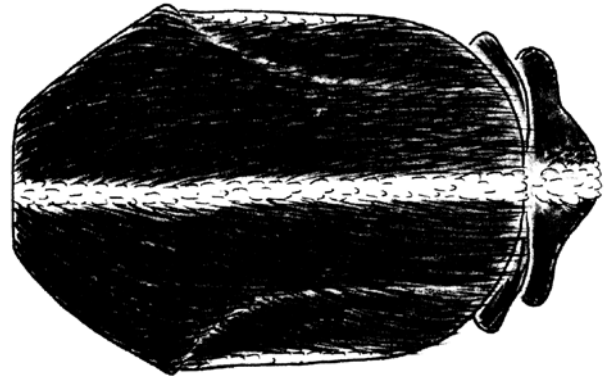


Fig. 57b *sapphirina*



Fig. 57c. *lowii*

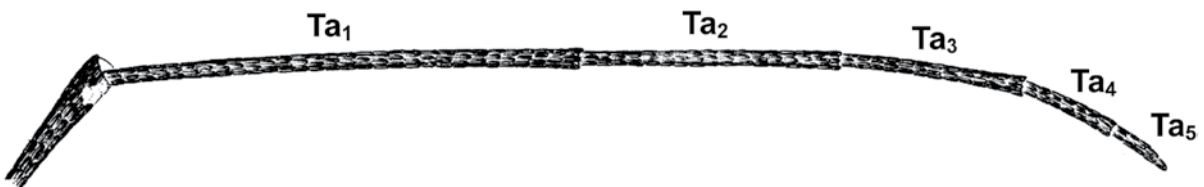


Fig. 57d. *sapphirina*

Key to Adult Female *Culiseta*

1. Scales on wings, palpi, and legs entirely dark (Fig. 58a, c) *melanura*
Scales on palpi, legs, and anterior veins of wing speckled (Fig. 58b, d) *inornata*

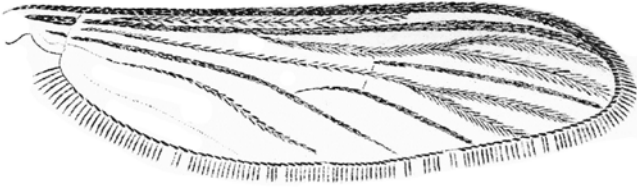


Fig. 58a *melanura*

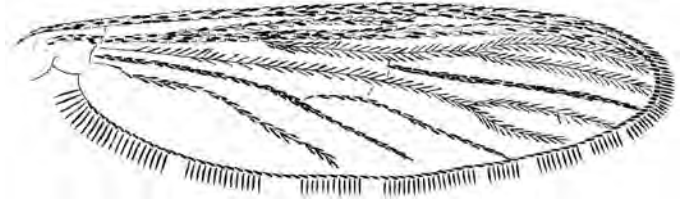


Fig. 58b *inornata*



Fig. 58c *melanura*



Fig. 58d *inornata*

Key to Adult Female *Orthopodomyia*

1. Lower mesokatepisternal setae 4 or more (Fig. 59a); base of wing vein R4+ 5 usually with patch of pale scales (Fig. 59c) *signifera*

Lower mesokatepisternal setae 0-2 (Fig. 59b); base of vein R4+ 5 usually dark-scaled (Fig. 59d) *alba*

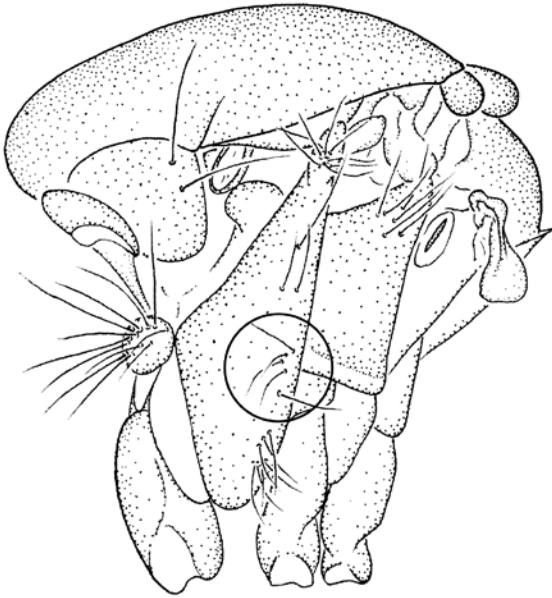


Fig. 59a *signifera*

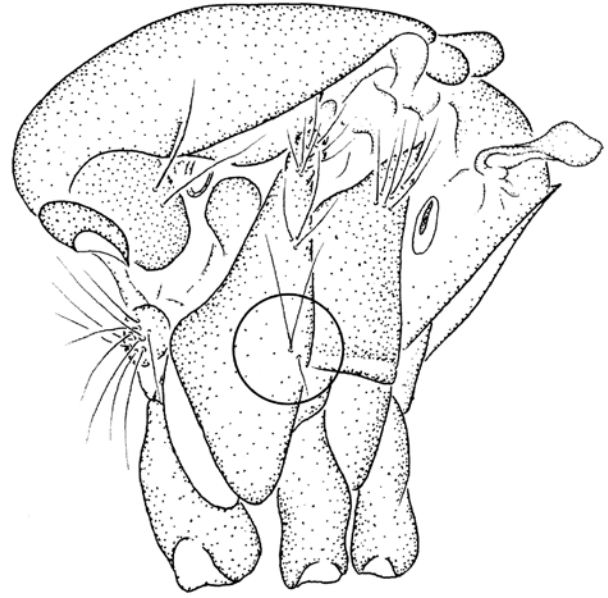


Fig. 59b *alba*

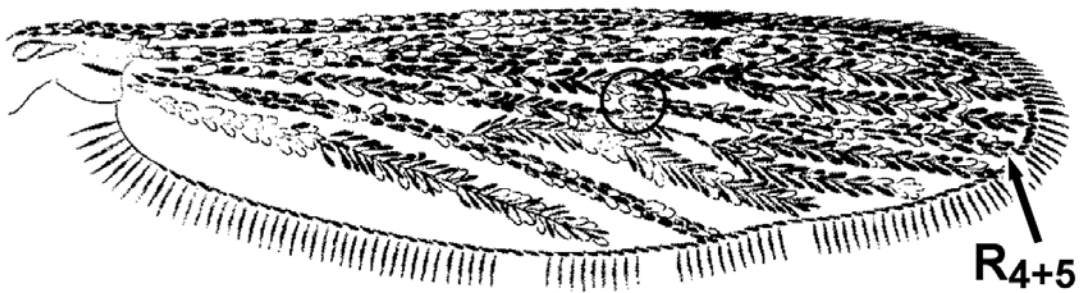


Fig. 59c *signifera*

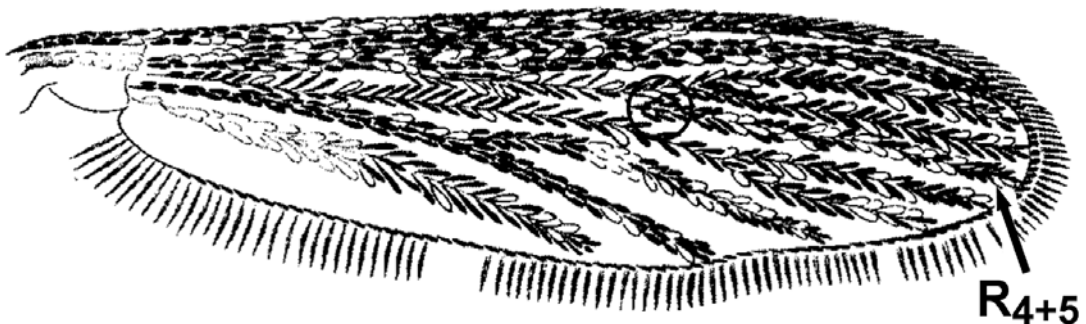


Fig. 59d *alba*

Species Fact Sheets for Mississippi Mosquitoes

Aedes aegypti

(yellow fever mosquito)

Host preference: humans

Larval habitat: artificial containers

Flight range: ≈ 500 ft.

Biting activity: daytime

Overwinter stage: egg

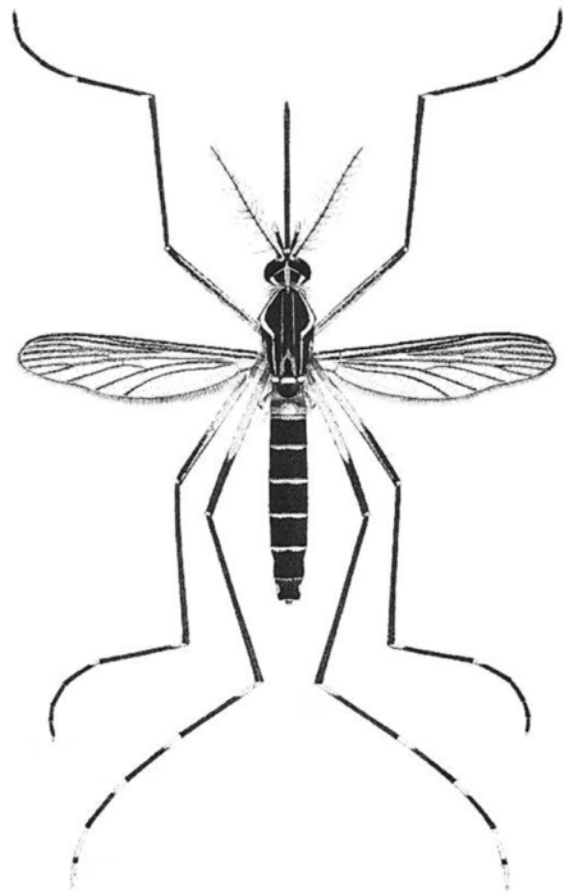
Broods per year: multiple

Diagnostic description:

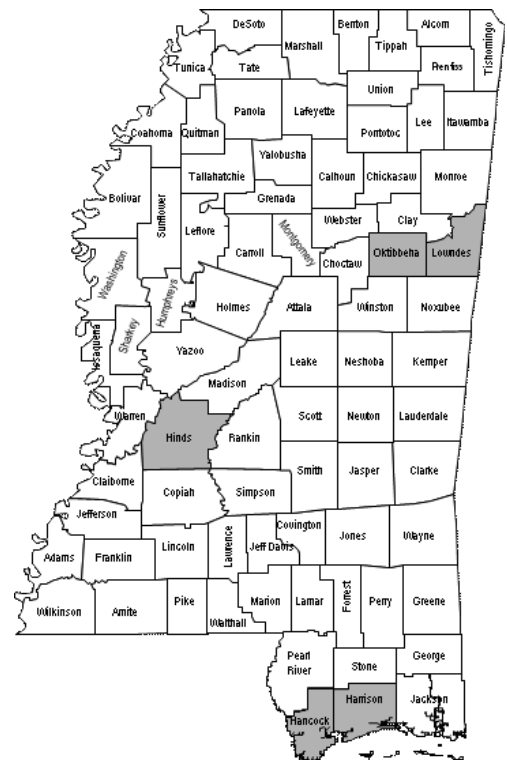
- palpi short
- silvery lyre-shaped stripes on scutum
- pointed abdomen
- broad white basal bands on hind tarsi
- hindtarsomere 5 entirely white
- clypeus with white scales

Disease: yellow fever, dengue, chikungunya

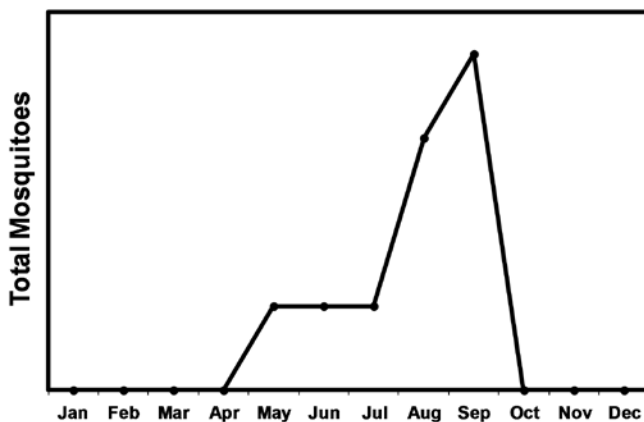
Remarks: The last known collection of *Aedes aegypti* in Mississippi was 25 Sep 1986 in Hinds County (Byram); this species currently occurs in the New Orleans metro area, making it possible (even likely) that there are isolated populations occurring in at least the southern half of Mississippi.



Distribution



Seasonal Abundance



Aedes albopictus

(Asian tiger mosquito)

Host preference: humans, mammals, birds

Larval habitat: artificial containers, tree holes

Flight range: \approx 500 ft.

Biting activity: daytime

Overwinter stage: egg

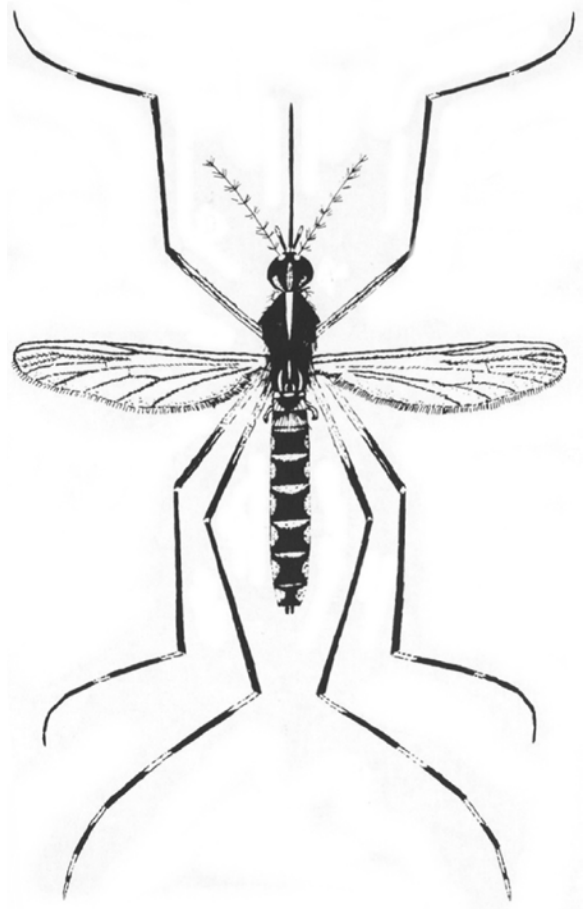
Broods per year: multiple

Diagnostic description:

- palpi short
- scutum black with narrow silver stripe
- abdomen pointed
- proboscis entirely dark
- wings entirely dark
- hindtarsi with broad basal white bands
- hindtarsomere 5 entirely white
- clypeus without scales

Disease: Believed to be involved in transmission of LaCrosse encephalitis in urban areas; vector of dengue, chikungunya, and WNV.

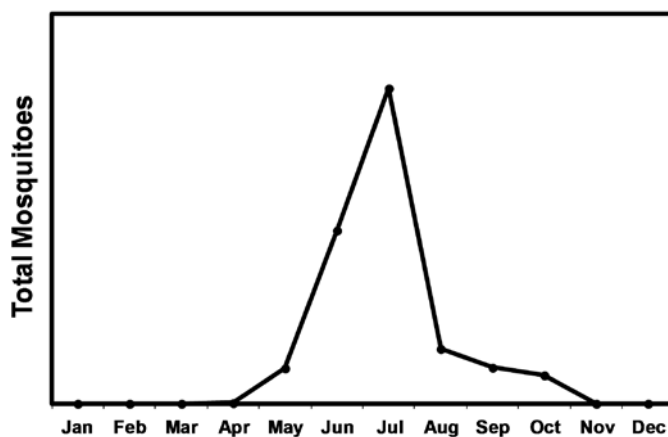
Remarks: Introduced in the United States around 1986 via tires shipped from Japan; most common container-breeding mosquito in Mississippi.



Distribution



Seasonal Abundance



Anopheles atropos

Host preference: large mammals including humans

Larval habitat: salt marsh

Flight range: 1-5 miles

Biting activity: night, dawn, dusk

Overwinter stage: adult

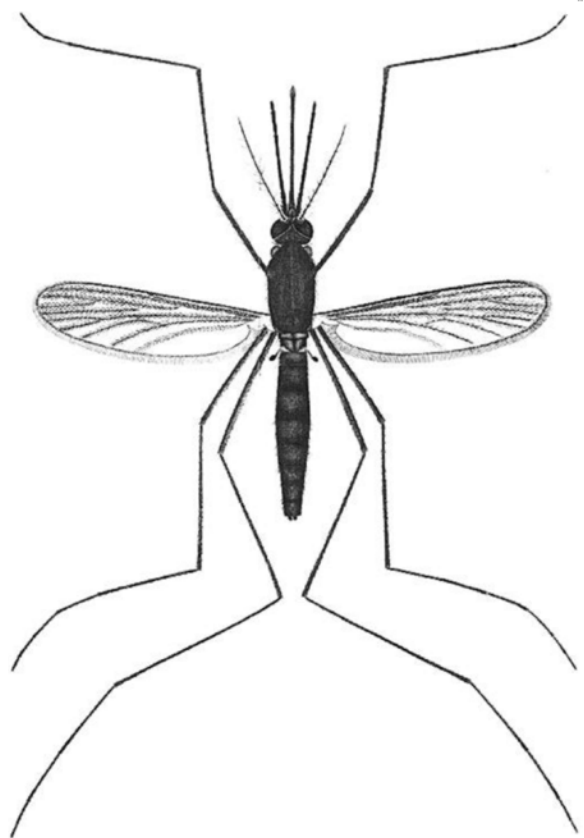
Broods per year: multiple

Diagnostic description:

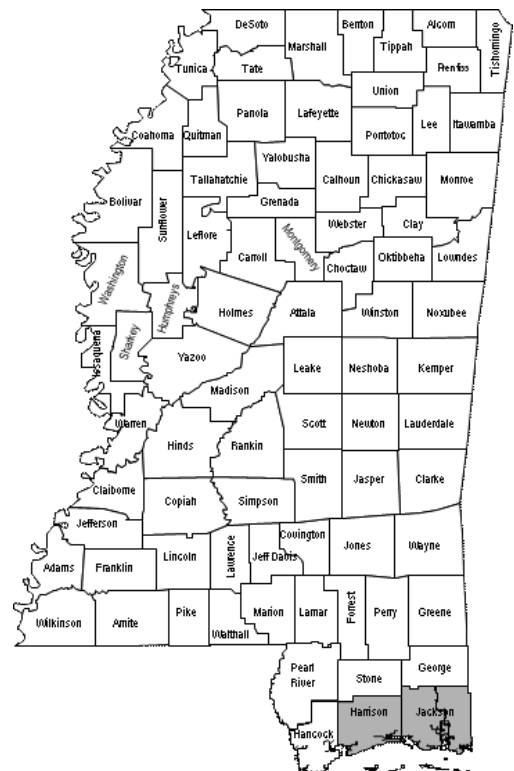
- palpi dark and about as long as proboscis
- abdomen blunt or rounded
- abdomen and tarsi entirely dark
- occiput (top of head) and halter knob all dark
- wing scales all dark, without dark spots

Disease: Able to transmit malaria in lab setting, but not considered a natural vector.

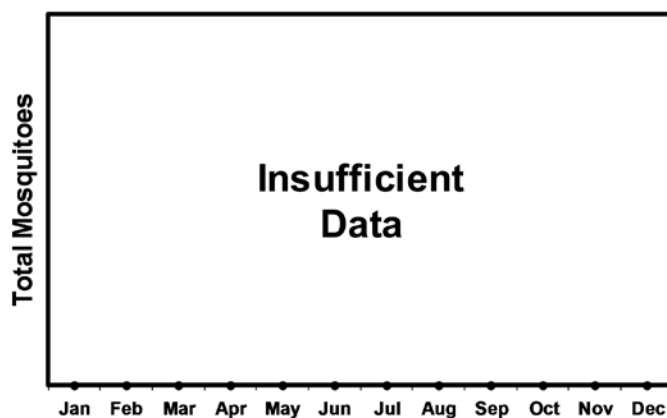
Remarks: Primarily occurs along the Gulf Coast; not very abundant; breeds in brackish water.



Distribution



Seasonal Abundance



Anopheles bradleyi

Host preference: humans, mammals

Larval habitat: brackish pools and marshes with floating and emergent vegetation, algae

Flight range: 1–2 miles

Biting activity: night, dusk, dawn

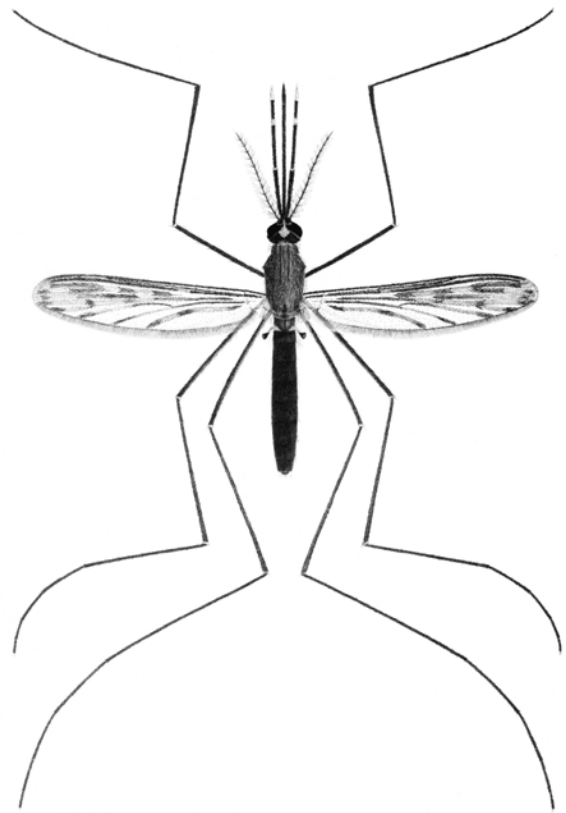
Overwinter stage: adult

Broods per year: multiple

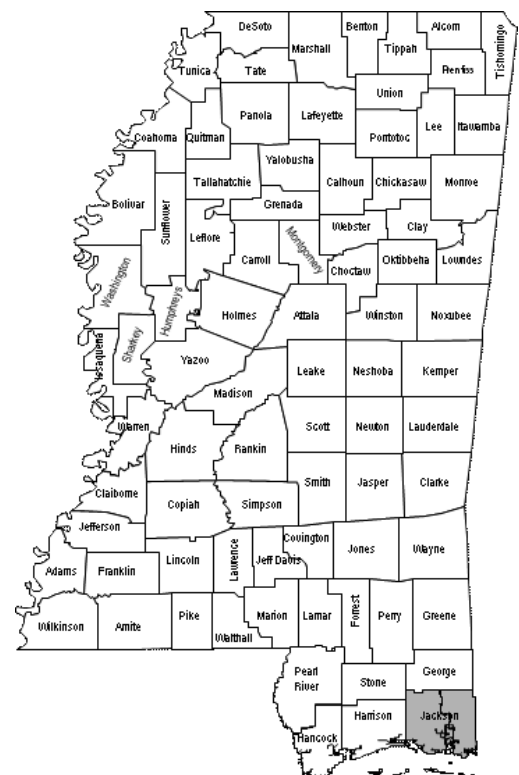
Diagnostic description: see *An. crucians*

Disease: Successfully infected with malaria in lab setting, but not believed to be a natural vector.

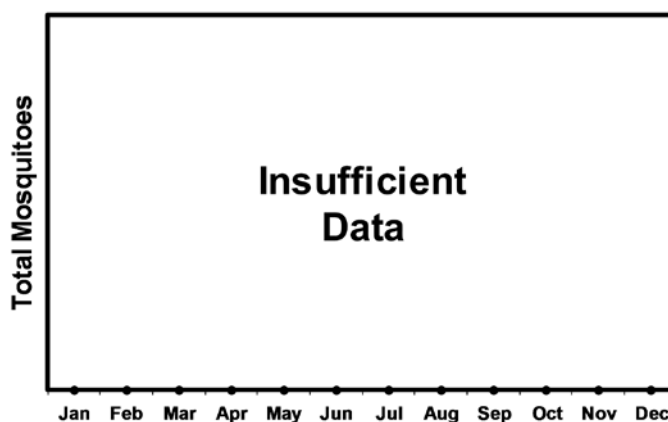
Remarks: This species, along with *An. crucians*, *An. georgianus*, and four undescribed species belong to the *An. crucians* complex. Adults are very difficult to tell apart and best distinguished from one another using DNA PCR assays.



Distribution



Seasonal Abundance



Anopheles crucians

Host preference: mammals, humans, birds

Larval habitat: fresh water swamps, lake margins

Flight range: 1–2 miles

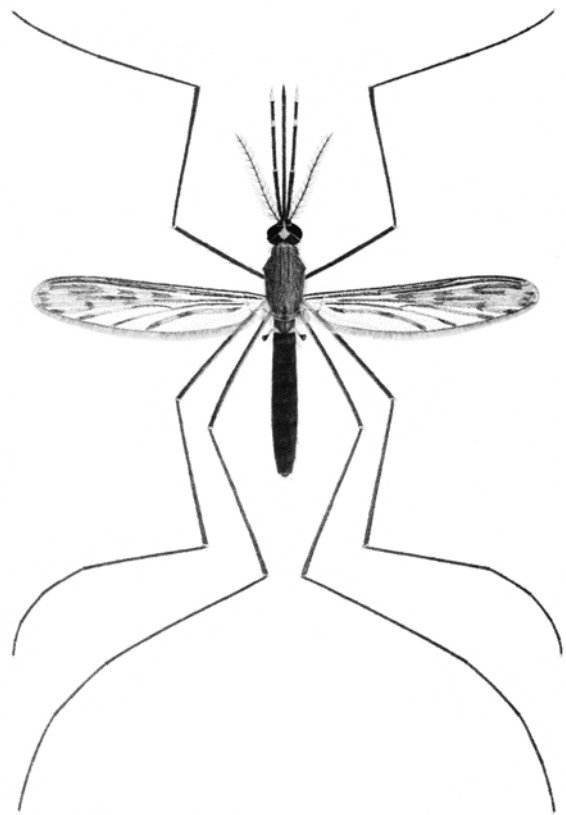
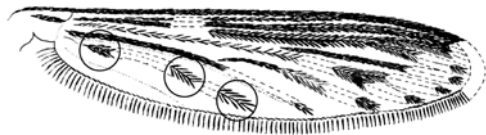
Biting activity: night, dusk, dawn

Overwinter stage: adult

Broods per year: multiple

Diagnostic description:

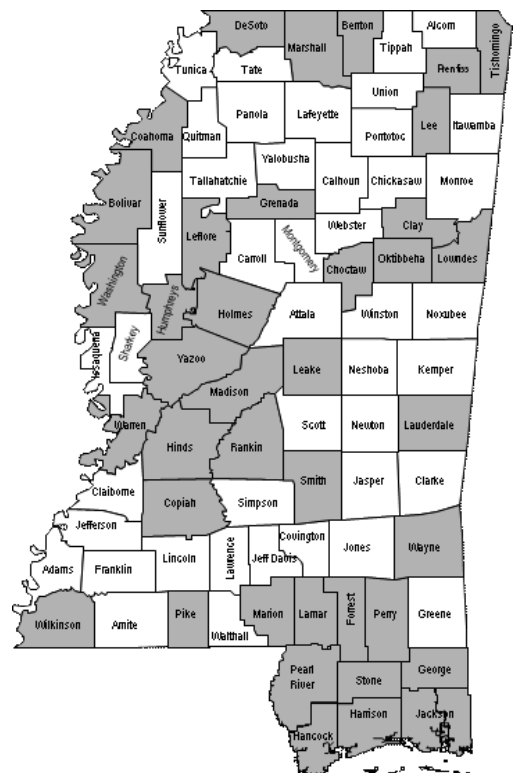
- palpi about as long as proboscis
- abdomen blunt or rounded
- proboscis entirely dark
- wings intermixed with pale and dark scales
- wings with pale patch at distal end
- distal segments of palpi entirely pale
- hindlegs entirely dark
- halter knob entirely dark
- three black spots on vein 1A



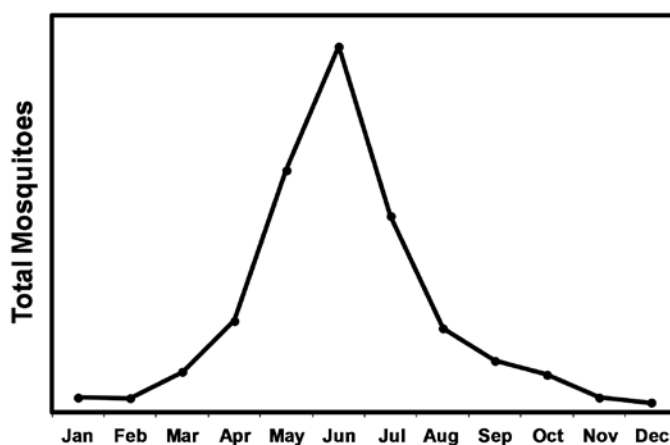
Disease: Natural populations have been found infected with agents of malaria, EEE, and WNV.

Remarks: Complex of three described and four undescribed species that are difficult to separate morphologically, usually referred to as Crucians complex. At least three of the seven species occur in Mississippi (*An. crucians*, *An. georgianus*, *An. bradleyi*).

Distribution



Seasonal Abundance



Anopheles georgianus

Host preference: mammals including humans

Larval habitat: fresh water swamps, lake margins

Flight range: 1-2 miles

Biting activity: night, dusk, dawn

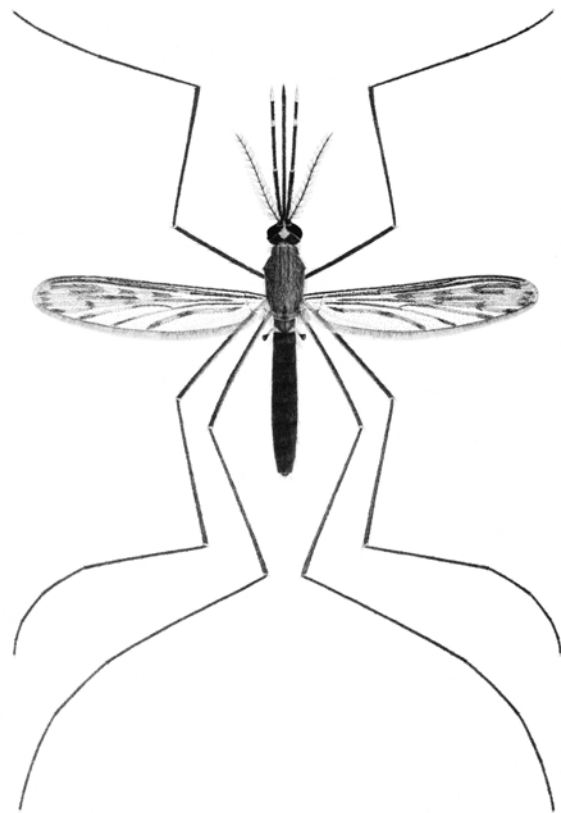
Overwinter stage: adult

Broods per year: multiple

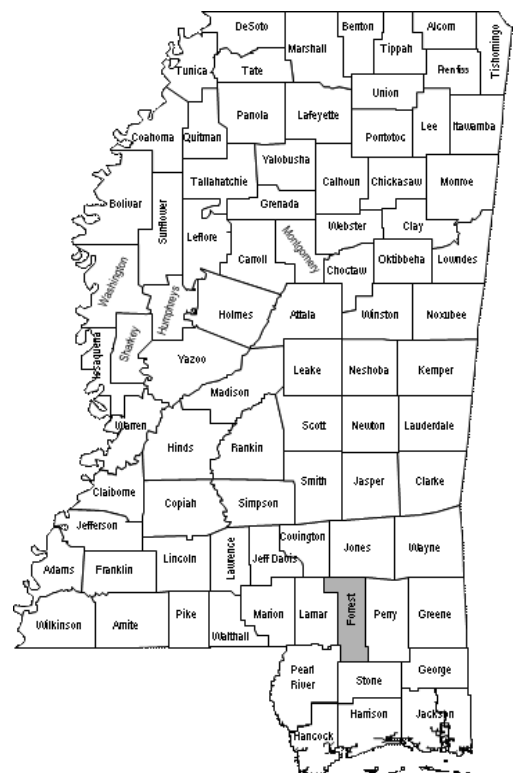
Diagnostic description: see *An. crucians*

Disease: Little is known about malaria transmission with this species, but is not believed to be a natural vector.

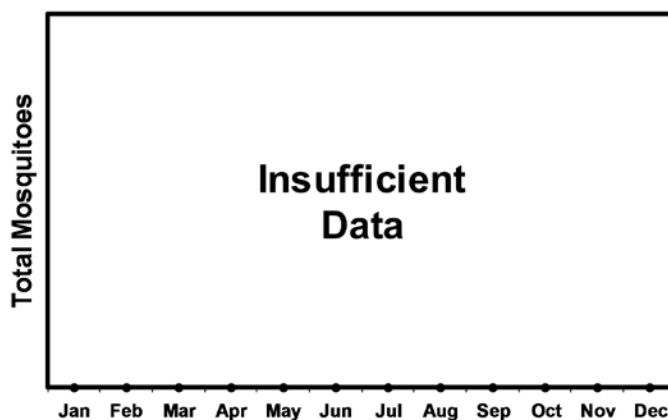
Remarks: This species, along with *An. crucians*, *An. bradleyi*, and four undescribed species belong to the *An. crucians* complex. Adults are very difficult to tell apart and are usually only distinguished from one another using DNA PCR assays.



Distribution



Seasonal Abundance



Anopheles pseudopunctipennis

Host preference: mammals including humans

Larval habitat: sunny stream pools and margins

Flight range: up to ¼ mile

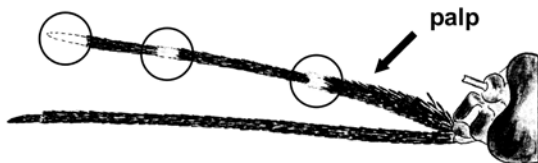
Biting activity: night

Overwinter stage: adult

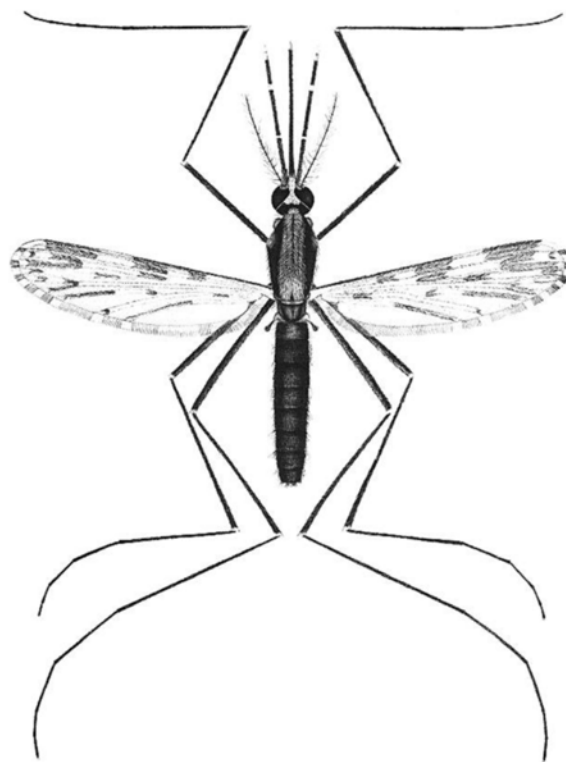
Broods per year: multiple

Diagnostic description:

- morphologically similar to *An. punctipennis* but with more pale scales on wing
- palpi about as long as proboscis, with pale rings and tips



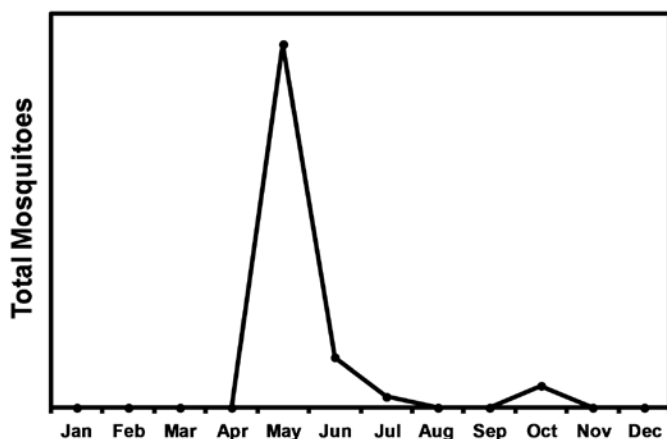
- abdomen blunt or rounded
- proboscis dark
- hindtarsi entirely dark
- two pale patches on anterior wing margin; pale areas along posterior fringe of wing



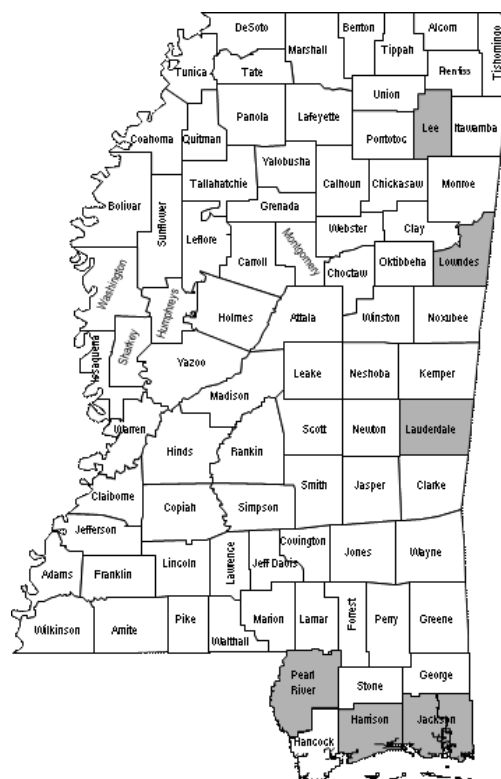
Disease: Not known to play a major role in malaria transmission in the United States.

Remarks: Considered an important vector of malaria in Mexico and parts of South America.

Seasonal Abundance



Distribution



Anopheles walkeri

Host preference: humans and other large mammals

Larval habitat: sunny freshwater swamps and lake margins with emergent and floating vegetation

Flight range: up to 2 miles

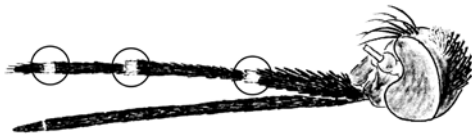
Biting activity: night and day (when disturbed; will readily enter dwellings)

Overwinter stage: egg

Broods per year: multiple

Diagnostic description:

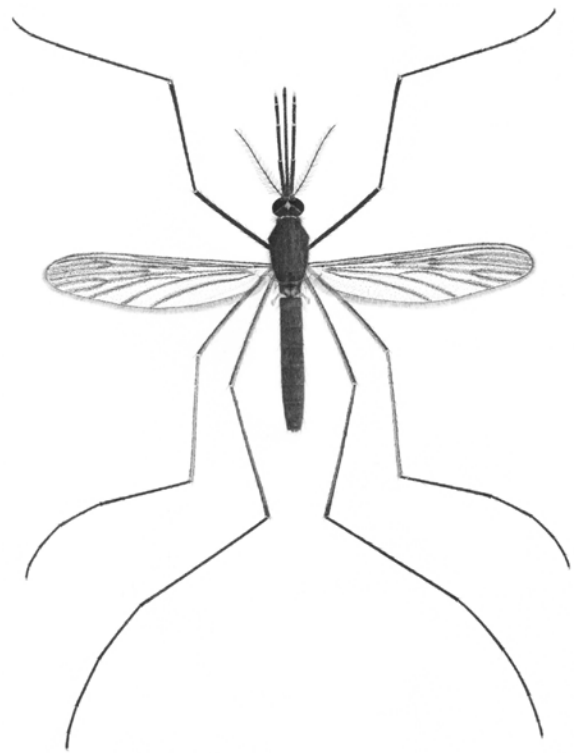
- palpi about as long as proboscis
- abdomen blunt or rounded
- palpi with narrow pale apical rings



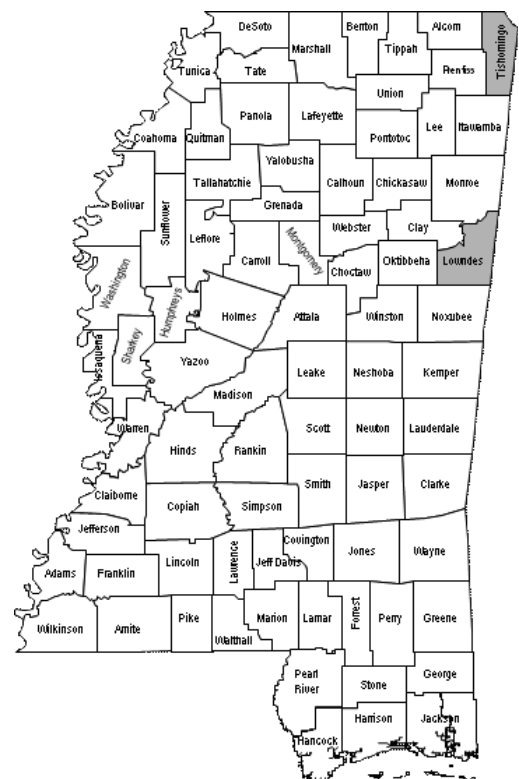
- abdomen with fine golden setae
- wing scales entirely dark with four clumps of scales appearing as four spots
- with white scale patch on top of head

Disease: Not known to be a natural vector of malaria in the United States.

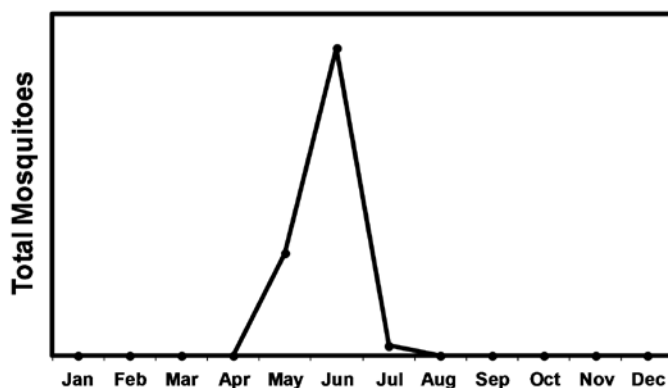
Remarks: Both *An. walkeri* and *An. quadrimaculatus* wings have four dark scaled spots, but the spots on *walkeri* are not as pronounced as those of *quadrimaculatus*.



Distribution



Seasonal Abundance



Culex coronator

Host preference: large mammals and occasionally humans, possibly birds

Larval habitat: stagnant or slow moving ground pools and seeps, artificial containers; sun or shade

Flight range: suspected to be a mile or more

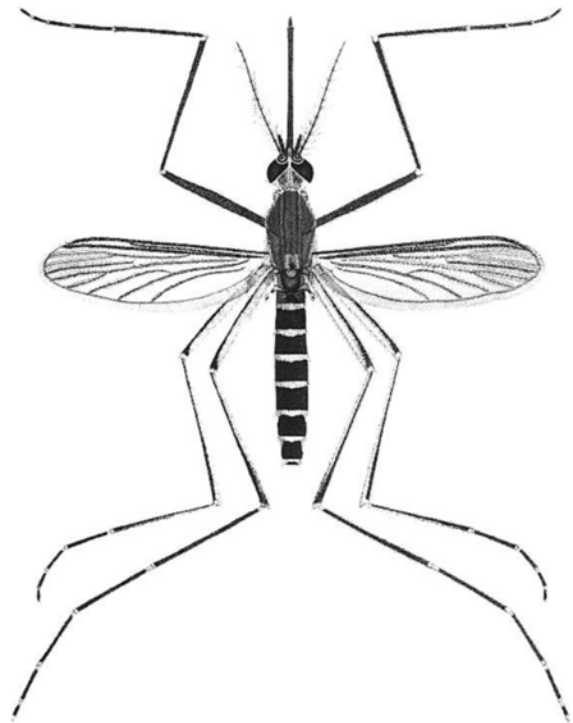
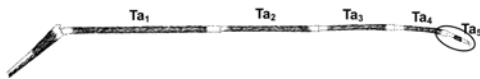
Biting activity: dusk, night, dawn

Overwinter stage: adult

Broods per year: multiple

Diagnostic description:

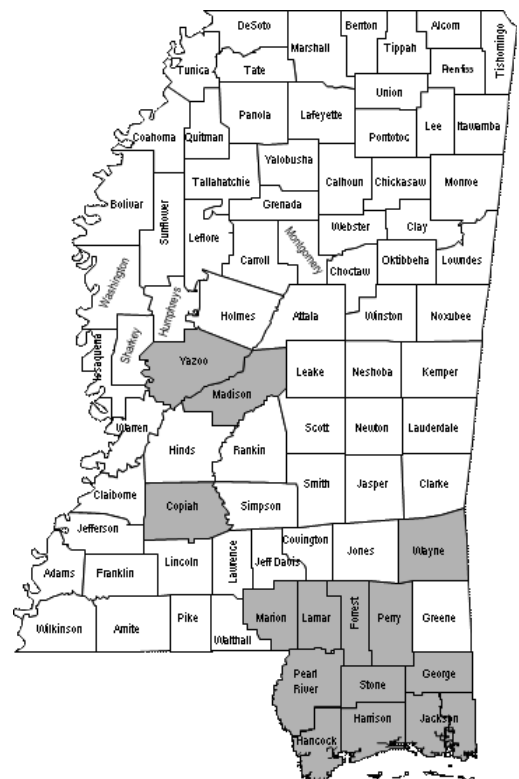
- palpi short, dark
- proboscis dark with median patch of ventral pale scales
- abdomen blunt or rounded
- abdomen with basal pale bands
- hindtarsomeres with pale bands across joints
- hindtarsomere 5 with dark band between two pale bands



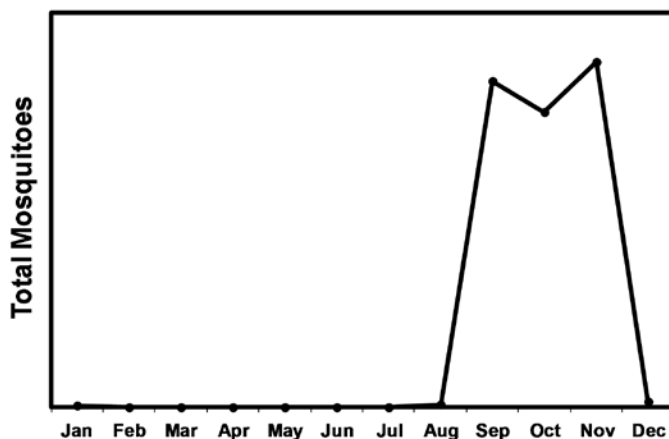
Disease: Although specimens from Texas and Louisiana have tested positive for WNV, its role in disease transmission in the United States is not yet determined.

Remarks: First reported collection from Mississippi was in Copiah County in October of 2004.

Distribution



Seasonal Abundance



Culex erraticus

Host preference: birds (preferred), mammals, humans, lizards

Larval habitat: permanent ponds with grassy vegetation, freshwater swamps with little to some duckweed

Flight range: up to ¼ mile

Biting activity: dusk, dawn, day (if disturbed)

Overwinter stage: adult

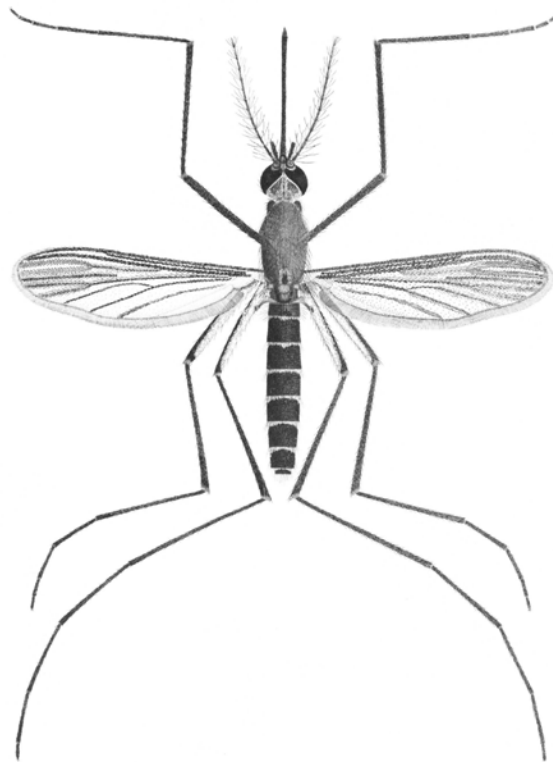
Broods per year: multiple

Diagnostic description:

- relatively small mosquito
- palpi short, dark
- abdomen blunt or rounded
- proboscis entirely dark with tip slightly swollen
- hindlegs dark, but may exhibit small pale knee patches
- abdomen and legs tend to have bronzy, metallic blue-green appearance under magnification

Disease: This species has tested positive for WNV, but it does not seem to play a major role, if any, in transmission. Considered a probable vector of EEE in Alabama. Known to transmit lizard malaria in Florida.

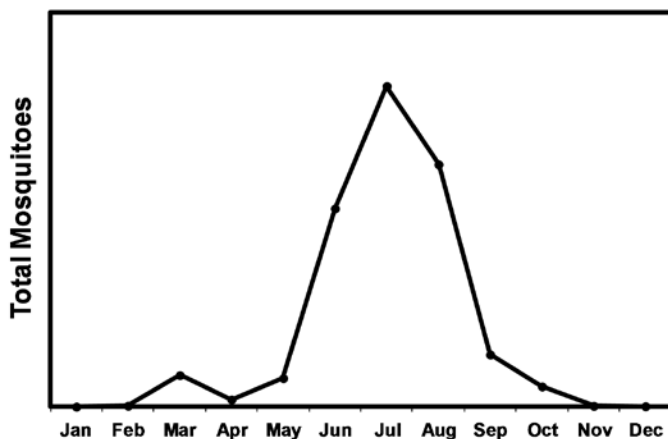
Remarks: One of the most common species occurring in Mississippi; one of three species belonging to the *Melanoconion* subgenus of *Culex* (*Cx. peccator* and *Cx. pilosus* represent the other two).



Distribution



Seasonal Abundance



Culex pilosus

Host preference: reptiles, small mammals

Larval habitat: temporary and semi-permanent pools including ditches, streams, grassy pools, and floodwater areas

Flight range: near breeding site

Biting activity: rarely bites humans

Overwinter stage: adult

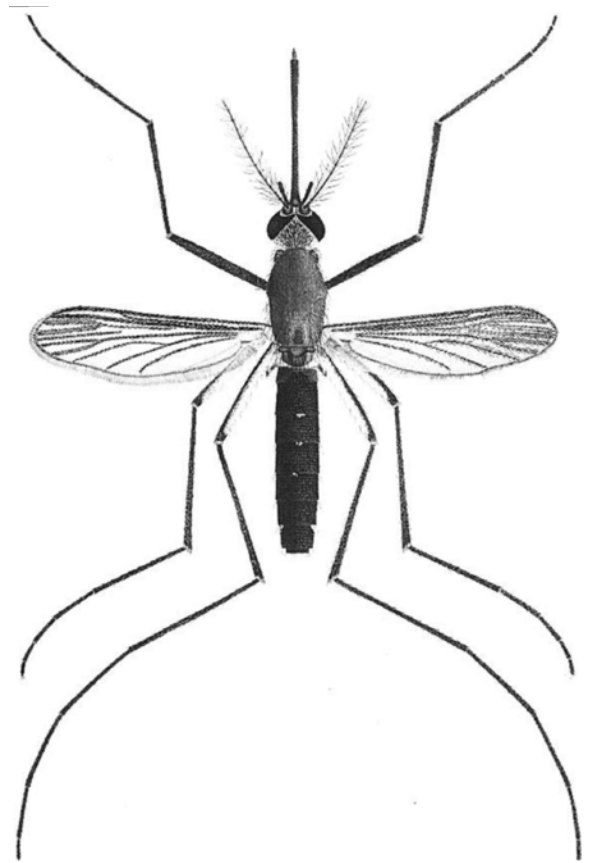
Broods per year: multiple

Diagnostic description:

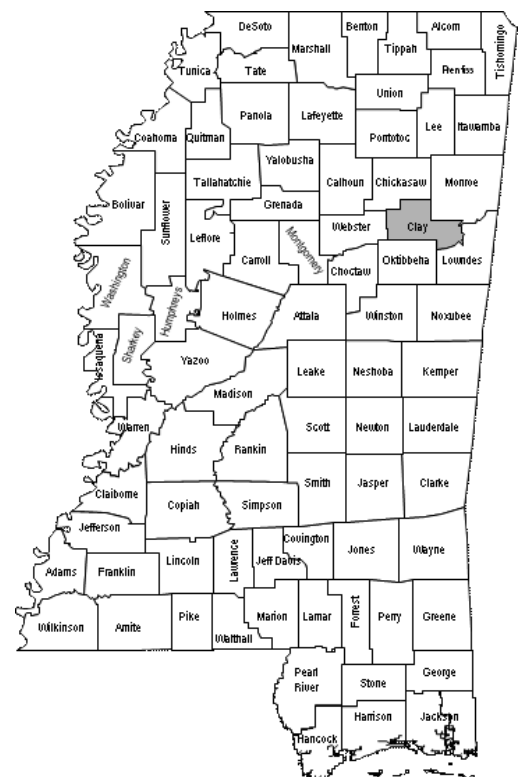
- small mosquito
- palpi short, dark
- proboscis long, narrow, dark, and slightly swollen at tip
- abdomen blunt or rounded

Disease: Plays no significant role in disease transmission.

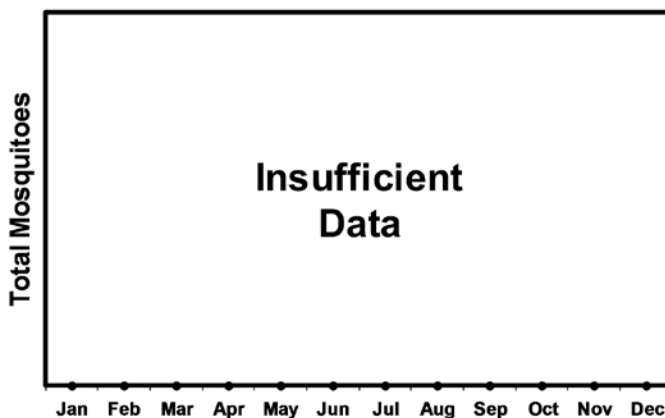
Remarks: Relatively uncommon in Mississippi; unlike other *Culex* species, *Cx. pilosus* eggs are able to withstand drying out.



Distribution



Seasonal Abundance



Culex quinquefasciatus

(Southern house mosquito)

Host preference: birds, humans, mammals

Larval habitat: water with high organic content (such as sewage ditches), artificial containers

Flight range: up to 1 mile

Biting activity: night, dusk, dawn

Overwinter stage: adult

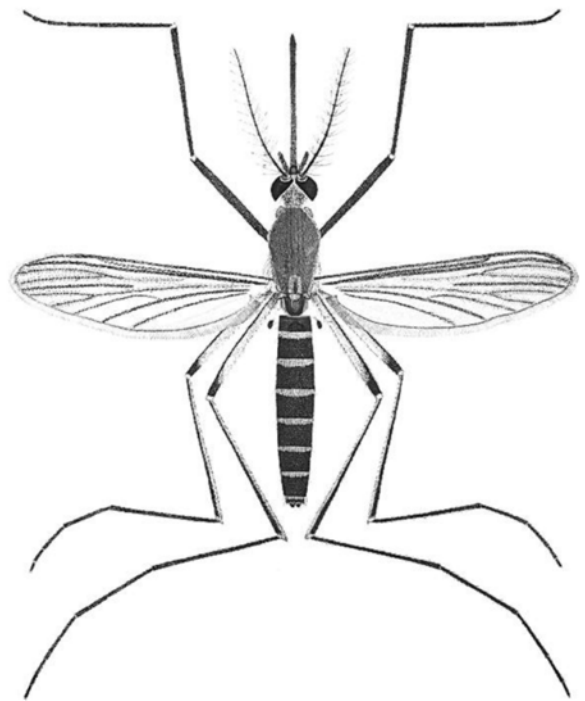
Broods per year: multiple

Diagnostic description:

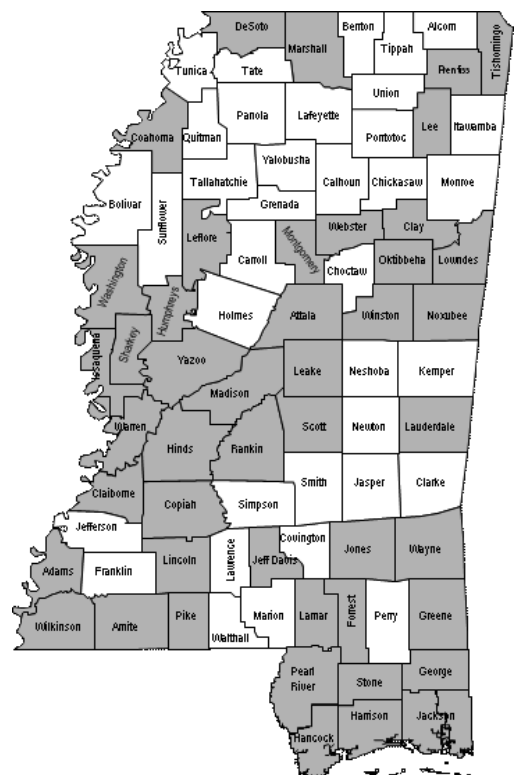
- palpi short
- abdomen blunt or rounded
- thorax, proboscis, tarsi, and wing scales entirely dark scaled
- mid-lobe of scutellum with patch of long pale scales
- abdominal segments with broad basal pale bands (bands narrow in width laterally)
- abdominal segments 7-8 covered two-thirds or more with dark scales, with no copper scales
- abdomen with black and white scales on bottom side (ventral)

Disease: West Nile virus, St. Louis encephalitis, dog heartworm

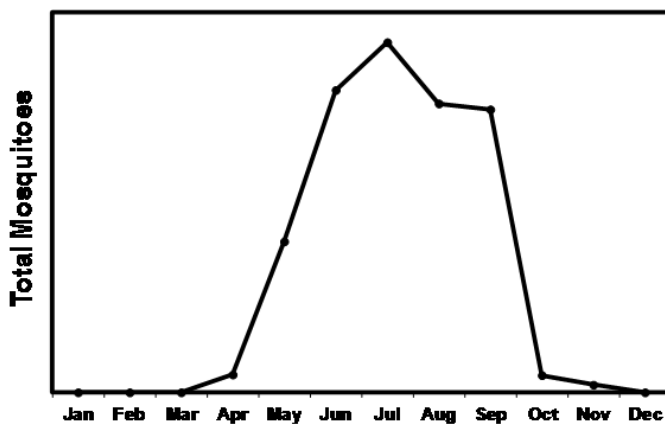
Remarks: This species belongs to the *Culex pipiens* complex.



Distribution



Seasonal Abundance



Culex restuans

Host preference: birds, humans, mammals

Larval habitat: drainage ditches, woodland pools, ground pools, artificial containers

Flight range: 1 – 2 miles

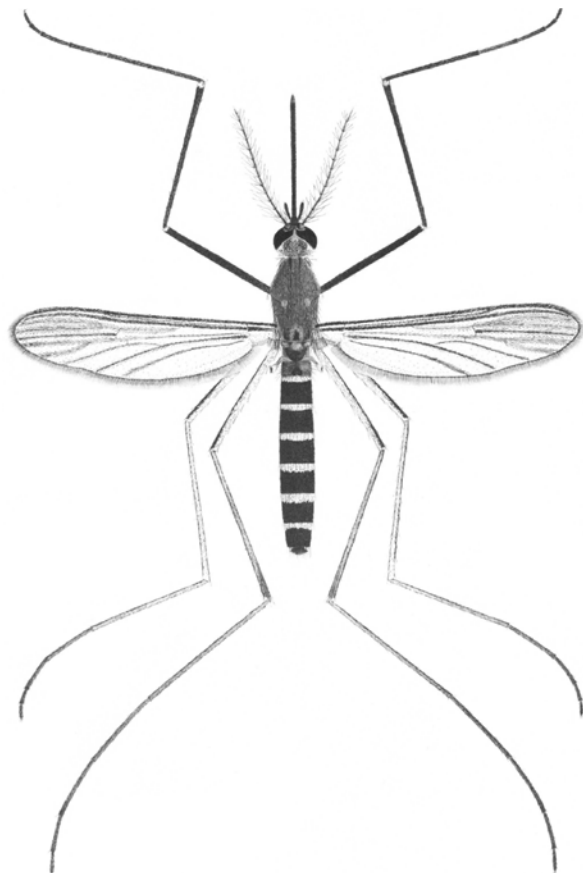
Biting activity: night, dusk, dawn

Overwinter stage: adult

Broods per year: multiple

Diagnostic description:

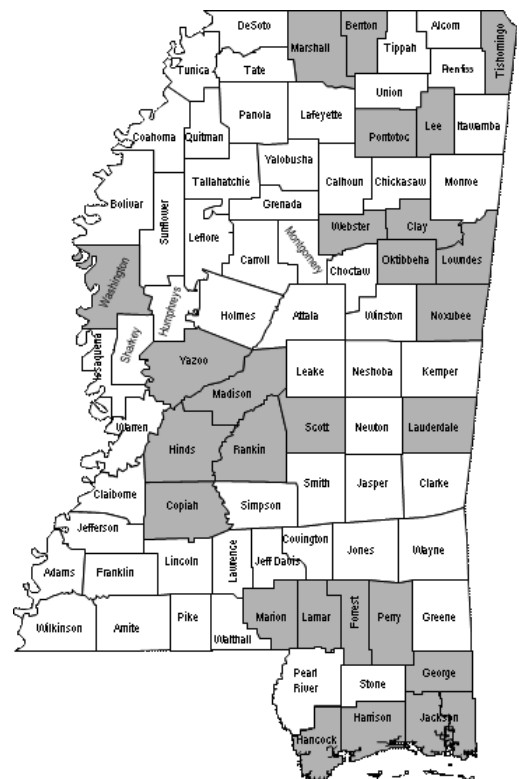
- medium-sized mosquito
- palpi short, dark
- proboscis dark with some ventral pale scales
- scutum with narrow curved golden-brown scales
- scutum with pair of pale-scaled submedian spots
- abdominal segments with pale basal bands; 1st abdominal tergite with median patch of dark scales
- legs dark-scaled with bronze to metallic blue-green reflection
- hindtarsi entirely dark; may have faint deep yellow or light brown bands
- wing scales narrow, dark



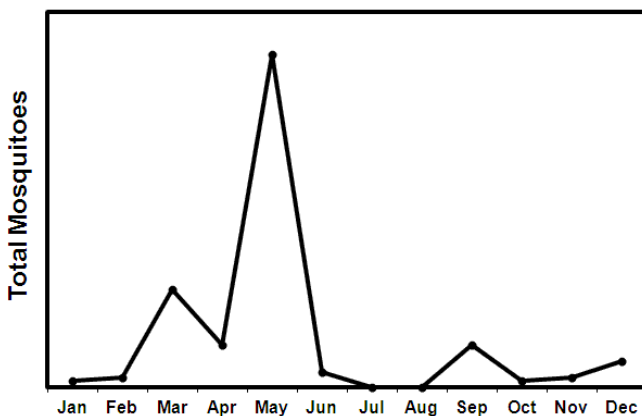
Disease: Likely maintains WNV and SLE (St. Louis Encephalitis) in the bird population.

Remarks: More abundant in cooler months; larvae can be found in both clear water and water with high organic content.

Distribution



Seasonal Abundance



Culex salinarius

Host preference: birds, humans, mammals

Larval habitat: drainage ditches, artificial containers, fresh-water swamps, lake margins, brackish marshes along the Gulf Coast

Flight range: up to 5 miles

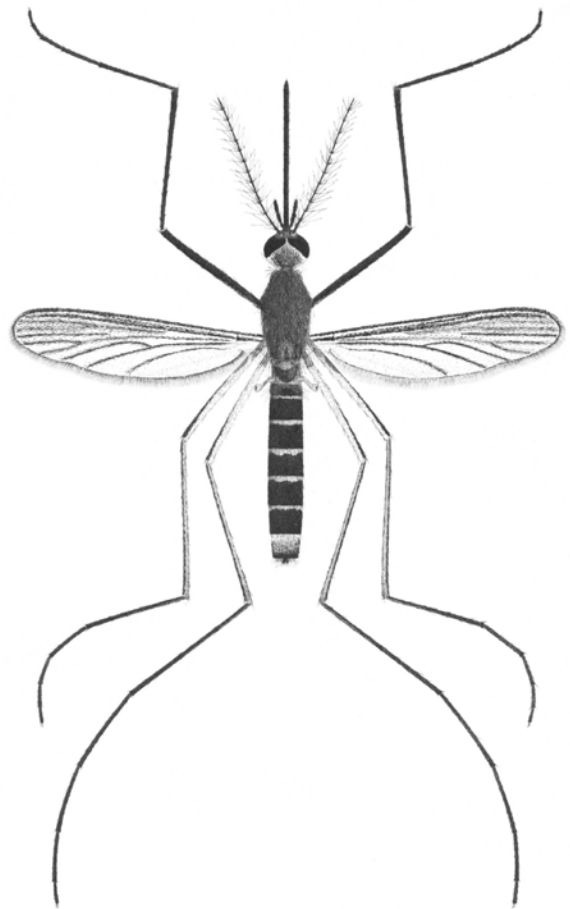
Biting activity: dusk, night, dawn

Overwinter stage: adult

Broods per year: multiple

Diagnostic description:

- palpi short
- abdomen blunt or rounded
- proboscis, wings, thorax, and tarsi entirely dark-scaled
- hind part of thorax with dark scales
- abdominal segments with basal copper colored bands
- abdominal segments 7 and 8 almost entirely covered with copper scales
- bottom of abdominal segments covered with copper scales
- mid-lobe of scutellum with tiny brown scales



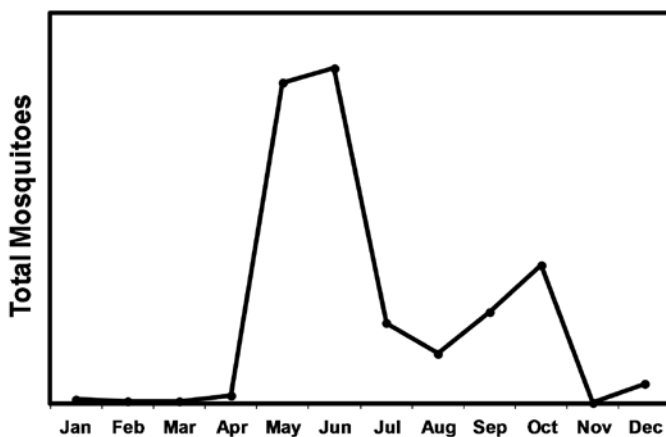
Disease: St. Louis Encephalitis (SLE), WNV. Known bridge vector of EEE in other southern states.

Remarks: This species played a role in the 1975–76 SLE outbreak in which 291 confirmed human cases occurred in Mississippi; recent studies suggest this species also likely serves as a vector of WNV.

Distribution



Seasonal Abundance



Culex territans

Host preference: cold-blooded animals (particularly frogs)

Larval habitat: drainage ditches, freshwater swamps, semi-permanent/permanent pools

Flight range: up to 1/8 mile

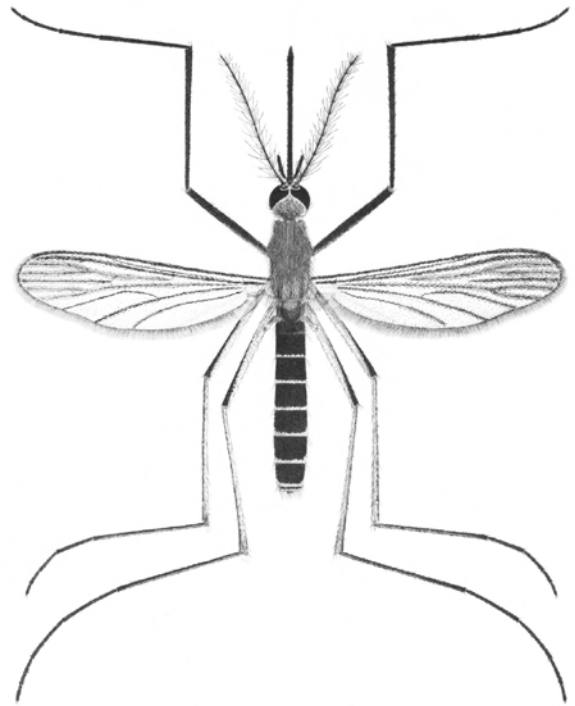
Biting activity: not known to bite humans

Overwinter stage: adult

Broods per year: multiple

Diagnostic description:

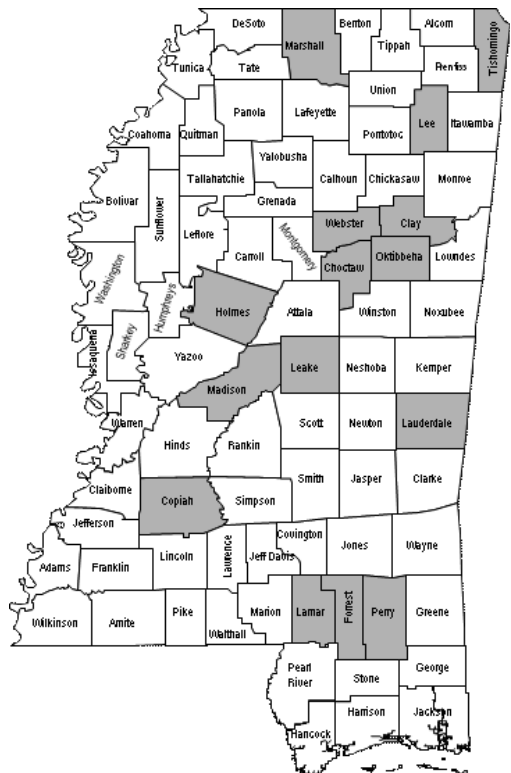
- medium-sized mosquito
- palpi short, dark
- proboscis long, dark
- scutum with narrow light to dark brown scales
- scutum sometimes with pair of submedian pale spots as with *Cx. restuans*
- wing scales narrow, dark
- legs dark-scaled with bronze to metallic blue-green reflection except for narrow pale knee spots
- abdominal segments with bands of pale apical scales, or lateral patches



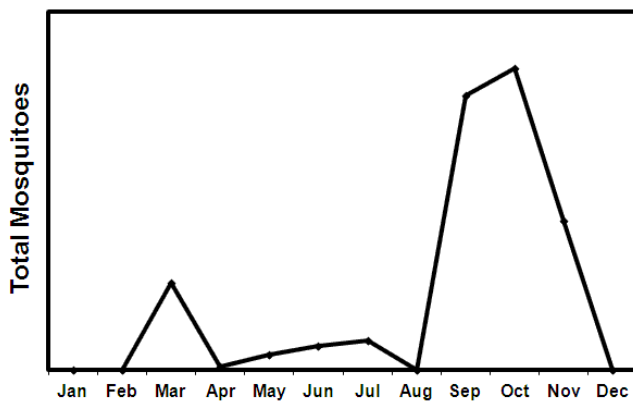
Disease: Not known to play any role in transmission.

Remarks: This species morphologically resembles *Cx. quinquefasciatus* and *Cx. restuans* but can be differentiated by the presence of apical pale bands on abdominal segments versus basal pale bands; most likely statewide.

Distribution



Seasonal Abundance



Culiseta inornata

(winter mosquito)

Host preference: large mammals including humans

Larval habitat: semi-permanent pools, freshwater marshes, edges of ponds with emergent vegetation, drainage ditches, brackish water in coastal areas

Flight range: generally not far from breeding site, but records have shown ranges of 2–15 miles

Biting activity: do not readily bite humans

Overwinter stage: adult

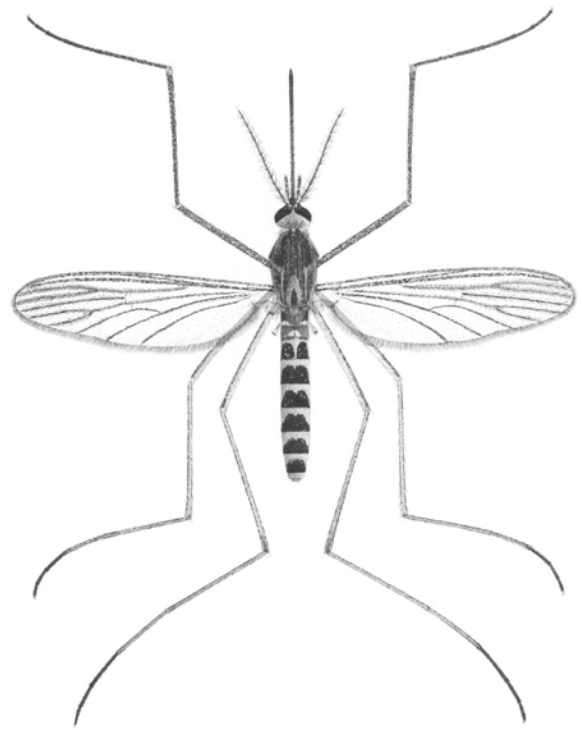
Broods per year: multiple

Diagnostic description:

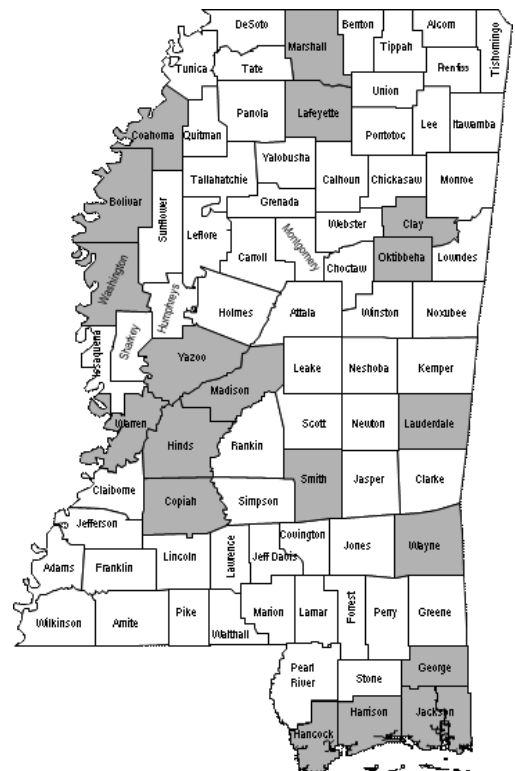
- relatively large mosquito
- palpi short, mostly dark with scattered pale scales
- abdomen rounded or blunt
- proboscis dark with scattered pale scales
- wing scales small, narrow, dark, and somewhat sparse on all veins but costa, subcosta, and vein 1, where they are broader, more numerous, and intermixed with white scales
- hindtarsomeres unbanded, but intermixed with pale and dark scales
- wing scales narrow, dark
- basal third of wing broader than most species

Disease: Not known to play any role in transmission.

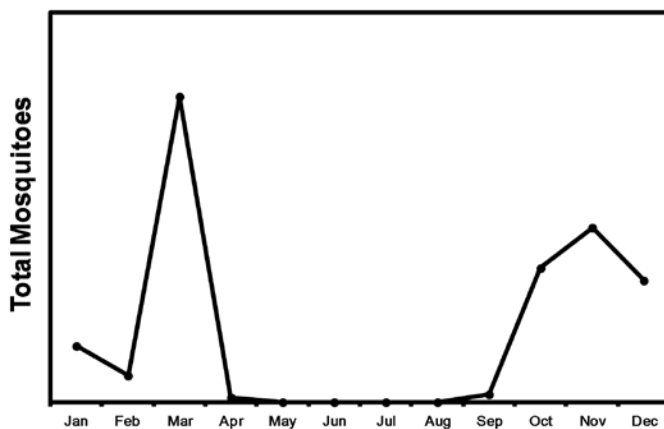
Remarks: Found naturally infected with Western Equine Encephalitis (WEE); however, WEE is known only in Indiana and Michigan to occur east of the Mississippi River.



Distribution



Seasonal Abundance



Culiseta melanura

Host preference: birds

Larval habitat: shaded small permanent/semi-permanent bodies of water (i.e. woodland pools, hardwood swamps)

Flight range: ½–2 miles

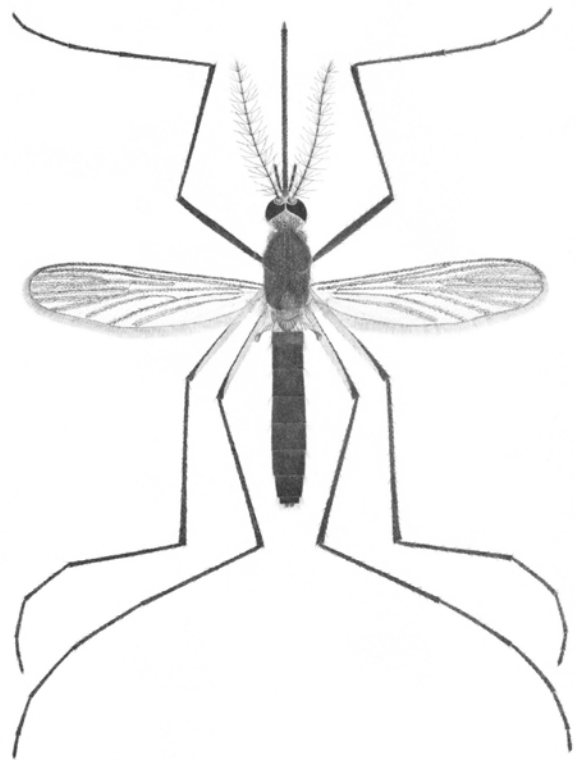
Biting activity: night, dusk, dawn

Overwinter stage: larva

Broods per year: multiple

Diagnostic description:

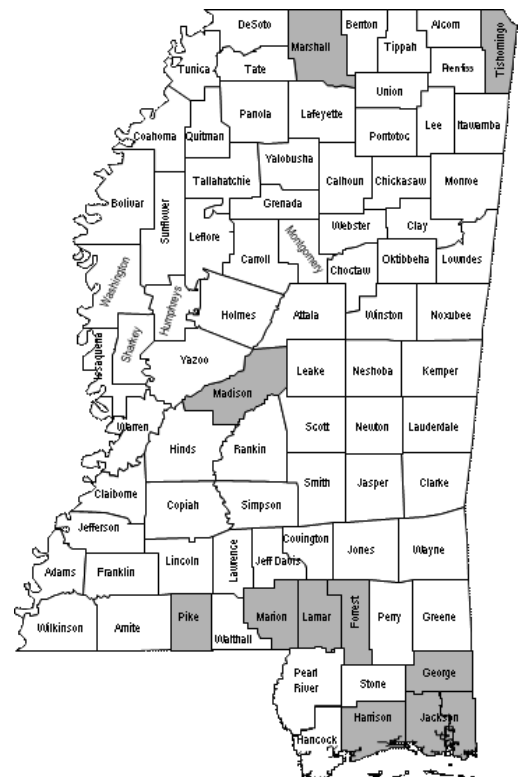
- medium-sized mosquito
- palpi short, dark
- abdomen blunt or rounded
- proboscis dark, slightly curved downward and long
- scutum composed of dark to golden brown scales with no distinct pattern
- abdomen dark-scaled with basal pale patches laterally (not visible from above)
- hindtarsomeres entirely dark
- wings dark-scaled



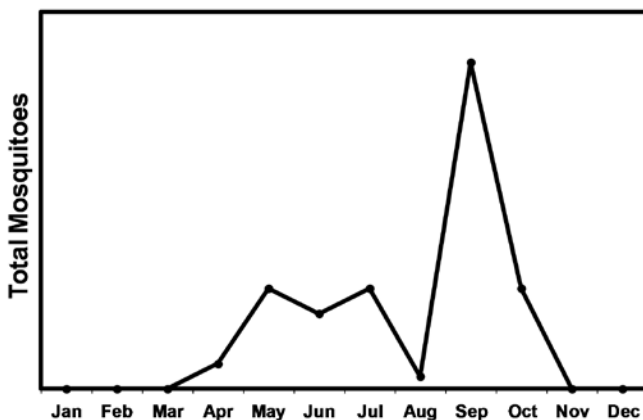
Disease: Little direct contact, if any, with humans. However, primary vector of EEE virus in the bird population.

Remarks: A good species for determining the level of EEE virus circulating in bird populations close to humans.

Distribution



Seasonal Abundance



Ochlerotatus dorsalis

Host preference: humans and other large mammals; will feed on large birds if no mammals present

Larval habitat: temporary brackish and freshwater pools, marshes, irrigation water, particularly near oil well operations and chemical plants

Flight range: up to 20 miles or more

Biting activity: day or night, but peaks at dusk

Overwinter stage: egg

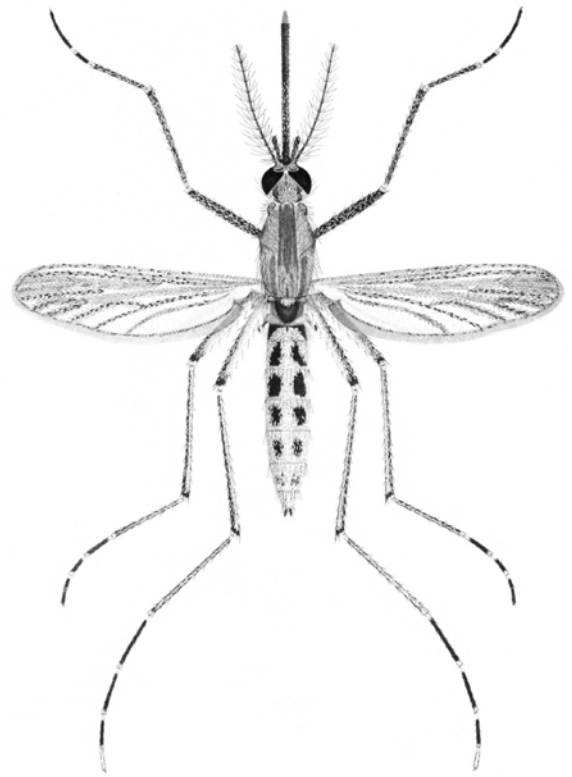
Broods per year: generally one

Diagnostic description:

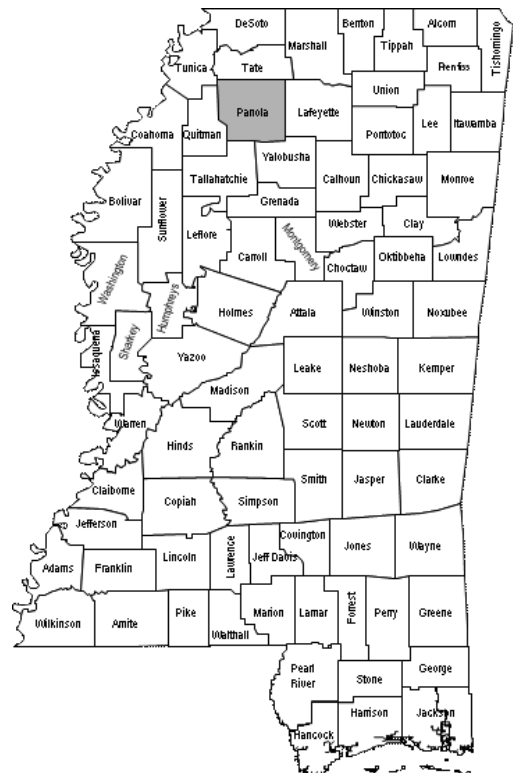
- palpi short, dark
- abdomen pointed
- proboscis dark with scattered pale scales
- hindtarsi with pale bands on both sides of joints
- wing scales mixed with pale and dark scales
- abdominal segments mostly pale scaled with pair of dark spots
- abdominal segments 6-7 almost entirely pale scaled

Disease: Little, if any, role in Mississippi.

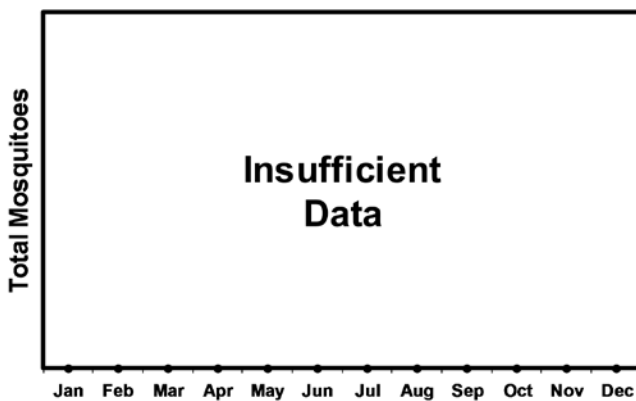
Remarks: Very rare in Mississippi, not collected in the last 60+ years.



Distribution



Seasonal Abundance



Ochlerotatus dupreei

Host preference: mostly birds

Larval habitat: temporary woodland pools, grassland pools

Flight range: near breeding site

Biting activity: does not readily bite humans

Overwinter stage: egg

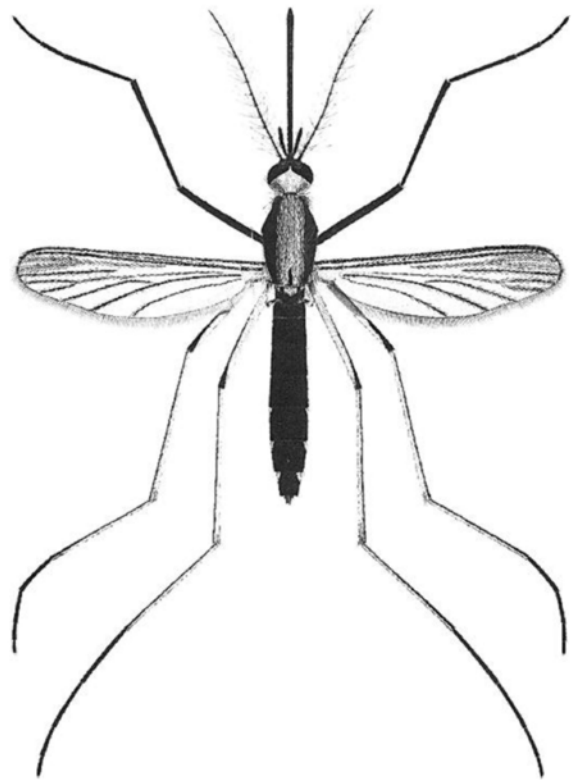
Broods per year: multiple

Diagnostic description:

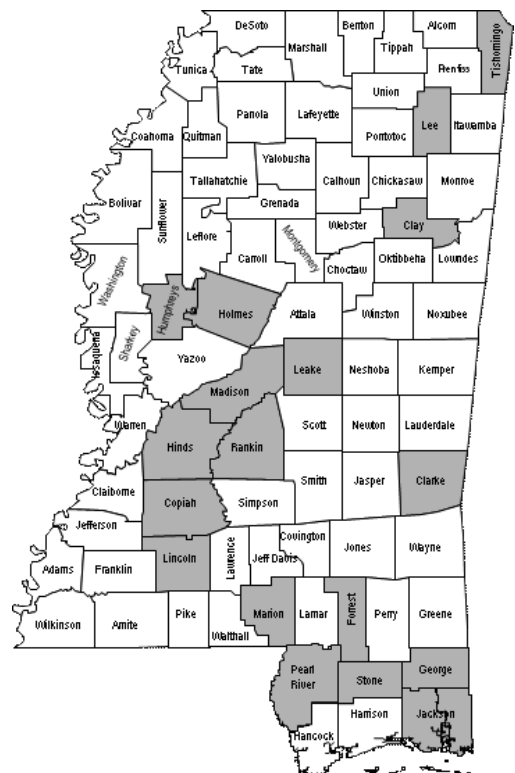
- palpi short, dark
- abdomen pointed
- scutum with broad median longitudinal white stripe
- decumbent scales on head broad

Disease: Little, if any, role in Mississippi.

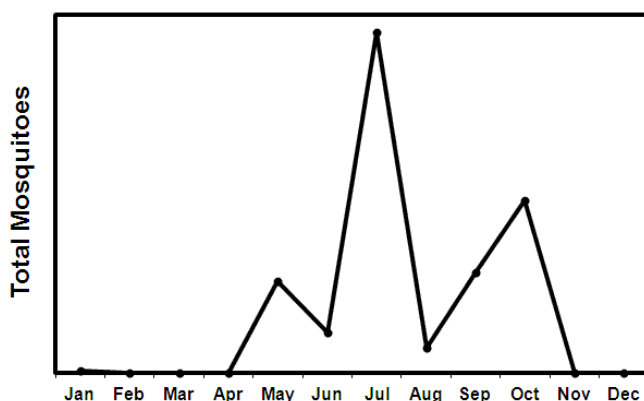
Remarks: Adults are very small like *Cx. erraticus* and *Ur. sapphirina*, but are easily confused with *Oc. atlanticus* and *Oc. tormentor*.



Distribution



Seasonal Abundance



Ochlerotatus fulvus pallens

Host preference: mammals including humans

Larval habitat: temporary woodland pools

Flight range: 2-5 miles

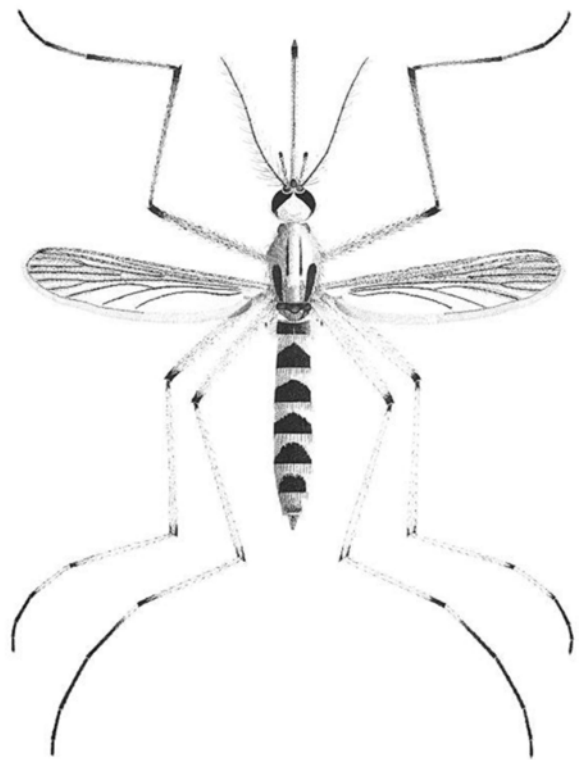
Biting activity: night, dusk, dawn, some day

Overwinter stage: egg

Broods per year: multiple

Diagnostic description:

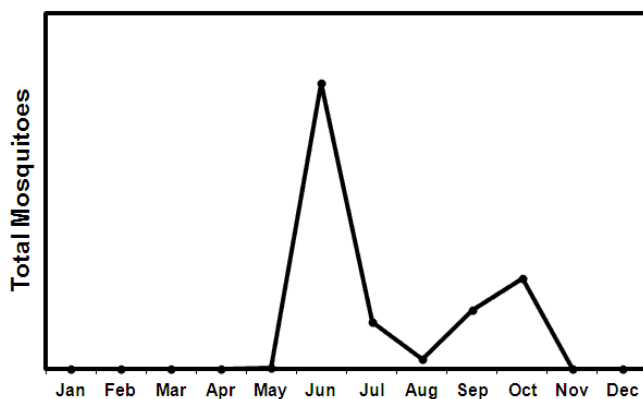
- medium to large-sized mosquito
- palpi and proboscis yellow scaled with black tips
- scutum yellow with two large dark spots
- wing scales yellow
- hindtarsal segments 2-5 primarily dark with yellow scales intermixed; hindtarsus 1 entirely yellow
- abdomen pointed
- abdomen yellow-scaled with dark apical bands that taper laterally



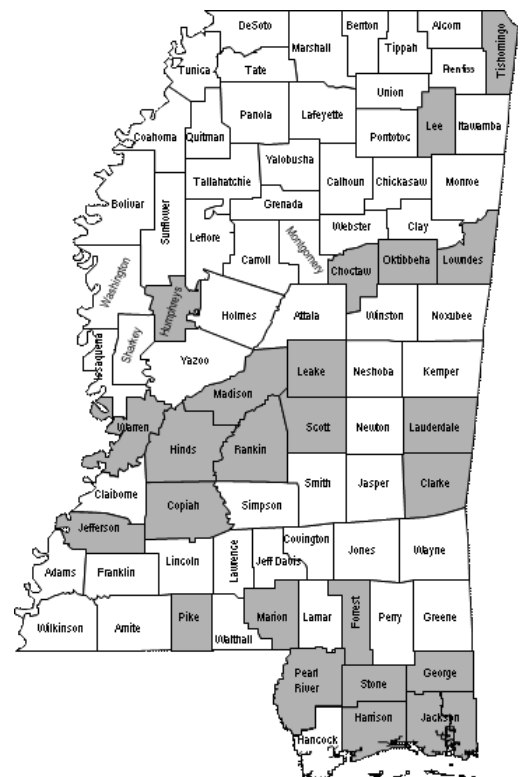
Disease: Little, if any, role in transmission.

Remarks: Considered a fierce biter, but not often encountered; a brilliant yellow and black species.

Seasonal Abundance



Distribution



Ochlerotatus grossbecki

Host preference: mammals, humans

Larval habitat: temporary woodland pools (especially those lined with leaves)

Flight range: unknown

Biting activity: dusk, dawn, day (when disturbed)

Overwinter stage: egg

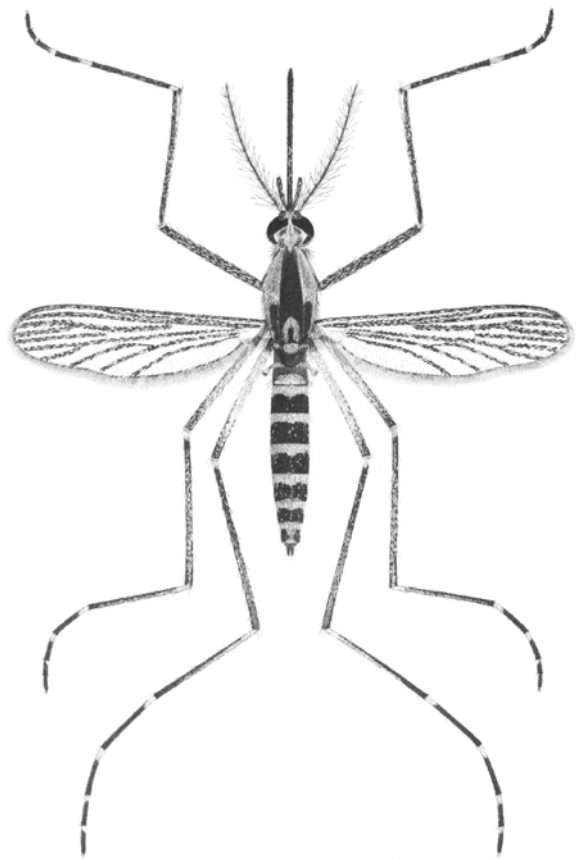
Broods per year: generally one

Diagnostic description:

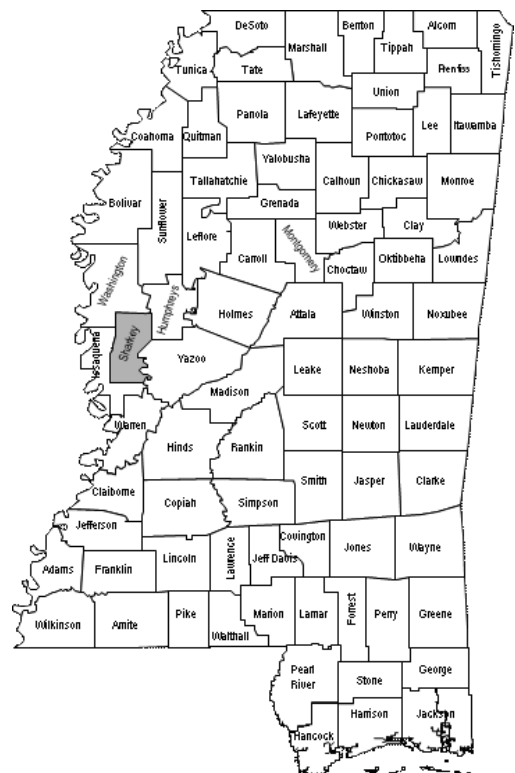
- palpi short, dark with scattered pale scales
- abdomen pointed
- abdomen with pale, basal bands
- proboscis dark with few scattered pale scales on basal half
- wing scales broad, triangular shaped, and intermixed with dark and pale scales
- hindtarsomeres with broad, pale, basal bands

Disease: Little, if any, role in transmission.

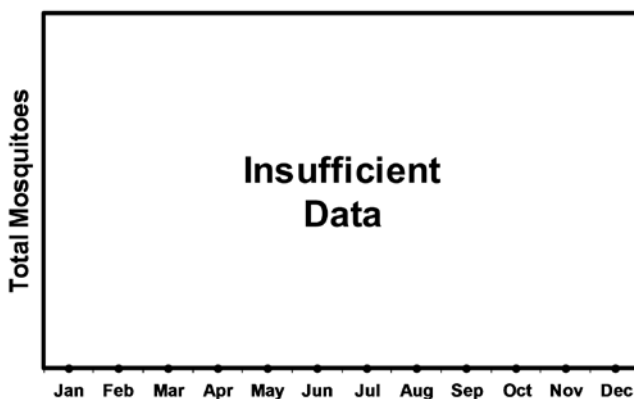
Remarks: Rare in Mississippi. Persistent biters but do not occur in high enough numbers to be considered a nuisance. Only species with a sharp pointed abdomen and very large scales on the wings. Adults occur in late winter and early spring along with *Oc. canadensis*, before most mosquito surveillance starts.



Distribution



Seasonal Abundance



Ochlerotatus hendersoni

Host preference: squirrels, raccoons, chipmunks

Larval habitat: tree holes

Flight range: near breeding site

Biting activity: dusk, dawn

Overwinter stage: egg

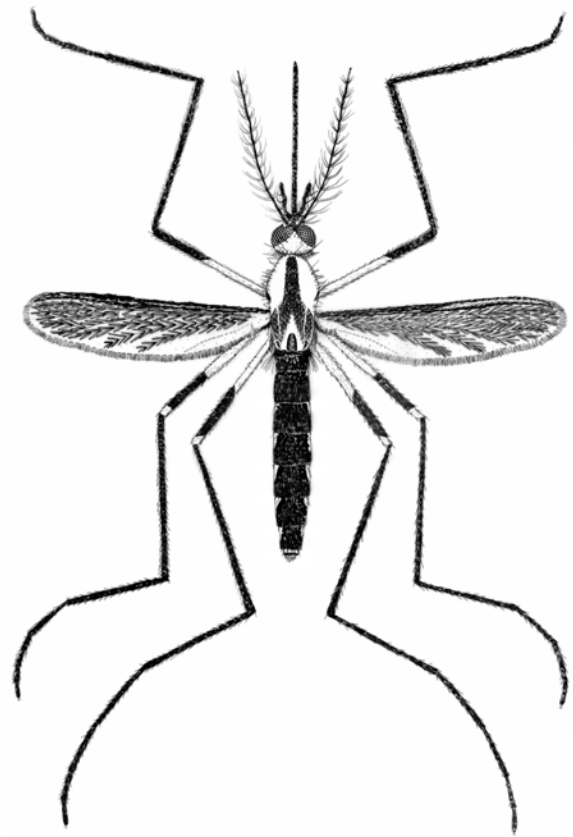
Broods per year: multiple

Diagnostic description:

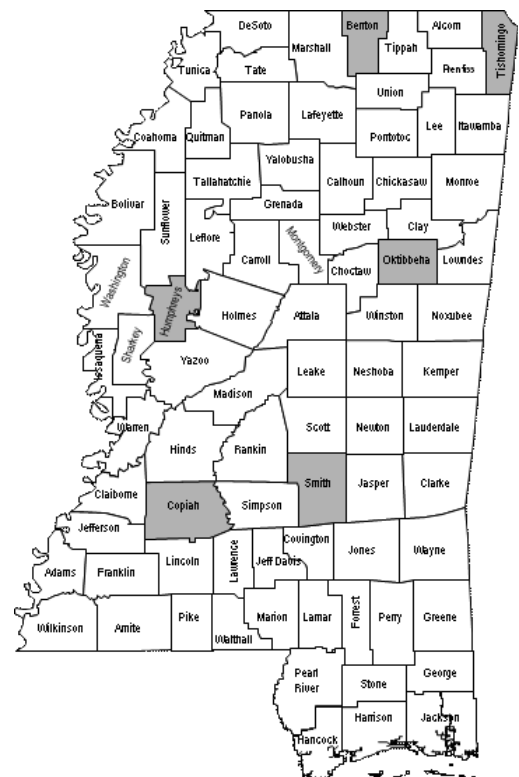
- palpi short, dark
- abdomen pointed
- proboscis dark, unbanded
- scutal fossa entirely covered with silver scales

Disease: Little, if any, role in transmission.

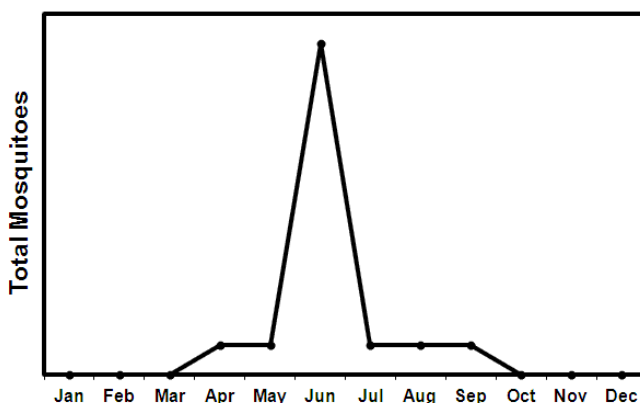
Remarks: This species is morphologically similar to *Oc. triseriatus*, and occurs in the tops of trees, where the larvae are in tree holes in the canopy.



Distribution



Seasonal Abundance



Ochlerotatus japonicus

(Asian bush mosquito)

Host preference: humans, mammals

Larval habitat: artificial and natural containers like tree holes, rock holes, tires, pots, and bird baths

Flight range: probably stays within 500 feet of shaded forest and larval habitats

Biting activity: day

Overwinter stage: egg, larva

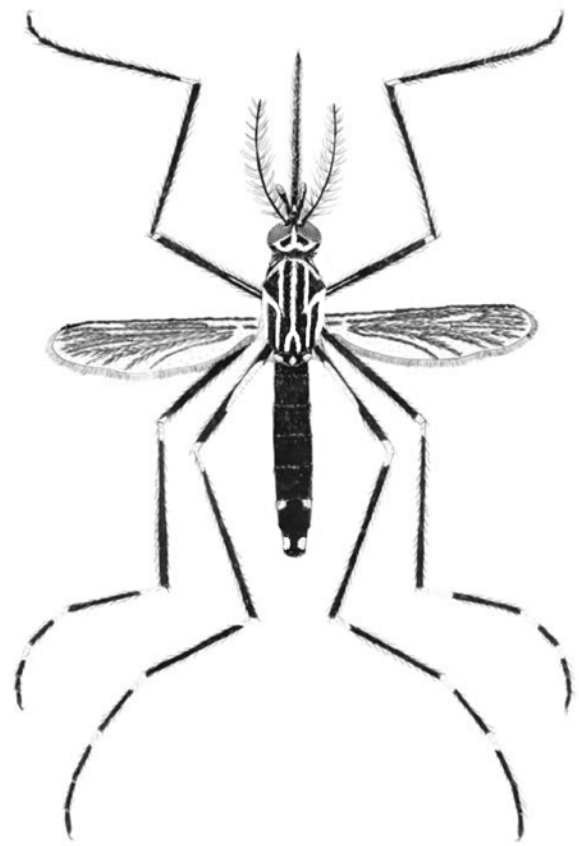
Broods per year: multiple

Diagnostic description:

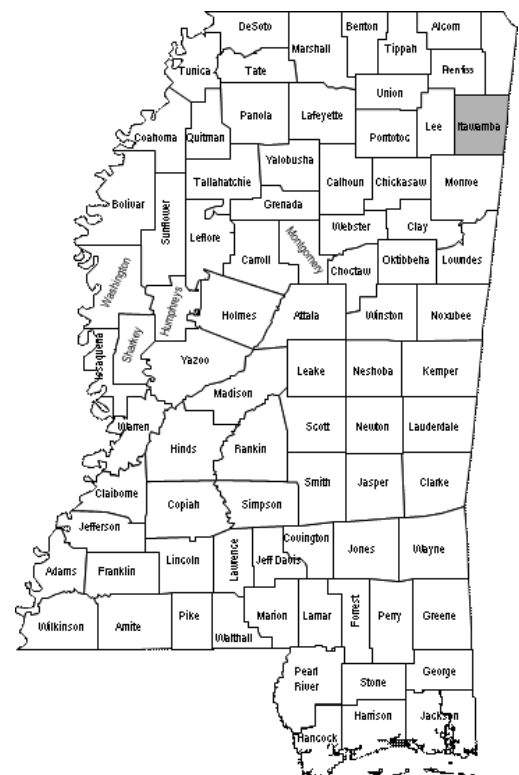
- palpi short
- abdomen pointed
- proboscis, wings entirely dark
- thorax with median longitudinal bronze stripe, and lateral gold stripes
- abdomen with silver spots on sides
- hindtarsi 1–3 each with broad basal pale band

Disease: Excellent laboratory vector of WNV, EEE, LAC viruses; many pools of this species found positive for WNV.

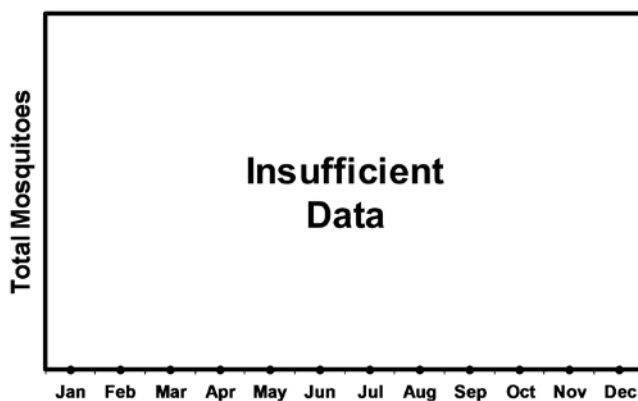
Remarks: Laboratory studies have shown that *Oc. japonicus* is a very efficient vector of WNV, but its role in transmission in nature is unknown.



Distribution



Seasonal Abundance



Ochlerotatus mitchellae

Host preference: mammals, humans

Larval habitat: temporary fresh water pools

Flight range: near breeding sites

Biting activity: dusk, dawn, day

Overwinter stage: egg

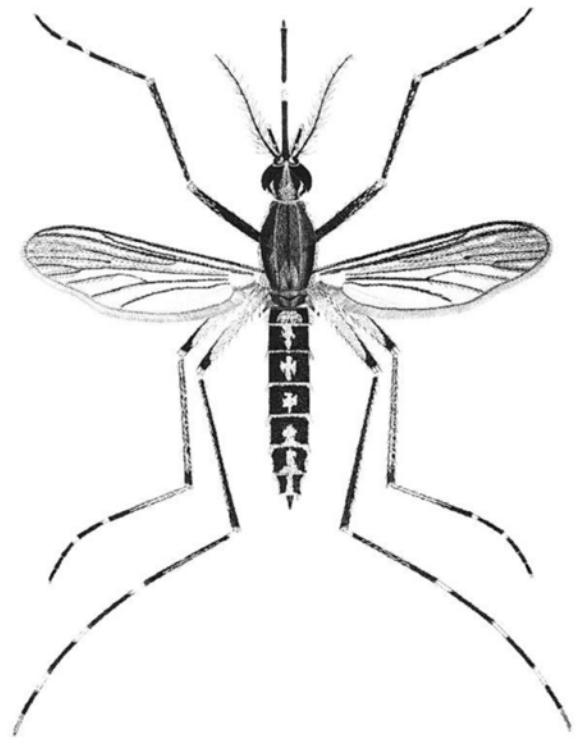
Broods per year: multiple

Diagnostic description:

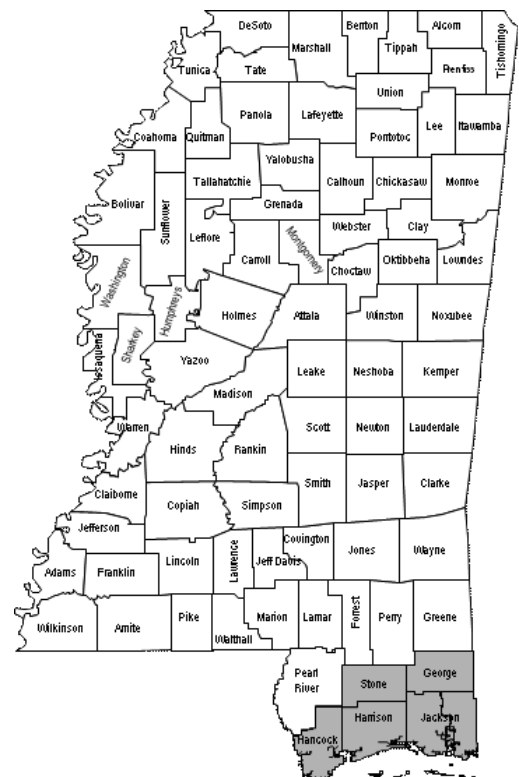
- banded proboscis
- speckled front femur and tibia
- tarsi with basal pale bands
- hind tarsomere 5 entirely pale
- wing scales entirely dark
- abdomen with pale median longitudinal stripe
- hindtarsomere 1 without median pale band

Disease: Has been found naturally infected with EEE virus.

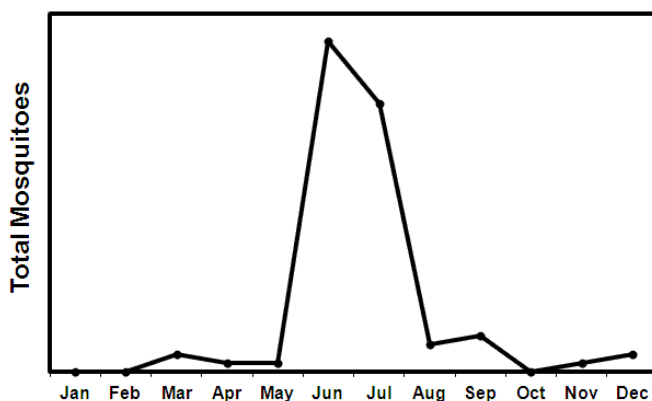
Remarks: Low risk for human involvement because species is uncommon.



Distribution



Seasonal Abundance



Ochlerotatus sollicitans

(tan salt marsh mosquito)

Host preference: humans, birds

Larval habitat: coastal salt marsh, inland brackish swamps

Flight range: up to 40 miles wind assisted

Biting activity: dusk, dawn, day

Overwinter stage: egg

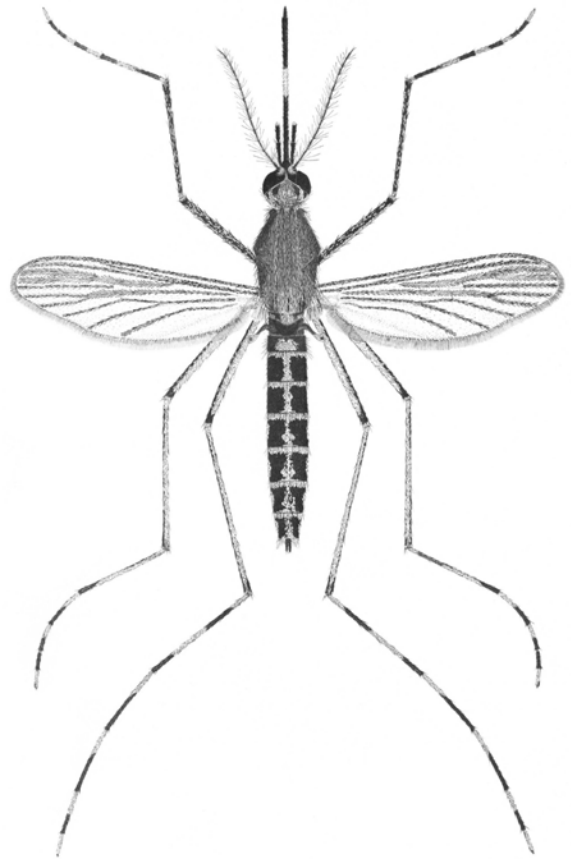
Broods per year: multiple

Diagnostic description:

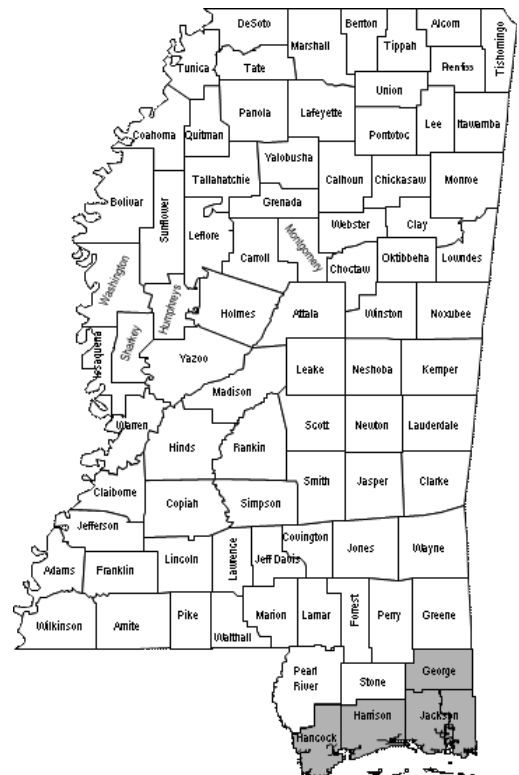
- short palpi
- pointed abdomen
- proboscis with white band or ring
- wing scales mixed white and dark
- abdominal segments with basal pale bands and median longitudinal pale stripe
- hindtarsi with broad basal pale bands
- hindtarsomere 1 with median pale band
- hindtarsomere 5 entirely pale

Disease: EEE, dog heartworm.

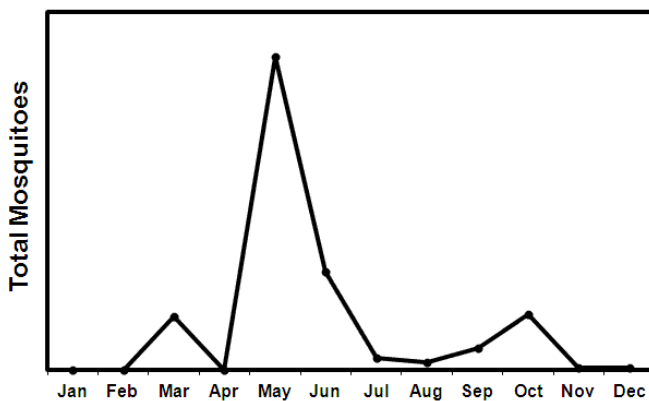
Remarks: Adults rest in vegetation during the day and will readily attack in full sun when disturbed. A major pest species near the beach.



Distribution



Seasonal Abundance



Ochlerotatus stimulans

Host preference: mammals, humans

Larval habitat: flood waters in woodland creek and river bottoms

Flight range: near breeding site

Biting activity: dusk, dawn, night, day

Overwinter stage: egg

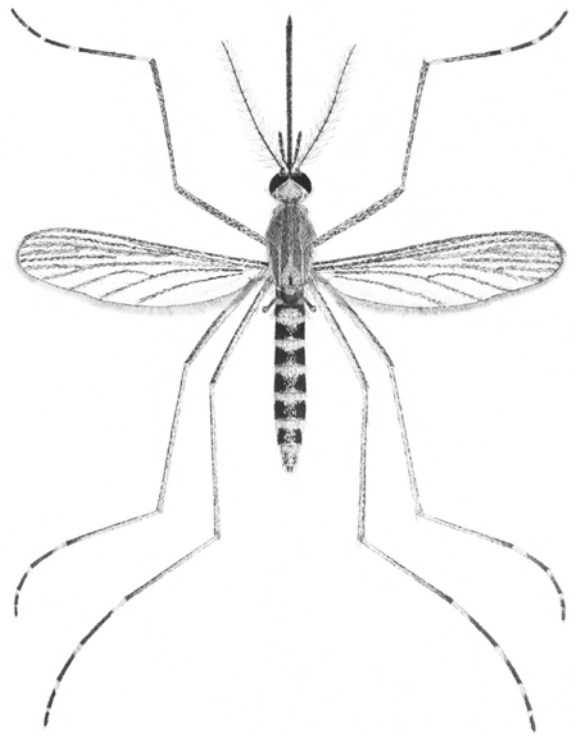
Broods per year: multiple

Diagnostic description:

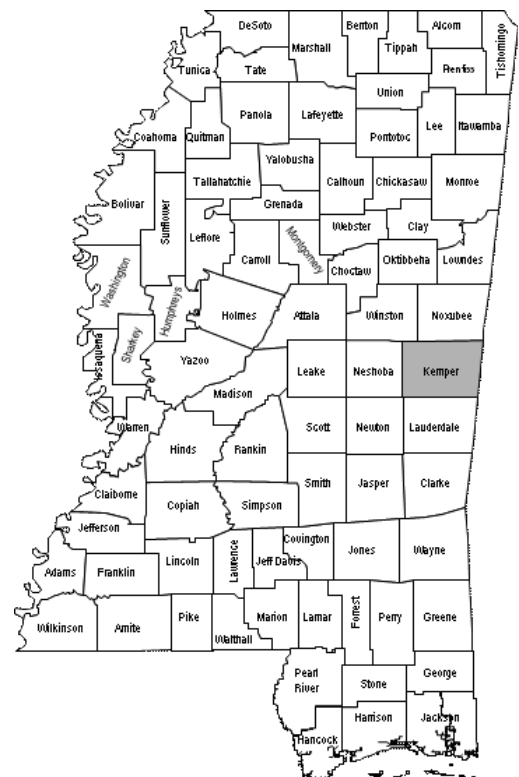
- proboscis and palps dark, sprinkled with white scales
- abdominal segments 2–8 with broad basal band of pale scales
- femora intermixed with dark and pale scales
- tarsal segments 1–4 with broad basal pale bands; tarsi 5 entirely dark

Disease: Known vector of avian pox.

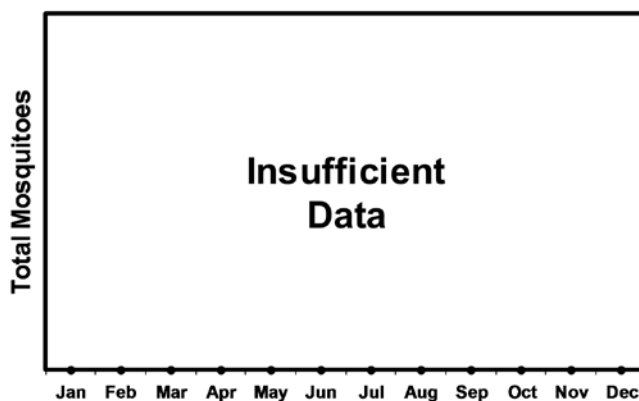
Remarks: Only recorded once from Mississippi, circa 1920; this species is not common to the southeastern states.



Distribution



Seasonal Abundance



Ochlerotatus thibaulti

Host preference: mammals, humans

Larval habitat: dark subterranean voids under uprooted trees (particularly red maples), freshwater swamps (hollowed trunks of cypress trees)

Flight range: near breeding site

Biting activity: dusk, dawn, night, day

Overwinter stage: egg

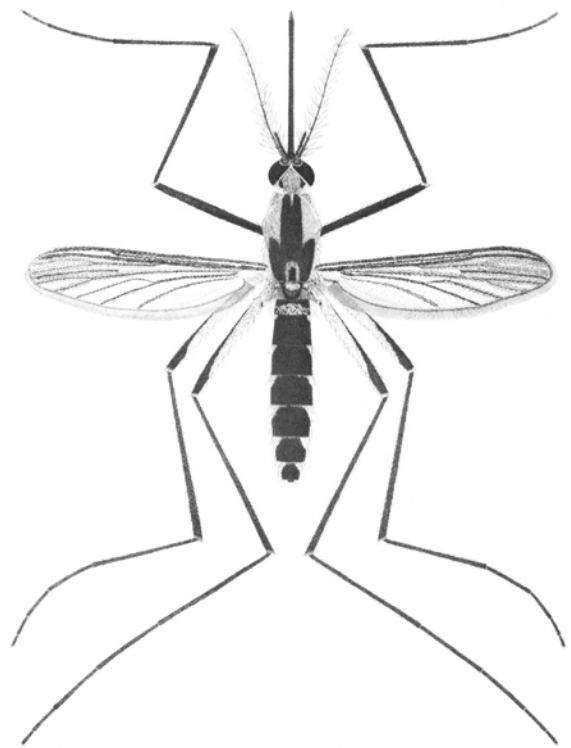
Broods per year: generally one

Diagnostic description:

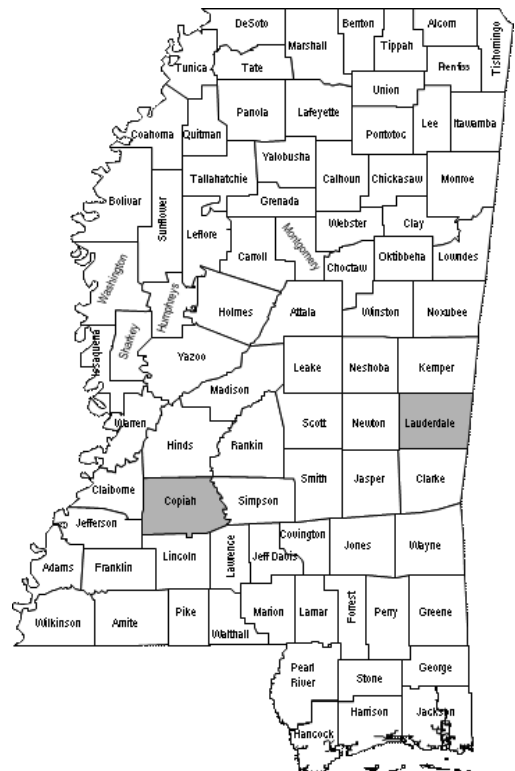
- palpi short
- abdomen pointed
- proboscis dark, unbanded
- scutum with broad median stripe of dark scales and with golden scales laterally
- abdomen dark with pale basolateral patches
- legs dark-scaled

Disease: No evidence of disease transmission.

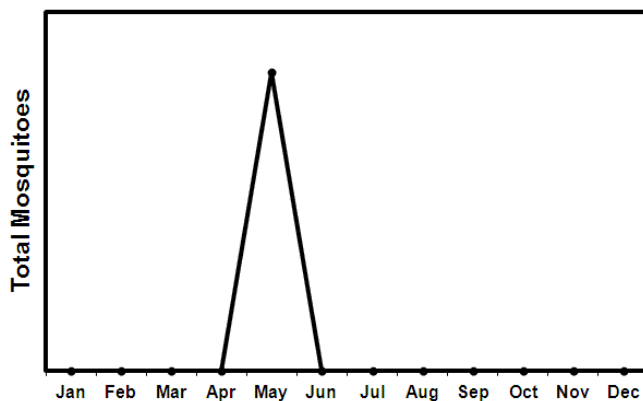
Remarks: This species is relatively rare in Mississippi due to its restrictive breeding habitat and patchy distribution; can be an extremely painful biter.



Distribution



Seasonal Abundance



Ochlerotatus tormentor

Host preference: mammals, humans

Larval habitat: temporary woodland pools

Flight range: up to ½ mile

Biting activity: night, dusk, dawn

Overwinter stage: egg

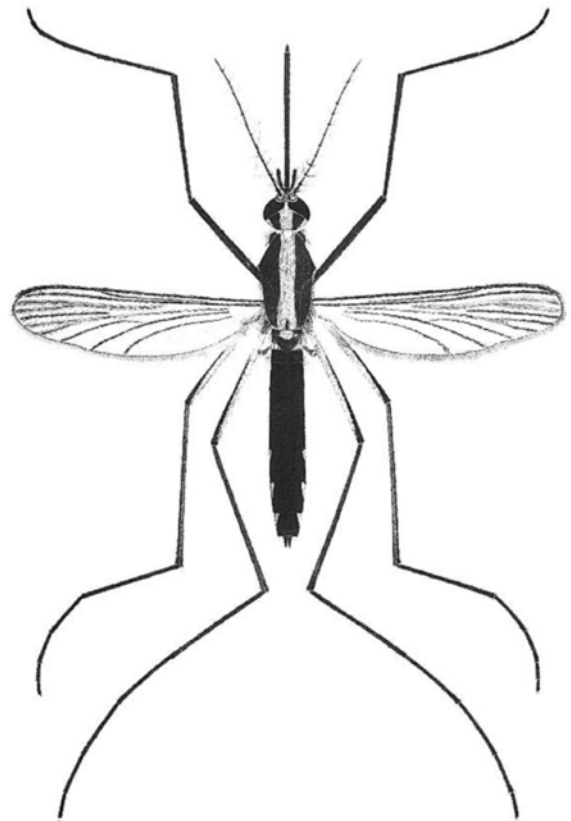
Broods per year: multiple

Diagnostic description:

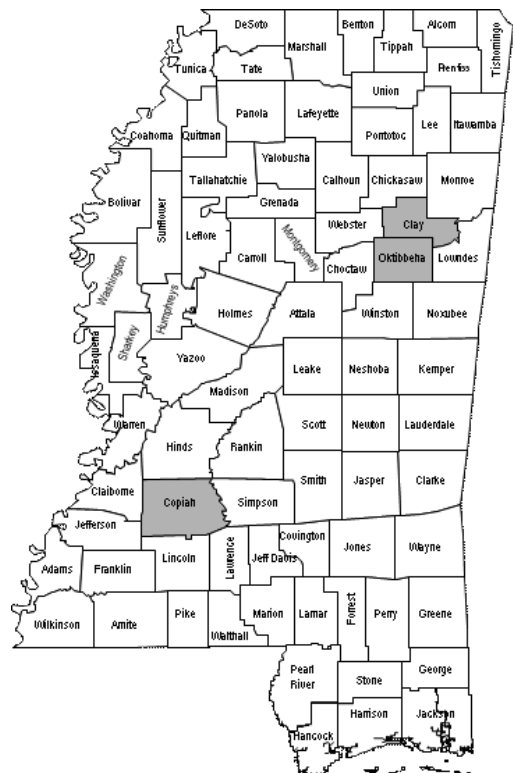
- proboscis dark
- stripe of white scales
- legs and tarsomeres dark scaled
- wing scales dark
- abdomen without pale bands, but with small pale basal lateral patches

Disease: Likely plays little, if any, role in transmission.

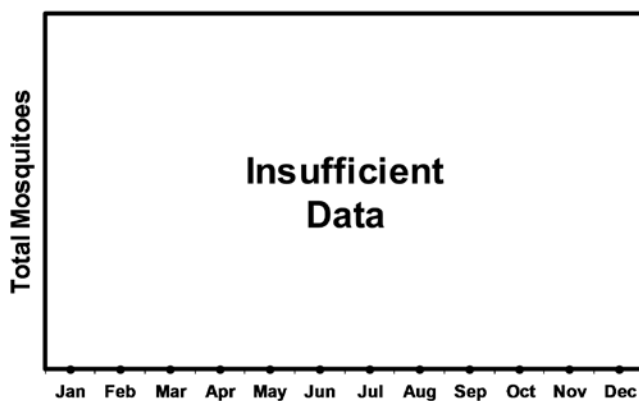
Remarks: Remains in shaded areas near larval habitat. Can be a very irritating biter. An “in your face” species.



Distribution



Seasonal Abundance



Ochlerotatus trivittatus

Host preference: humans, mammals, reptiles

Larval habitat: floodwaters, woodland pools, grassy pools

Flight range: near breeding site, but known to fly as far as ½ mile

Biting activity: dusk, dawn

Overwinter stage: egg

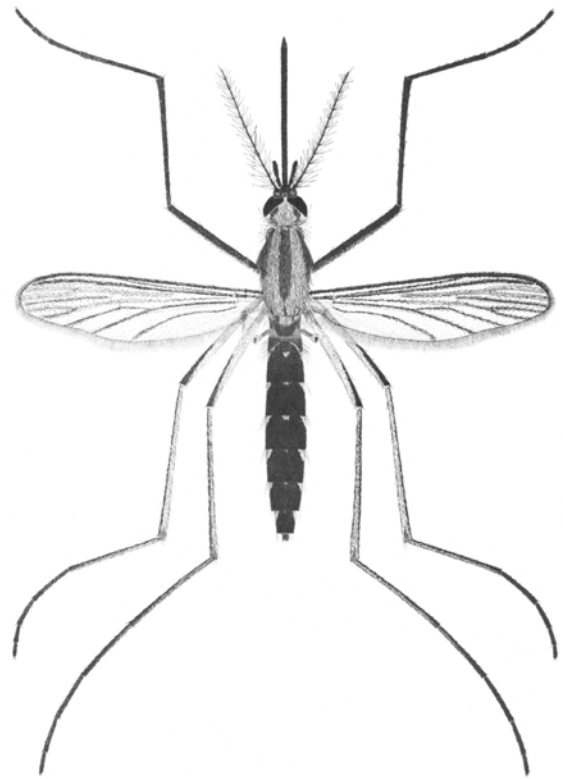
Broods per year: generally one

Diagnostic description:

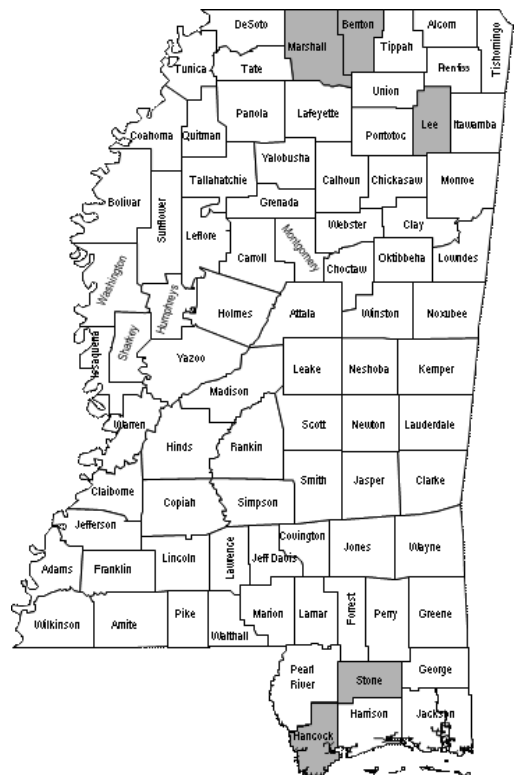
- palpi short, dark
- abdomen pointed
- proboscis dark, unbanded
- hindlegs entirely dark, unbanded
- scutum with median dark stripe, two submedian pale stripes, and two anterolateral dark stripes
- abdominal segments without bands, but may have median pale spot

Disease: This species has tested positive for WNV but is not believed to play any role in transmission. Transmits Trivittatus virus in midwestern states.

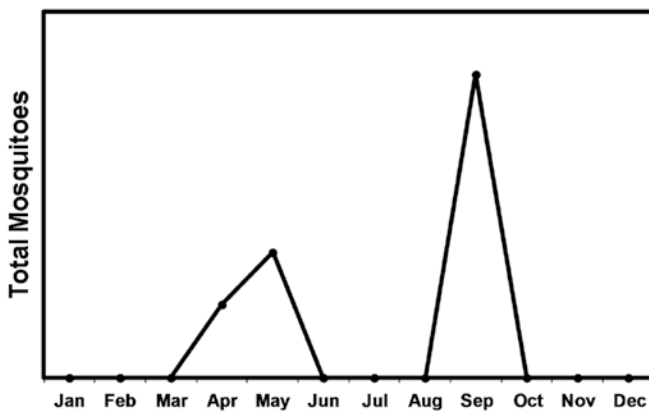
Remarks: Aggressive, persistent biter that will readily attack in open, sunlit areas when disturbed; uncommon in Mississippi.



Distribution



Seasonal Abundance



Orthopodomyia signifera

Host preference: birds

Larval habitat: tree holes, artificial containers, tires

Flight range: near breeding site

Biting activity: not known to bite humans

Overwinter stage: larva

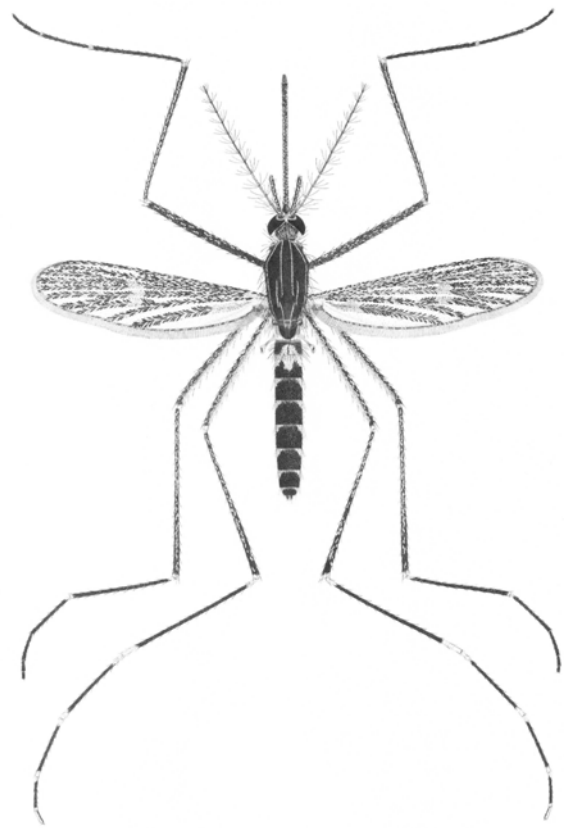
Broods per year: multiple

Diagnostic description:

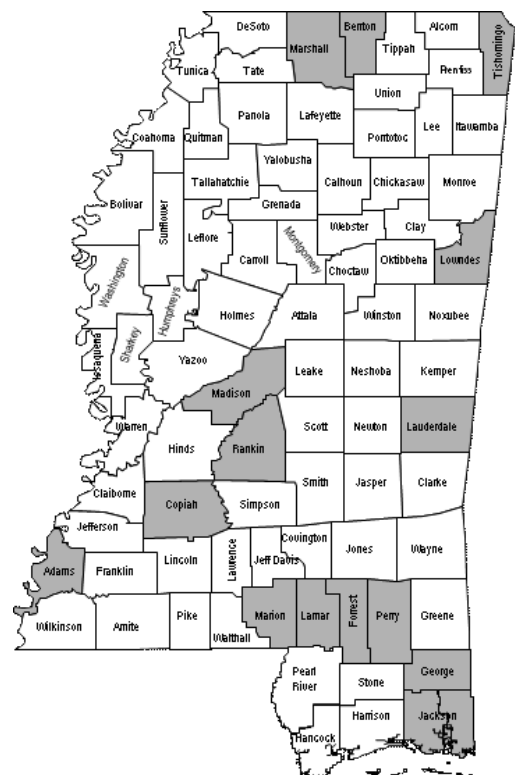
- proboscis, legs speckled with black and white scales
- scutum with fine longitudinal lines of pale scales
- wings speckled black and white with large scales
- abdomen with or without narrow pale basal bands
- hindtarsomeres with basal and apical pale band across joints
- hindtarsomere 5 entirely pale

Disease: Has been found naturally positive for EEE and WNV. May be involved in virus cycle in birds.

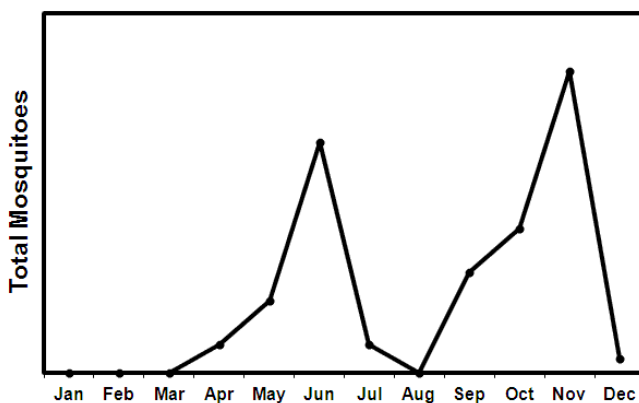
Remarks: Beautiful species; adults have been collected at heights of nearly 500 feet.



Distribution



Seasonal Abundance



Psorophora ciliata

(shaggy-legged gallinipper or “giant” mosquito)

Host preference: mammals including humans

Larval habitat: woodland pools

Flight range: up to 2 miles

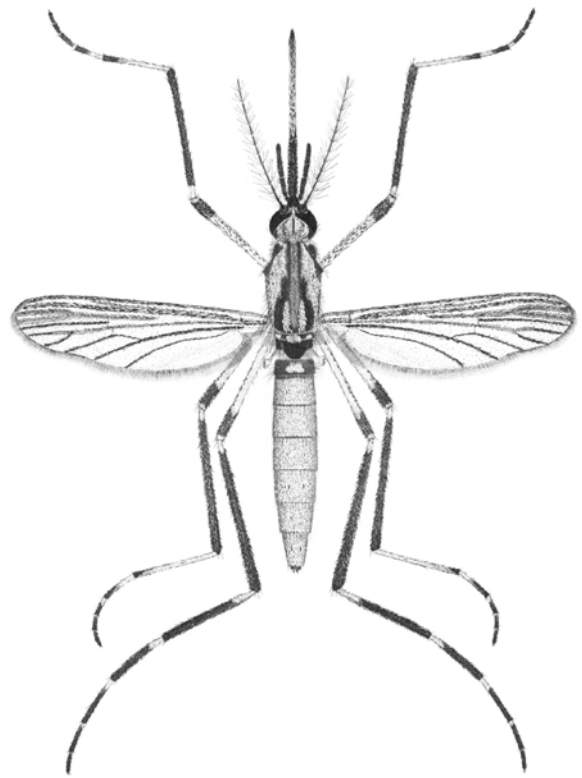
Biting activity: dusk, dawn, night, day

Overwinter stage: egg

Broods per year: multiple

Diagnostic description:

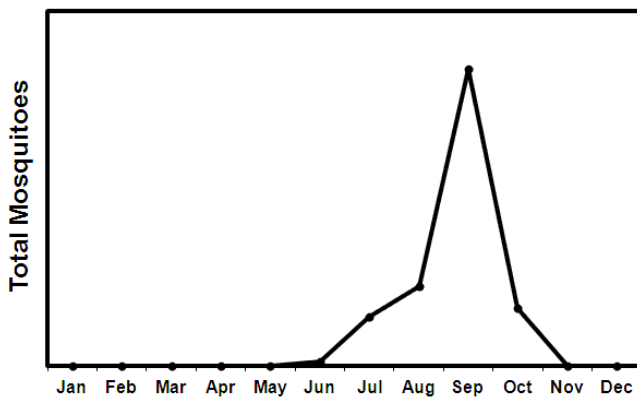
- very large mosquito
- palpi short, dark
- abdomen pointed and pale-scaled
- scutum with median longitudinal gold stripe
- prespiracular setae on side of thorax
- proboscis with large area of scattered pale scales
- hind legs with dense scales giving a shaggy appearance
- hindtarsomeres 1–4 with basal pale bands



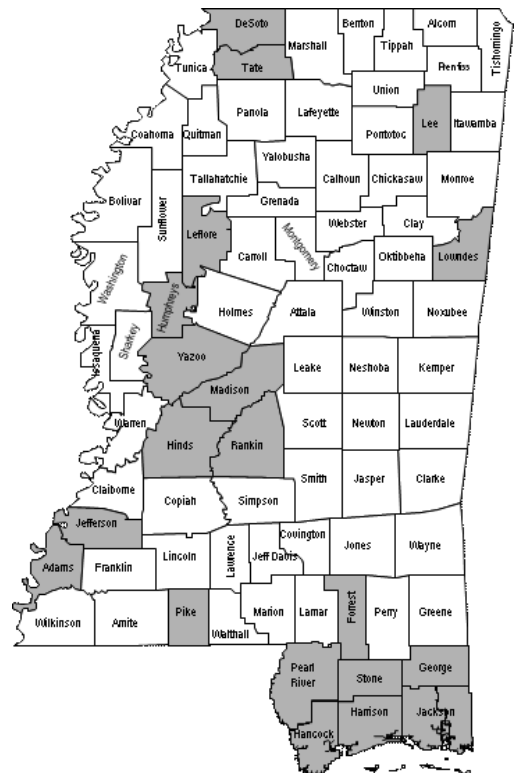
Disease: Has been found naturally infected with EEE virus.

Remarks: Larvae are predacious on other associated mosquito larvae and other aquatic invertebrates; female adults are considered aggressive and deliver painful bites.

Seasonal Abundance



Distribution



Psorophora columbiae

(dark rice field mosquito)

Host preference: large mammals including humans

Larval habitat: irrigated fields, rice fields, ground pools, temporary water, grassy pools

Flight range: up to 8 miles

Biting activity: dusk, dawn, night, day

Overwinter stage: egg

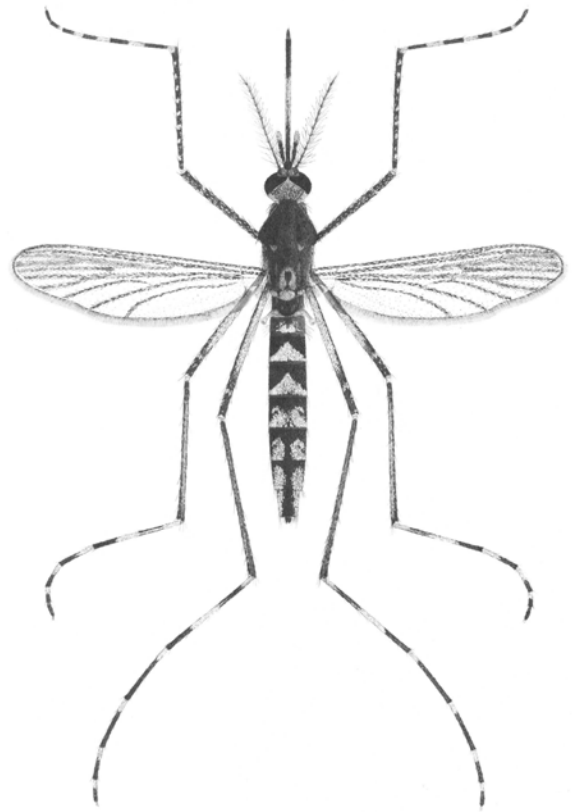
Broods per year: multiple

Diagnostic description:

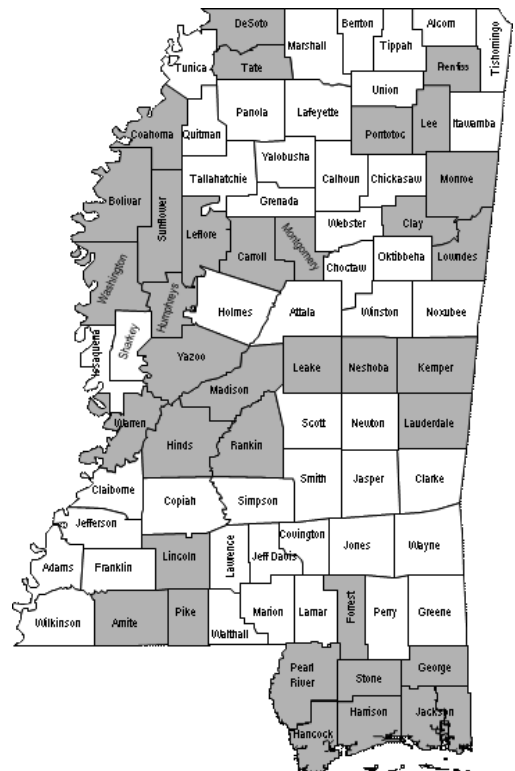
- medium to large mosquito
- proboscis with broad pale band
- abdomen sharp-pointed
- wing scales mixed black and white
- hindtarsomeres with basal pale bands
- hindtarsomere 1 with median pale band
- abdominal segments 2–3 with apical pale bands
- hindfemur with preapical pale band

Disease: Found naturally infected with EEE and WNV.

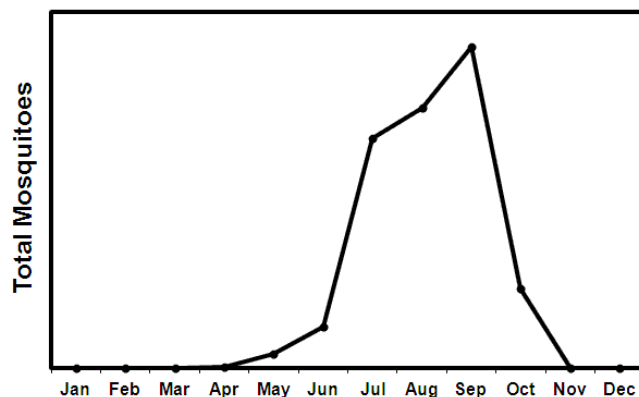
Remarks: Unbearable pest when in large numbers, will bite day or night, likes full sunlight.



Distribution



Seasonal Abundance



Psorophora cyanescens

Host preference: large mammals and humans

Larval habitat: temporary pools

Flight range: 2 miles or more

Biting activity: dusk, dawn, midday

Overwinter stage: egg

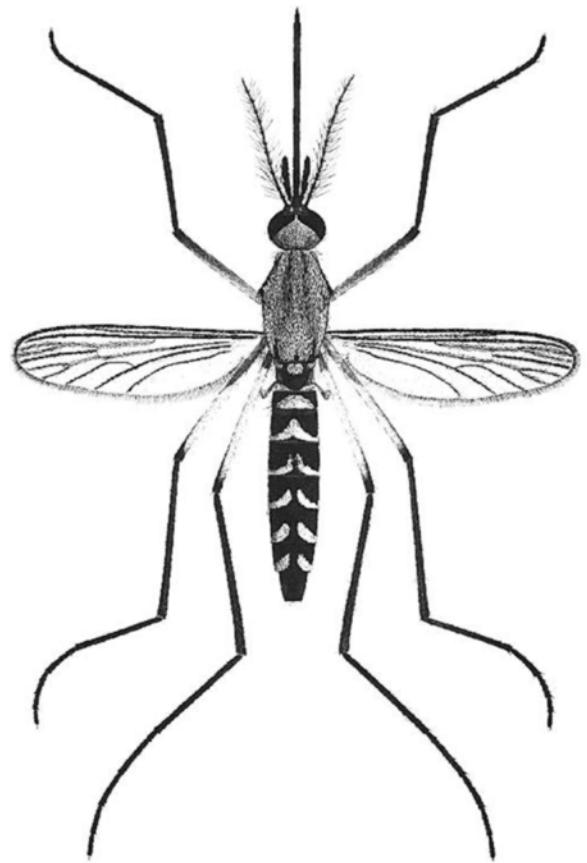
Broods per year: multiple

Diagnostic description:

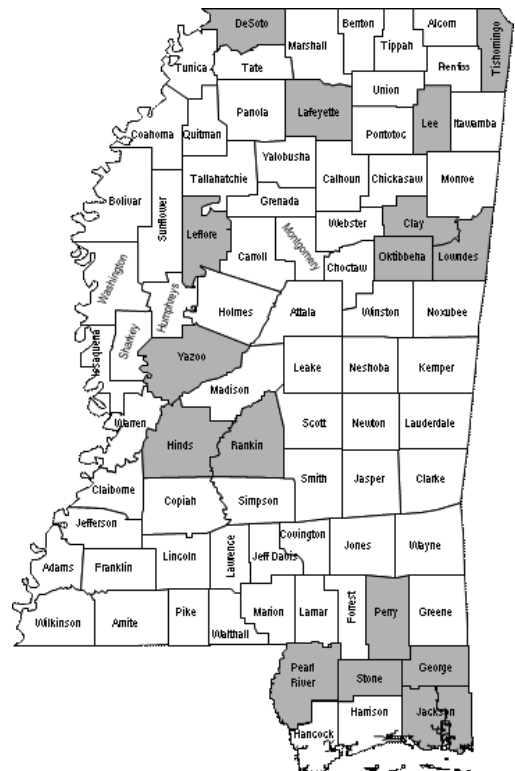
- proboscis, palpi, wings and tarsi with purple-black scales
- scutum with yellow-green scales
- abdomen sharp-pointed
- abdominal segments 2 and usually 3 with apical pale bands

Disease: Not known to play a significant role in disease transmission.

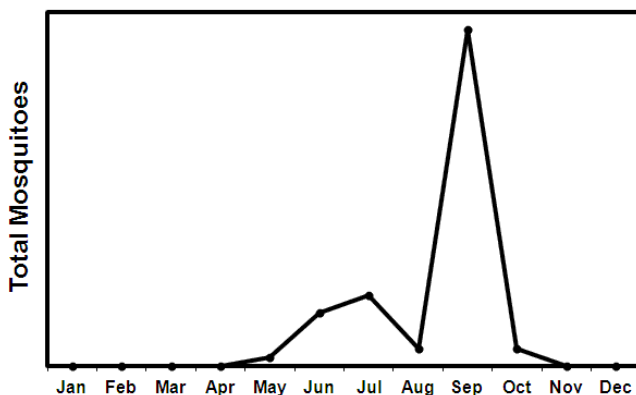
Remarks: Very vicious biter, even at midday in full sunlight; develops from egg to adult in 5–7 days. Usually appears after major rains of 4+ inches.



Distribution



Seasonal Abundance



Psorophora discolor

Host preference: mammals, humans

Larval habitat: grassy temporary freshwater pools in open sunlight

Flight range: not known

Biting activity: daytime, dusk

Overwinter stage: egg

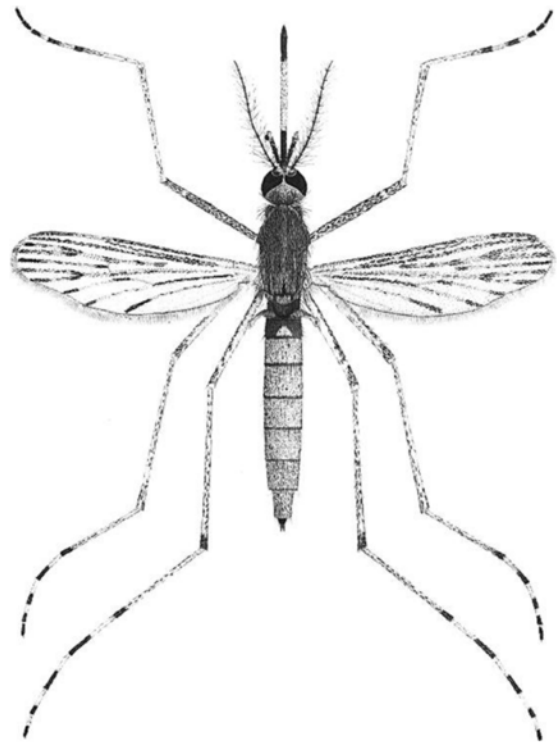
Broods per year: multiple

Diagnostic description:

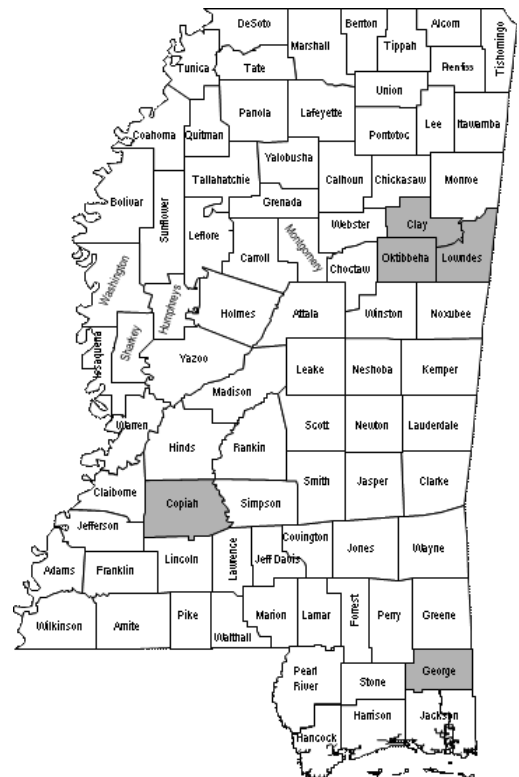
- like columbiae, but with brown and white scales
- proboscis with very broad pale band
- abdomen sharp-pointed
- dorsum of abdomen covered with pale scales
- wing with pale areas on some veins, other areas with pale and brown scales
- hindtarsi with basal pale bands
- hindfemur with faint preapical pale band

Disease: Not considered important.

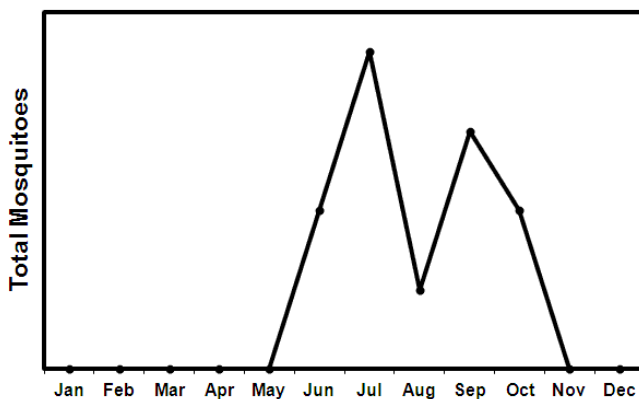
Remarks: Uncommon species; will bite humans.



Distribution



Seasonal Abundance



Psorophora horrida

Host preference: mammals

Larval habitat: temporary pools, floodwaters

Flight range: up to 2 miles

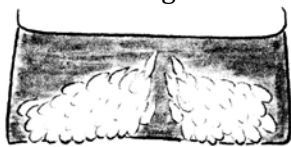
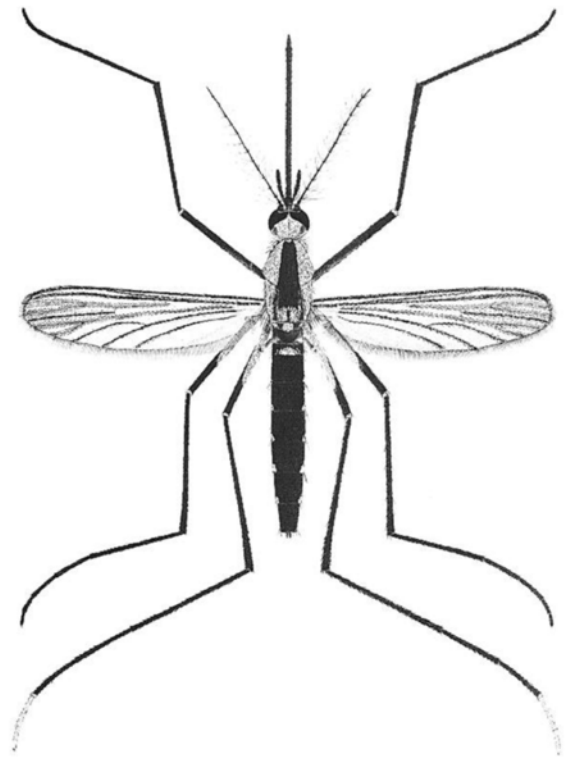
Biting activity: dusk, dawn, night

Overwinter stage: egg

Broods per year: multiple

Diagnostic description:

- palpi short, entirely dark
- abdomen pointed
- proboscis purple
- prespiracular and postspiracular setae present
- scutum with broad median longitudinal stripe of dark scales and white scales laterally
- abdominal segment 1 with median patch of pale scales



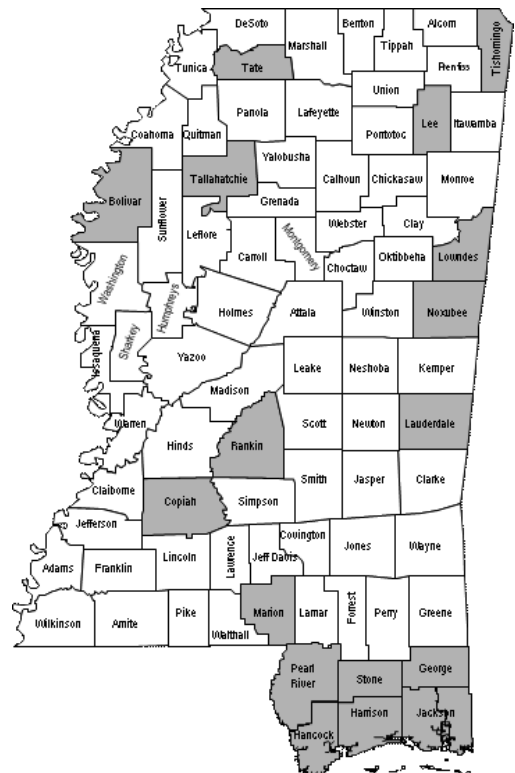
← abdominal segment 1

- abdominal segments 2-7 with lateral apical pale patches, no complete bands
- hindtarsomeres 1-3 purple, hindtarsomeres 4 and 5 all white
- integument black

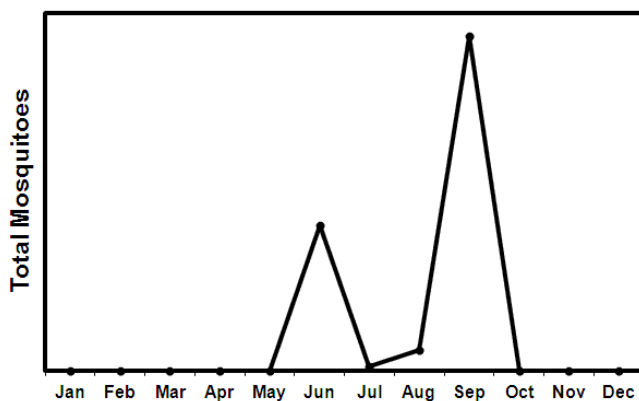
Disease: See *Ps. ferox*.

Remarks: See *Ps. ferox*.

Distribution



Seasonal Abundance



Psorophora howardii

Host preference: primarily mammals

Larval habitat: drainage ditches, temporary pools, floodwaters, freshwater

Flight range: up to 2 miles

Biting activity: dusk, dawn, night, daytime

Overwinter stage: egg

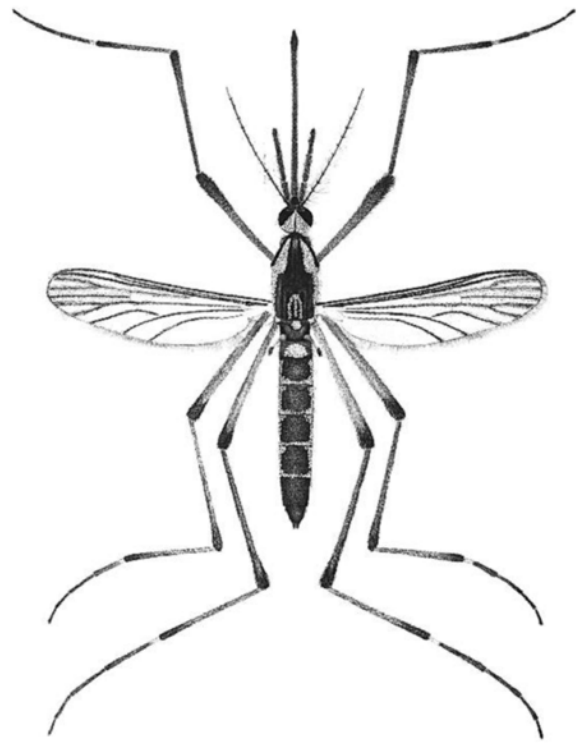
Broods per year: multiple

Diagnostic description:

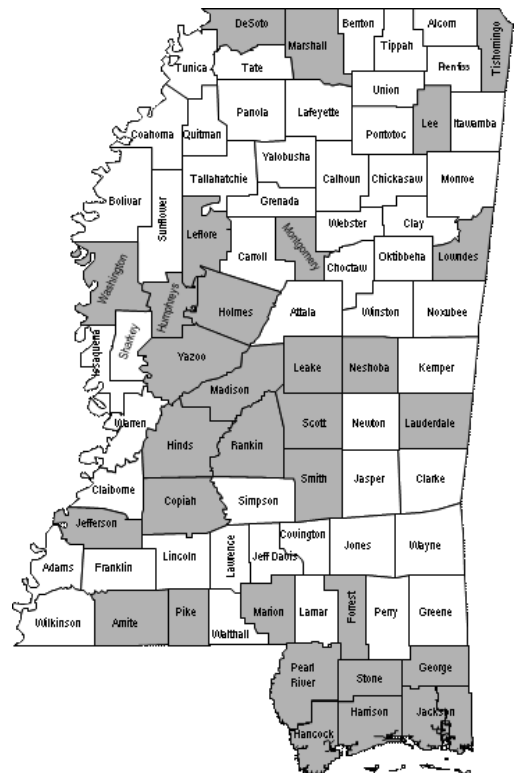
- very large species
- sharp pointed abdomen
- proboscis black
- scutum with median black stripe
- abdominal segments mostly dark
- long palpi about half length of proboscis

Disease: Not considered important.

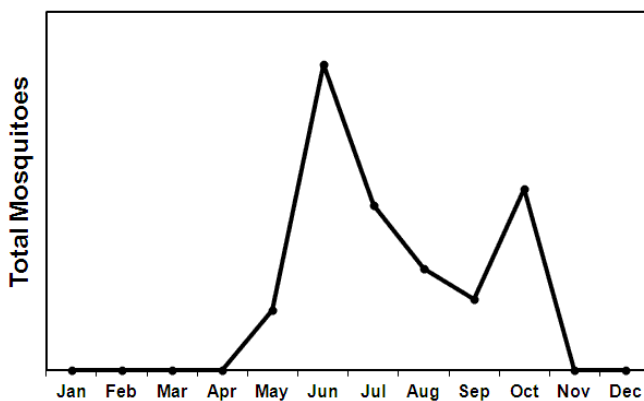
Remarks: Giant larvae are predaceous on other larvae; very painful and persistent biter.



Distribution



Seasonal Abundance



Psorophora mathesoni

Host preference: mammals, birds, reptiles, humans

Larval habitat: woodland pools, temporary pools, shaded freshwater

Flight range: up to 2 miles

Biting activity: dusk, dawn, night

Overwinter stage: egg

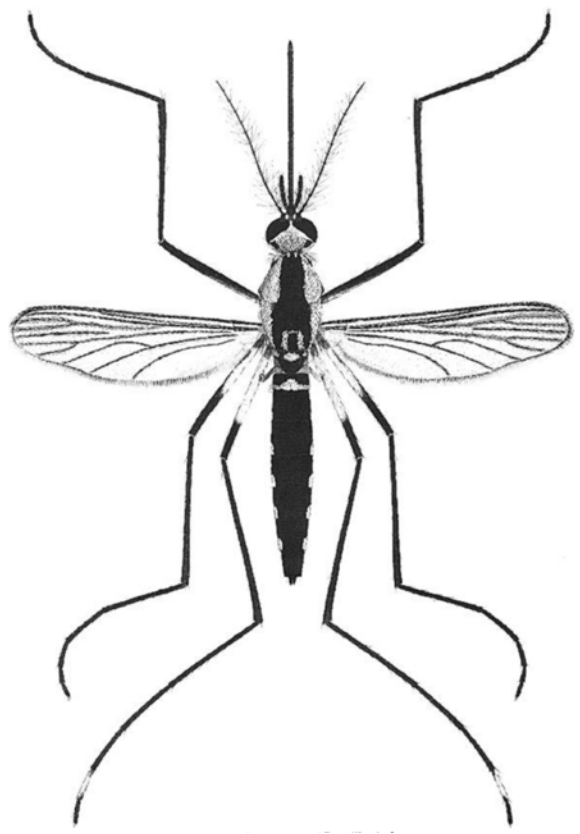
Broods per year: one or more

Diagnostic description:

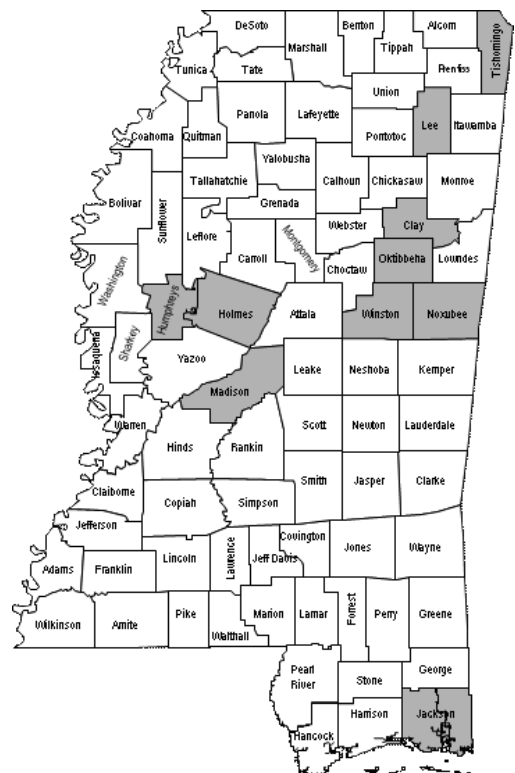
- proboscis, palpi, dorsum of abdomen purple-black
- tarsi black except pale hindtarsomere 4
- abdominal segment 1 with median patch of pale scales
- scutum with median longitudinal stripe of black scales and white scales laterally
- with apical-lateral pale patches on abdominal segments

Disease: Not considered important.

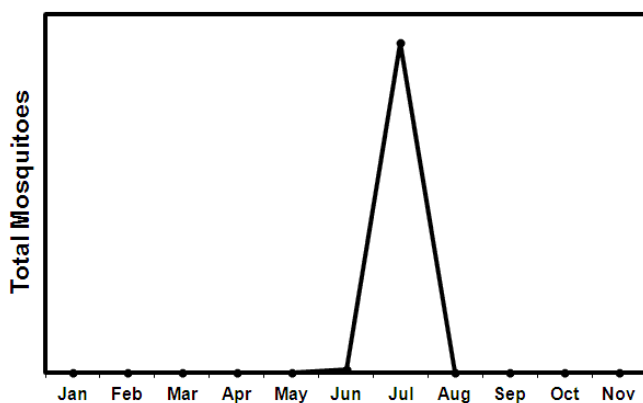
Remarks: Eggs resistant to drying and freezing; commonly associated with *Ps. ferox*.



Distribution



Seasonal Abundance



Toxorhynchites rutilus septentrionalis

Host preference: no blood meal required

Larval habitat: tree holes, artificial containers

Flight range: near breeding site

Biting activity: do not bite animals

Overwinter stage: larva

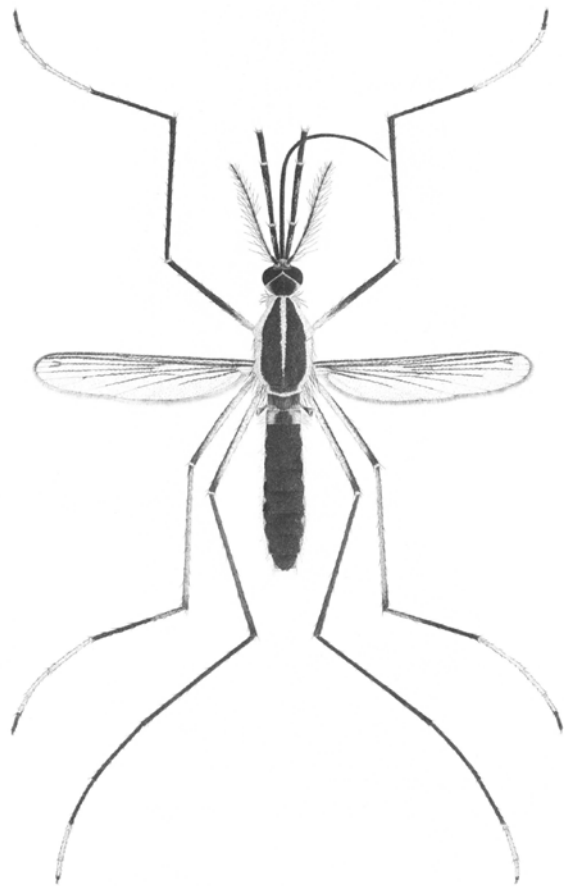
Broods per year: multiple

Diagnostic description:

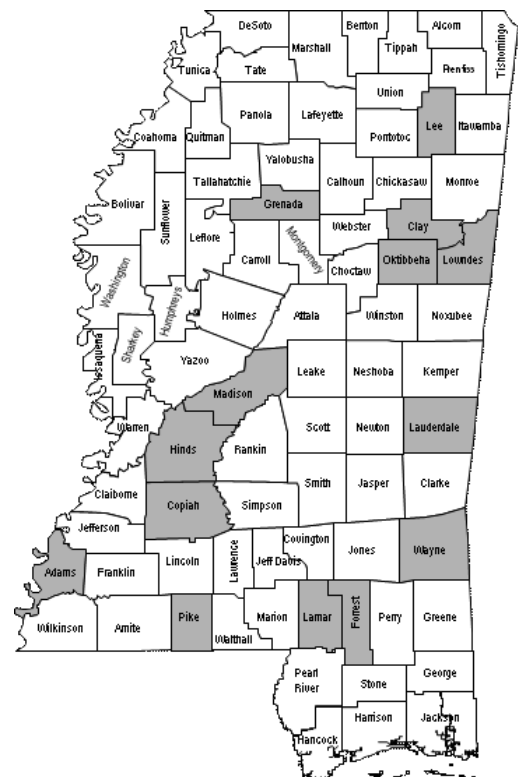
- very large species
- palpi about $\frac{2}{3}$ length of proboscis
- proboscis strongly curved
- scales on body iridescent blue, green, yellow

Disease: None.

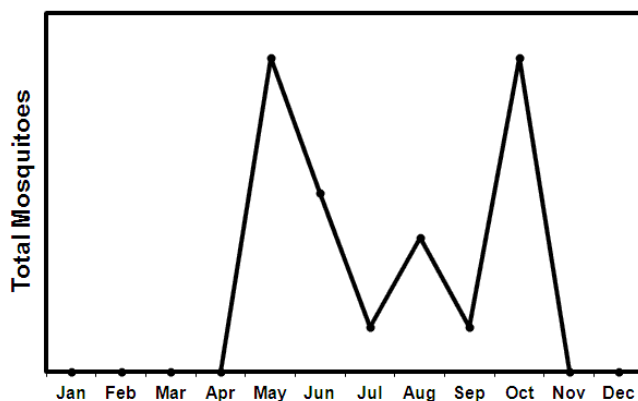
Remarks: Larvae are predacious of other mosquito larvae; male and female adults fly during the day and primarily feed on the nectar of flowers.



Distribution



Seasonal Abundance



Uranotaenia lowii

Host preference: amphibians, reptiles

Larval habitat: permanent freshwater in coastal plain

Flight range: up to 1 mile

Biting activity: rarely, if ever, bites humans; nocturnal

Overwinter stage: adult

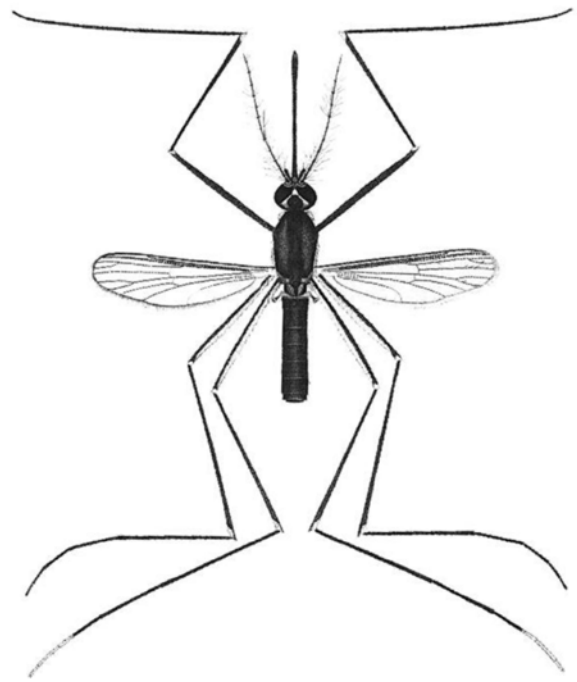
Broods per year: multiple

Diagnostic description:

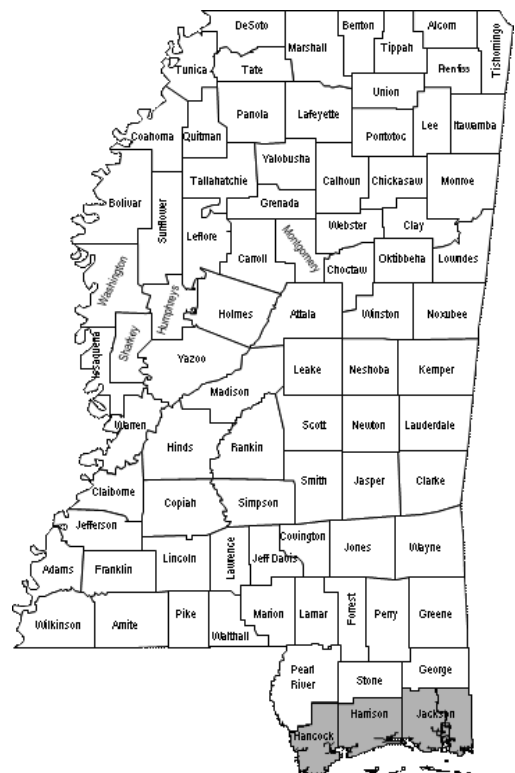
- tiny species with iridescent azure blue scales on sides of thorax and wing
- scutum with median dark stripe, without median longitudinal blue stripe
- abdomen blunt and dark-scaled
- hindtarsomeres 4–5 white
- second marginal wing cell shorter than vein R_{2+3}

Disease: Not considered important.

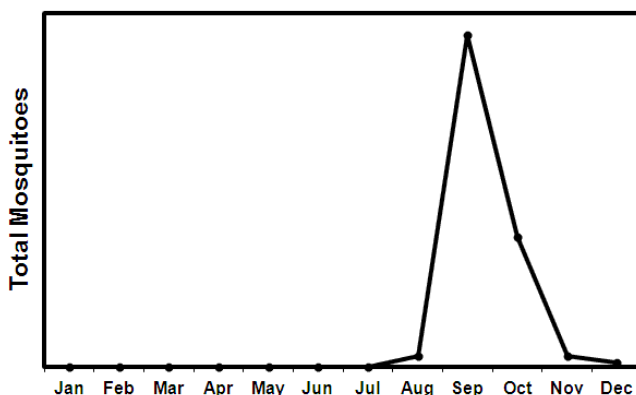
Remarks: Uncommon; usually collected near the coast.



Distribution



Seasonal Abundance



Wyeomyia smithii

(pitcher-plant mosquito)

Host preference: none

Larval habitat: pitcher plants

Flight range: stays near breeding site

Biting activity: rarely bites humans or other animals

Overwinter stage: larva

Broods per year: multiple

Diagnostic description:

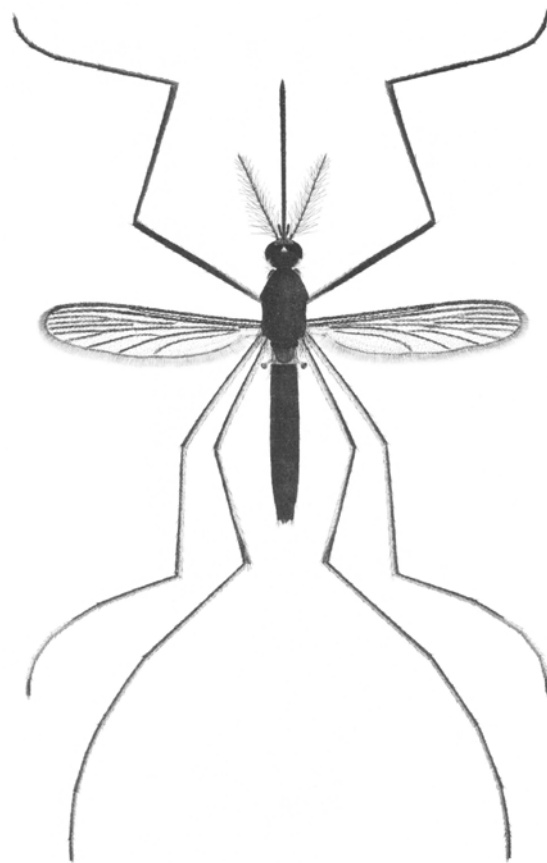
- palpi short
- abdomen blunt or rounded
- mesopostnotum with setae
- top of abdomen covered with broad dark scales, bottom of abdomen covered with pale scales; light and dark
- scales meet to form clean line



- wing scales narrow and dark
- hindtarsomeres dark with no pale bands

Disease: None.

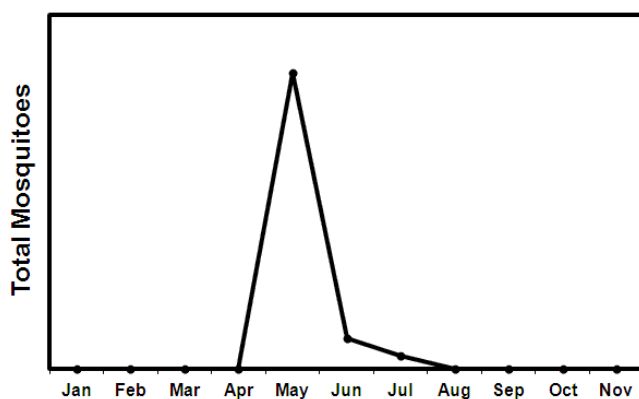
Remarks: Known to occur only in the pitcher plant hybrid *Sarracenia purpurea* and hybrids including this species.



Distribution



Seasonal Abundance





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