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Wyoming Mosquito Manual

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Contributors

This work would not be possible without the seminal 1981 publication of the "Identification and Geographical Distribution of the Mosquitoes of North America, North of Mexico" by Richard F. Darsie Jr. and, Ronald A. Ward. Illustrations, unless otherwise noted in the caption for the plates or figures are from their book and are used with permission of the copyright holder, the American Mosquito Control Association, 15000 Commerce Parkway, Suite C, Mount Laurel, NJ 08054.

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Introduction

Mosquitoes belong to the family *Culicidae* in the order Diptera, the true flies. There are more than 3,000 mosquito species belonging to 41 genera, which are known to occur throughout the world (Service, 2008). North America has more than 174 mosquito species, representing 14 genera (Darsie & Ward, 2005) , and Wyoming is known to be home to 45 species. The majority of them belonging to the genus *Ochlerotatus* that used to be considered a subgenus of *Aedes* (Reinert, 2000).

The purpose of this manual is to assist the user in understanding the basic biology and role mosquitoes have in disease transmission in Wyoming. The dichotomous identification keys include just the species known to occur in Wyoming to help simplify the identification process.

The first part of this manual explores the economic role mosquitoes play, both as a nuisance species and, most importantly, as a vector of disease. Next, is a brief discussion of the mosquito surveys that have been completed in Wyoming followed by an overview of the biology and life history of these fascinating insects. At the end of the first part, the characteristics used to identify mosquitoes are illustrated and the most common insects that are often mistaken to be a mosquito are pictured.

The second part of this manual includes the taxonomic keys of the adult female and fourth stage larvae of the mosquito species that are known to occur in Wyoming. In the final section, we have provided several pages of reference material that provide additional information to the users of this manual.

The mosquito identification keys and illustrations in this manual were compiled from material developed by Darsie and Ward (2005) in their authoritative publication, the *Identification and Geographical Distribution of the Mosquitoes of North America, North of Mexico*. Although the keys included in this manual are specific to the mosquito species known to occur in Wyoming, there is always the possibility a mosquito species not previously known to occur in this region may be collected at some point, thus making these keys unhelpful for its identification. If the user is having difficulty identifying a mosquito specimen, they can contact the University of Wyoming where an extension entomologist can assist in making a positive identification. In fact, the authors encourage the users of this manual to report any species they believe may not have been previously reported in Wyoming as well as any species that may be a new county record.

Finally, the authors take full responsibility for any mistaken illustrations, words, or other errors that may have escaped the editorial process and encourage all users to contact them if there are any questions, comments, and or suggestions on how this manual could be improved in future editions.

Importance of Mosquitoes

As blood sucking nuisances and as a vector of disease, mosquitoes have an effect on the economy of a region. Although it is difficult to assess the true economic importance of mosquitoes, it has been established that livestock exposed to large numbers of mosquitoes may gain less weight and utilize food less efficiently (Bowman, 2003). Although this is especially true for beef cattle, it can result in the decrease of milk production in dairy cattle. In addition to lost revenue in the livestock industry, there is evidence that as a nuisance species, the mosquito can impact land value and recreational activities. It has been reported in areas where high numbers of mosquitoes are known to occur, the real estate value of the land can decrease and in some recreational areas large mosquito populations will deter outdoor activities, which can also have a negative effect on tourism (Siverly, 1972).

In Wyoming, mosquitoes have historically been associated with the discomfort and annoyance they cause. In a study conducted in Laramie, Wyoming, one calf-baited trap was used to collect mosquitoes and it yielded more than 45,000 mosquitoes in a single night (Lloyd & Pennington, 1976). With the introduction of West Nile Virus into the US, mosquitoes have become recognized as a health threat rather than a simple nuisance. Fortunately, Wyoming's geographic location makes the transmission of virulent mosquito-borne disease a relatively rare occurrence when compared to other areas of the world such as tropical regions where diseases such as malaria, dengue, and yellow fever are endemic. Nonetheless, Wyoming is not disease free and every once in a while, a disease such as the West Nile Virus emerges and reminds us of how important the mosquito is as a vector of disease. As a result, we are including a brief description of mosquito-borne diseases (human and animal) found in Wyoming.

West Nile Virus (WNV). The West Nile Virus is probably the most well-known mosquito-borne disease in Wyoming. This virus was unknown in the United States until 1999 when it first appeared in the northeastern region. The natural transmission cycle involves competent mosquito vector species and populations of bird species that have reservoir competence. The severe form of the disease can be debilitating or fatal in humans and horses, as well as some domestic and wild birds, particularly those in the Corvidae (crow) family. The primary vector to people in Wyoming is *Culex tarsalis*, but *Aedes* and *Ochlerotatus* species have also been implicated in the transmission of the virus in bird populations. Currently there is a vaccine for horses but not for humans, most of whom never show any symptoms once infected with the virus.

St. Louis Encephalitis (SLE). St. Louis encephalitis is similar to the West Nile Virus (WNV) and is caused by a flavivirus. It mainly occurs in the eastern and central United States, but cases have also occurred in the west. According to the Centers for Disease Control and Prevention (CDC) , since 1964 there have been 88 cases reported in Colorado and only one in Wyoming. The transmission cycle involves several species of birds and a few species of *Culex* mosquitoes including *Culex pipiens* and *Culex tarsalis*. Humans, non-human mammals and some bird species are considered dead-end hosts and are not involved in further disease transmission. The reaction of humans infected with SLE is variable and dependent on age and general health. The fatality rate is higher in people over 50 years of age.

California Encephalitis (CE) , LaCrosse (LAC) , and Jamestown Canyon (JC) Encephalitis. These viruses of the California serogroup are in the *Bunyaviridae* virus family and rarely occur in the United States. In fact, only about 80 cases are reported each year. Most cases are attributed to LaCrosse and occur in children under the age of 16. The disease is less severe than SLE and Western Equine Encephalitis (WEE) , with a mortality rate of less than one percent. The natural hosts are small and medium sized animals such as rabbits, hares, chipmunks and squirrels rather than birds. The vector species are *Ochlerotatus* mosquitoes with the most prominent species being *Ochlerotatus triseriatus*. However, the virus has been isolated from *Oc. canadensis*, *Oc. melanimon*, and *Oc. trivittatus*.

Western Equine Encephalitis (WEE). This is an alphavirus mainly found in states located to the west of the Mississippi River and the upper Midwest states. Outbreaks of WEE periodically occur in the western parts of the United States. The disease tends to occur in rural locations with a natural transmission cycle that involves the mosquito vector and wild birds. In the western United States, the main vector species is *Culex tarsalis* and *Oc. melanimon*. WEE can cause death in both humans and horses, but both of these are considered dead-end hosts and are not involved in further transmission of the virus. There is a vaccine for horses, but currently no vaccine is available for humans.

Dog Heartworm (*Dirofilaria immitis*). Unlike the diseases previously discussed, dog heartworm is caused by a parasitic worm and the condition is often referred to as dirofilariasis. In the United States, dirofilariasis has long been endemic in the Atlantic and Gulf Coast states, and along the Mississippi River valley. Within the past 15 to 20 years the disease has moved northward and westward and is now considered endemic in several western states including some in the Rocky Mountain region. Although the disease is not known to be endemic, in Wyoming there have been a few isolated cases reported here. The natural cycle includes the mosquito vector and domestic and wild dogs. There are several different mosquito species in Wyoming considered to be biologically capable of transmitting heartworm, these include: *Aedes vexans*, *Ae. sierrensis*, *Oc. trivittatus*, *Anopheles punctipennis*, and *Culex pipiens*.

Mosquito Surveys in Wyoming

Mosquito surveys in the U.S. have traditionally been conducted to aid in mosquito control efforts and to monitor vectors of human diseases such as the viral encephalitides (Clark et al., 1982; Gerhardt et al., 2001; Turell et al., 2001; Erwin et al., 2002; Sardelis et al., 2003; Shaman et al., 2003). Information from many of these surveys has been compiled by Darsie and Ward (2005) in a comprehensive treatise.

With the onset of the West Nile Virus (WNV) in the U.S., many agencies have received funding to monitor and control vector mosquito populations. This has resulted in numerous epidemiologic updates (Rutledge et al., 2003; Hribar et al., 2003; Goddard et al., 2003; Bugbee & Forte, 2004). Such information has been valuable in updating records and providing a more comprehensive list of known and potential vector species for a variety of human and animal diseases.

The first mosquito survey in Wyoming was reported by Dyar in 1923 and updated by Rees in 1948 and by Harmston and Owen 1951. A more complete study was conducted in 1957 by Owen and Gerhardt. Subsequent surveys have been performed by Nielsen et al. (1968) , Pennington and Lloyd (1975) , Lunt and Peters (1976) , Lloyd and Pennington (1976) , Jones and Lloyd (1985) , Denke et al. (1996) and Moore (2001) , many of which were a review of the published as well as unpublished literature (Denke & Spackman, 1990; Nielsen & Blackmore, 1996; Darsie & Ward, 2005; Fenoff, 2007). Although some of these surveys and reviews are recent, many regions of the state have not been surveyed since the earliest surveys that were completed. The most recent research has focused on West Nile Virus and Dog Heartworm (Lloyd, 2005; Fenoff, 2007).

Biology and Life History

Mosquitoes have long, 14 to 15 segmented antennae, six legs, two wings with scales on the veins and trailing edge, and an elongated proboscis used for sucking blood and or nectar. Mosquitoes have four stages of development: egg, larva, pupa and adult and they undergo complete metamorphosis (Plate 1). Eggs require a water source in order to hatch and the larval and pupae stages require a non-moving water source to complete their development to an adult which is the terrestrial form.

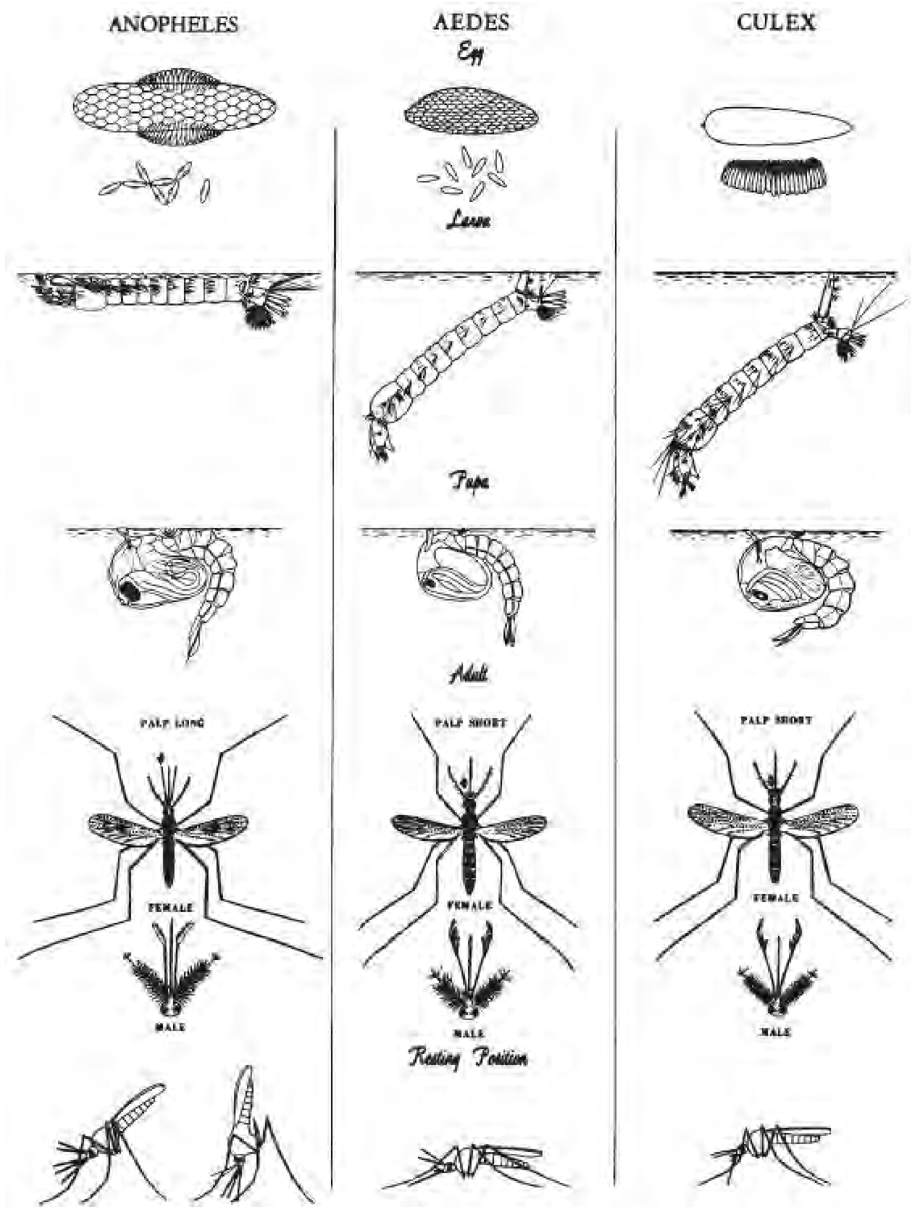


Plate 1. Life stages of three common mosquito genera (US Dept. of Health, Education, and Welfare Public Health Service, Communicable Disease Center, Training Branch, 1962).

The eggs are laid, singly or in rafts, on the surface of a non-moving water source or in a dry place that tends to flood seasonally. The duration of the egg stage varies as a result of the environmental conditions and species of mosquito. Some species over-winter in the egg stage thus prolonging its development, but usually eggs laid on the surface of water will hatch in less than one week and some may hatch within two days in the warmest part of the summer.

Mosquito larvae require water for the full duration of their larval development. The larvae are air breathers and the majority of species in Wyoming obtain their oxygen from air above the surface of the water through an air tube called a siphon. Larvae in this stage of development are commonly called "wrigglers," a term used to describe their movement through the water. The duration of the larval stage also varies as a result of the environmental conditions, but generally this stage of development is completed within two weeks. All larvae molt four times and each stage between molts is called an instar. At the end of the fourth instar, the larva pupates and begins its third developmental phase.

The pupa stage is a non-feeding, transitional instar that also requires water to complete its development. This stage is short and can be completed in two to three days. Unlike the long wriggling larval form, the pupa takes the shape of a comma and tumbles around the water surface. As a result, the pupae are also referred to as "tumblers." Once this phase is complete, the adult mosquito emerges by breaking out of the pupal exuvia. Initially, the newly emerged adult mosquito will rest on the surface of the water or climb onto emergent piece of vegetation where it waits for its wings to expand and harden at which time it takes flight. Before they are capable of flight, they are vulnerable to drowning from wind and wave action.

The adult stage is terrestrial and its duration varies by species and location. Males tend to live from a few hours to a few days, while females can live from a few weeks to a few months. Only the reproductive females feed on blood to develop eggs. Both male and female mosquitoes feed on nectar and plant juices for carbohydrates to fuel their bodies. Most Wyoming mosquito species feed on either mammals, birds or both for their blood source. However, some mosquitoes feed on reptiles and amphibians (Cupp et al., 2004). The preference tends to be species specific. While some mosquito species will have one generation each year, others may have more than four in Wyoming and will overwinter as adult mosquitoes in sheltered areas.

Characteristics Used to Identify Mosquito Species

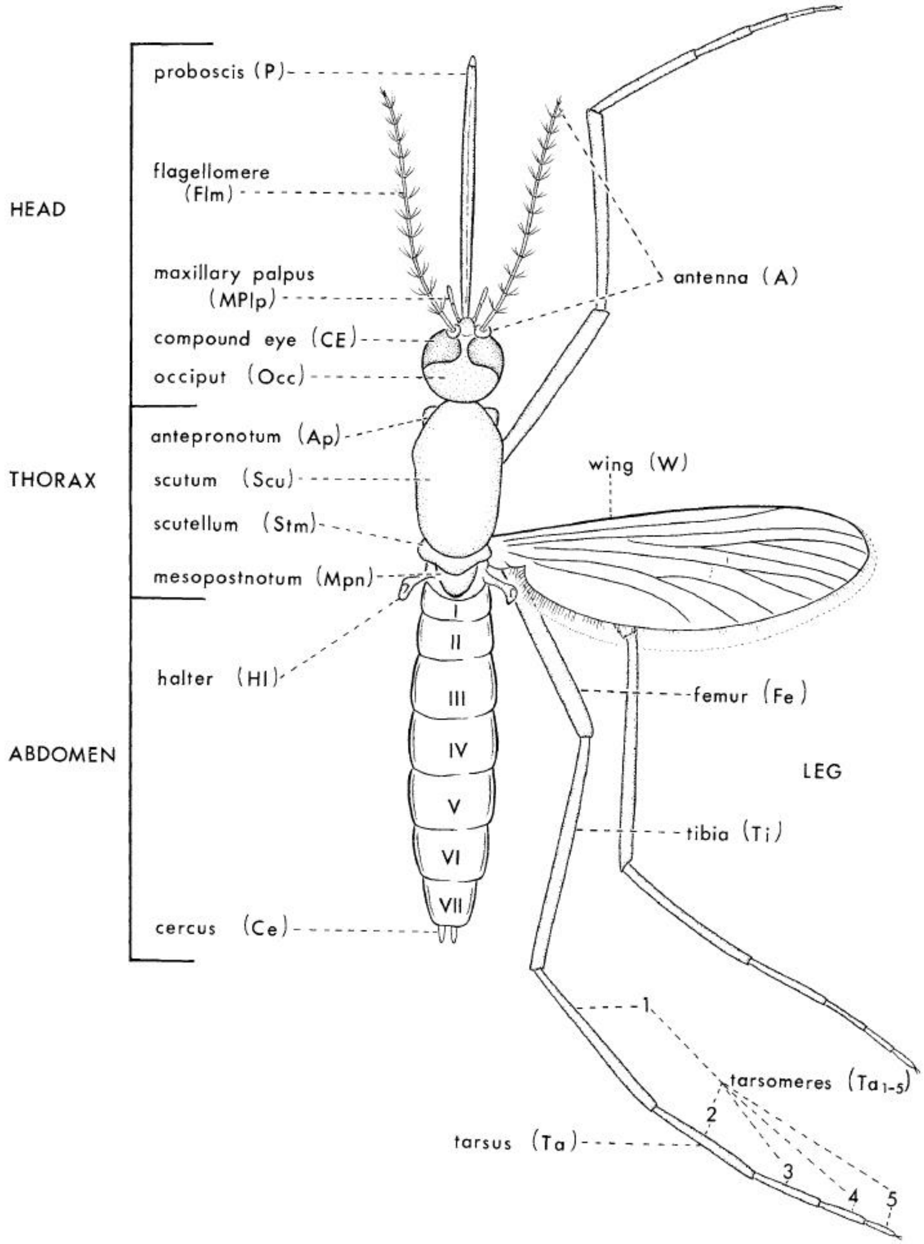
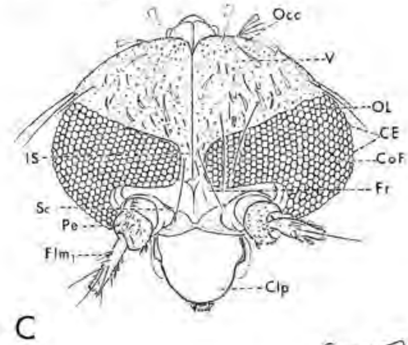


Plate 2. Adult female mosquito diagnostic characters nomenclature.

Adults

Adult mosquitoes (Diptera: Culicidae) are distinguished from other flies by the presence of scales on the wings and a long proboscis on the head. The body of the adult mosquito is divided into three regions: head, thorax and abdomen (Plate 2). Each of the three body regions, which bear structures useful for identification, are detailed below.

Mam	mesepimeron
Mem	metameron
MeSL	lower mesepimeral setae
MeSU	upper mesepimeral setae
Mks	mesokatepisternum
MkSL	lower mesokatepisternal setae
MkSU	upper mesokatepisternal setae
Mpn	mesopostnotum
MS	mesothoracic spiracle
Msm	mesomeron
MSS	medial scutellar setae
Mtm	metepimeron
Mtn	metanotum
Mtpn	metapostnotum
Mts	metepisternum
MtS	metathoracic spiracle
PA	postspiracular area
PaS	prealar setae
PeSU	upper proepisternal setae
PGL	postgenital lobe
PM	postprocoxal membrane
Pmas	posterior mesanepisternum
Ppn	postpronotum
PpS	postpronotal setae
Ps	proepisternum
PS	postspiracular setae
PsS	prespiracular setae
PsA	prespiracular area
S	sternum
SA	subspiracular area
SaS	supraalar setae
Scu	scutum
SF	scutal fossa
SFS	scutal fossal setae
Stm	scutellum
Te	tergum of abdomen
W	wing



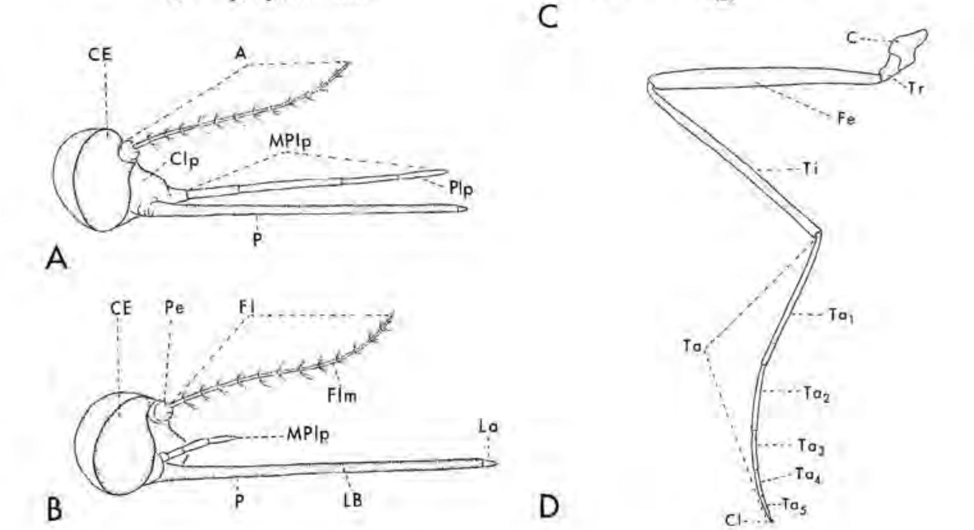


Plate 3. Head and leg of adult female mosquito. A. Lateral view of anopheline head; B. Lateral view of culicine head; C. Dorsal view of culicine head; D Lateral view of leg.

Head (Plate 3 A, B, C). A large portion of the head is made up of two large **compound eyes**. Arising between the eyes is a pair of long, threadlike **antennae** with whorls of short **setae** ("hairs") in the female, and whorls of long setae in the male. The antennae are made up of three parts: the **scape**, which is the small basal segment and is covered by the globular second segment or **pedicel**, and the **flagellum**, which is composed of 13 or 14 segments called **flagellomeres**. The **proboscis** is the elongated **labium**, which encloses the thin, stiff, hair like stylets used to pierce the host's skin when taking a blood meal. Scales on the proboscis and head are important identifying features. Some mosquito species have a pale-scaled ring near the middle of the proboscis, such as the *Culex tarsalis*, while others only have dark scales throughout.

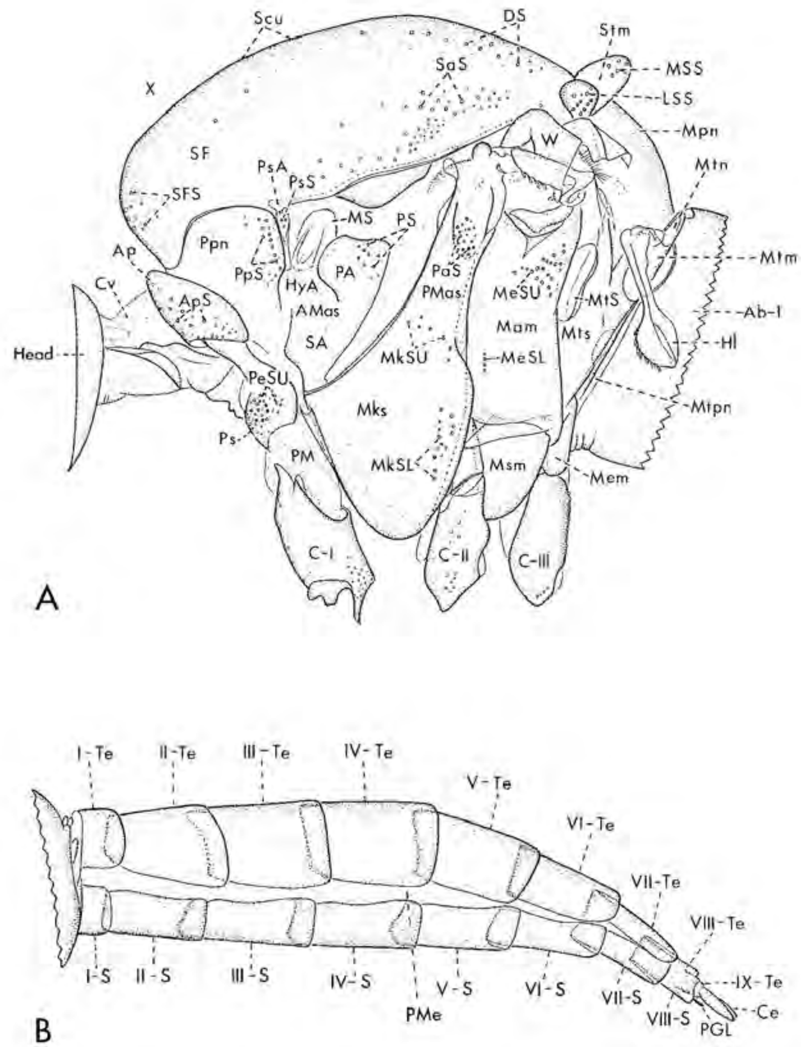


Plate 4. Side view of thorax (A) and abdomen (B) of an adult female mosquito.

Thorax (Plate 4 A, Plate 5 A,B). The thorax is located between the head and the abdomen and it is divided into three regions: **prothorax**, **mesothorax** and **metathorax**. Each of these regions has one pair of legs. The mesothorax contains the flight muscles and wings and is much larger than the other two segments. The metathorax contains a pair of knobbed shaped structures called **halteres** (plural) which are the organs used for balance while in flight. With the exception for small areas belonging to the prothorax and metathorax, the **pleural sclerites** of the mesothorax fill the sides of the thorax. The scale patterns of these sclerites are significant identifying characteristics. The presence or absence of **post-spiracular setae** in conjunction with the presence or absence of **spiracular setae** is also important.

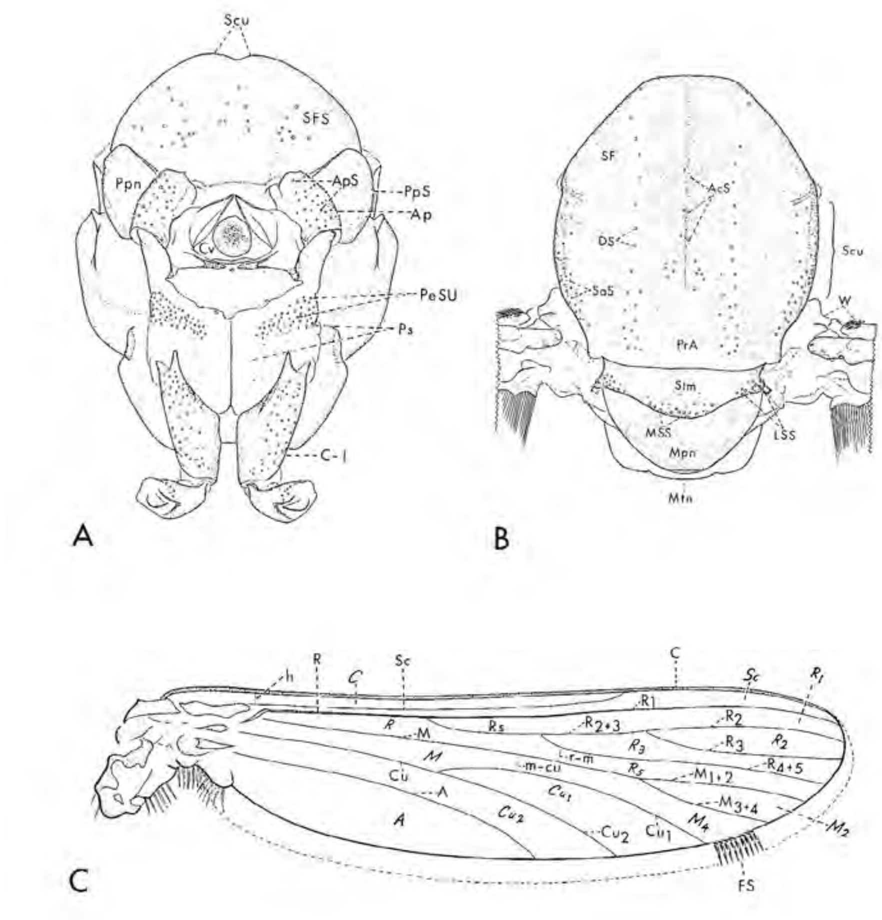


Plate 5. A—thorax frontal view, without head. B—thorax dorsal view. C—illustrates a typical wing of an adult female mosquito, drawn without the scales on the veins.

Mosquito wing vein nomenclature and figure abbreviations used in Plate5, figure C.

Costal—C—the vein at the leading edge of an insect wing.

Subcostal—Sc—the second longitudinal vein (behind the costal vein), that curves and joins the costal vein on the wing.

Radial—R—the third longitudinal vein, with five branches that reach the mosquito's wing margin.

Medial—M—the fourth longitudinal vein, with four branches that reach the mosquito's wing margin.

Cubital—Cu—the fifth longitudinal vein, two branches reach the mosquito's wing margin.

Anal—A—the sixth and unbranched vein behind the cubital.

Legs (Plate 3, D). The leg consists of five parts: **coxa**, **trochanter**, **femur**, **tibia** and **tarsus**. The tarsus has five segments called **tarsomeres**. The fifth tarsal segment has a pair of **tarsal claws** which are an important identifying feature for certain species. In fact, in some genera, the claws of the fore and middle legs are longer and are of a different structure than those of the hind legs. Additionally, the pattern and color of the leg scales, which often form distinctive bands, are significant identifying characteristics.

Wings (Plate 5, C). The size, shape and color of the wing scales are very useful identifying characters. The wings are made up of thin covering called **cells** which are connected by a network of **veins**. The wings have scales that cover the veins dorsally and ventrally and in some species the tips of the wings are covered with scales, e.g. *Anopheles earlei*.

Abdomen (Plate 4, B). The abdomen is made up of ten segments, which are referred to by Roman numerals. Each segment has a dorsal sclerite called the **tergum** and a ventral sclerite called the **sternum**. These two sclerites are connected laterally by an elastic tissue called the **pleural membrane**. The last three abdominal segments (VIII–X) are shortened and modified, and their shape can be used in separating certain genera. For example, *Culex* and *Culiseta* species have terminal segments that appear bluntly rounded or truncate, whereas mosquitoes in the genera *Aedes, Ochlerotatus,* and *Psorophora* have terminal segments that taper apically offering a more pointed appearance. For species identification, the scale patterns of the abdomen may also provide useful characteristics.

Larvae

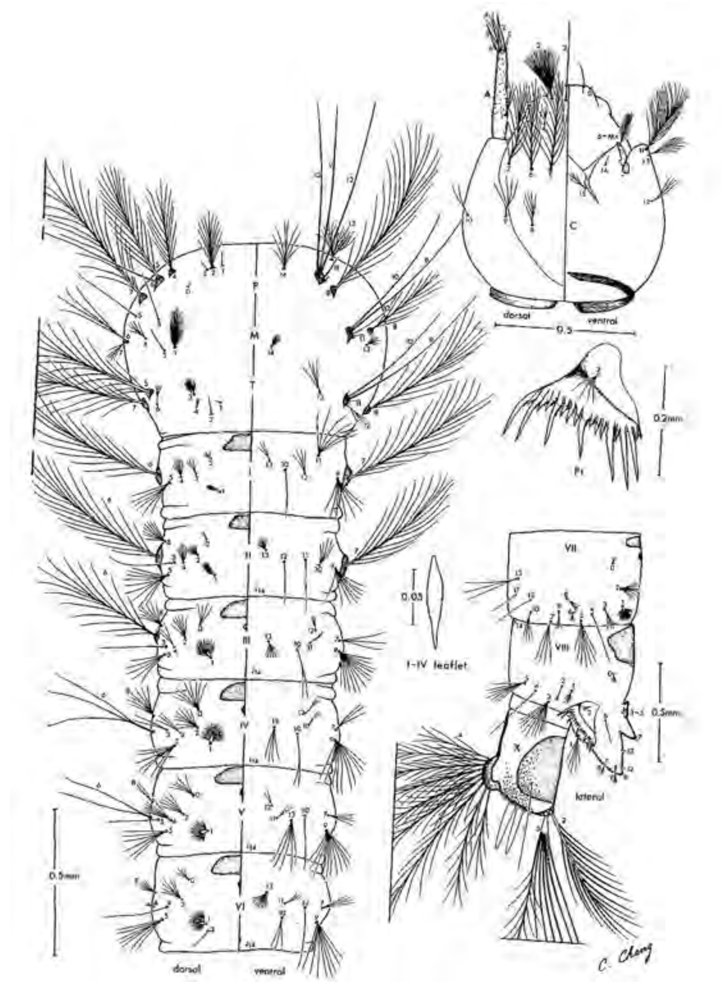


Plate 6. Illustration of a fourth stage anopheline larva. The dorsal view on the left, ventral view on the right of head (upper right figure) and the thorax and abdominal segments I through VI left figure; side view of abdominal segments VII through X in lower right figure showing the greatly reduced air siphon diagnostic of Anopheles mosquito species.

Like the adults, the fourth instar mosquito larva has three body regions: head, thorax and abdomen. Each of these body regions has diagnostic characters that can be useful for species identification.

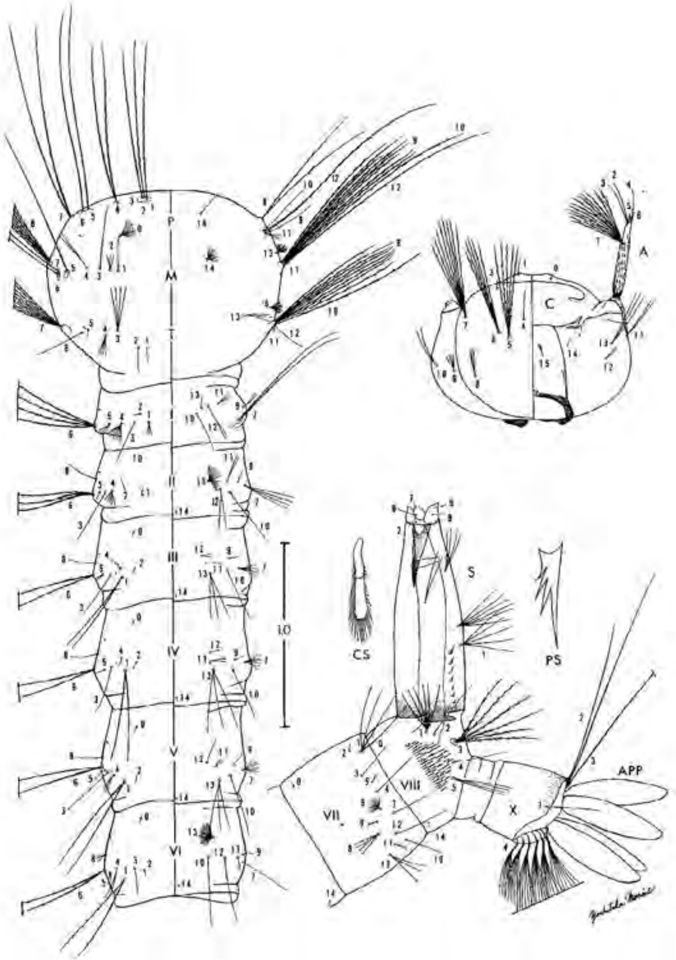


Plate 7. Fourth stage mosquito larva body parts; the dorsal view on the left, ventral view on the right of head (upper right figure) and the thorax and abdominal segments I through VI left figure. A side view of abdominal segments VII through X is in lower right shows the elongated siphon tube typical of common *Aedes*, *Ochlerotatus*, and *Culex* species.

Head (Plate 6 & 7). The shape of the head is distinctive in some species. However, the number and position of setae located on the head is of great significance. The head has 16 pairs of setae and of these, setae 2-C to 9-C are the most important identifiers. The length of the antennae in relation to the head is also a key-identifying feature. Furthermore, the location of the six antennal setae may assist in identification.

Thorax (Plate 6 & 7). The thorax is wider than the head and is composed of three segments: prothorax, mesothorax and metathorax. These are distinguished by rows of setae and although the thorax has 42 pairs of setae, only 10 pairs are used in identification.

Abdomen (Plate 6 & 7). The abdomen is made up of 10 segments, which are referred to by Roman numerals. Segment VIII is modified to form a breathing apparatus (siphon). Segment X is the most posterior segment and is referred to as the anal segment; it possesses a large sclerite, called the **saddle,** and has high identification value. The number of setae found on segments VIII–X is also useful for identification of the larvae.

Mistaken Identity

There are several insects that, to the untrained eye, often appear to be mosquitoes. However, by knowing some of the key characteristics unique to mosquitoes, one can easily differentiate them. The following are a few of the most common insects often mistaken to be mosquitoes.

Plate 8. Crane fly, (Diptera: Tipulidae) lack proboscis and scales on wings. (Photo by David Cappaert, Michigan State University, Bugwood.org)

Crane Flies (Plate 8) are usually much larger insects than typical mosquitoes. They can be attracted to outdoor lights on warm summer nights. These are much larger than mosquitoes, lack the elongated piercing-sucking mouthparts and they do not bite.

Plate 9. Non-biting midge, (Diptera: Chironomidae) lack a proboscis for feeding and have no scales on wings. (Photo by Joseph Berger, Bugwood.org)

Midges (Plate 9) and gnats, are the common names for small, true flies from dipteran Families other than Culicidae that can be confused with mosquitoes because they have a similar appearance when at rest, and their flight behavior can be similar. However, with a closer look you will be able to see the long piercing-sucking mouthparts, a characteristic of the mosquito, are absent. At rest, they frequently hold the front pair of legs aloft and they don't have scales on their wing veins and edges.

Plate 10. Mayfly, Order Ephemeroptera lack all of the diagnostic characters of Culicidae. (Photo by Chazz Hesselein, Alabama Cooperative Extension System, Bugwood.org)

Mayflies (Plate 10) are sometimes confused with mosquitoes because they are often quite abundant around water sources, are attracted to porch lights and rest on the walls of buildings thus attracting the attention of some people.

Mosquito Systematics

Many North American mosquito species formerly placed in the genus *Aedes* were reclassified as *Ochlerotatus* species by John Reinert in the year 2000. In Wyoming, only *Aedes vexans* remains in the genus. There are valid reasons for the taxonomic change. If you are new to mosquito identification you won't have any problem and the current taxonomy should remain valid for the duration of your career. The article by Dr. Reinert entitled "New classification for the composite genus *Aedes* (Diptera: Culicidae: Aedini) , elevation of subgenus *Ochlerotatus* (pronounced oh-klur-oh-TAY-tus) to generic rank, reclassification of the other subgenera, and notes on certain subgenera and species" can be found in the *Journal of the American Mosquito Control Association*, 16(3):175-188.

Taxonomic classification of mosquitoes known to be in Wyoming as of 2016

Order Diptera

Infraorder Culicomorpha (Mosquitoes and Midges)

Family Culicidae (Mosquitoes)

Genus *Anopheles*
An. *earlei*

An. *franciscanus*

An. *punctipennis*

An. *walkeri*—may be present in extreme eastern Wyoming

An. *freeborni*

Abbreviations used in the following keys:

Aedes—Ae.

Anopheles—An.

Canadensis—c.

Coquillettidia—Co.

Culex—Cx.

Culiseta—Cs.

Ochlerotatus—Oc.

Psorophora—Ps.

In biology, a single species is abbreviated sp. and multiple species is abbreviated as spp.

Tribe Aedini

Genus *Aedes*
Ae. *cinereus*

Ae. vexans—Inland Floodwater Mosquito

Genus *Ochlerotatus*
Oc. *campestris*

Oc. *canadensis*—Subspecies canadensis

Oc. *cataphylla*

Oc. *communis*

Oc. *dorsalis*

Oc. *euedes*—limited to extreme NW corner of Wyoming.

Oc. *excrucians*

Oc. *fitchii*

Oc. *flavescens*

Oc. *hendersoni*

Oc. *hexodontus*

Oc. *impiger*

Oc. *implicatus*

Oc. *increpitus*

Oc. *intrudens*

*Oc. *japonicus*—Asian Rock Pool Mosquito has been reported from Teton County, Wyoming once but is not included in the taxonomic key for the genus.

Oc. *melanimon*

Oc. *mercurator*

Oc. *nevadensis*

Oc. *nigromaculis*

Oc. *niphadopsis*

Oc. *pionips*

*Oc. *provocans*—may occur in Wyoming but will key to Oc. *implicatus* in this manual

Oc. *pullatus*

Oc. *punctor*

Oc. *schizopinax*

*Oc. *sierrensis*—Western treehole mosquito—extreme western Wyoming distribution

Oc. *spencerii*—Subspecies *idahoensis*

Oc. *sticticus*

*Oc. *triseriatus*—Eastern treehole mosquito considered rare in Wyoming

Oc. *trivittatus*

*Oc. *ventrovittus*—found in Yellowstone National Park

Genus Psorophora

Ps. *signipennis*

Tribe Culicini

Genus *Culex*

Cx. *pipiens*—Northern House Mosquito

Cx. *restuans*

* Cx. *salinarius*—is considered rare in Wyoming

Cx. *tarsalis*—Western Encephalitis Mosquito

Cx. *territans*

Tribe Mansoniini

Genus *Coquillettidia*

Co. *perturbans*

Genus Culiseta

Cs. *alaskaensis*

Cs. *impatiens*

Cs. *incidens*

Cs. *inornata*

Cs. *morsitans*

Genus *Uranotaenia sapphirina**—could possibly be in extreme in northeastern Wyoming but is not included in this manual

Key to the Genera of Adult Female Mosquitoes

1 Maxillary palpi about as long as proboscis (Fig. 1); scutellum evenly rounded with evenly distributed setae (Fig. 2) . . . . *Anopheles* spp.

Maxillary palpi less than half as long as proboscis (Fig. 3); scutellum tri-lobed with setae present on each lobe (Fig. 4) 2

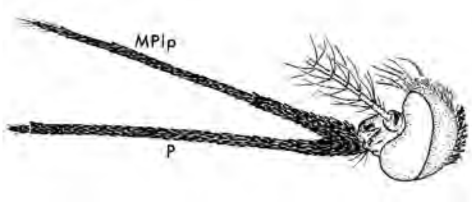


Fig. 1. Lateral view of head: *Anopheles*

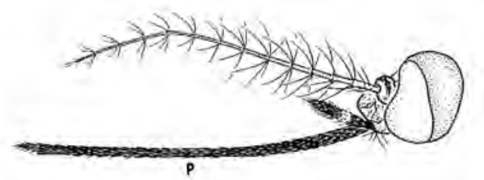


Fig. 3. Lateral view of head: *Aedes*

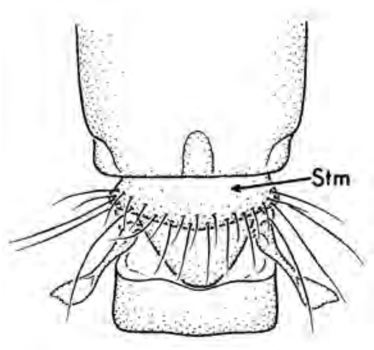


Fig. 2. Dorsal view of thorax: *Anopheles* spp.

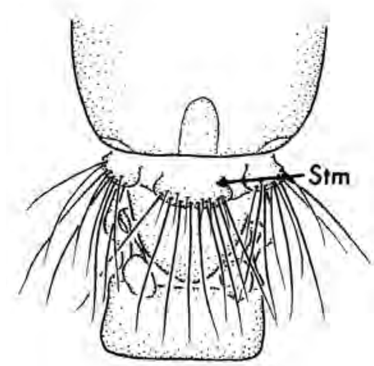


Fig. 4. Dorsal view of thorax: *Aedes*

2 (1) Prespiracular setae present (Fig. 5) 3

Prespiracular setae absent (Fig. 6) 4

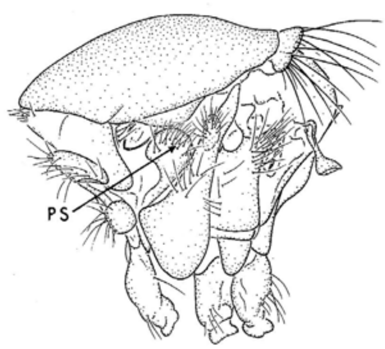


Fig. 5. Lateral view of thorax—*Psorophora*

Fig. 6. Lateral view of thorax—Cs. *inornata*

3 (2) Tip of abdomen narrow, pointed, cerci visible (Fig. 7) . . . . *Psorophora signipennis*

Tip of abdomen blunt, rounded (Fig. 8); large (up to 1 inch [3 cm]) mosquito; base of wing vein Sc with row of setae ventrally (Fig. 9) . . . . *Culiseta*

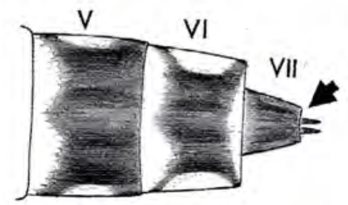


Fig. 7. Dorsal view of abdomen with pointed shape and very visible cerci

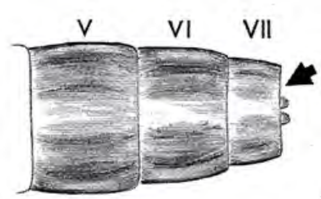


Fig. 8. Dorsal view of a blunt, rounded abdomen

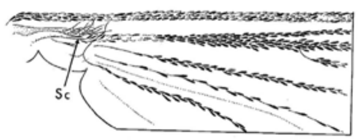


Fig. 9. Ventral view of basal half of wing: *Culiseta inornata*

4 (2) Tip of abdomen narrow, pointed, cerci visible (Fig. 7. . . . . *Aedes* or *Ochlerotatus*

Tip of abdomen rounded, cerci not obvious (Fig. 8) 5

5 (4) Most wing scales dark and narrow (Fig. 10) . . . .*Culex*

Most scales on dorsal surface of wing are broad (Fig. 11); hind tarsi with pale bands at bases of segments only (Fig. 12). . . . . *Coquillettidia perturbans*

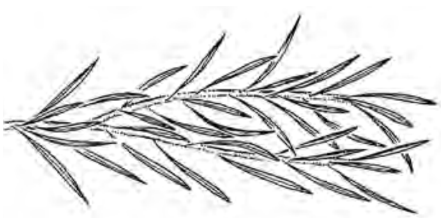


Fig. 10. Dorsal view of wing scales

Fig. 11. Dorsal view of wing scales

Fig. 12. Hind leg showing basal bands

Key to the Adult Female Mosquitoes of the Genus *Anopheles*

1 Wings with patches of white or yellowish white scales (Fig. 13) 2

Wings entirely dark scaled (Fig. 14) or with pale scales on apical fringe (Fig. 15 3

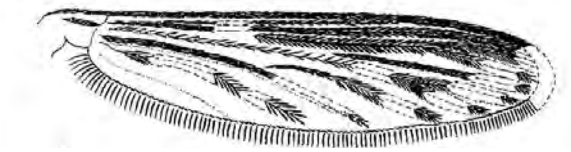


Fig. 13. Wing with light colored scale patches

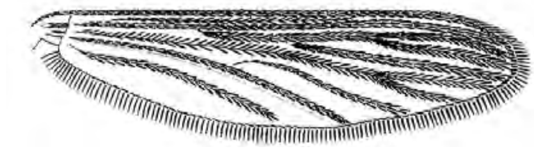


Fig 14. Dorsal view of wing: *An. quadrimaculatus*

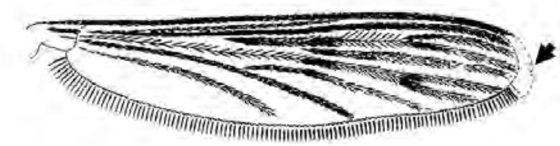


Fig. 15. Dorsal view of wing: *An. earlei*

2 (1) Tip of wings with two patches of pale scales (Fig. 16); palpi entirely dark scaled, without narrow white rings (Fig. 17) . . . . *punctipennis*

Palpi with narrow white rings (Fig. 18) . . . . *franciscanus*

Fig. 16. Dorsal view of wing: *An. punctipennis*

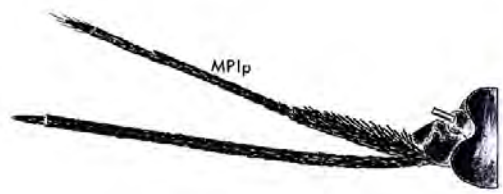


Fig. 17. Lateral view of head: *An. punctipennis*

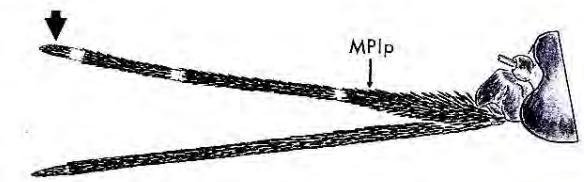


Fig. 18. Lateral view of head: *An. franciscanus*

3 (1) Tip of wing entirely dark (Fig 19) . . . . *freeborni*

Tip of wing with silvery or copper-colored scales (Fig. 15) . . . . *earlei*

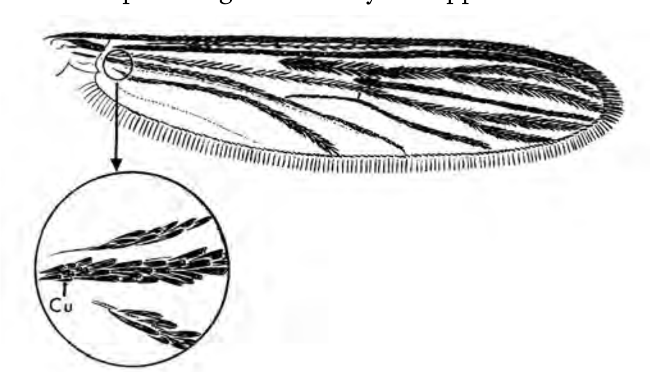


Fig. 19. Dorsal view of wing with all dark scales on basal part of the wing truncate: *An freeborni*

Key to the Adult Female Mosquitoes of the Genus *Culex*

1 Tarsi and proboscis banded with white scales (Fig. 20 & 21) . . . . *tarsalis*

Tarsi and proboscis without white bands (Fig. 22 & 23) 2

Fig. 20. Hindleg: *Cx. tarsalis*

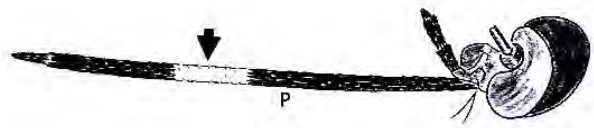


Fig. 21. Lateral view of head: *Cx. tarsalis*

Fig. 22. Hindleg: *Cx. restuans*

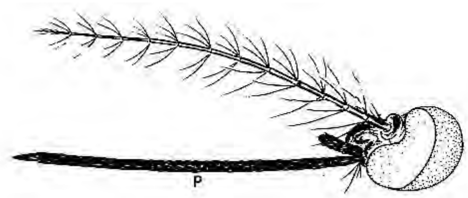


Fig. 23. Lateral view of head: *Cx. pipiens*

2 (1) Abdominal tergites with narrow bands of white scales at apex of segments (Fig. 24) . . . . *territans*

Abdomen with bands of white scales at base of segments, or un-banded (Fig. 25). .3

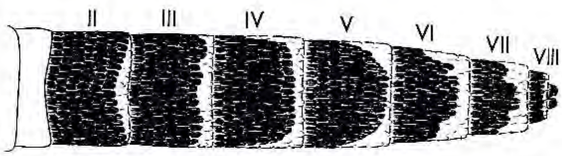


Fig. 24. Dorsal view of abdomen: *Cx. territans*

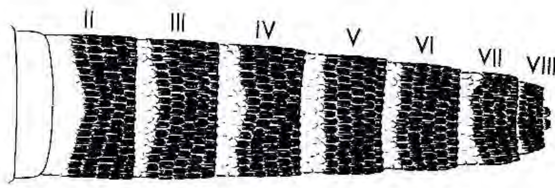


Fig. 25. Dorsal view of abdomen: *Cx. restuans*

3 (2) Abdominal segments with narrow or inconspicuous bands of yellowish scales, segment VII and VIII often entirely pale-scaled dorsally (Fig. 26) . . . . *salinarius*

Abdominal segments with broad, conspicuous bands of whitish scales (Fig. 27); segment VII and VIII usually entirely dark-scaled 4

4 (3) Scutum with a dorsal pair of pale-scaled spots, posterior to center (Fig. 28); basal pale bands of abdominal terga not rounded posteriorly, broadly joined to lateral pale patches with only slight sublateral constrictions, most evident on tergum IV (Fig. 29) . . . . *restuans*

Scutum lacking a pair of pale-scaled spots (Fig. 30); basal pale bands of abdominal terga rounded posteriorly, with marked sublateral constrictions, narrowly joined to lateral pale patches (Fig. 31) .*pipiens*

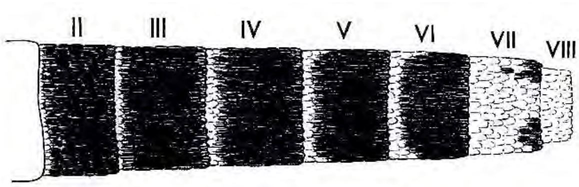


Fig. 26. Dorsal view of abdomen: *Cx. salinarius*

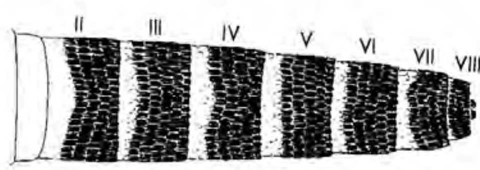


Fig. 27. Dorsal view of abdomen: *Cx. restuans*

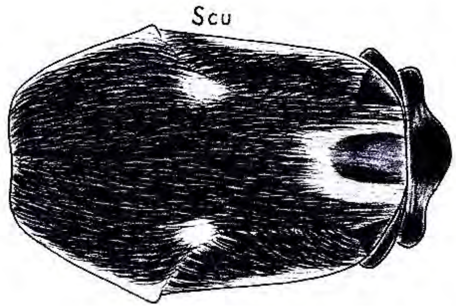


Fig. 28. Dorsal view of scutum: *Cx. restuans*

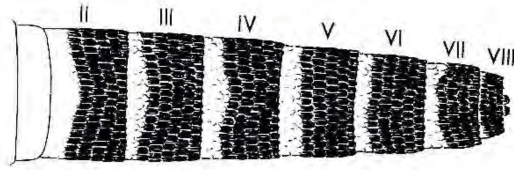


Fig. 29. Dorsal view of abdomen: *Cx. restuans*

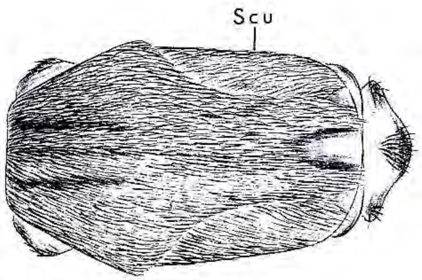


Fig. 30. Dorsal view of thorax: *Cx. pipiens*

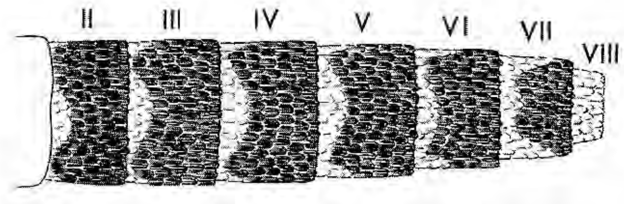


Fig. 31. Dorsal view of abdomen: *Cx. pipiens*

Key to the Adult Female Mosquitoes of the Genus *Culiseta*

1 Hind tarsi with pale basal bands (Fig. 32) 2

Hind tarsi completely black, unbanded (Fig. 33) 3

Fig. 32. Hindleg *Cs. morsitans*

Fig. 33. Hindleg of *Cs. impatiens*

2 (1) Hind leg with broad pale bands, covering one-fourth to one-third of tarsomere two (Fig. 34); costa, subcosta, and vein 1 with pale scales intermixed with dark scales; proboscis speckled with pale scales, especially on ventral surface . . . . *alaskaensis*

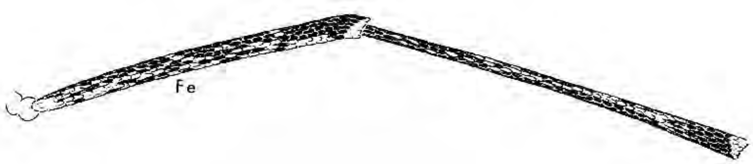


Fig. 34. Lateral view of hind femur and hind tibia: *Cs. alaskaensis*

2 (2) Hind leg with narrow pale bands, covering only about one-tenth or less of tarsomere two (Fig. 35); wing scales of costa, subcosta, and vein R1 entirely black with dense patches of dark scales (Fig. 36); proboscis uniformly dark scaled. . . . . *incidens*

Fig. 35. Hindleg: *Cs. morsitans*

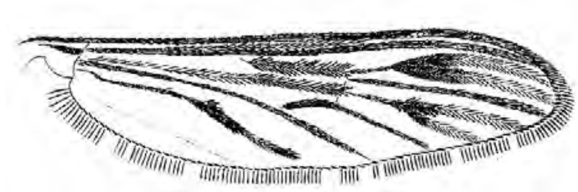


Fig. 36. Dorsal view of wing: *Cs. incidens*

3 (1) Wings have intermingled dark and light scales with numerous pale scales on the costa, subcosta and vein R1 (Fig. 37); hindtarsomeres 1,2 with dark and pale scales (Fig. 38) . . . . *inornata*

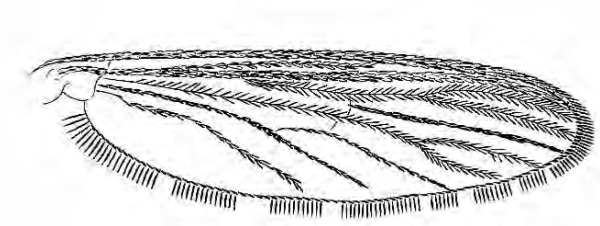


Fig. 37. Dorsal view of wing: *Cs. inornata*

Fig. 38. Hindleg: *Cs. inornata*

All scales of costa, subcosta, and vein R1 entirely dark (Fig 39); hind tarsomeres entirely dark scaled (Fig. 40). . . . . *impatiens*

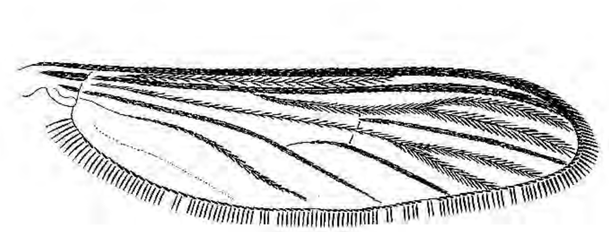


Fig. 39. Dorsal view of wing: *Cs. impatiens*

Fig. 40. Hindleg tarsomeres: *Cs. impatiens*

Key to the Adult Female Mosquitoes of the Genus *Ochlerotatus* and *Aedes*

1 Hindtarsomeres with pale bands (Fig. 41) 2

Hindtarsomeres without pale bands (Fig. 42) 16

Fig. 41. Hindleg: *Oc. excrucians*

Fig. 42. Hindleg: *Oc. triseriatus*

2 (1) Hindtarsomeres with pale bands both apically and basally, on at least some segments (Fig. 43) 3

Hindtarsomeres with pale bands on the base of the segments only (Fig. 44) 6

Fig. 43. Hindleg: *Oc. c. canadensis*

Fig. 44. Hindleg: *Oc. excrucians*

3 (2) Wing with dark and pale scales mixed, or mostly pale scaled (Fig. 45); postprocoxal scale patch present (Fig. 46) 4

Wing with scales all dark, or with some pale scales on the anterior veins dorsally (Fig. 47); postprocoxal scale patch absent (Fig. 48); last segment of hind tarsi entirely white (Fig. 49); scutum golden brown (Fig. 50) . . . . *canadensis*

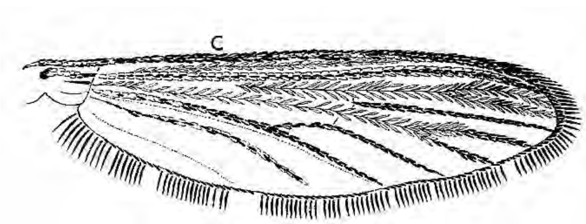


Fig. 45. Dorsal view of wing: *Oc. melanimon*

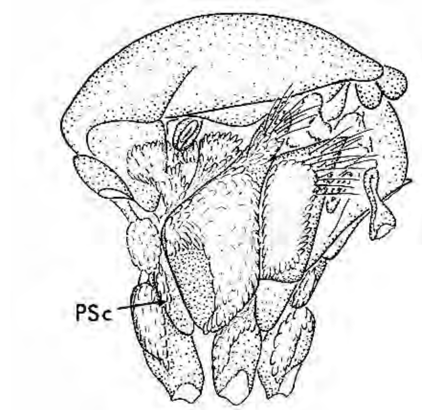


Fig. 46. Lateral view of thorax: *Oc. dorsalis*

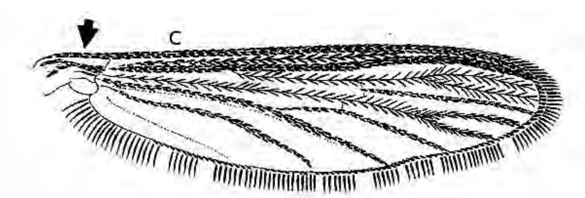


Fig. 47. Dorsal view of wing: *Oc. c. canadensis*

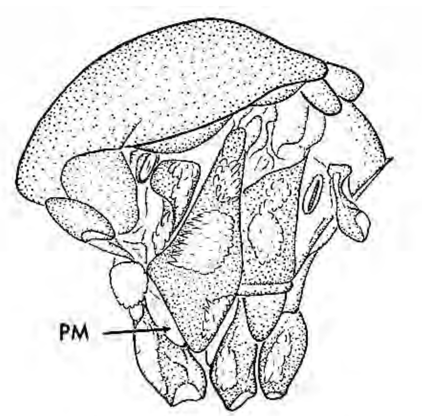


Fig. 48. Lateral view of thorax: *Oc. atropalpus*

Fig. 49. Hindleg: *Oc. c. canadensis*

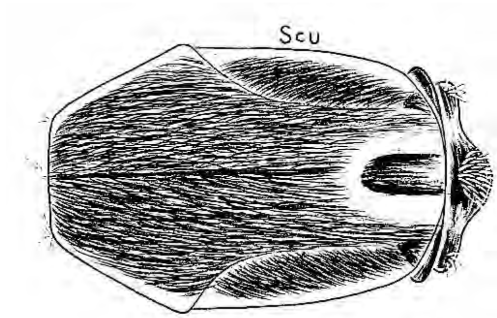


Fig. 50. Dorsal view of scutum: *Oc. c. canadensis*

4 (3) Costal wing vein mostly pale scaled (Fig. 51); top of last abdominal segment with more pale than dark scales (Fig. 52) 5

Costal wing vein mostly dark scaled (Fig. 53); top of last abdominal segment with more dark than pale scales (Fig. 54) . . . . *melanimon*

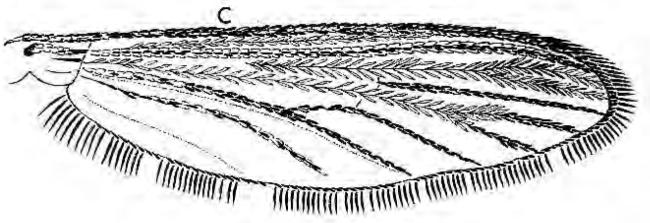


Fig. 51. Dorsal view of wing: *Oc. dorsalis*

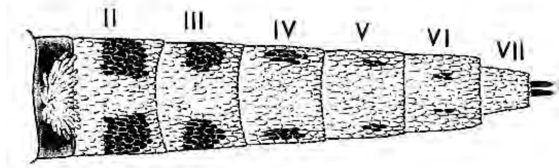


Fig. 52. Dorsal view of abdomen: *Oc. dorsalis*

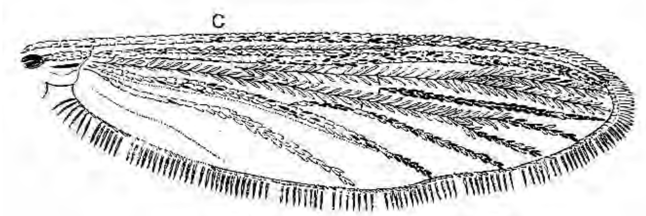


Fig. 53. Dorsal view of wing: *Oc. melanimon*

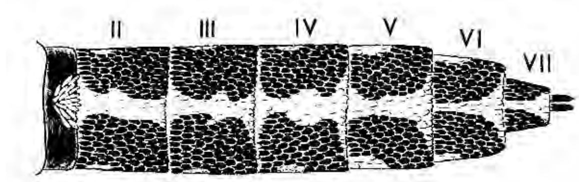


Fig. 54. Dorsal view of abdomen: *Oc. melanimon*

5 (4) Radius 4+5 wing vein with more dark scales than radius 2 and radius 3 (Fig. 55); foreclaw almost straight in the middle (Fig. 56) . . . . *dorsalis*

Radius 4+5 wing vein with as many dark scales as radius 2 and radius 3 (Fig. 57); foreclaw abruptly curving near attachment of tooth (Fig. 58). . . . . *campestris*

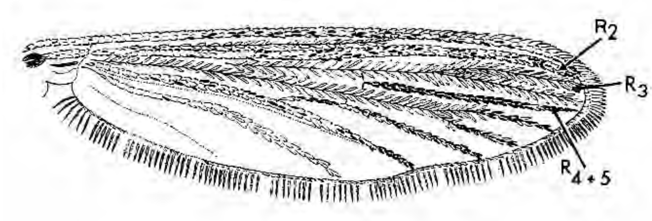


Fig. 55. Dorsal view of wing: *Oc. dorsalis*

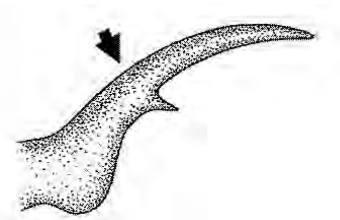


Fig. 56. Foreclaw: *Oc. dorsalis*

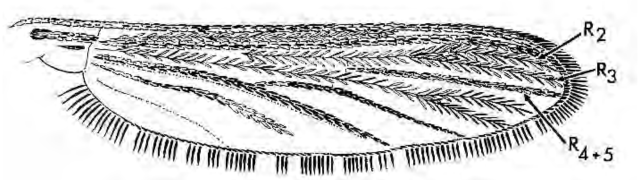


Fig. 57. Dorsal view of wing: *Oc. campestris*

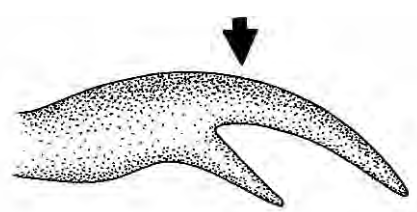


Fig. 58. Foreclaw: *Oc. campestris*

6 (2) Proboscis with a definite pale band near the middle (Fig. 59) 7

Proboscis without a definite pale band near the middle (Fig. 60) 8

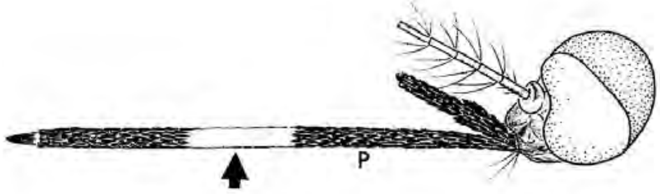


Fig. 59. Lateral view of head: *Oc. sollicitans*

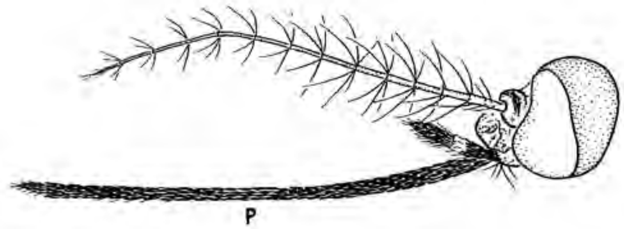


Fig. 60. Lateral view of head: *Ae. vexans*

7 (6) Hindtarsomere 1 with a definite, yellow-scaled median band (Fig. 61); patches on sides of the top of the abdomen whitish (Fig. 62); ***not known to occur in Wyoming*** . . . . *sollicitans*

Hindtarsomere 1 without median pale scaled band, or if present, with a whitish band (Fig. 63); abdominal terga with yellowish scales forming median, longitudinal stripe (Fig. 64) . . . . *nigromaculis*

Fig. 61. Hindtarsomeres: *Oc. sollicitans*

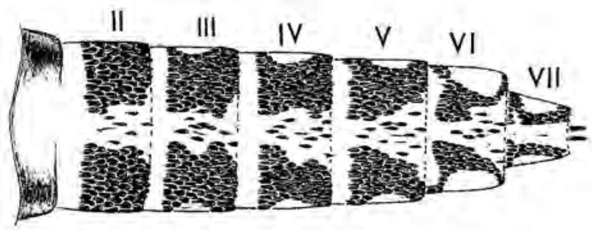


Fig. 62. Dorsal view of abdomen: *Oc. sollicitans*

Fig. 63. Hindtarsomeres: *Oc. nigromaculis*

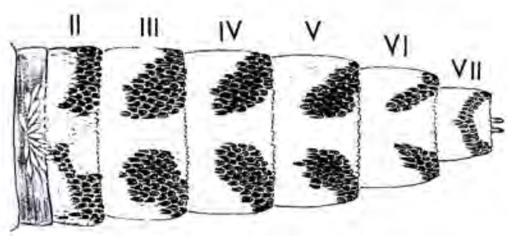


Fig. 64. Dorsal view of abdomen: *Oc. nigromaculis*

8 (6) Basal pale bands on hindtarsomeres narrow, covering less than one-fourth of the segment (Fig. 65); white bands on abdominal tergites indented medially with a v-shaped notch; last segment of abdomen entirely dark-scaled (Fig. 66) . . . . *vexans*

Basal pale bands on hindtarsomeres broad, usually covering more than one-third of the segment (Fig. 67) 9

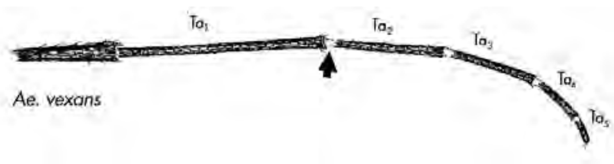


Fig. 65. Hindleg: *Ae. vexans*

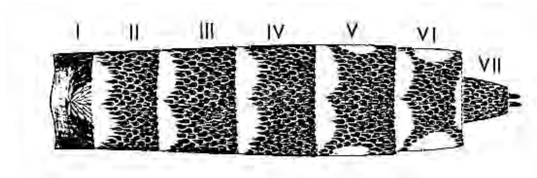


Fig. 66. Dorsal view of abdomen: *Ae. vexans*

Fig. 67. Hindtarsomeres: *Oc. nigromaculis*

9 (8) Palpus dark scaled (Fig 68); abdominal terga with yellowish scales forming a median, longitudinal stripe (Fig. 69) . . . . *nigromaculus*

Palpus with some pale scales (Fig 70); abdominal terga without pale stripe 10

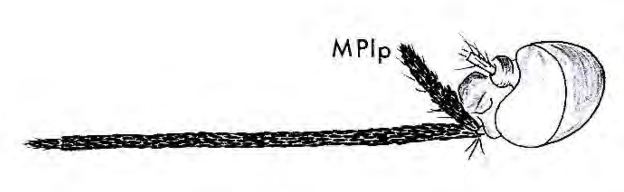


Fig. 68. Lateral view of head: *Oc. nigromaculis*

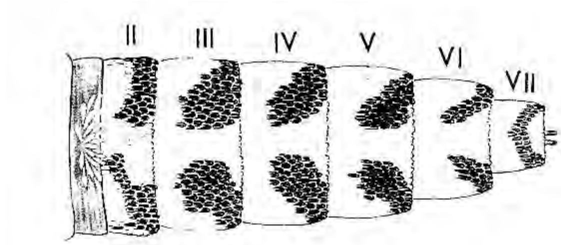


Fig. 69. Dorsal view of abdomen: *Oc. nigromaculis*

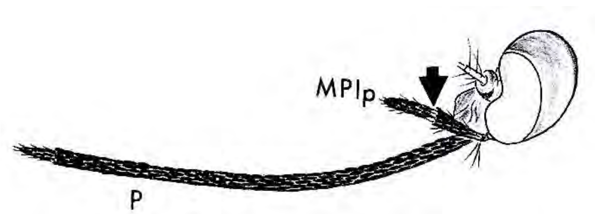


Fig. 70. Lateral view of head: *Oc. increpitus*

10 (9) Top of abdomen covered entirely with yellow scales (Fig. 71) . . . . *flavescens*

Top of abdomen not covered with yellow scales, usually with pale scaled basal bands on some or all segments (Fig. 72) 11

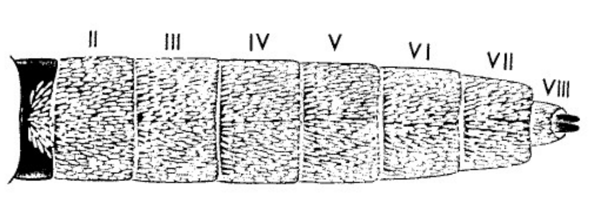


Fig. 71. Dorsal view of abdomen: *Oc. flavescens*

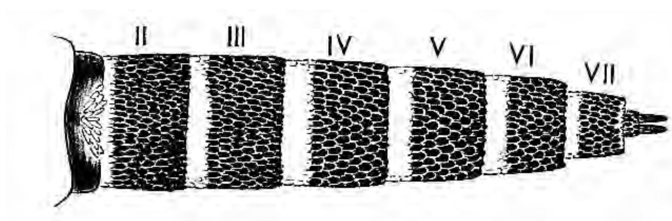


Fig. 72. Dorsal view of abdomen: *Oc. increpitus*

11 (10) Foreclaw sharply bent and subparallel to long tooth; tooth nearly two-thirds length of main claw and of nearly equal thickness throughout (Fig. 73) . . . .*excrucians*

Foreclaw not sharply bent, or parallel to tooth (Fig. 74) 12

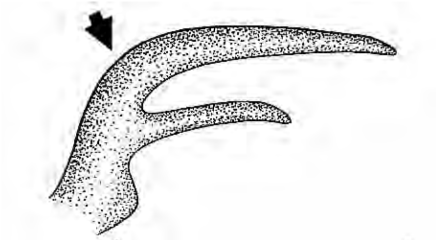


Fig. 73. Foreclaw: *Oc. excrucians* enlarged

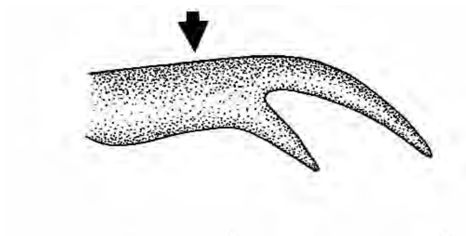


Fig. 74. Foreclaw: *Oc. increpitus* enlarged

12 (11) Palpus without a white ring (Fig. 75); tooth of foreclaw long, thin, 0.5 length of claw (Fig. 76); mesomeron bare; lower mesanepimeral setae absent . . . .*fitchii*

Palpus with a white ring (Fig. 77); tooth of foreclaw long and not blunt (Fig. 78); mesomeron with a few scales; lower mesanepimeral setae present 13

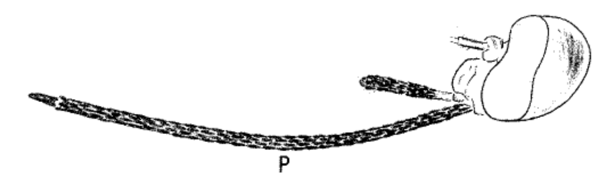


Fig. 75. Lateral view of head: *Oc. fitchii*

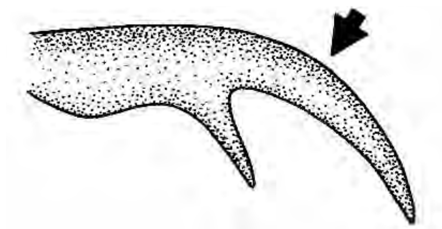


Fig. 76. Foreclaw: *Oc. fitchii*

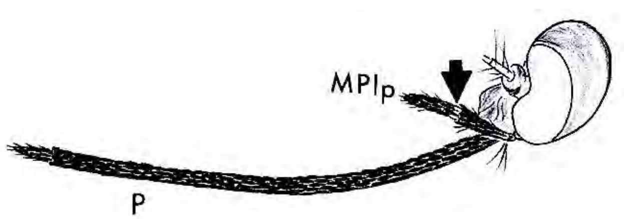


Fig. 77. Lateral view of head: *Oc. increpitus*

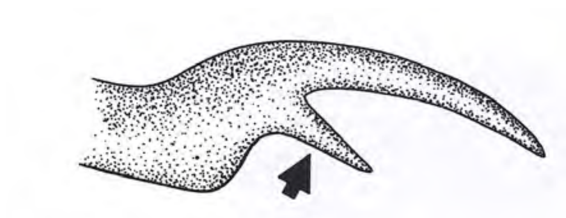


Fig. 78. Foreclaw enlarged: *Oc. euedes*

13 (12) Last two segments of maxillary palpus with apical pale scaled rings (Fig. 79); proboscis dark scaled; underside of abdomen with patches of dark scales on the sides of segments 3, 4, and 5 (Fig. 80) . . . . *increpitus*

Last two segments of maxillary palpus not marked with pale scaled rings; proboscis with some pale scales (Fig. 81); top of abdomen without patches of pale scales on the sides abdominal segments 3,4, and 5 (Fig. 82) 14

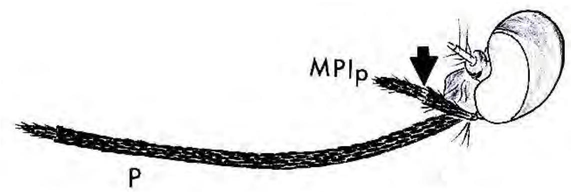


Fig. 79. Lateral view of head: *Oc. increpitus*

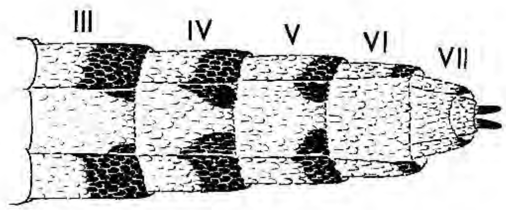


Fig. 80. Ventral view of abdomen: *Oc. increpitus*

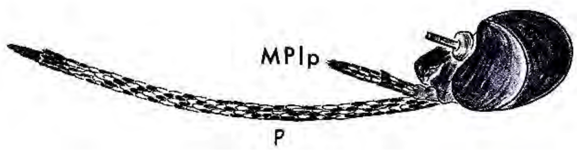


Fig. 81. Lateral view of head: *Oc. stimulans*

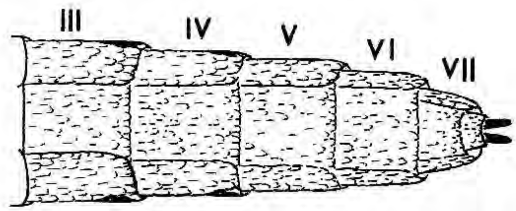


Fig. 82. Ventral view of abdomen: *Oc. stimulans*

14 (13) Scales on antennal pedicel numerous, mostly pale (Fig. 83); scutum with medium to dark brown median longitudinal stripe (Fig. 84). 15

Scales on antennal pedicel few, mostly dark (Fig. 85); scutum with reddish brown scales medially, sometimes with a stripe . . . . *stimulans*

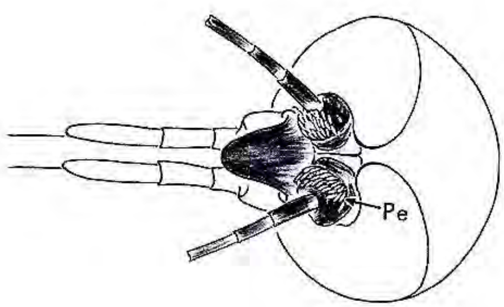


Fig. 83. Anterior view of head: *Oc. fitchii*

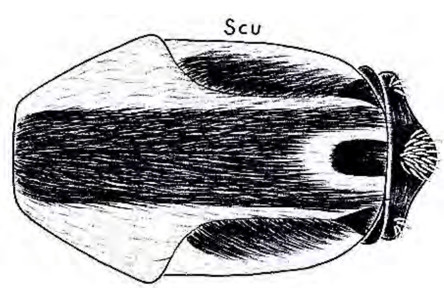


Fig. 84. Dorsal view of median thorax stripe

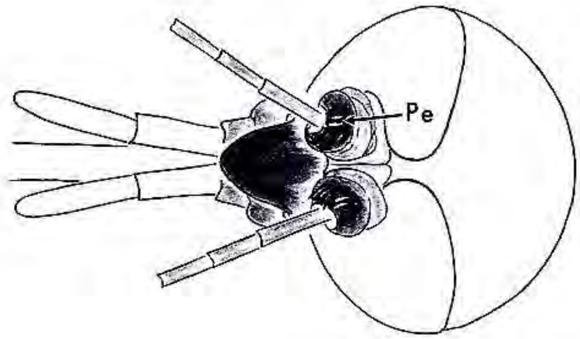


Fig. 85. Anterior view of head: *Oc. stimulans*

15 (14) Foretarsomere 3 with an incomplete basal pale ring (Fig. 86); dorsal brown scaled area of postpronotum at most half as large as ventral pale scaled area (Fig. 87). . . . . *mercurator*

Foretarsomere 3 with a complete basal pale ring (Fig. 88); dorsal brown scaled area of post pronotum equal to or larger than pale scaled area; hind tarsomeres without pale bands (Fig. 89 . . . . *fitchii*

Fig. 86. Lateral view of foretarsi: *Oc. mercurator*

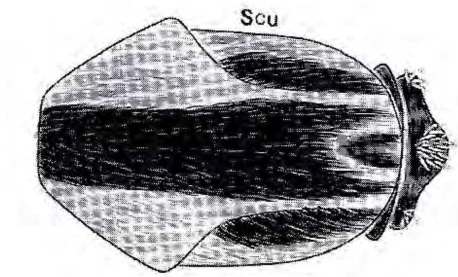


Fig. 87. Dorsal view of thorax: *Oc. mercurator*

Fig. 88. Lateral view of foretarsi: *Oc. fitchii*

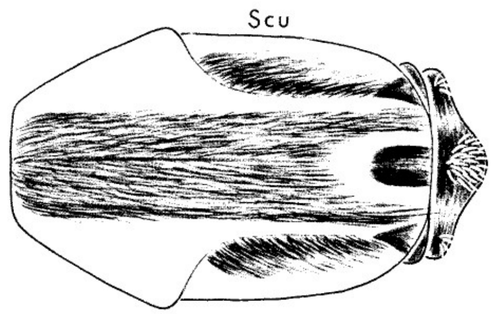


Fig. 89. Dorsal view of thorax: *Oc. fitchii*

16 (1) Scutum with patch or median or submedian stripes of silvery white, pale white, or pale gold scales, or with silvery white scales laterally (Fig. 90). 17

Scutum without silvery white scales medially or laterally, or pale white or pale yellow scales medially (Fig. 91) 19

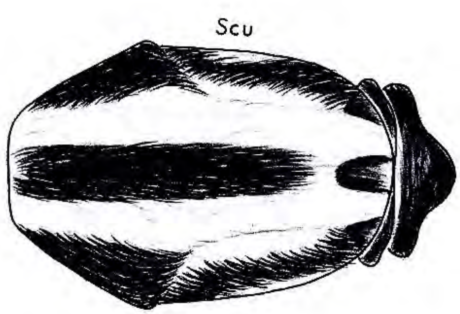


Fig. 90. Dorsal view of scutum: *Oc. trivittatus*

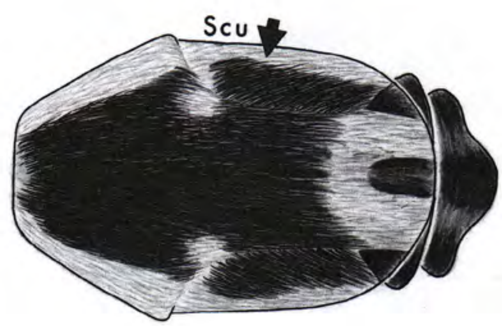


Fig. 91. Dorsal view of thorax: *Oc. catapylla*

17 (16) Scutum with median, longitudinal stripe of dark brown scales and silvery white scales laterally (Fig. 92) 18

Scutum with pair of submedian pale scaled stripes, separated by dark stripe of about the same width (Fig. 93) . . . . *trivittatus*

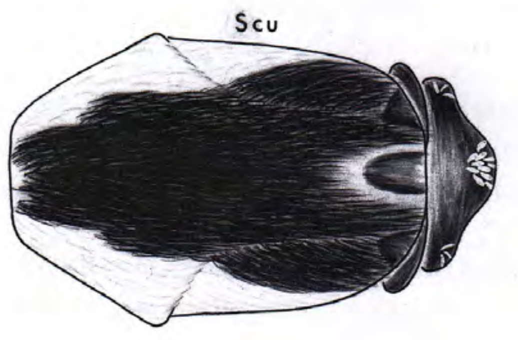


Fig. 92. Dorsal view of scutum: *Oc. triseriatus*

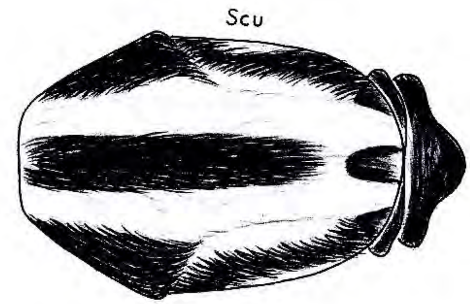


Fig. 93. Dorsal view of scutum: *Oc. trivittatus*

18 (17) Setae of anterior portion of scutum relatively few and weak (Fig. 94); claws of fore and midlegs evenly curved; tooth less than one-third the length of claw (Fig. 95) . . . . *triseriatus*

Setae of anterior portion of scutum numerous and well developed (Fig. 96); claws of fore and midlegs curving abruptly; tooth from one-third to one-half as long as the claw (Fig 97) . . . . *hendersoni*

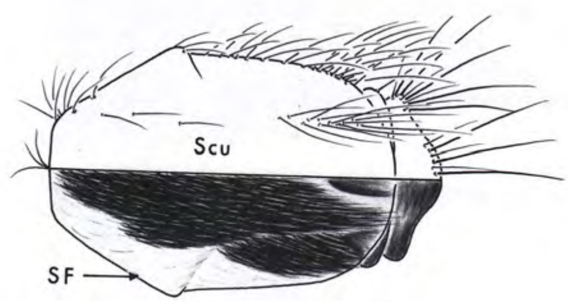


Fig. 94. Dorsal view of thorax: *Oc. triseriatus*

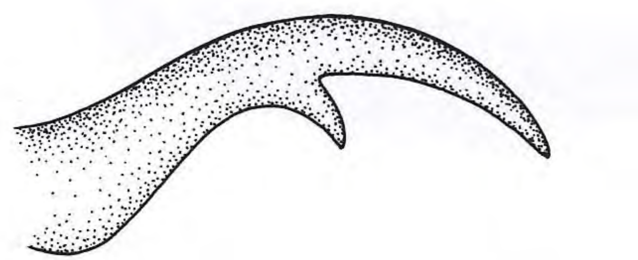


Fig. 95. Foreclaw: *Oc. triseriatus*

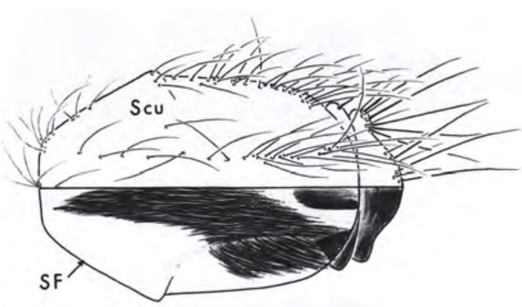


Fig. 96. Dorsal view of thorax: *Oc. hendersoni*

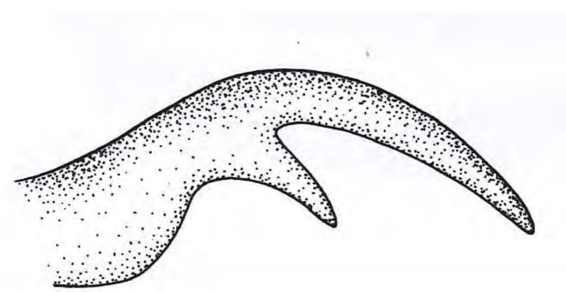


Fig. 97. Foreclaw: *Oc. hendersoni*

19 (16) Wing with many pale scales either confined to anterior veins, some on all veins, or veins alternating dark and pale scaled (Fig. 98) 20

Wing veins entirely dark scaled or with pale scales at base of costa and sometimes Subcosta and radius (Fig. 99). 24

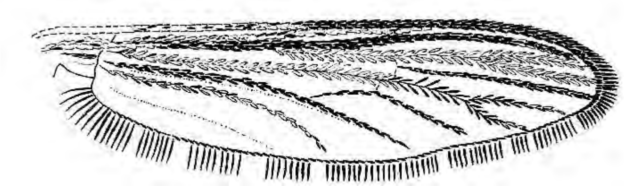


Fig. 98. Dorsal view of wing: *Oc. s. idahoensis*

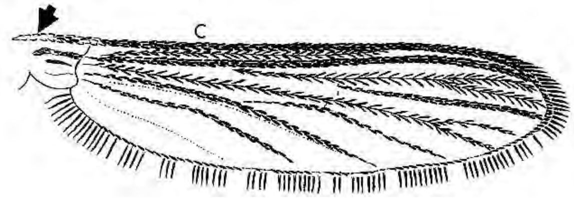


Fig. 99. Dorsal view of wing: *Oc. pullatus*

20 (19) Wing with veins alternating dark and pale scaled; radius 1, radius 4+5, and cubitus dark while the others are pale (Fig. 100) (*spencerii* subspecies) 21

Wing with pale scales scattered over all veins or confined to anterior veins (Fig. 101) 22

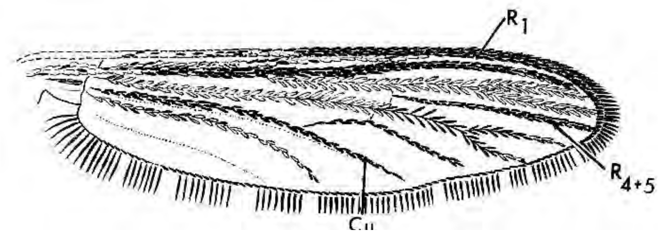


Fig. 100. Dorsal view of wing: *Oc. s. idahoensis*

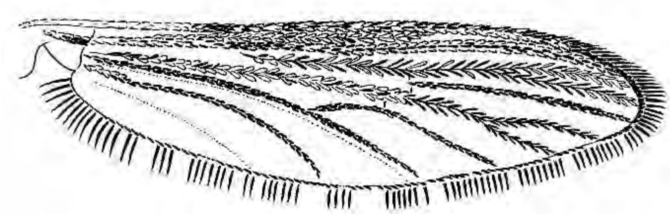


Fig. 101. Dorsal view of wing: *Oc. niphadopsis*

21 (20) Top of abdomen with stripe of pale scales down the middle, or almost entirely pale scaled (Fig. 102); scales on dorsal half of post pronotum brown (Fig. 103) . . . . *s. spencerii*

Top of abdomen with only bands of pale scales at the base of the segments (Fig. 104);Dorsal half of postpronotum with some pale scales (Fig. 105) . . . . *s. idahoensis*

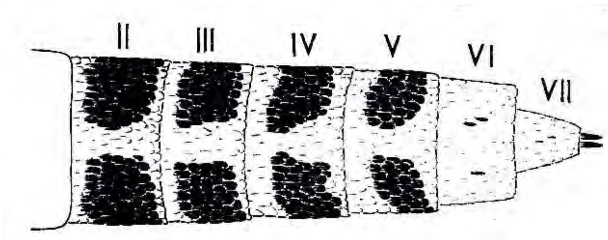


Fig. 102. Dorsal view of abdomen: *Oc. s. spencerii*

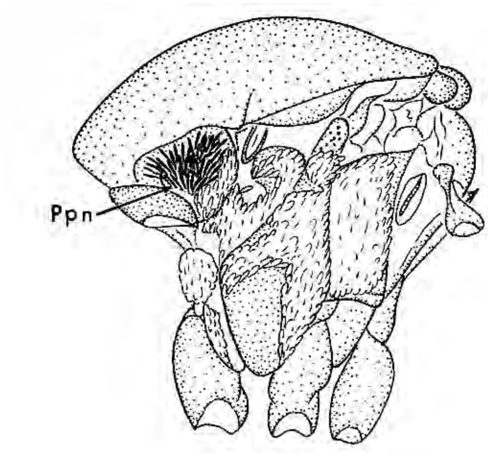


Fig. 103. Lateral view of thorax: *Oc. s. spencerii*

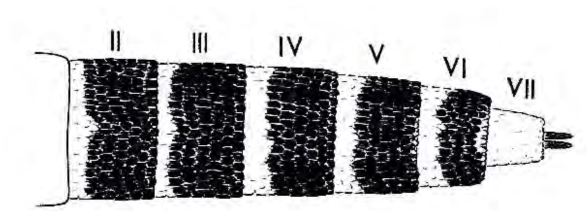


Fig. 104. Dorsal view of abdomen: *Oc. s. idahoensis*

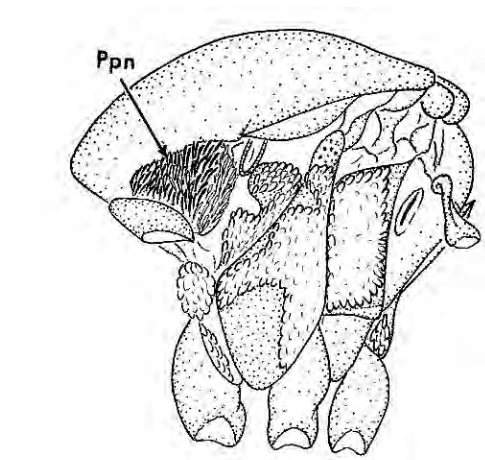


Fig. 105. Lateral view of thorax: *Oc. s. idahoensis*

22 (20) Palpus and proboscis dark scaled (Fig. 106); lower mesanepimeral setae absent (Fig. 107) . . . . *ventrovittis*

Palpus and proboscis with some pale scales (Fig. 108); lower mesanepimeral setae present (Fig. 109) 23

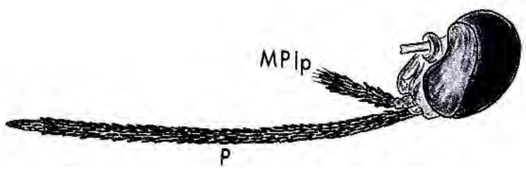


Fig. 106. Lateral view of head: *Oc. ventrovittis*

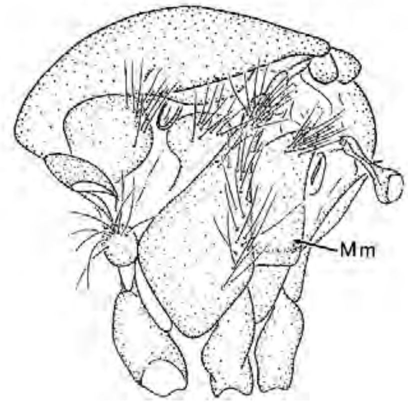


Fig. 107. Lateral view of thorax: *Oc. ventrovittis*

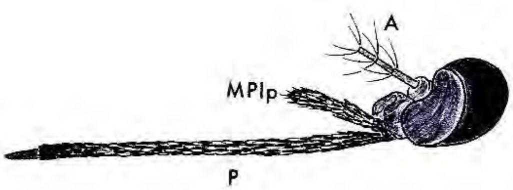


Fig. 108. Lateral view of head: *Oc. bicristatus*

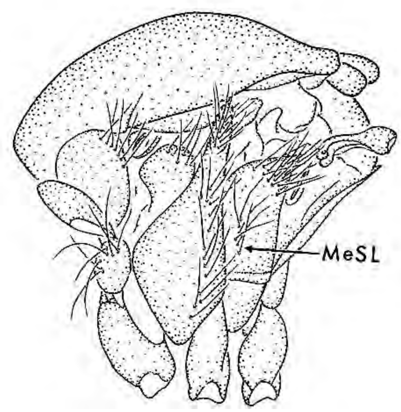


Fig. 109. Lateral view of thorax: *Oc. cataphylla*

23 (22) Top of abdomen with broad basal pale bands and apical pale scales, often forming a stripe down the middle (Fig. 110); pale scales numerous on wing veins anterior to cubitus (Fig. 111) . . . .*niphadopsis*

Top of abdomen with narrow, basal pale bands, without apical pale scales orlongitudinal stripe (Fig. 112); pale scales on wing subcosta, and radius 1 (Fig. 113) . . . .*cataphylla*

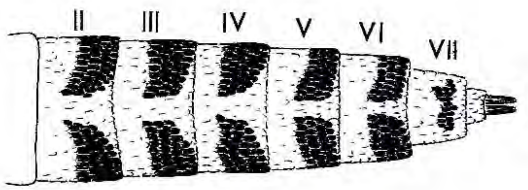


Fig. 110. Dorsal view of abdomen: *Oc. niphadopsis*

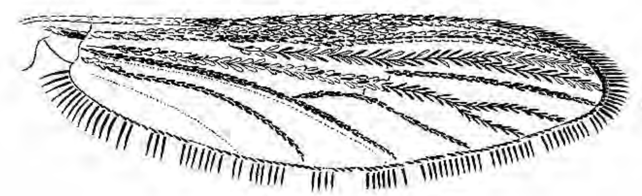


Fig. 111. Dorsal view of wing: *Oc. niphadopsis*

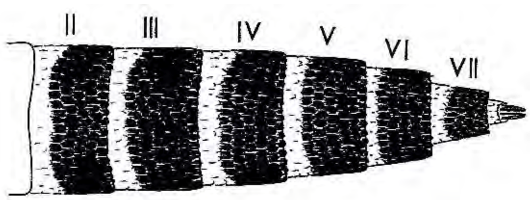


Fig. 112. Dorsal view of abdomen: *Oc. cataphylla*

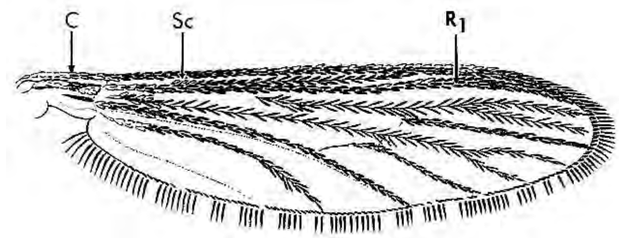


Fig. 113. Dorsal view of wing: *Oc. cataphylla*

24 (19) Hypostigmal scale patch present (Fig. 114). 25

Hypostigmal scale patch absent (Fig. 115). 27

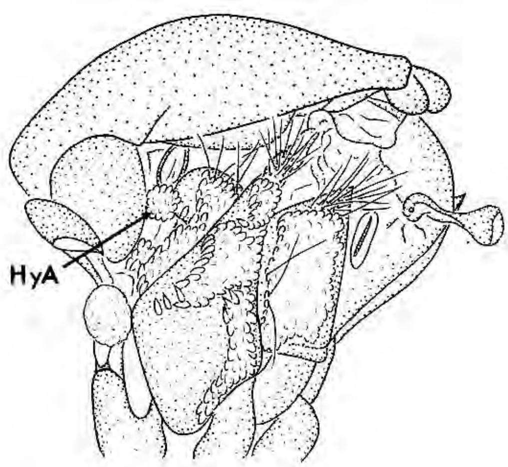


Fig. 114. Lateral view of thorax: *Oc. pullatus*

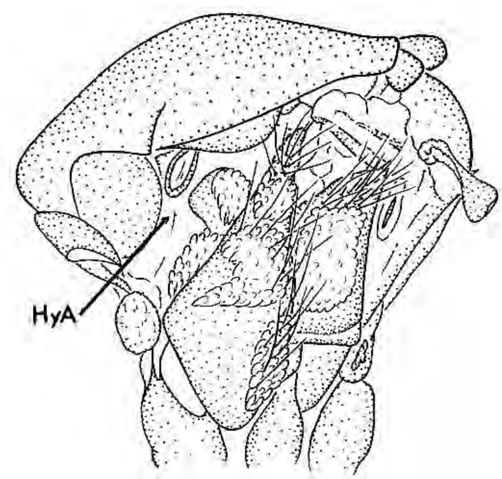


Fig. 115. Lateral view of thorax: *Oc. diantaeus*

25 (24) Postprocoxal scale patch absent (Fig. 116); palpus with some pale scales (Fig. 117) 26

Postprocoxal scale patch present (Fig. 118); palpus entirely dark scaled (Fig. 119) .... *implicatus*

(*Oc. provocans* may occur in Wyoming, but it will key to *Oc. implicatus*)

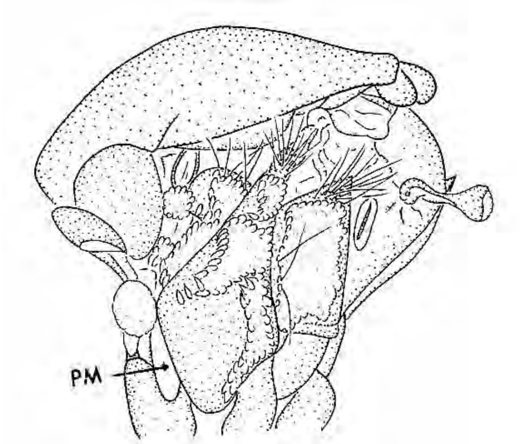


Fig. 116. Lateral view of thorax: *Oc. pullatus*

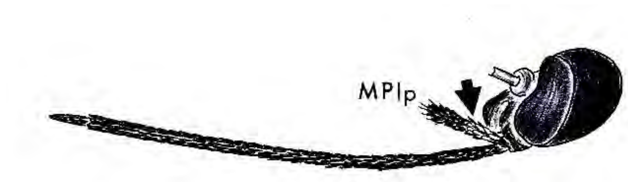


Fig. 117. Lateral view of head: *Oc. pullatus*

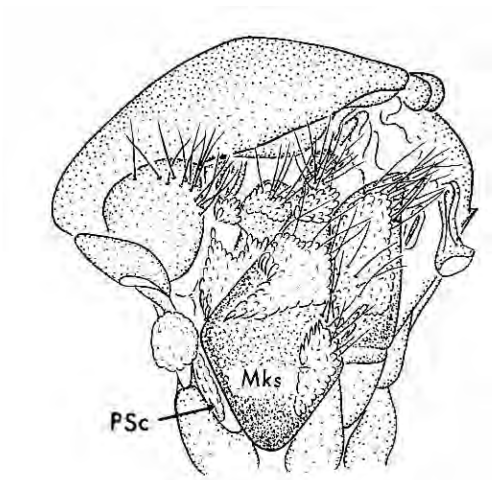


Fig. 118. Lateral view of thorax: *Oc. implicatus*

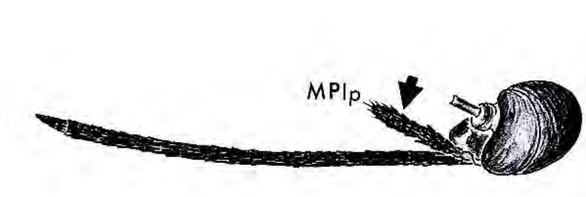


Fig. 119. Lateral view of head: *Oc. implicatus*

26 (26) Mesanepimeron sometimes without scales in ventral one-fourth (Fig. 120); scutum with scales nearly all one color (Fig. 121) . . . . *intrudens*

Mesanepimeron usually with scales to near the ventral margin (Fig. 122); scutum with pair of median longitudinal stripes divided by a thin line of no scales (Fig. 123) . . . .*pullatus*

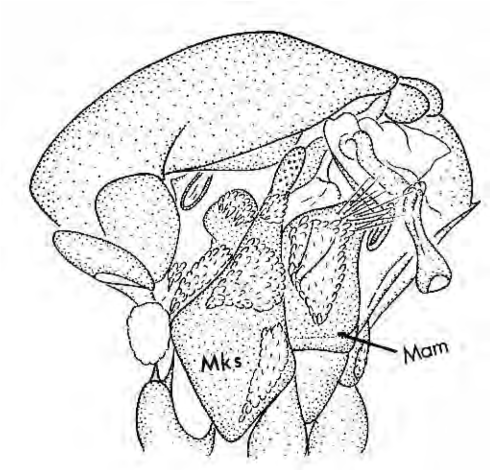


Fig. 120. Lateral view of thorax: *Oc. intrudens*

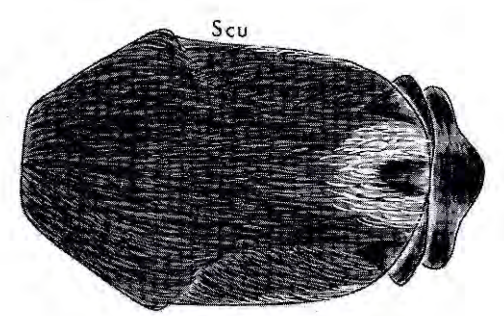


Fig. 121. Dorsal view of scutum: *Oc. intrudens*

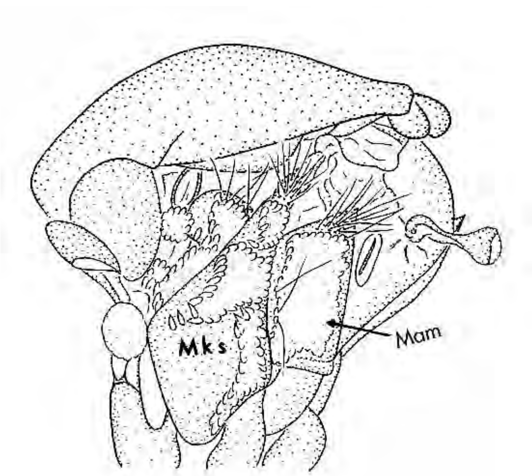


Fig. 122. Lateral view of thorax: *Oc. pullatus*

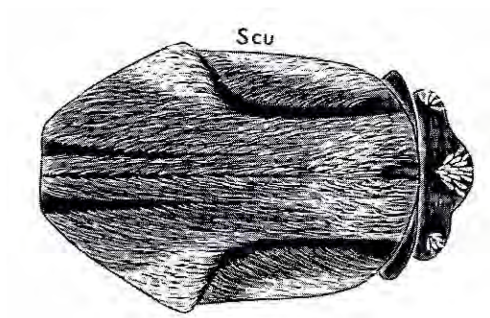


Fig. 123. Dorsal view of scutum: *Oc. x*

27 (24) Top of abdomen without basal pale bands or, if present, on fewer than half of the segments (Fig. 124) . . . . *diantaeus*

Top of abdomen usually with pale basal bands on first 7 segments, at least on more than half of the segments, or, if absent, with a lateral stripe of pale scales (Fig. 125) 28

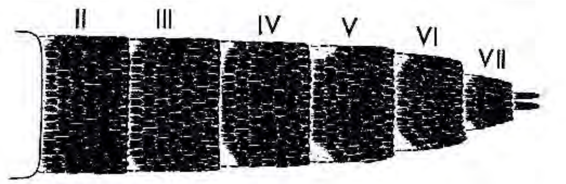


Fig. 124. Dorsal view of abdomen: *Oc. diantaeus*

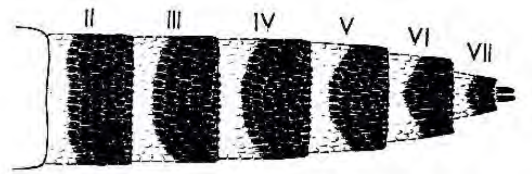


Fig. 125. Dorsal view of abdomen: *Oc. intrudens*

28 (27) Postprocoxal scale patch absent (Fig. 126) 29

Postprocoxal scale patch present (Fig. 127) 33

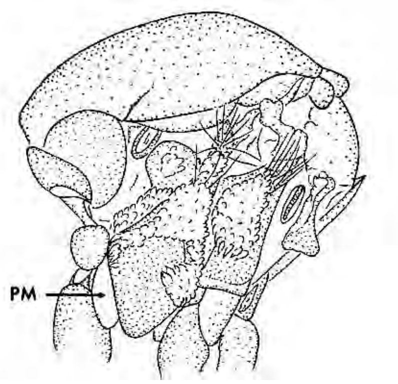


Fig. 126. Lateral view of thorax: *Oc. sticticus*

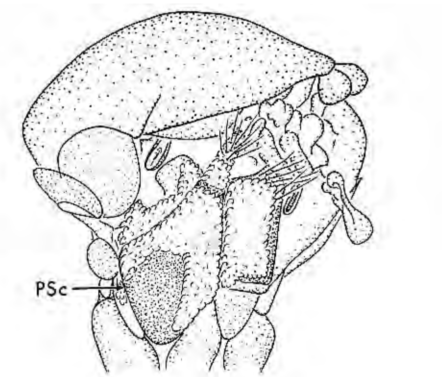


Fig. 127. Lateral view of thorax: *Oc. punctor*

29 (28) Mesokatepistemum with scales usually not extending to near anterior angle (Fig. 128); scutum with unicolorous scales; if median longitudinal stripe, its scales lighter than those laterally (Fig. 129) 30

Mesokatepistemum with scales extending to near anterior angle (Fig. 130); scutum with dark stripe down the middle (Fig. 131) 31

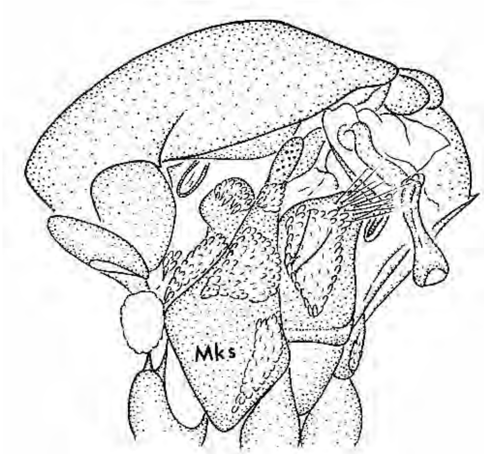


Fig. 128. Lateral view of thorax: *Oc. intrudens*

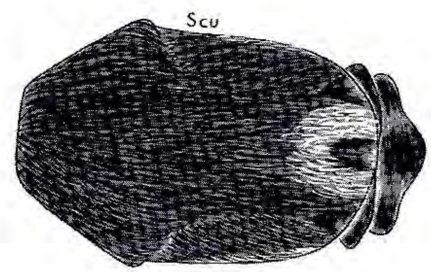


Fig. 129. Dorsal view of scutum: *Oc. intrudens*

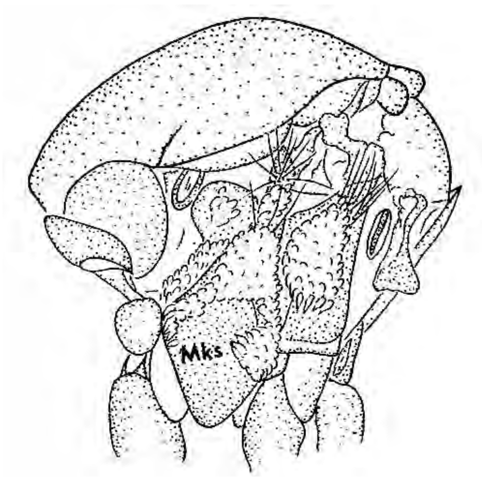


Fig. 130. Lateral view of thorax: *Oc. sticticus*

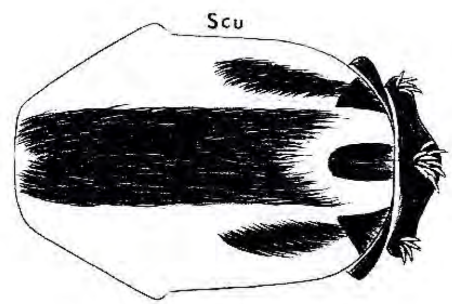


Fig. 131. Dorsal view of scutum: *Oc. sticticus*

30 (29) Forecoxa with a patch of brown scales (Fig. 132); subspiracular area bare (Fig. 133) . . . .*cinereus*

Forecoxa with scales pale or with a few dark scales only (Fig. 134); subspiracular area with scales (Fig. 135) . . . . *intrudens*

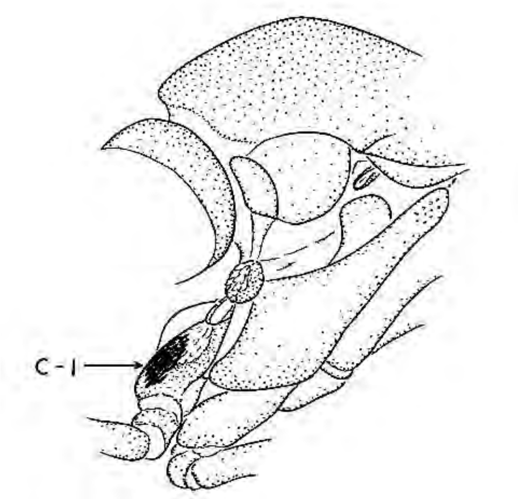


Fig. 132. Anterior view of thorax: *Ae. cinereus*

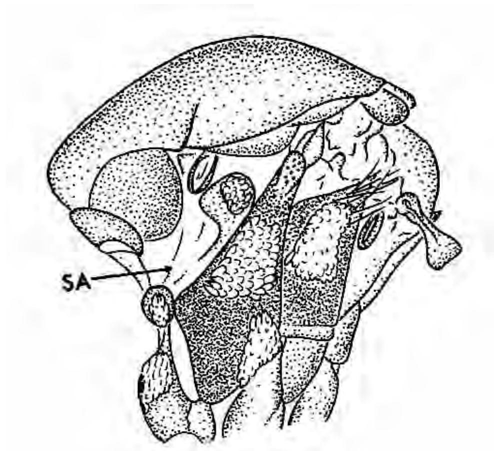


Fig. 133. Lateral view of thorax: *Ae. cinereus*

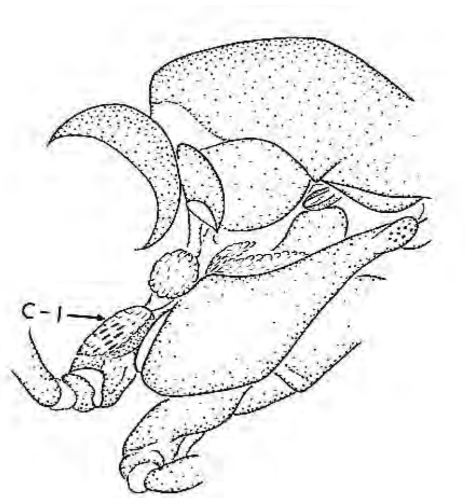


Fig. 134. Anterior view of thorax: *Oc. intrudens*

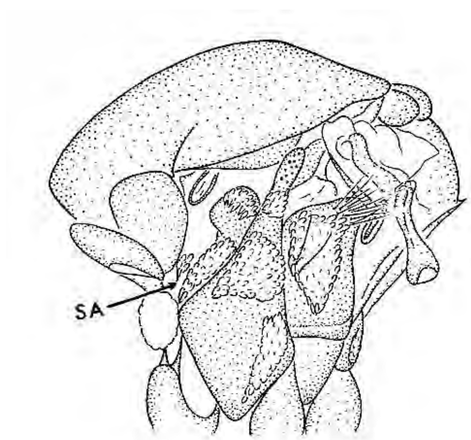


Fig. 135. Lateral view of thorax: *Oc. intrudens*

31 (29) Scutellar and supraalar setae yellowish (Fig. 136); mesanepimeron usually without lower setae (Fig. 137); ventral one-fourth devoid of scales . . . . *sticticus*

Scutellar and supraalar setae brown or black (Fig. 138); mesanepimeron with lower setae; ventral one-fourth scaled (Fig. 139) 32

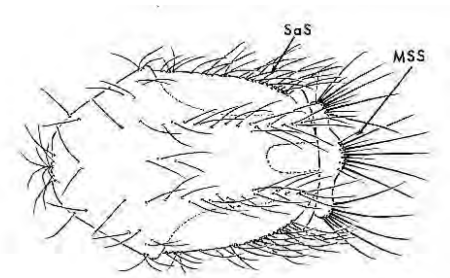


Fig. 136. Dorsal view of thorax: *Oc. sticticus*

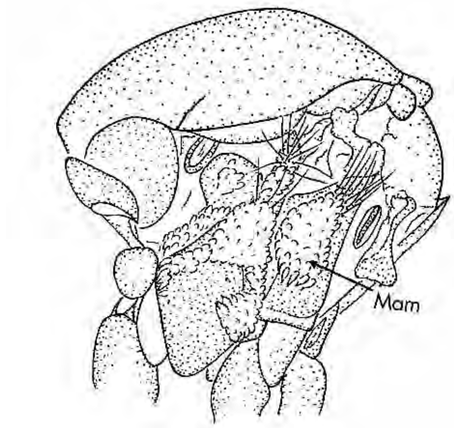


Fig. 137. Lateral view of thorax: *Oc. sticticus*

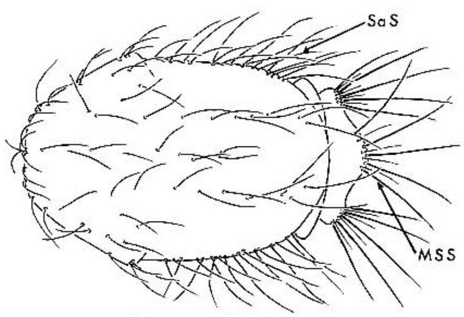


Fig. 138. Dorsal view of thorax: *Oc. communis*

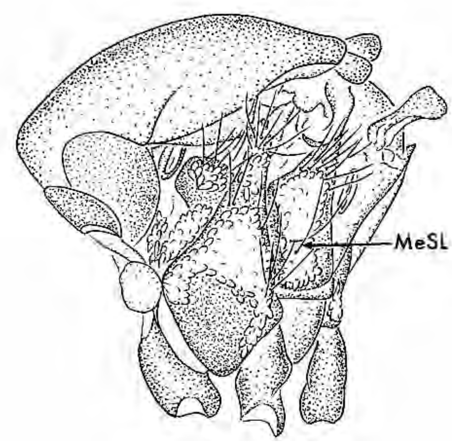


Fig. 139. Lateral view of thorax: *Oc. communis*

32 (31) Tooth of hindclaw long and thin; claw usually curving abruptly distal to tooth (Fig. 140) . . . . . . *communis*

Tooth of hindclaw short and broad; claw usually curving more gradually distal to tooth (Fig. 141) . . . . *nevadensis*

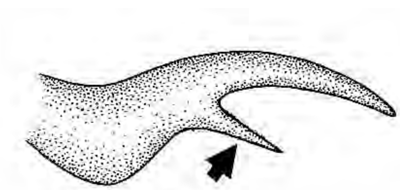


Fig. 140. Hindclaw: *Oc. communis*

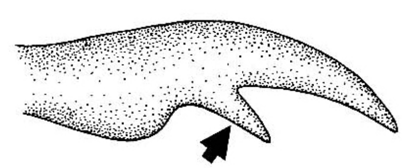


Fig. 141. Hindclaw: *Oc. nevadensis*

33 (28) Lower mesanepimeral setae absent (Fig. 142); pale basal band on top of second abdominal segment narrowed or completely interrupted medially (Fig. 143) . . . . *ventrovittus*

Lower mesanepimeral setae present (Fig. 144); pale basal band on second abdominal segment scarcely narrower medially (Fig. 145) 34

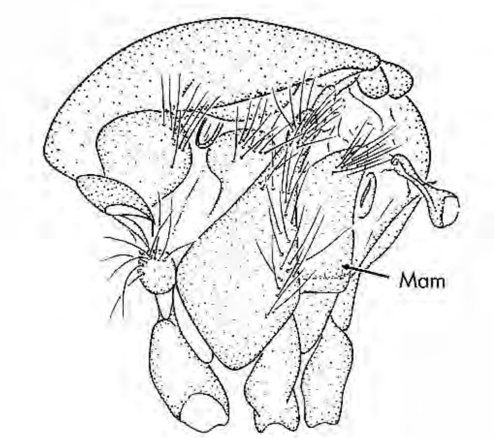


Fig. 142. Lateral view of thorax: *Oc. ventrovittis*

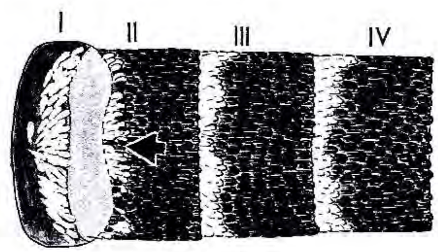


Fig. 143. Dorsal view of abdomen: *Oc. ventrovittis*

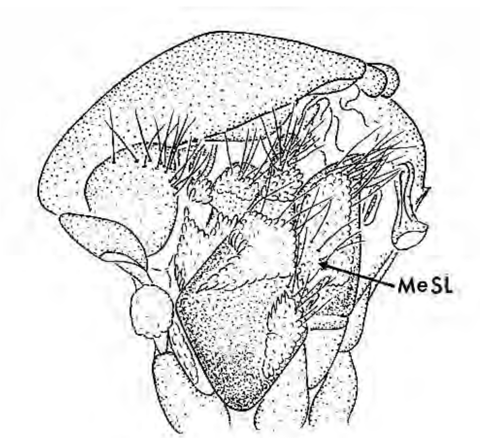


Fig. 144. Lateral view of thorax: *Oc. implicatus*

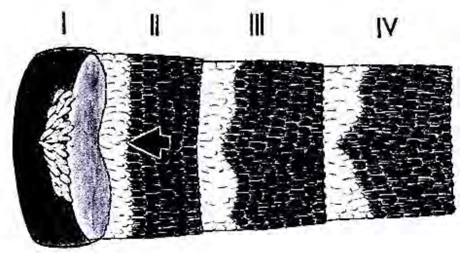


Fig. 145. Dorsal view of abdomen: *Oc. implicatus*

34 (33) Scutum with many long, dark setae, hairy in appearance (Fig. 146); postpronotum with setae scattered over posterior (Fig. 147) . . . . *impiger*

Scutum with few long setae, not hairy in appearance (Fig. 148); postpronotum with setae in single or irregular double row along posterior border (Fig. 149) 35

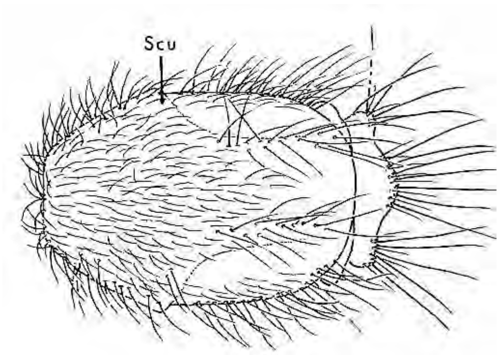


Fig. 146. Dorsal view of thorax: *Oc. impiger*

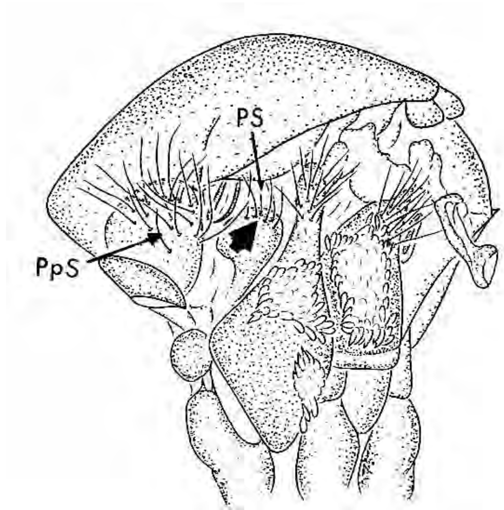


Fig. 147. Lateral view of thorax: *Oc. impiger*

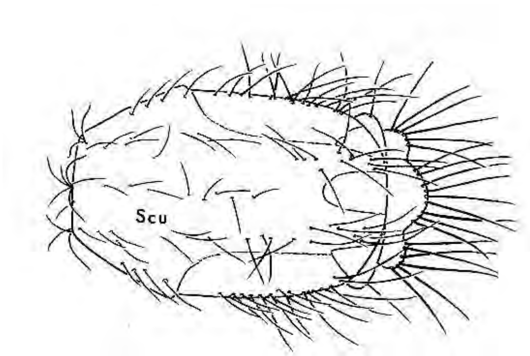


Fig. 148. Dorsal view of thorax: *Oc. pionips*

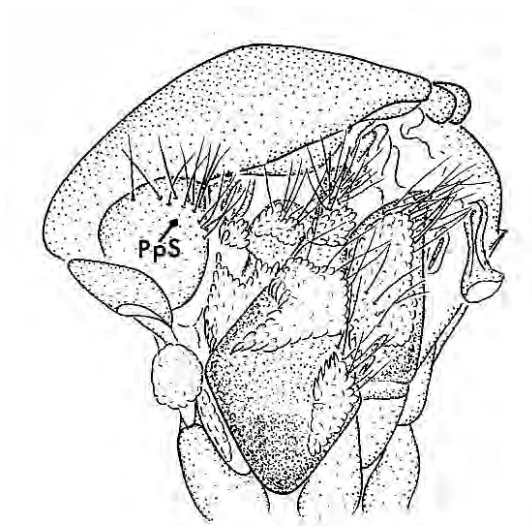


Fig. 149. Lateral view of thorax: *Oc. implicatus*

35 (34) Proboscis with yellow-gray scales ventrally; palpus with pale scales scattered over it (Fig. 150); top of last abdominal segment nearly covered with pale scales (Fig. 151) .... *schizopinax*

Proboscis and palpus dark scaled (Fig. 152); top of last abdominal segment with no more than half pale scales (Fig. 153) 36

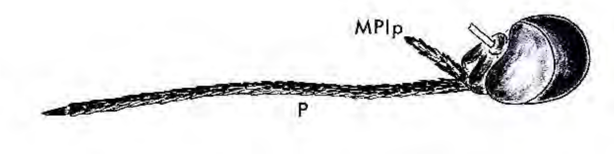


Fig. 150. Lateral view of head: *Oc. schizopinax*

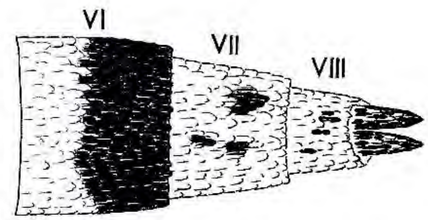


Fig. 151. Dorsal view of abdomen: *Oc. schizopinax*

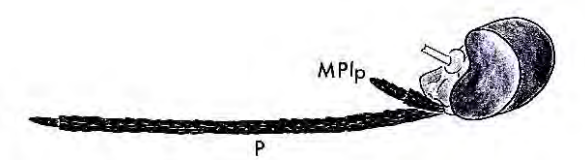


Fig. 152. Lateral view of head: *Oc. punctor*

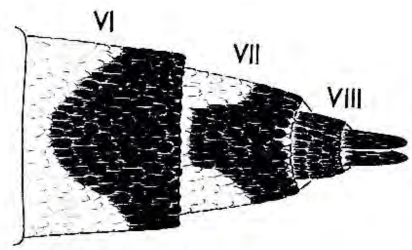


Fig. 153. Dorsal view of abdomen: *Oc. punctor*

36 (35) Proepistemum without scales on anterior face, at least in ventral half (Fig. 154) 37

Proepistemum fully scaled on anterior face (Fig. 155) 38

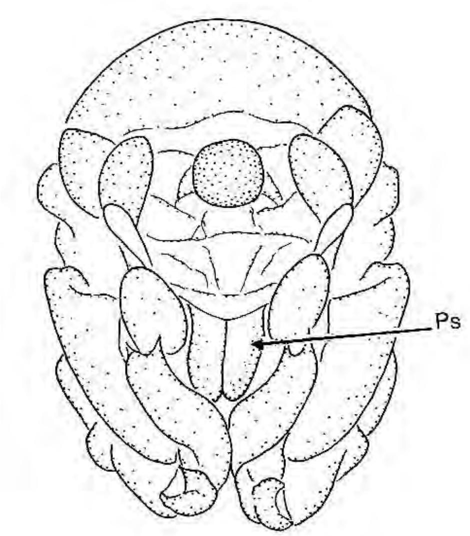


Fig. 154. Anterior view of thorax: *Oc. implicatus*

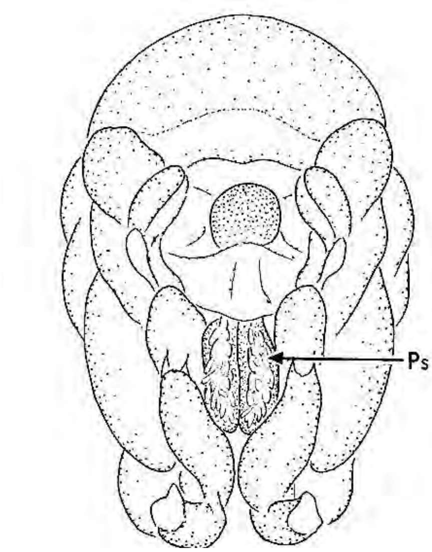


Fig. 155. Anterior view of thorax: *Oc. hexodontus*

37 (36) Mesokatepisternal scales not reaching to anterior angle (Fig. 156); wing with seven or more pale scales at the base of costa (Fig. 157) . . . . *implicatus*

Mesokatepisternal scales reaching to anterior angle (Fig. 158); wing dark scaled or with fewer than seven pale scales at the base of costa (Fig. 159) . . . . *punctor*

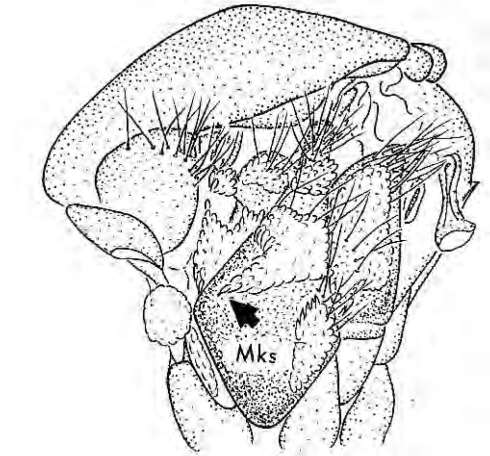


Fig. 156. Lateral view of thorax: *Oc. implicatus*

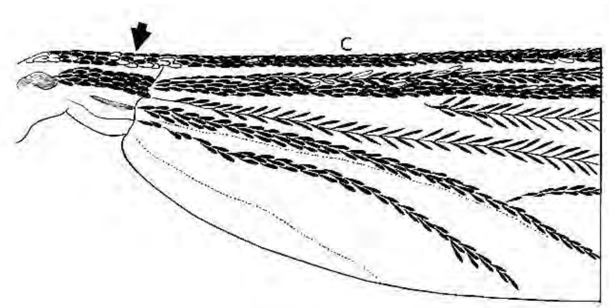


Fig. 157. Dorsal view of wing: *Oc. implicatus*

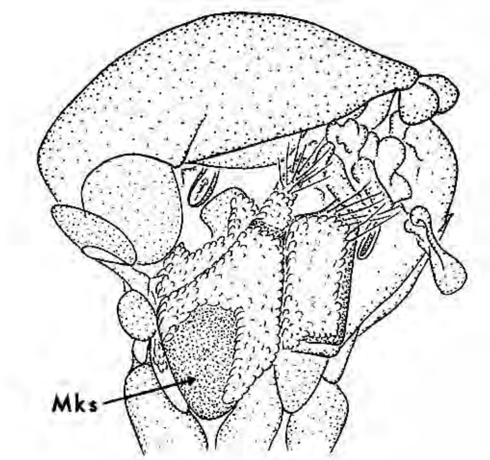


Fig. 158. Lateral view of thorax: *Oc. punctor*

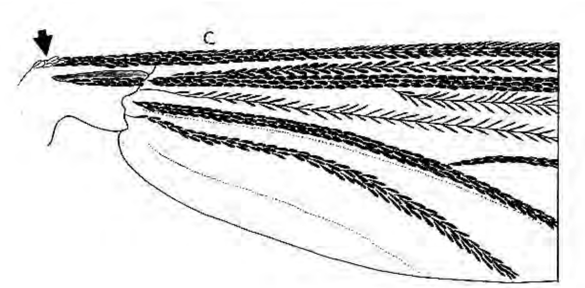


Fig. 159. Dorsal view of wing: *Oc. punctor*

38 (36) Supra-alar and scutellar setae dark brown or black (Fig. 160); with 15 or more postmetasternal scales present (Fig. 161) . . . . *pionips*

Supra-alar and scutellar setae yellow to yellow-brown (Fig. 162); postmetasternal scales absent or with two or three scales only (Fig. 163) 39

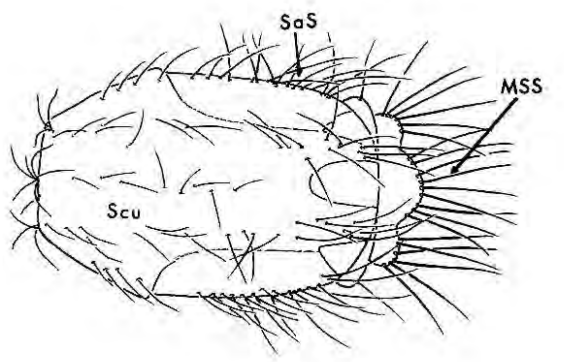


Fig. 160. Dorsal view of thorax: *Oc. pionips*

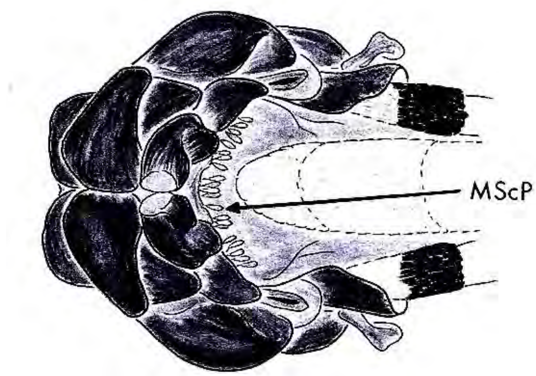


Fig. 161. Ventral view of abdomen: *Oc. pionips*

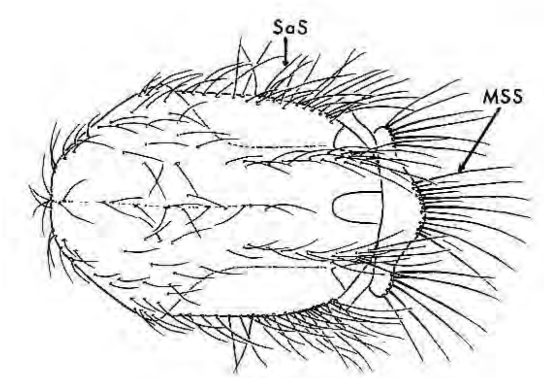


Fig. 162. Dorsal view of thorax: *Oc. hexodontus*

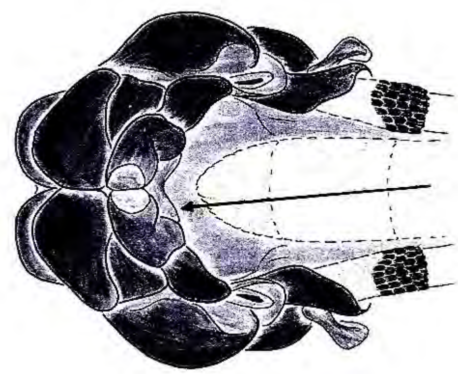


Fig. 163. Ventral view of abdomen: *Oc. hexodontus*

39 (38) Large patch of pale scales at the base of costa (Fig. 164); underside of abdomen with pale scales or rarely with a few dark scales (Fig. 165) . . . . *hexodontus*

Wing dark scaled or with fewer than eight pale scales at the base of the costa (Fig. 166); underside of abdomen with many dark scales apically (Fig. 167). . . . . *punctor*

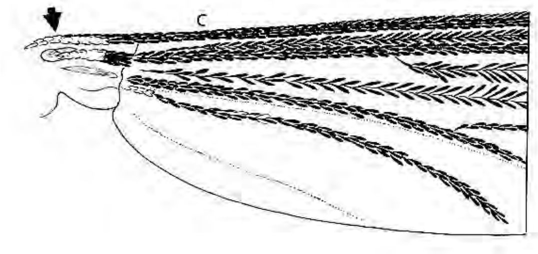


Fig. 164. Dorsal view of wing: *Oc. hexodontus*

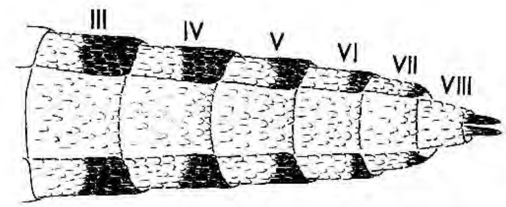


Fig. 165. Ventral view of abdomen: *Oc. hexodontus*

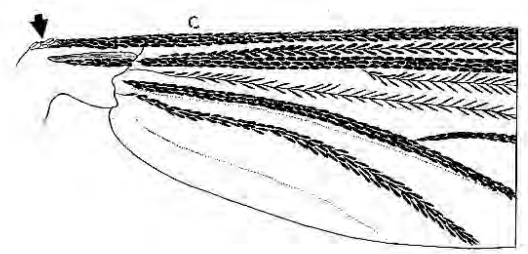


Fig. 166. Dorsal view of wing: *Oc. punctor*

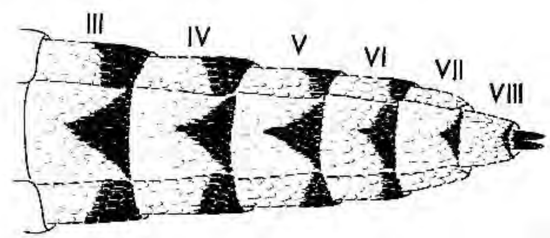


Fig. 167. Ventral view of abdomen: *Oc. punctor*

Key to the Genera of Fourth Instar Larvae Female Mosquitoes

1 Respiratory siphon absent; abdominal terga with seta 1 palmate, at least on IV-VI (Fig. 168) . . . *Anopheles*

Respiratory siphon present; seta 1 on abdominal terga never palmate (Fig. 170) 2

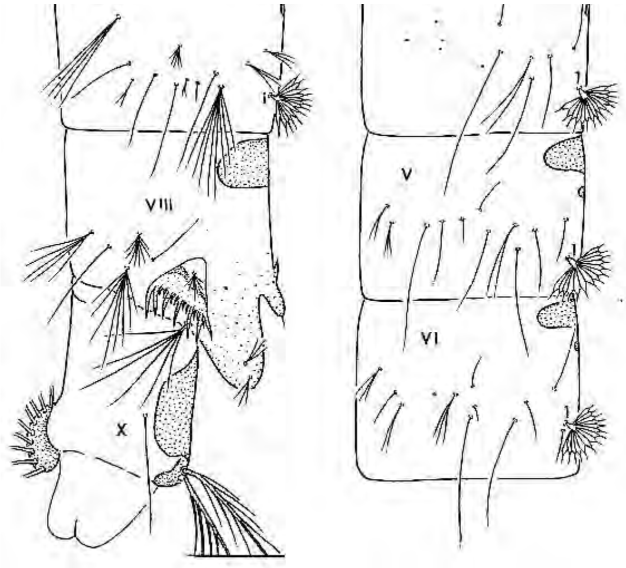


Fig. 168. Lateral view of abdominal segments IV-X: *An. quadrimaculatus*

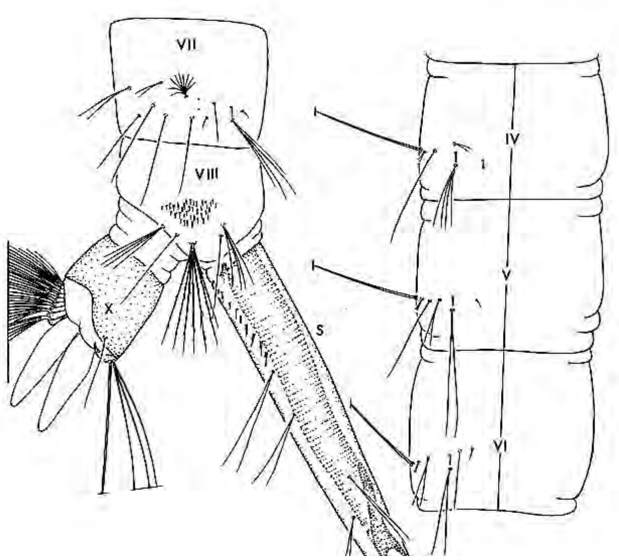


Fig. 169. Dorsal and lateral view of abdominal segments IV-X: *Cx. pipiens*

2 (1) Siphon short, without pectin, strongly tapered, with saw-like teeth on one side, adapted to piercing roots of aquatic plants (Fig. 170) . . . . *Coquillettidia perturbans*

Siphon elongate, more than twice as long as broad, with pectin, not strongly tapered (Fig. 171) 3

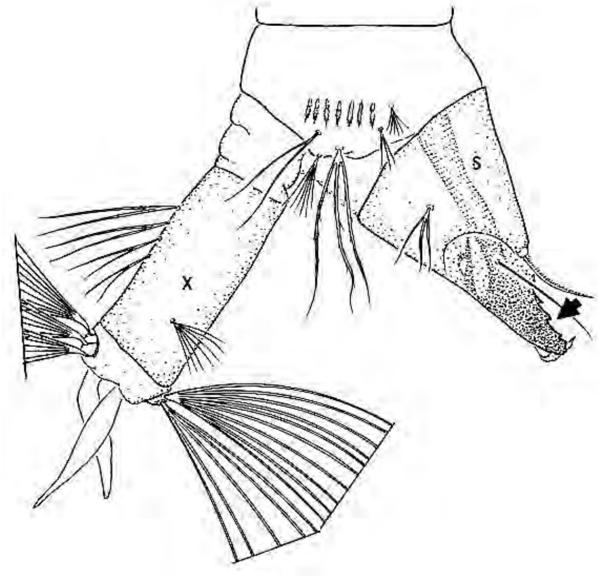


Fig. 170. Lateral view of abdominal segments VIII-X: *Ma. dyari*

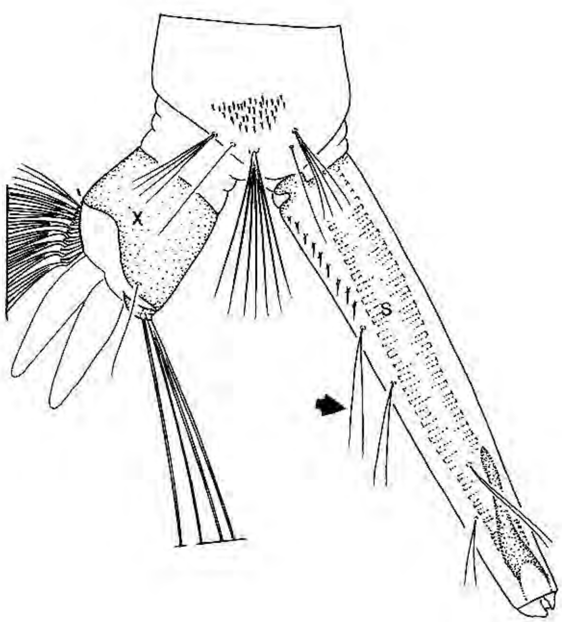


Fig. 171. Lateral view of abdominal segments VIII-X: *Cx. pipiens*

3 (2) A pair of ventral setal tufts inserted on siphon near base (Fig. 172) .... *Culiseta*

Basal siphonal setal tufts absent (Fig. 173) 4

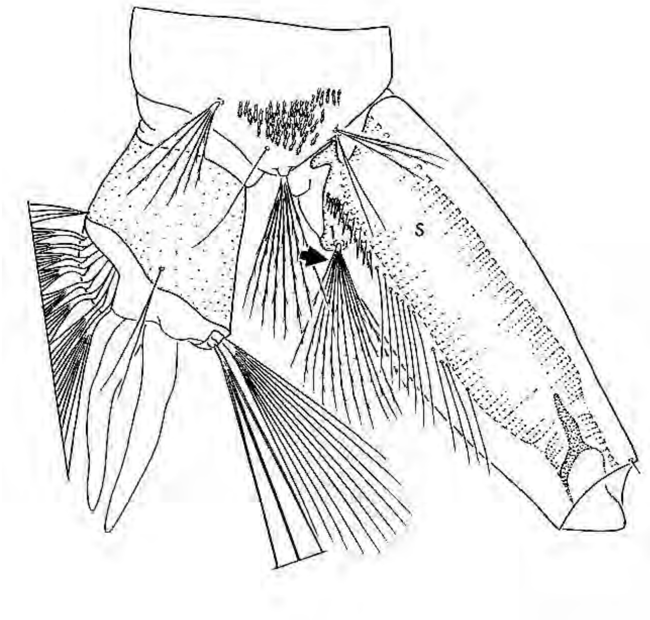


Fig. 172. Lateral view of abdominal segments VIII-X: *Cs. inornata*

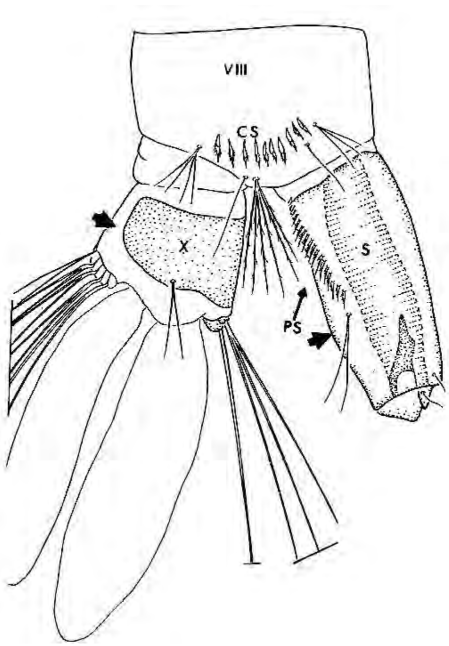


Fig. 173. Lateral view of abdominal segments VIII-X: *Ae. aegypti*

4 (3) Siphon with several pairs of setal tufts or single hairs inserted distal to the pectin (Fig. 174) . . . . *Culex*

Siphon with one pair of setal tufts, inserted near the middle of the siphon (Fig. 175) 5

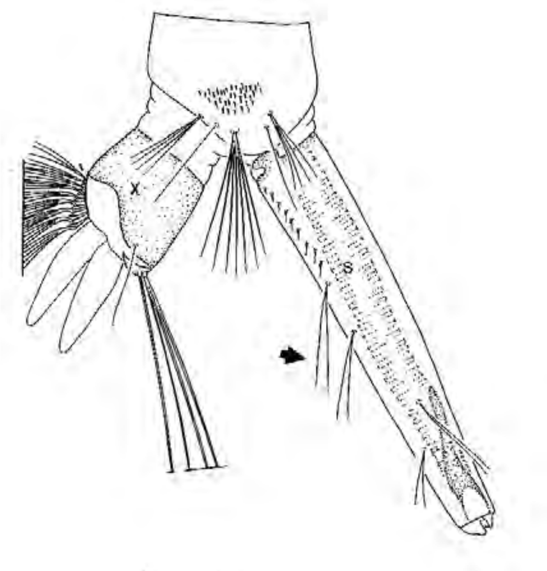


Fig. 174. Lateral view of abdominal segments VIII-X: *Cx. pipiens*

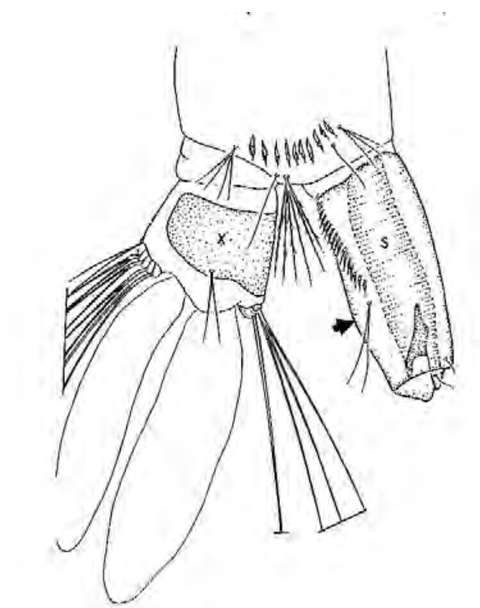


Fig. 175. Lateral view of abdominal segments VIII-X: *Ae. aegypti*

5 (4) Anal segment ringed by anal saddle, which is pierced along mid-ventral line by tufts of the ventral brush (Fig. 176) . . . . *Psorophora*

Anal segment not ringed by anal saddle (Fig. 177); or, if ringed by the saddle, the mid-ventral line is not pierced by tufts of the ventral brush (Fig. 178) . . . . *Ochlerotatus* & *Aedes*

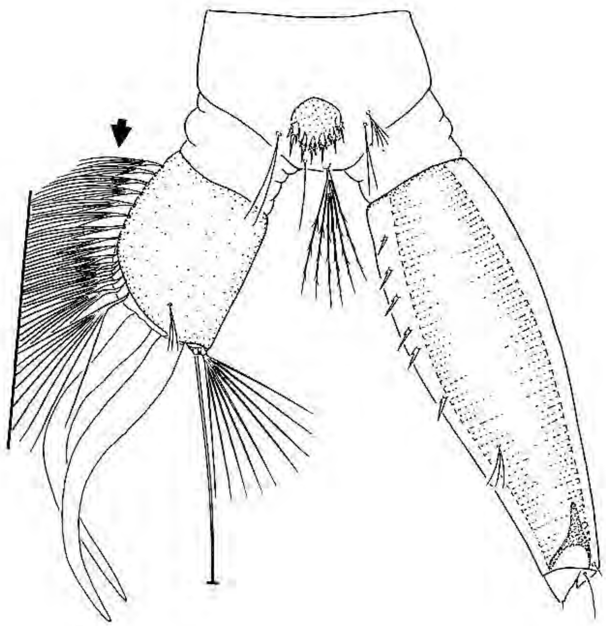


Fig. 176. Lateral view of abdominal segments VIII-X: *Ps. columbiae*

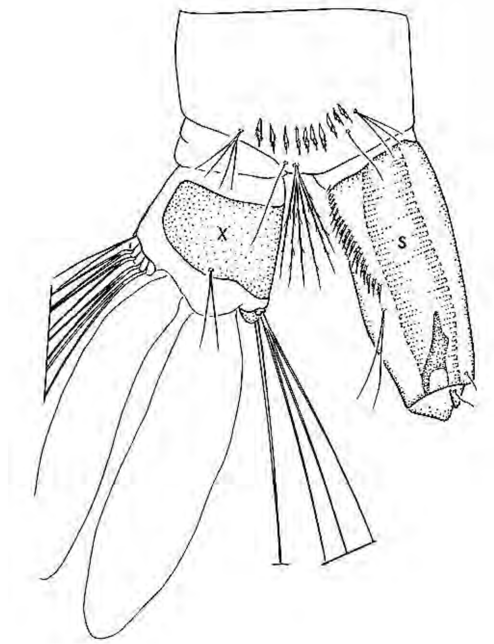


Fig. 177. Lateral view of abdominal segments VIII-X: *Ae. aegypti*

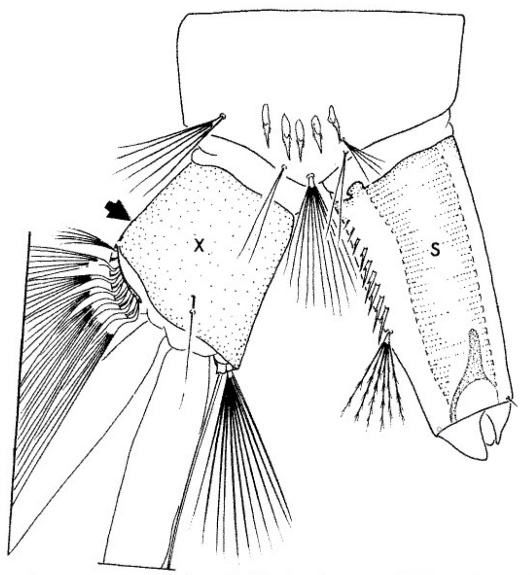


Fig. 178. Mid-ventral line of saddle is not pierced by tufts of the ventral brush

Key to the Genera of Fourth Instar Larvae of the Genus *Anopheles*

1 Outer clypeal hair single (Fig. 179) . . . . . . *franciscanus*

Outer clypeal hair densely branched (Fig. 180) 2

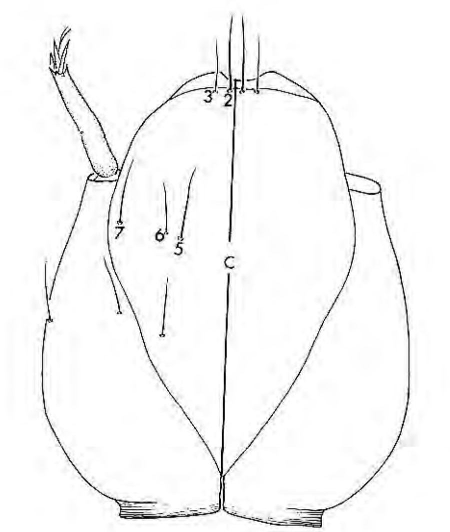


Fig. 179. Dorsal view of head: *An. judithae*

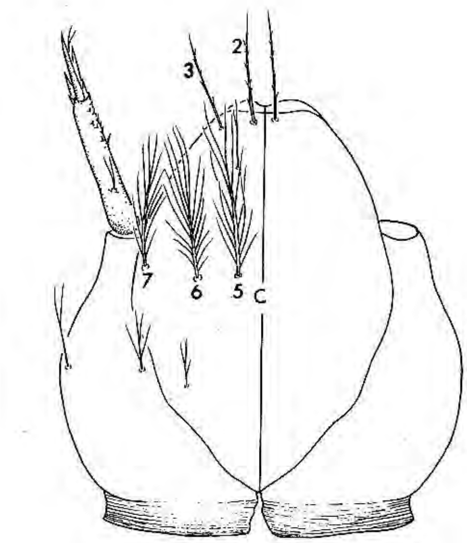


Fig. 180. Dorsal view of head: *An. albimanus*

2 (1) Inner clypeal hair forked or branched beyond the middle of seta 2-C (Fig. 181) . . . . . . *earlei*

Inner clypeal hair not forked, single (Fig. 182) 3

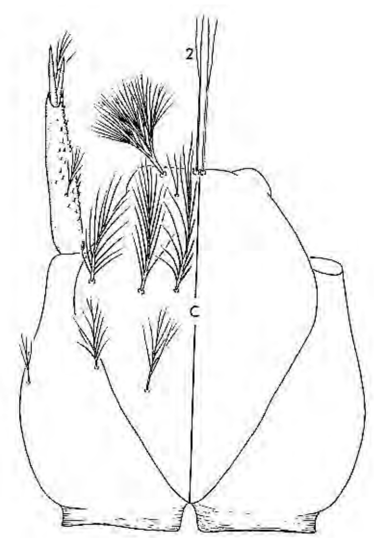


Fig. 181. Dorsal view of head: *An. earlei*

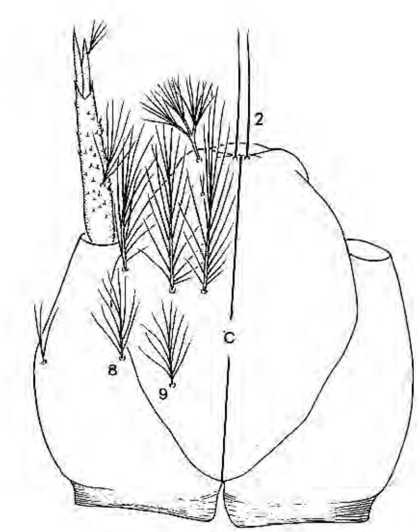


Fig. 182. Dorsal view of head: *An. quadrimaculatus*

3 (2) Middle abdominal segments with four median tergal plates (one large and three small forming a triangle) (Fig. 183) . . . . *freeborni*

Middle abdominal segments with only two median tergal plates (one large, one small) (Fig. 184) . . . . *punctipennis*

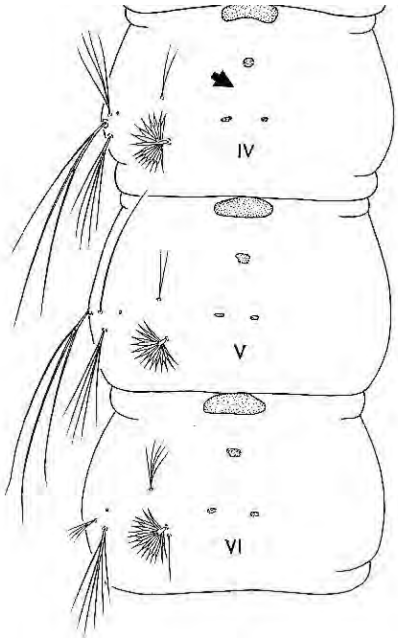


Fig. 183. Dorsal view of abdominal segments IV-VI: *An. freeborni*

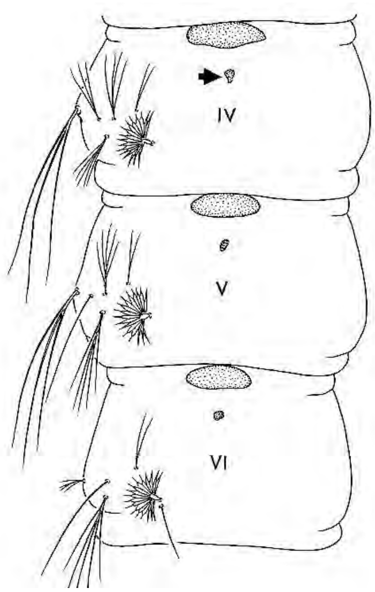


Fig. 184. Dorsal view of abdominal segments IV-VI: *An. punctipennis*

Key to the Fourth Instar Larvae of the Genus *Culiseta*

1 Lateral hair 1-X of anal saddle single to triple and as long as the saddle (Fig. 185) . . . . *inornata*

Lateral hair 1-X of anal saddle double to triple, less than one-third the length of anal saddle (Fig. 186) . 2

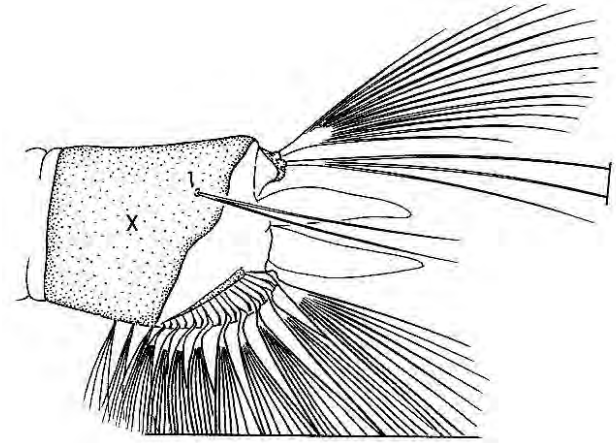


Fig. 185. Lateral view of abdominal segment X: *Cs. inornata*

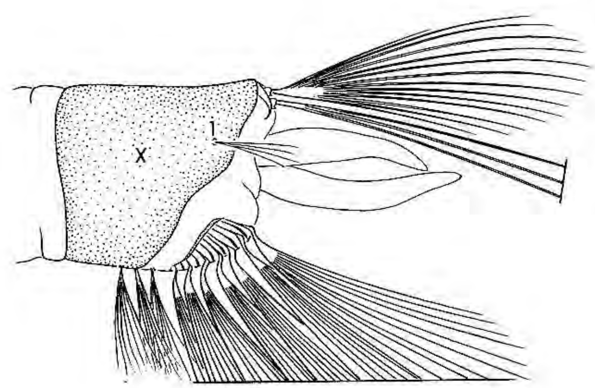


Fig. 186. Lateral view of abdominal segment X: Cs. *incidens*

2 (1) Upper and lower frontal head hairs similar in size and number of branches; ventrolateral tuft of head with three or four (rarely five) branches (Fig. 187); anal saddle pierced by three or four of the ventral tufts (Fig. 188) . . . . *impatiens*

Lower frontal head hairs with fewer branches and slightly longer than upper head hairs (Fig. 189); ventrolateral tuft of head with six or more branches 3

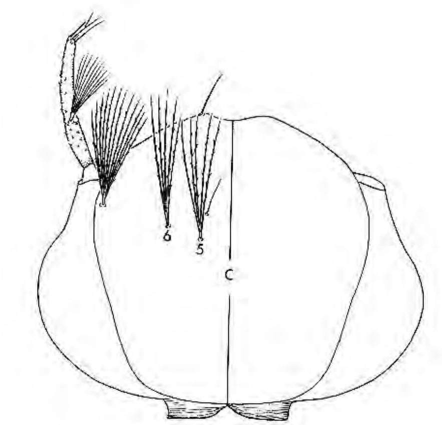


Fig. 187. Dorsal view of head: *Cs. impatiens*

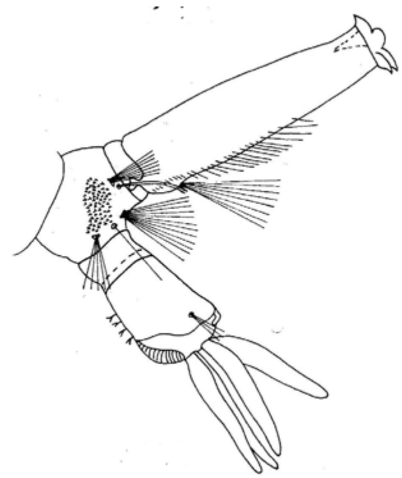


Fig. 188. Abdominal segments *Cs. impatiens*

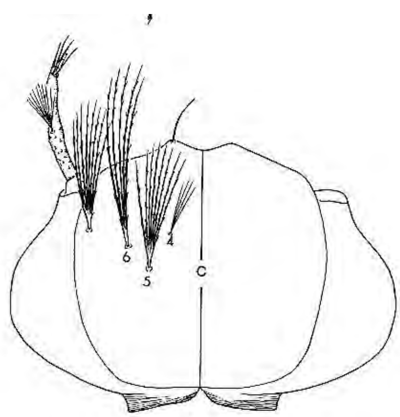


Fig. 189. Dorsal view of head: *Cs. inornata*

3 (2) Mesothoracic hairs number 1 and 2 both multiple, very short, similar in size (Fig. 190); antenna robust, its length about eight times its basal diameter, densely and coarsely speculate (Fig. 191) ..... *alaskaensis*

Mesothoracic hair number 1 single, much longer than hair number 2 which is multiple (Fig. 192); antenna slender, its length about 12 times its basal diameter, finely and sparsely speculate (Fig. 193) .... *incidens*

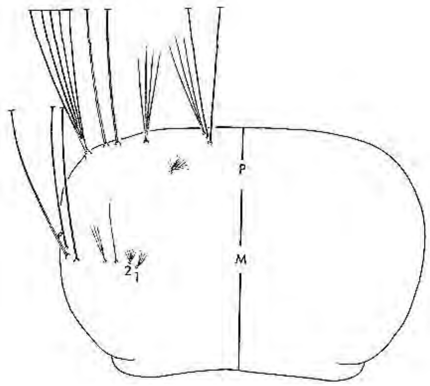


Fig. 190. Dorsal view of thorax: *Cs. alaskaensis*

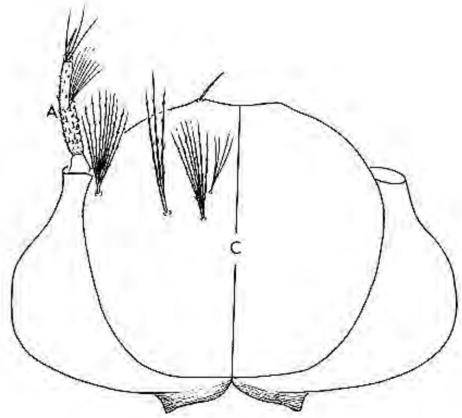


Fig. 191. Dorsal view of head: *Cs. alaskaensis*

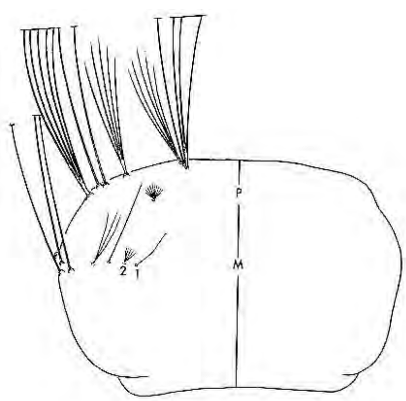


Fig. 192. Dorsal view of thorax: *Cs. incidens*

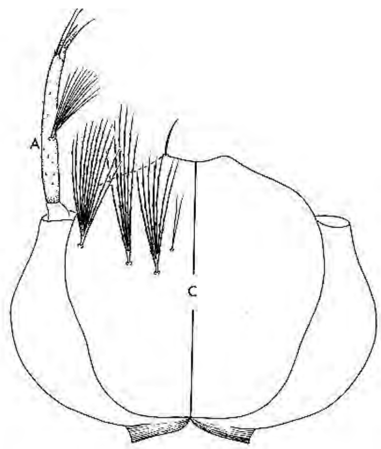


Fig. 193. Dorsal view of head: *Cs. incidens*

Key to the Fourth Instar Larvae of the Genus *Culex*

1 Antennal tuft inserted at middle of antenna (Fig. 194); siphonal tufts represented by single, irregularly placed hairs and a distal tuft of two to three hairs (Fig. 195) . . . . *restuans*

Antennal tuft inserted near distal third of antennae (Fig. 196); siphonal tufts represented by double or multiple hairs (Fig. 197) 2

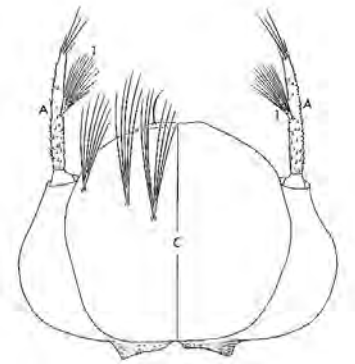


Fig. 194. Dorsal view of head: *Cx. restuans*

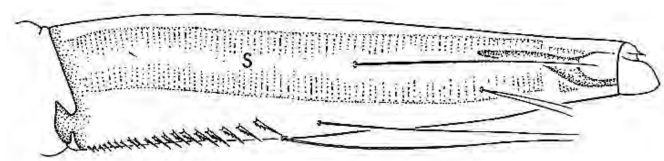


Fig. 195. Lateral view of siphon: *Cx. restuans*

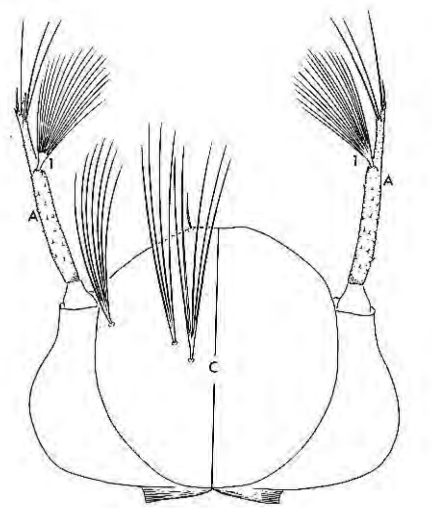


Fig. 196. Dorsal view of head: *Cx. thriambus*

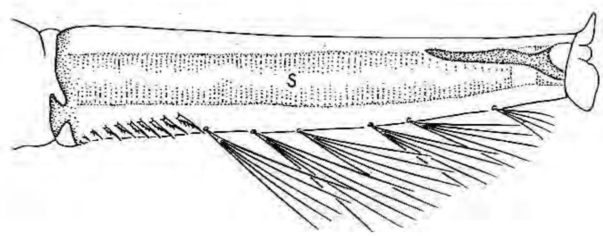


Fig. 197. Lateral view of siphon: *Cx. tarsalis*

2 (1) Both upper and lower frontal head hairs single or double (Fig. 198) . . . . *territans*

Both upper and lower frontal head hairs with three or more branches (Fig. 199) 3

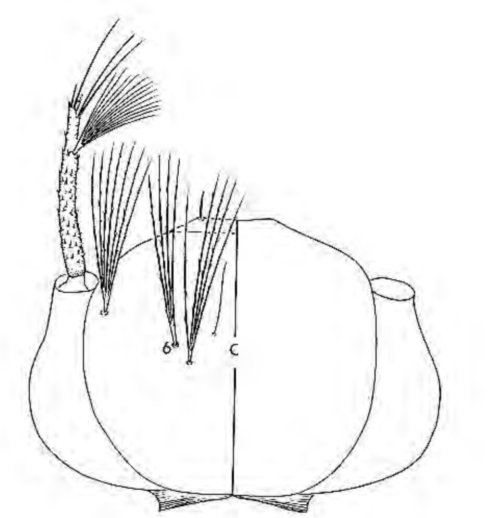


Fig. 198. Dorsal view of head: *Cx. territans*

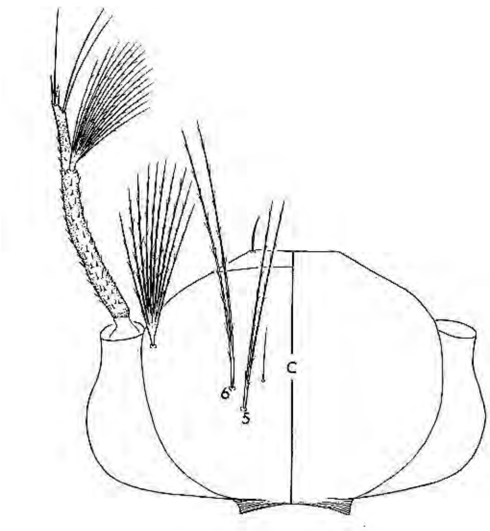


Fig. 199. Dorsal view of head: *Cx. pipiens*

3 (2) Siphon with five or six pairs of ventral tufts in straight line (Fig. 200) . . . . *tarsalis*

Siphon with four or five pairs of tufts, one or more pairs of which are inserted laterally out; siphon 4.5 to 5 times as long as basal diameter (Fig. 201) . . . . *pipiens*

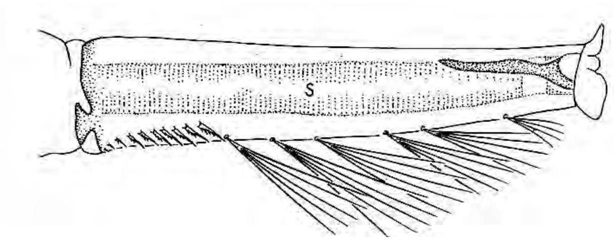


Fig. 200. Lateral view of siphon: *Cx. tarsalis*

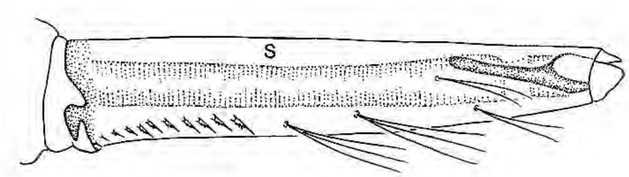


Fig. 201. Lateral view of siphon: *Cx. pipiens*

Key to the Fourth Instar Larvae of the Genus *Ochlerotatus* and *Aedes*

1 Siphon with more than one pair of setae, excluding seta 2-S (Fig. 202) .... *cinereus*

Siphon with only one pair of setae, excluding seta 2-S (Fig. 203) 2

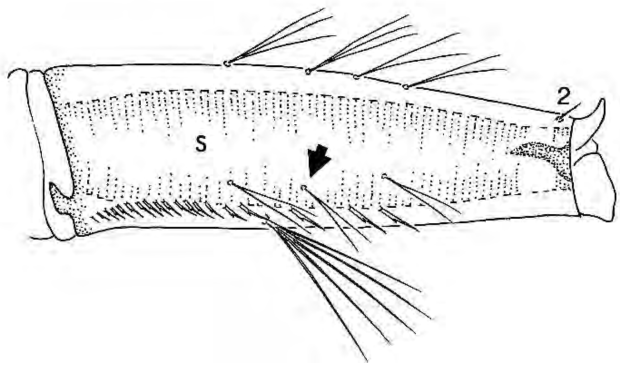


Fig. 202. Lateral view of siphon: *Oc. provocans*

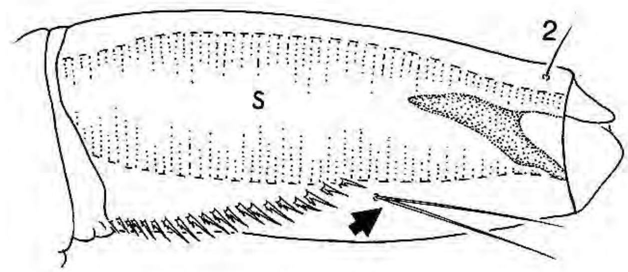


Fig. 203. Lateral view of siphon: *Ae. aegypti*

2(1) Anal segment completely encircling saddle (Fig. 204) 3

Anal segment not completely ringed by saddle (Fig. 205) 7

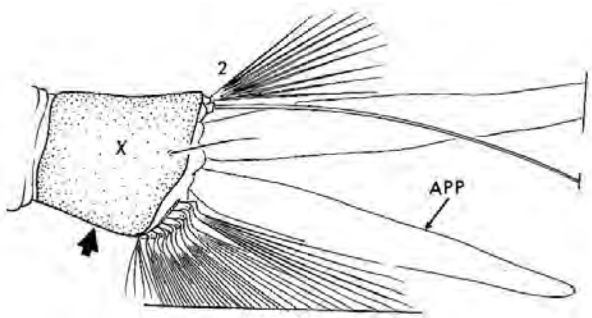


Fig. 204. Lateral view of abdominal segment X: *Oc. atlanticus*

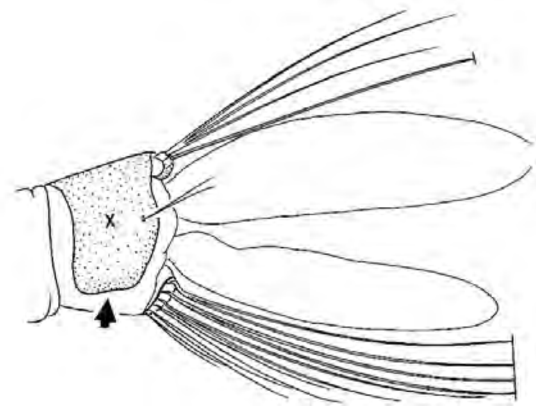


Fig. 205. Lateral view of abdominal segment X: *Ae. aegypti*

3 (2) Pecten on siphon with one or more apical spines arranged unevenly at the apex (Fig. 206) . . *nigromaculis*

Pecten with spines more or less evenly spaced (Fig. 207) 4

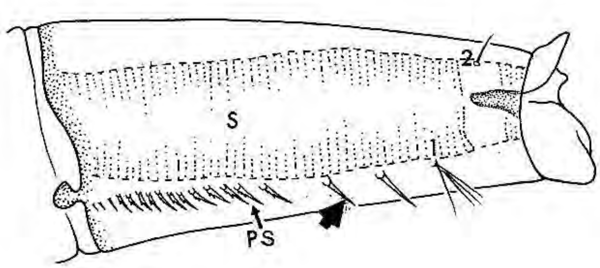


Fig. 206. Lateral view of siphon: *Oc. nigromaculis*

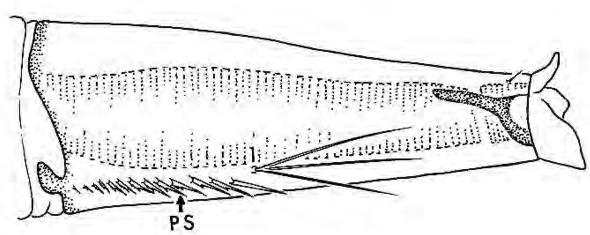


Fig. 207. Lateral view of siphon: *Oc. abserratus*

4 (3) Comb scales 4-9, very large (Fig. 208) . . . . *hexodontus*

Comb scales usually 10-30, usually small (Fig. 209) 5

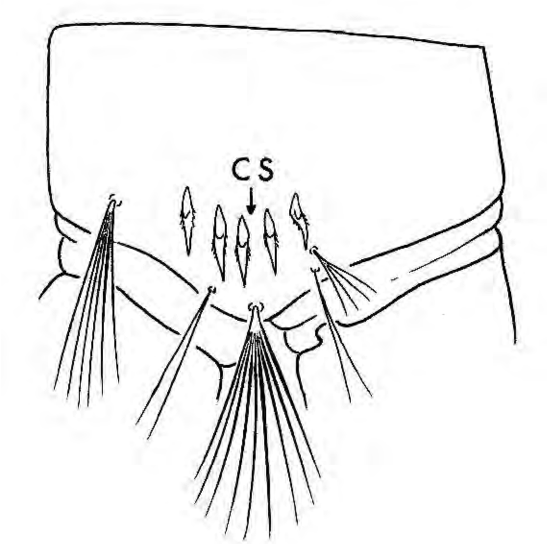


Fig. 208. Lateral view of abdominal segment VIII with 4-9 large comb scales

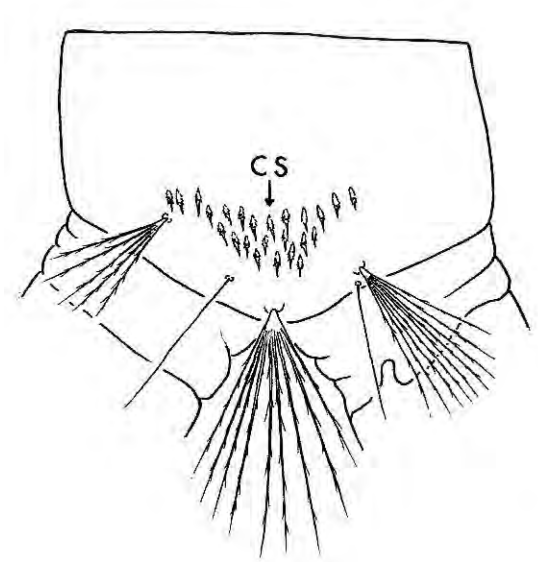


Fig. 209. Lateral view of abdominal segment VIII with 10-30 comb scales

5 (4) Dorsal preapical spine of the air tube much shorter than apical pectin spine; seta 1-X close to same length as saddle (Fig. 210 . . . . *punctor*

Dorsal preapical spine of the air tube as long as or longer than the apical pectin spine (Fig. 211); seta 1-X shorter than saddle (Fig. 212) 6

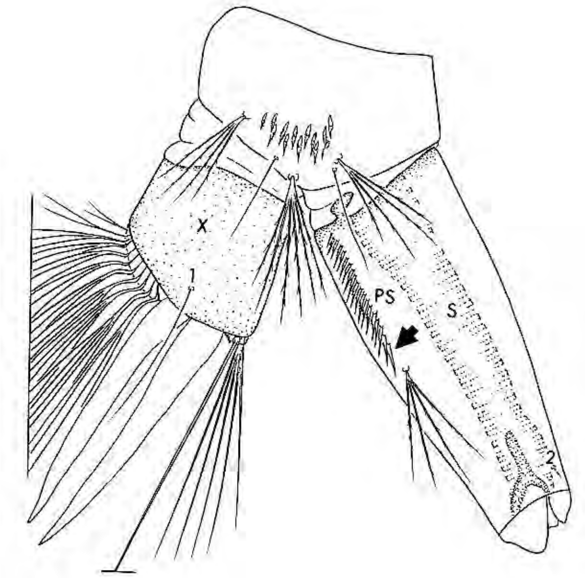


Fig. 210. Lateral view of abdominal segments *Oc. punctor*

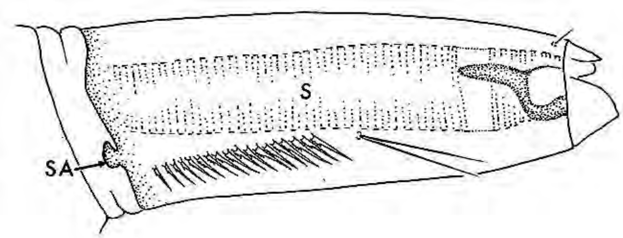


Fig. 211. Lateral view of siphon: *Oc. triseriatus* VIII-X:

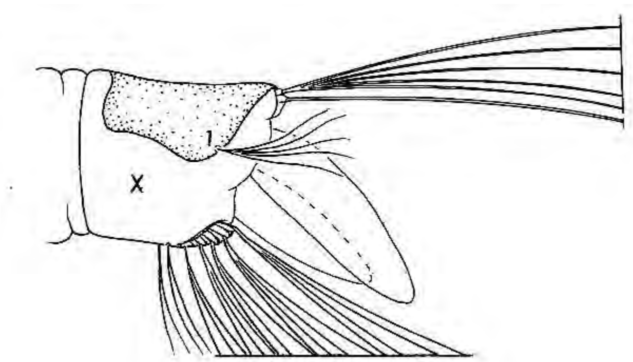


Fig. 212. Lateral view of abdominal segment X: *Oc. triseriatus*

6 (5) Comb scale with apical spine about 2.0-3.0 length of subapical spinules (Fig. 213) . . . . *trivittatus*

Comb scale with apical spine sub equal to subapical spinules, or only slightly stouter and longer (Fig. 214) . . . . *triseriatus*

Fig. 213. Comb scale: Oc. *infirmatus*

Fig. 214. Comb scale: Oc. *triseriatus*

7 (2) Pecten of siphon with one or more spines at the end attached farther apart than the rest (Fig. 215) 8

Pecten with spines more or less evenly spaced (Fig. 216) 18

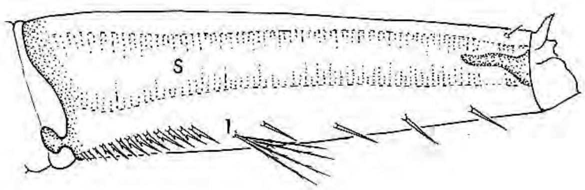


Fig. 215. Lateral view of siphon: Oc. *cataphylla*

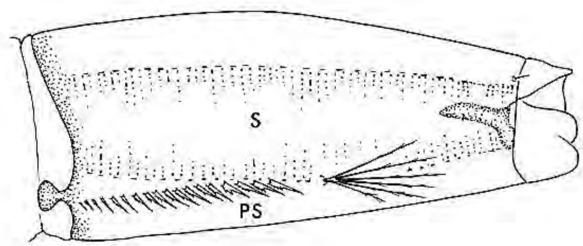


Fig. 216. Lateral view of siphon: Oc. *melanimon*

8 (7) Setal tuft at end of siphon attached with pectin (Fig. 215) . . . . *cataphylla*

Setal tuft at end of siphon attached beyond the pectin (Fig. 217) 9

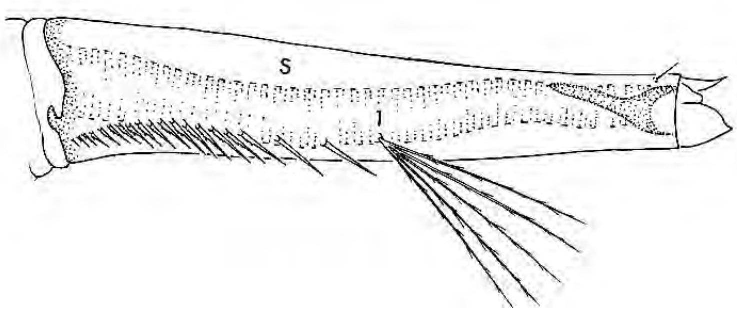


Fig. 217. Lateral view of siphon: Oc. *excrucians*

9 (8) Antenna equal to length of head capsule, or longer (Fig. 218) .... *diantaeus*

Antenna shorter than head capsule (Fig. 219) 10

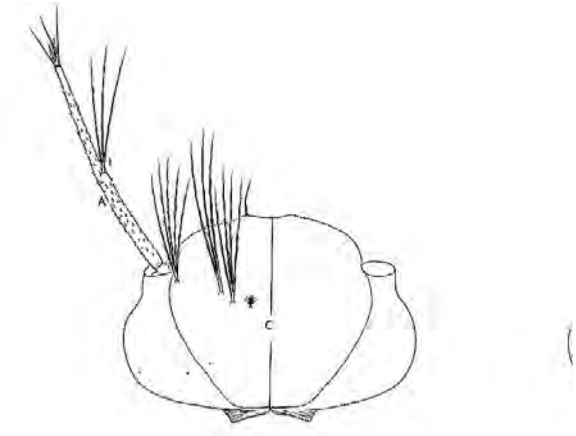


Fig. 218. Dorsal view of head: *Oc. diantaeus*

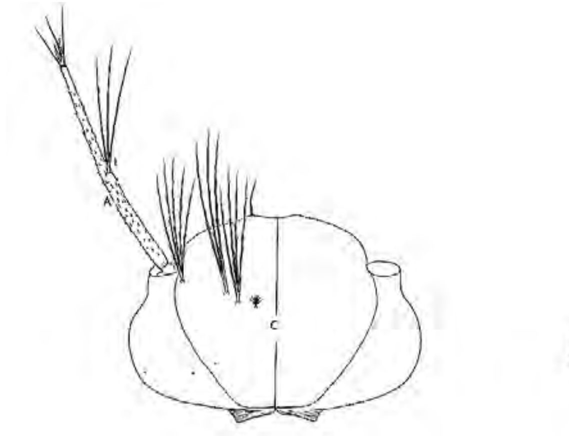


Fig. 219. Dorsal view of head: *Ae. vexans*

10 (9) Comb scales 14-23 in a single or irregular double row, pectin spines 12-24 (Fig. 220) 11

Comb scales in a patch of 18 or more (Fig. 221)..15

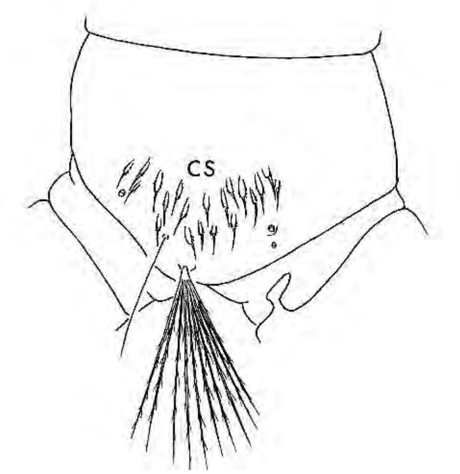


Fig. 220. Lateral view of abdominal segment VIII: *Oc. spencerii idahoensis*

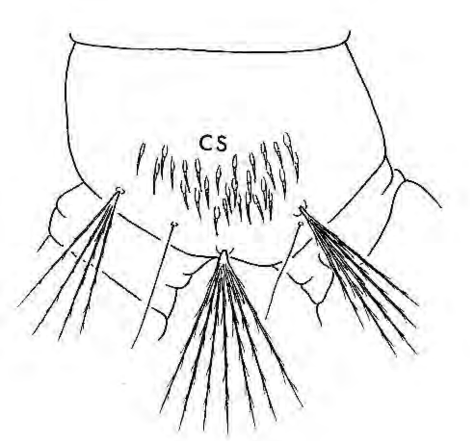


Fig. 221. Lateral view of abdominal segment VIII: *Oc. excrucians*

11 (10) Head hairs single or double, rarely triple, on both sides (Fig. 222) 12

Head hairs with three or more branches (Fig. 223)..17

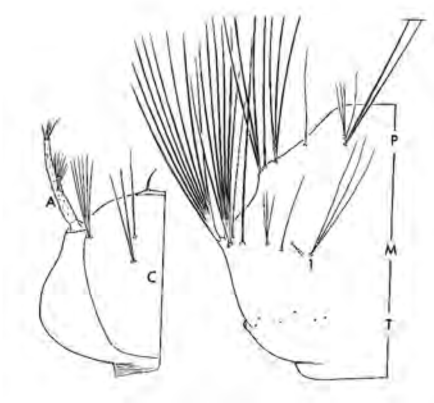


Fig. 222. Dorsal view of thorax and head *Oc. campestris*

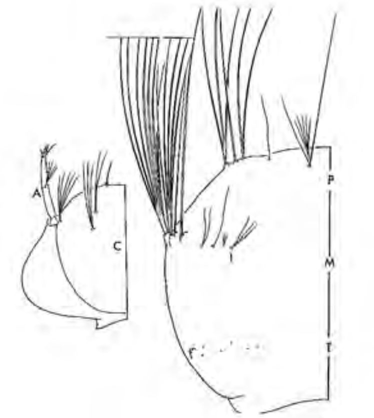


Fig. 223. Dorsal view of thorax and head *Oc. flavescens*

12 (11) Comb scales 13-30 in a single or irregular double row (Fig. 224) .... *s. idahoensis*

Comb scales 8-12 in a single or irregular double row (Fig. 225) 13

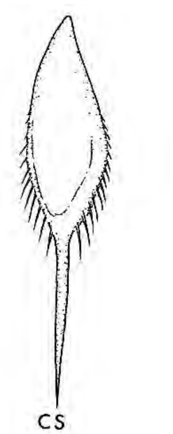


Fig. 224. Lateral view of abdominal segment VIII: *Oc. spencerii idahoensis*

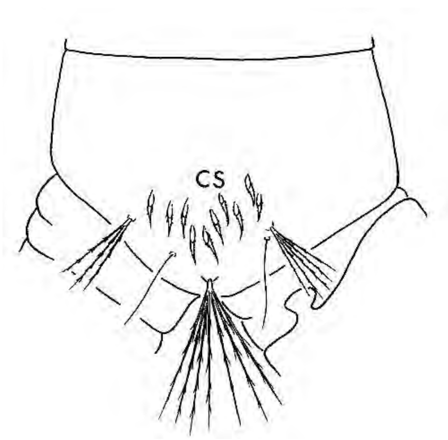


Fig. 225. Lateral view of abdominal segment VIII: *Oc. spencerii spencerii*

13 (12) Prothoracic hair 5 long, double or triple, not single as in this figure (Fig. 226); antennae about half as long as head (Fig. 227) 14

Prothoracic hair 5 long but usually single; antennae much less than half as long as head. . . . . . *s. spencerii*

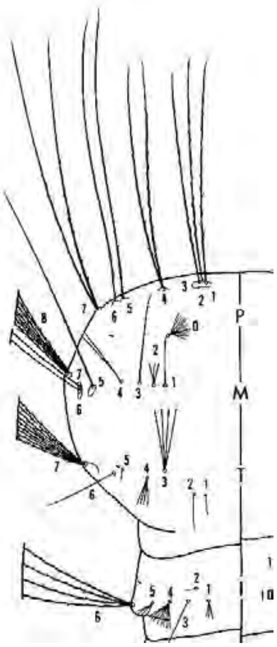


Fig. 226. Dorsal view of culicine with single P-5 hair

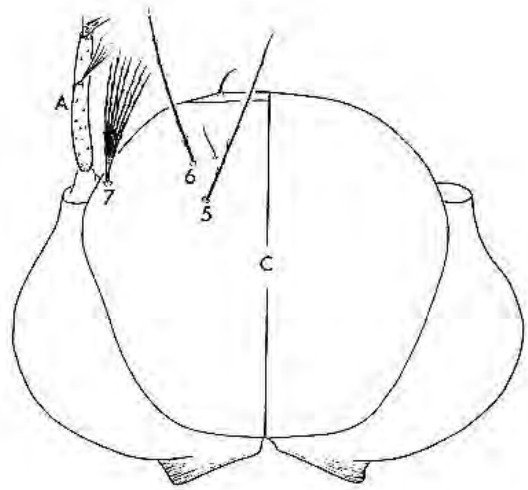


Fig. 227. Dorsal view of head: *Oc. niphadopsis*

14 (13) Lateral spinules of comb scales minute (Fig. 228) . . . . *ventrovittis*

Lateral spinules of comb scales nearly half as long as median spine (Fig. 229). . . . .*niphadopsis*

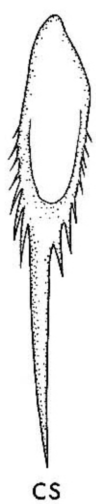


Fig. 228. Comb scale: *Oc. riparius*

Fig. 229. Comb scale: *Oc. niphadopsis*

15 (10) Siphon slender, about five times as long as wide (Fig. 230). . . . . *excrucians*

Siphon stouter, not more than four times as long as wide (Fig. 231) 16

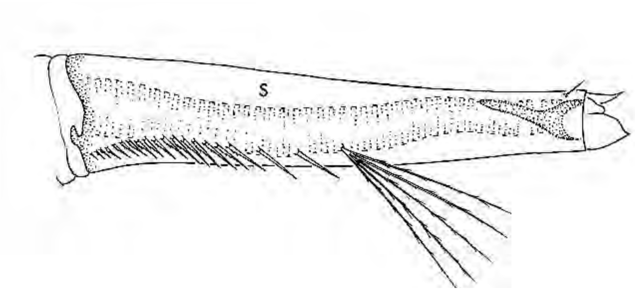


Fig. 230. Lateral view of siphon: *Oc. excrucians*

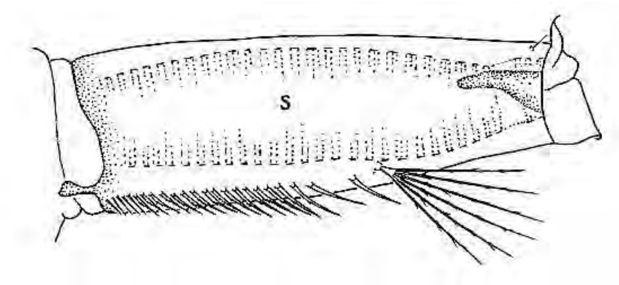


Fig. 231. Lateral view of siphon: *Oc. campestris*

16 (15) Pecten reaching distal to middle of siphon (Fig. 231) . . . . *campestris*

Pecten not reaching middle of siphon (Fig. 232) . . . . *flavescens*

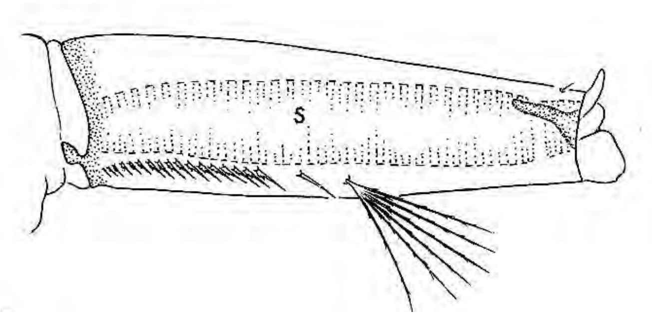


Fig. 232. Lateral view of siphon: *Oc. flavescens*

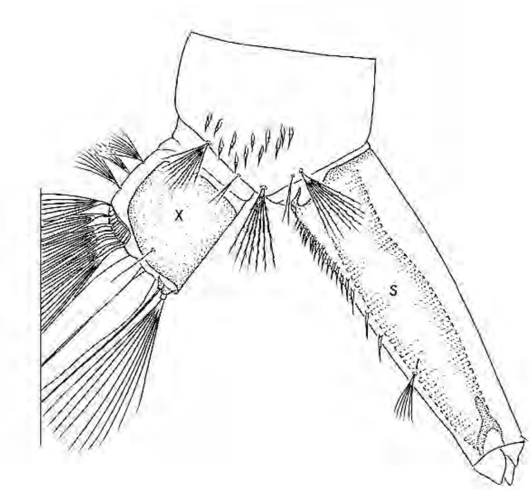


Fig. 233. Lateral view of abdominal segments VIII-X: *Ae. vexans*

17 (11) Branches of seta at end of pectin less than half the diameter to the base of the siphon in length; saddle not incised on ventral margin (Fig. 233) . . . . *Ae. vexans*

Branches of seta at end of pectin about equal in length to basal diameter of the siphon in length (Fig. 234); saddle deeply incised on ventral margin (Fig. 235) . . . . *intrudens*

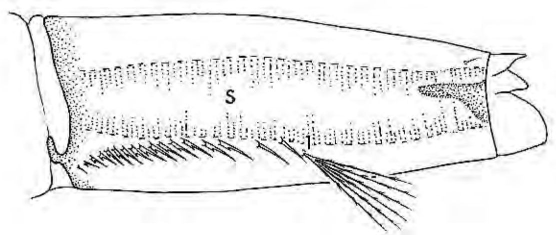


Fig. 234. Lateral view of siphon: *Oc. intrudens*

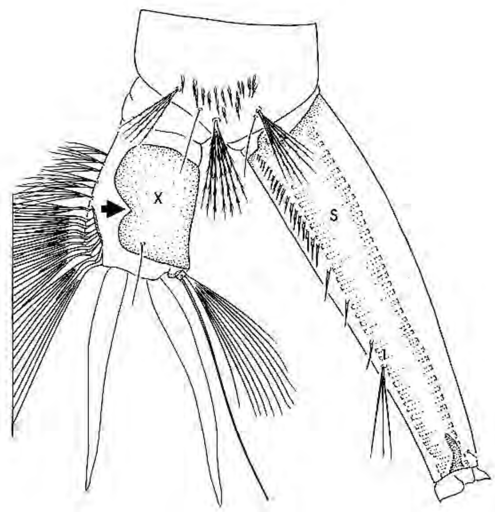


Fig. 235. Arrow points to incision on ventral margin of saddle

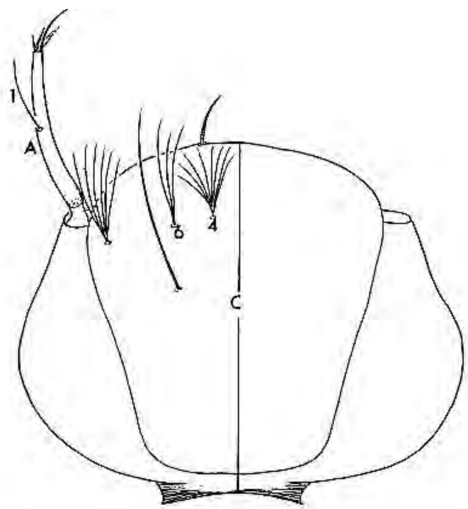


Fig. 236. Dorsal view of head: *Oc. triseriatus*

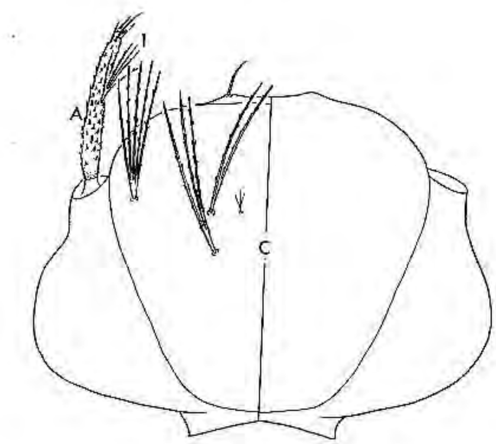


Fig. 237. Dorsal view of head: *Oc. fitchii*

18 (7) Seta at the middle of the antenna single or double; antenna usually smooth or with tiny spinules (Fig. 236) 19

Seta at the middle of the antenna with three or more branches; antenna with prominent, coarse spinules (Fig. 237) 20

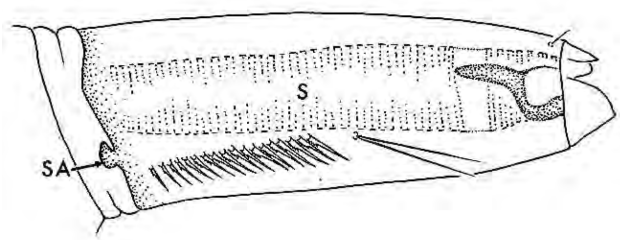


Fig. 238. Lateral view of siphon: *Oc. triseriatus*

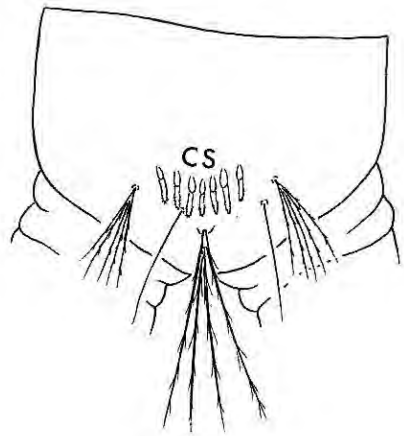


Fig. 239. Lateral view of abdominal segment VIII: *Oc. triseriatus*

19 (18) Acus (SA) of siphon attached (Fig. 238); comb scales usually fewer than 15 (Fig. 239 . . . . *triseriatus*

Acus of siphon not attached (Fig. 240); seta 4-X with two of most anterior setae double (Fig 241) . . . . *hendersoni*

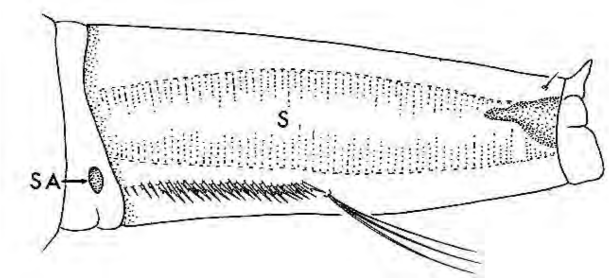


Fig. 240. Lateral view of siphon: *Oc. hendersoni*

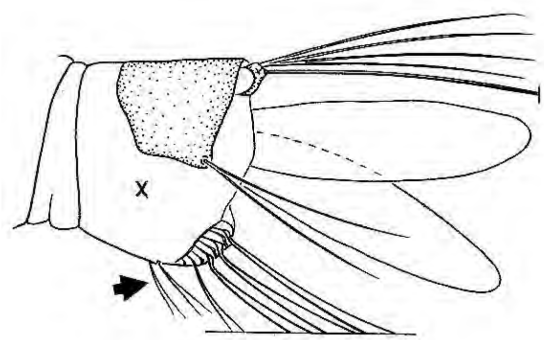


Fig. 241. Lateral view of abdominal segment X: *Oc. hendersoni*

20 (18) Individual comb scales with median spine at least 1 ½ times as long as the subapical spinules (Fig. 242) 21

Individual comb scales with median spine less than 1 1/23 times as long as subapical spinules (Fig. 243) 29

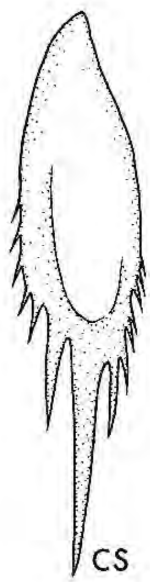


Fig. 242. Comb scale: Oc. *impiger*

Fig. 243. Comb scale: Oc. *cantator*

21 (20) Siphon four to five times as long as wide; apical pectin spines nearly equal to apicaldiameter of siphon (Fig. 244) . . . . *fitchii*

Siphon usually less than four times as long as wide; apical pectin spine not more than half as long as diameter of siphon (Fig. 245) 22

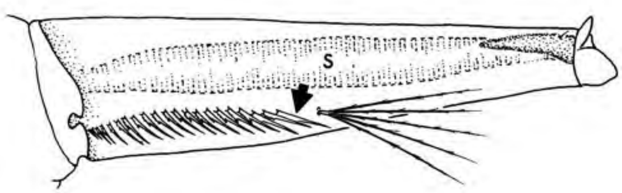


Fig. 244. Lateral view of siphon: Oc. *fitchii*

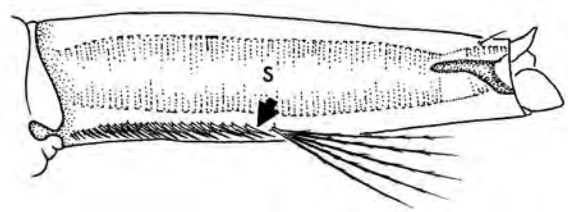


Fig. 245. Lateral view of siphon: Oc. *c. canadensis*

22 (21) Comb with 8-16 scales (Fig. 246) 23

Comb with 18 or more scales (Fig. 247).. 24

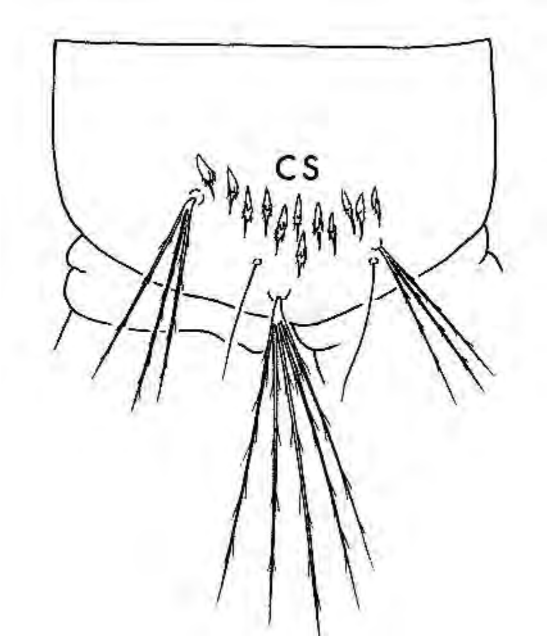


Fig. 246. Lateral view of abdominal segment VIII: *Oc. impiger*

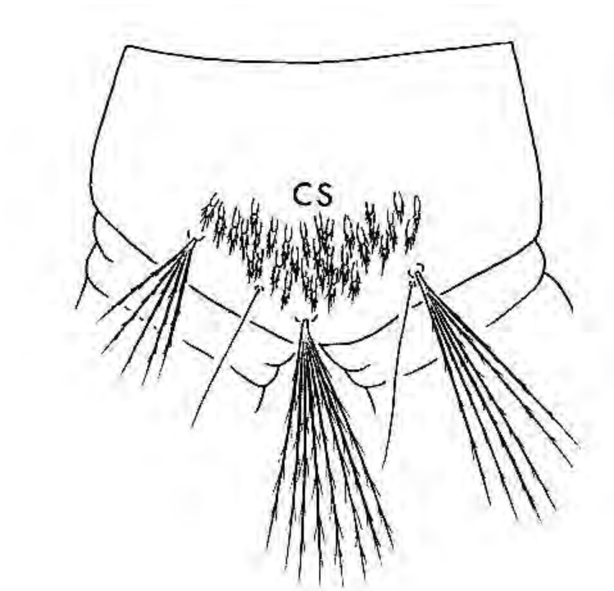


Fig. 247. Lateral view of abdominal segment VIII: *Oc. stimulans*

23 (22) Saddle extending to near the middle of the siphon (appearing to go almost all the way around) (Fig. 248) .... *punctodes* (**not found in Wyoming**)

Saddle extending only about half way to the middle of the siphon (appearing to go about half way down each side) (Fig. 249) .... *impiger*

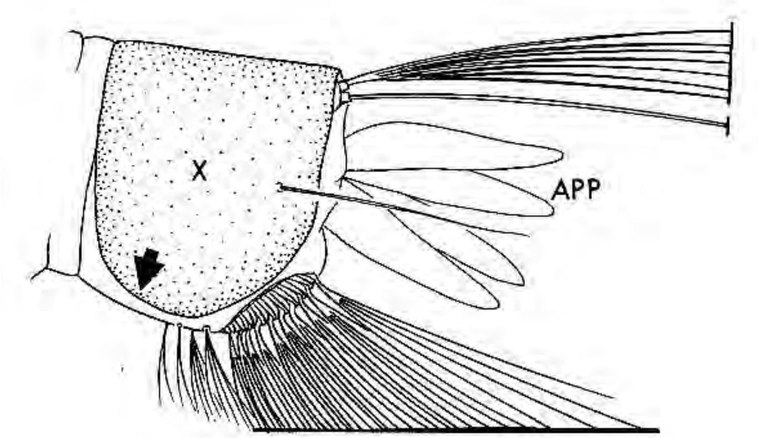


Fig. 248. Lateral view of abdominal segment X: *Oc. punctodes*

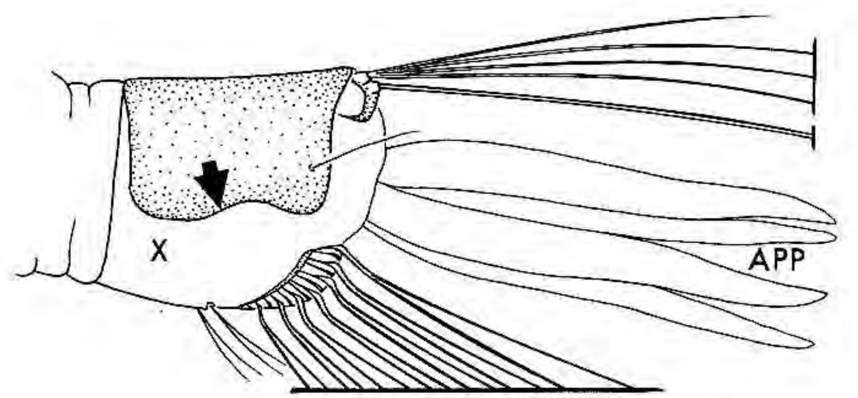


Fig. 249. Lateral view of abdominal segment X: *Oc. impiger*

24 (22) Seta 1 on the anal saddle shorter than the saddle (Fig. 250) 25

Seta 1 on the anal saddle longer than the saddle (Fig. 251) . . . . *schizopinax*

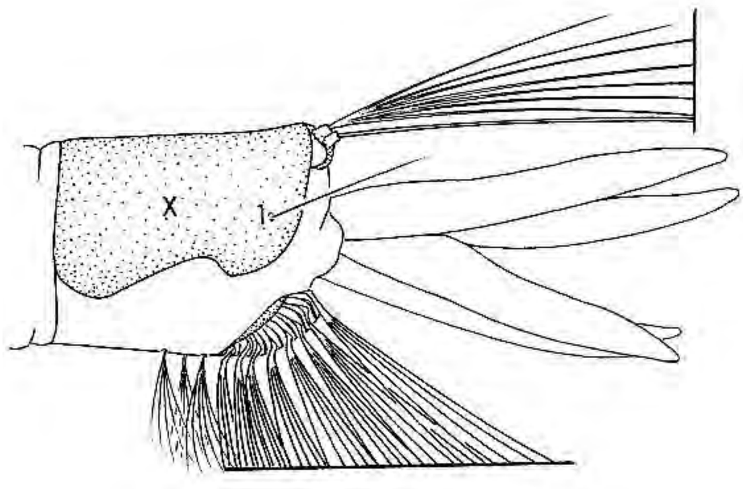


Fig. 250. Lateral view of abdominal segment X: *Oc. stimulans*

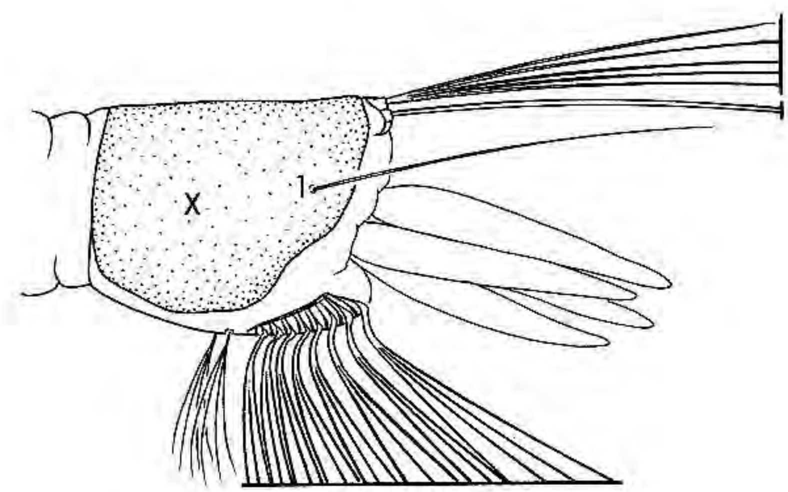


Fig. 251. Lateral view of abdominal segment X

25 (24) Head setae 5 and 6 single, or rarely double (Fig. 252). 26

Head setae 5 with two to four branches, 6 usually double (Fig. 253) 27

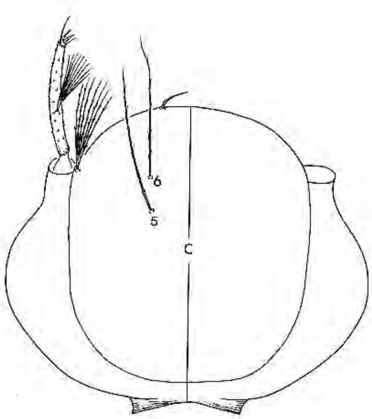


Fig. 252. Dorsal view of head: *Oc. melanimon*

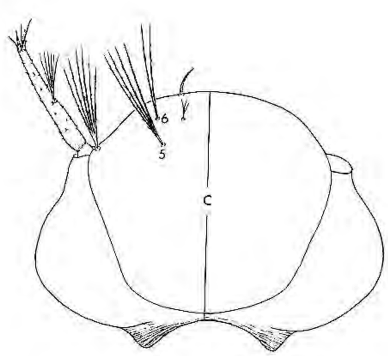


Fig. 253. Dorsal view of head: *Oc. sticticus*

26 (25) Seta at the end of pectin attached beyond the middle of the siphon (Fig. 254) . . . . *melanimon*

Seta at the end of pectin attached at about the middle of the siphon (Fig. 255) . . . .*nevadensis*

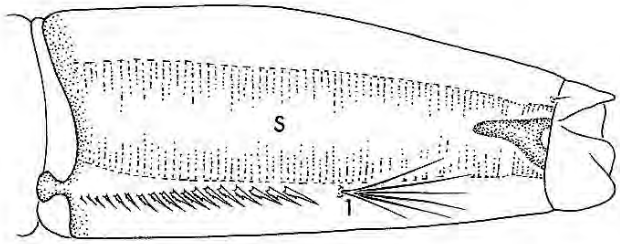


Fig. 254. Lateral view of siphon: *Oc. melanimon*

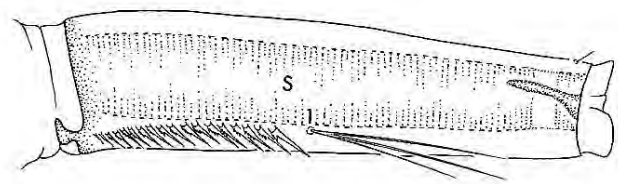


Fig. 255. Siphon with pectin (1) in the middle

27 (25) Seta 1-M (on mesothorax) longer than seta 3-M or head hair 5 (Fig. 256 & 257) . . . . *mercurator*

Seta 1-M shorter than seta 3-M and head hair 5 (Fig. 258 & 259) 28

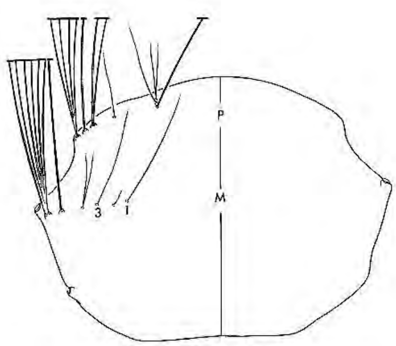


Fig. 256. Dorsal view of thorax: *Oc. mercurator*

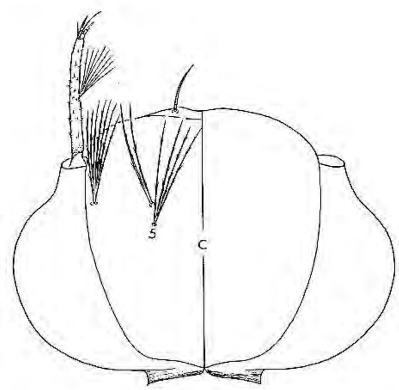


Fig. 257. Dorsal view of head: *Oc. mercurator*

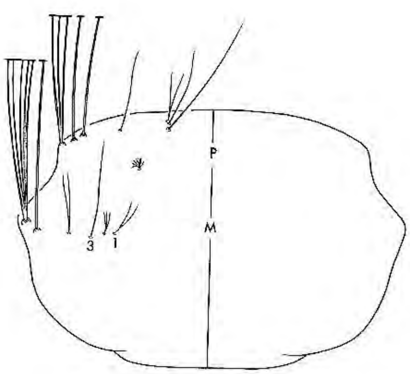


Fig. 258. Dorsal view of thorax: *Oc. sticticus*

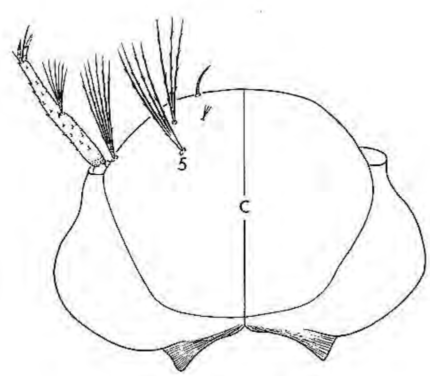


Fig. 259. Dorsal view of head: *Oc. sticticus*

28 (27) Siphon three to four times as long as wide (Fig. 260); comb scale with stout subapical spinules (Fig. 261) . . . . *flavescens* (part)

Siphon two and a half to three times as long as wide (Fig. 262); comb scale with stout subapical spinules (Fig. 263) . . . . *sticticus*

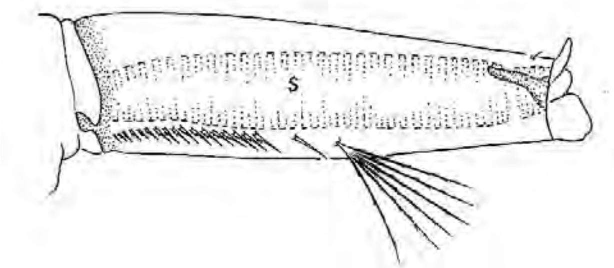


Fig. 260. Lateral view of siphon: *Oc. flavescens*

Fig. 261. Comb scale: *Oc. flavescens*

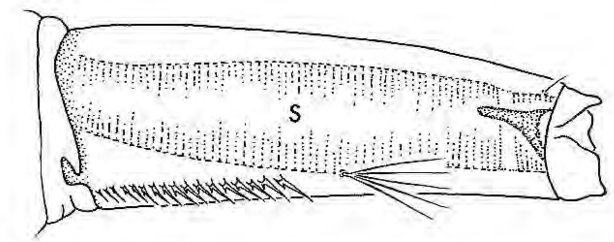


Fig. 262. Lateral view of siphon: *Oc. sticticus*

Fig. 263. Comb scale: *Oc. sticticus*

29 (20) Head hair 5 with four or more branches; head hair 6 with three or more branches (Fig. 264) 30

Head hair 5 with one to three branches; head hair 6 single or double, only rarely triple (Fig. 265) 32

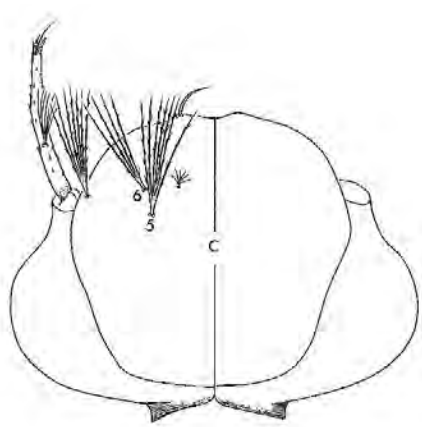


Fig. 264. Dorsal view of head: *Oc. pullatus*

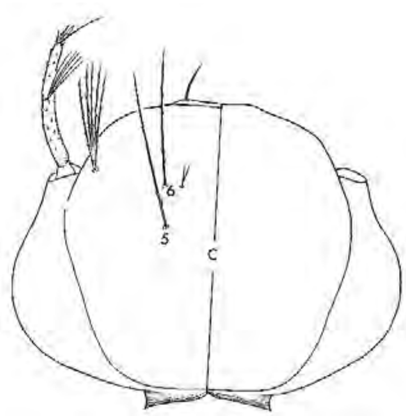


Fig. 265. Dorsal view of head: *Oc. dorsalis*

30 (29) Seta 1-M about the length of antenna, or longer (Fig. 266 & 267) 31

Seta 1-M shorter than antenna (Fig. 268) . . . . *campestris canadensis*

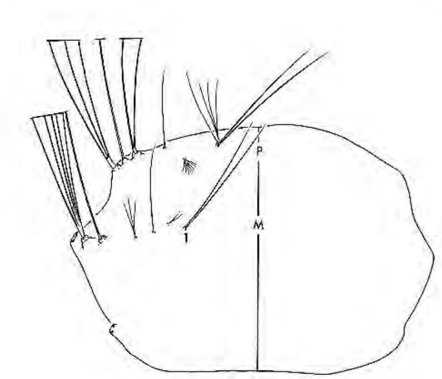


Fig. 266. Dorsal view of thorax: *Oc. dorsalis*

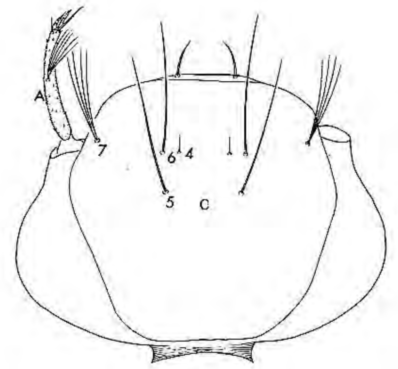


Fig. 267. Dorsal view of head: *Oc. dorsalis*

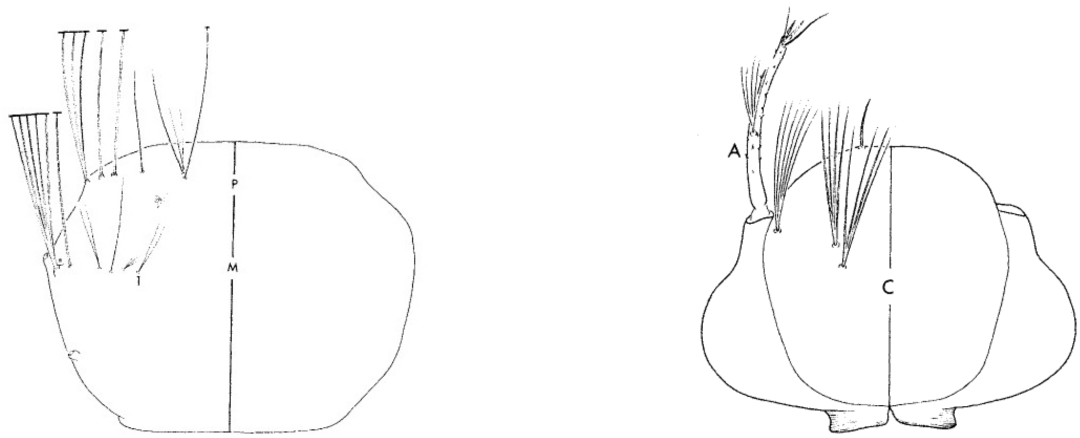


Fig. 268. Dorsal view of thorax and head: *Oc. campestris canadensis*

31 (30) Seventy or more comb scales (Fig. 269) . . . . *pionips*

Fewer than 70 (usually less than 60) comb scales . . . .*pullatus*

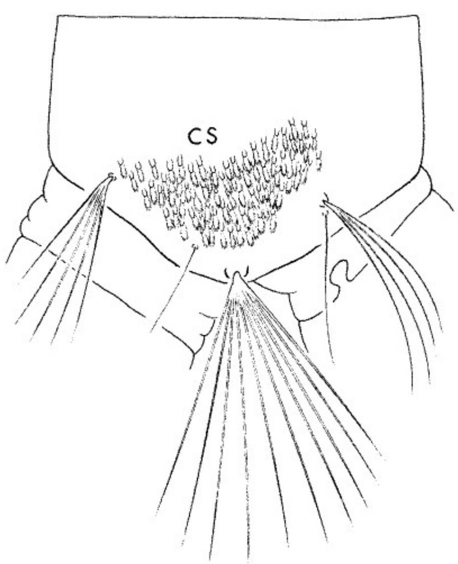


Fig. 269. Lateral view of abdominal segment VIII *Oc. pionips* showing 70+ comb scales.

32 (29) Seta 1-M about equal to length of antenna, or longer (Fig. 270 & 271) 33

Seta 1-M shorter than antenna (Fig. 272 & 273) 34

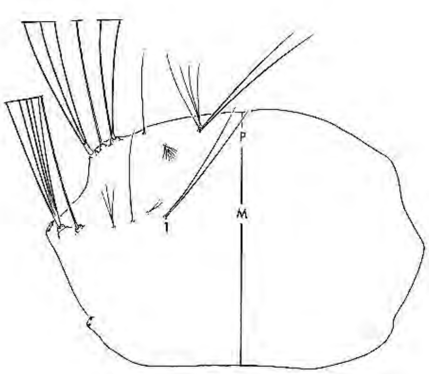


Fig. 270. Dorsal view of thorax: *Oc. dorsalis*

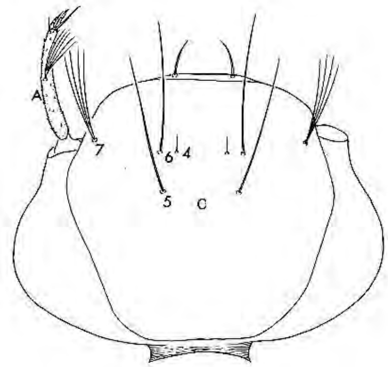


Fig. 271. Dorsal view of head: *Oc. dorsalis*

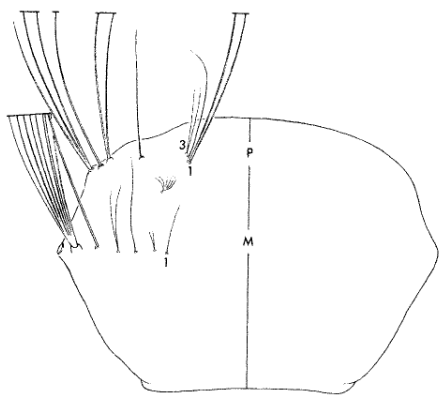


Fig. 272. Dorsal view of thorax: *Oc. increpitus*

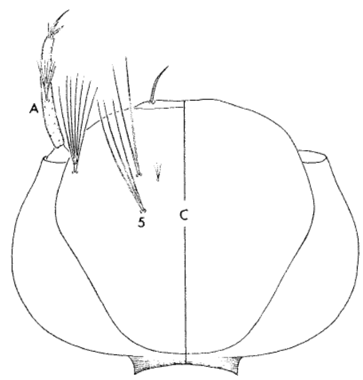


Fig. 273. Dorsal view of head: *Oc. increpitus*

33 (32) Pecten extending to the last half of the siphon; the last two spines stouter than the preceding spines (Fig. 274) .... *campestris*

Pecten not extending beyond the half-way point of the siphon; the last two spines about the same size as the preceding spines (Fig. 275) .... *dorsalis*

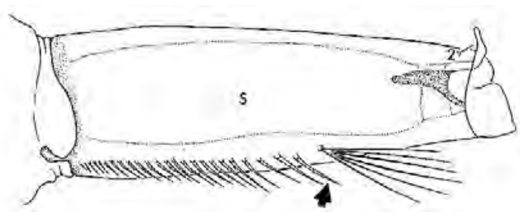


Fig. 274. Lateral view of siphon: *Oc. campestris*

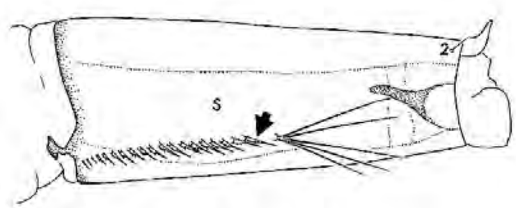


Fig. 275. Lateral view of siphon: *Oc. dorsalis*

34 (32) Comb scales 36 or more (Fig. 276) , with median spine no stouter than subapical spinules (Fig. 277) . . . . *communis*

Comb scales fewer than 35, with median spine stouter than subapical spinules on at least some scales (Fig. 278) 35

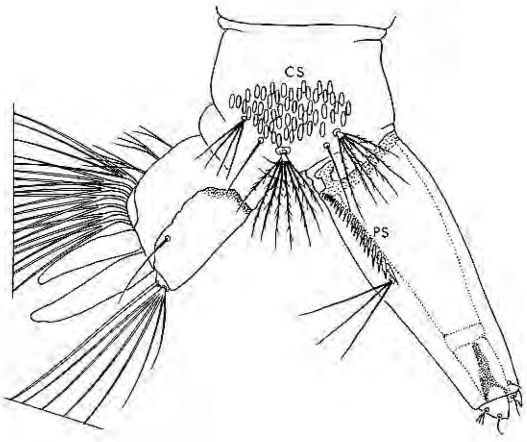


Fig. 276. Lateral view of abdominal segments VIII-X: *Oc. communis*

Fig. 277. Comb scale: *Oc. communis*

Fig. 278. Comb scale: *Oc. melanimon*

35 (34) Pecten extending to beyond the middle of the siphon (Fig. 279) . . . . *melanimon*

Pecten confined to the basal half of the siphon (Fig. 280). 36

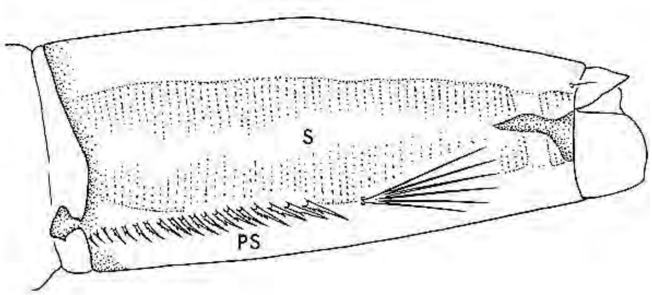


Fig. 279. Lateral view of siphon: *Oc. melanimon*

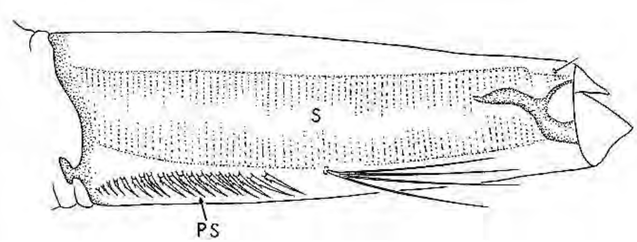


Fig. 280. Lateral view of siphon: *Oc. increpitus*

36 (35) Saddle with fine bristles along the posterior border (Fig. 281) . . . .
implicatus

Saddle with coarse bristles along the posterior border (Fig. 282) . . . .
increpitus

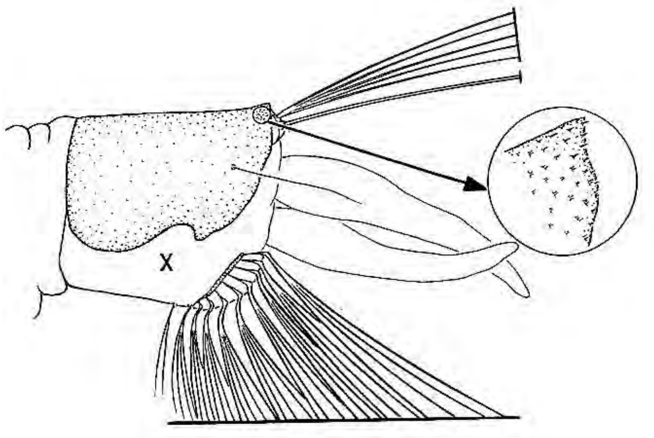


Fig. 281. Lateral view of abdominal segment X: *Oc. implicatus*

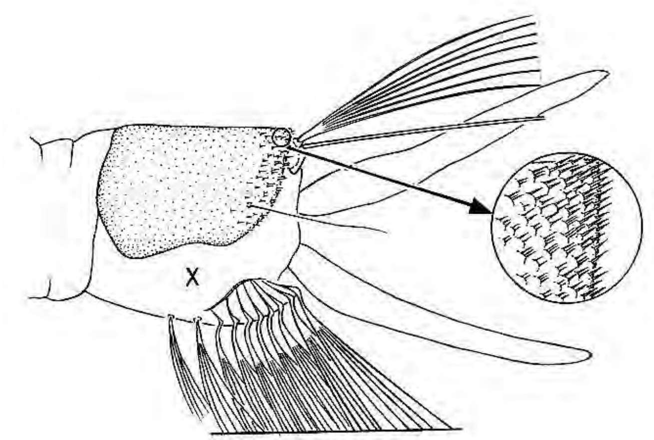


Fig. 282. Lateral view of abdominal segment X: *Oc. increpitus*

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Species List

According to the distribution maps of *Identification and Geographical Distribution of the Mosquitoes of North America, North of Mexico* (Darsie & Ward, 1981) , there are potentially 51 different species of mosquitoes that may occur in Wyoming. Here is the list of species. Darsie and Ward used the taxonomic nomenclature of *Aedes* for many species that have been reassigned to *Ochlerotatus.* The changes are listed below. Only the 45 species that have been actually collected and reported in Wyoming are included in the dichotomous keys to species in this manual. *Oc. euedes* may be found in the extreme northwest Wyoming. *Oc. provocans* may occur but will probably key to *Oc. implicatus*. *Oc. sierrensis* does occur in the forested areas of far western Wyoming and has been collected by Teton County Weed and Pest District. *Anopheles walkeri*'s range may extend into extreme eastern Wyoming in marsh habitats. *Culex salinarius* has been found in scattered locations in Wyoming according to Darsie & Ward (1981). *Uranotaenia sapphirina*'s known range just touches the eastern border of Wyoming. The species has iridescent, sapphire blue, markings on the thorax, distinguishing it from other Wyoming mosquitoes.

Aedes cinereus

Aedes vexans

Ochlerotatus (Aedes) campestris

Ochlerotatus (Aedes) canadensis canadensis

Ochlerotatus (Aedes) cataphylla

Ochlerotatus (Aedes) communis

Ochlerotatus (Aedes) diantaeus

Ochlerotatus (Aedes) dorsalis

Ochlerotatus (Aedes) euedes

Ochlerotatus (Aedes) excrucians

Ochlerotatus (Aedes) fitchii

Ochlerotatus (Aedes) flavescens

Ochlerotatus (Aedes) hendersoni

Ochlerotatus (Aedes) hexodontus

Ochlerotatus (Aedes) impiger

Ochlerotatus (Aedes) implicatus

Ochlerotatus (Aedes) increpitus

Ochlerotatus (*Aedes*) *intrudens*

Ochlerotatus (*Aedes*) *melanimon*

Ochlerotatus (*Aedes*) *mercurator*

Ochlerotatus (*Aedes*) *nevadensis*

Ochlerotatus (*Aedes*) *nigromaculis*

Ochlerotatus (*Aedes*) *niphadopsis*

Ochlerotatus (*Aedes*) *pionips*

Ochlerotatus (*Aedes*) *pullatus*

Ochlerotatus (*Aedes*) *provocans*

Ochlerotatus (*Aedes*) *punctor*

Ochlerotatus (*Aedes*) *schizopinax*

Ochlerotatus (*Aedes*) *sierrensis*

Ochlerotatus (*Aedes*) *spencerii idahoensis*

Ochlerotatus (*Aedes*) *sticticus*

Ochlerotatus (*Aedes*) *trivittatus*

Ochlerotatus (*Aedes*) *ventrovittis*

Anopheles earlei

Anopheles freeborni

Anopheles punctipennis

Anopheles franciscanus

Anopheles walkeri

Coquillettidia perturbans

Culex restuans

Culex pipiens

Culex salinarius

Culex tarsalis

Culex territans

Culiseta alaskaensis

Culiseta impatiens

Culiseta incidens

Culiseta inornata

Culiseta morsitans

Psorophora signipennis

Uranotaenia sapphirina

Glossary

Anal — A — the sixth and unbranched mosquito wing vein behind the cubital, see Plate 5, C.

Antepronotum — Ap — the region of the pronotum just behind the junction of head and thorax. Plate 5, A and Plate 4, A.

Apical — the region of a body part farther from the body.

Basal — the region of a body part closer to the body.

Cercus — Ce — one of the small paired appendages on the end of insect abdomen, plural is cerci. Plate 2 and Plate 4, B.

Clypeal — is the joint of the segment above the labrum on the mouth of the larvae between the clypeus (Clp) and the frons sclerite plates on the front of the insect's "face". Plate 3, C.

Costal — C — the vein at the leading edge of an insect wing, Plate 5, C.

Coxa — C — first leg segment, between the body and trochanter. Plates 3, D and 4, A.

Cubital — Cu — the fifth longitudinal vein with two branches that reach the mosquito's wing margin, see Plate 5, C.

Dorsal — the top side of the body or wing.

Exuvia — the cast — off outer skin of an insect left behind after it molts.

Femur — Fe — third leg segment, between trochanter and tibia. Plate 3, D.

Halteres — Hl — the pair of knobbed projections that the hind wings of adult mosquitoes have been transformed into, the singular is "halter". Plate 2 and Plate 4, A.

Flagellomere — Flm — segments of the antennae that are above the pedicel. Plate 2 and Plate 3, C.

Mesanepimeral — MeSL (L for lower) and MeSU (U for upper) — locations of setae on the mesanepimeron (Mts) sclerite plate on the side of the adult mosquito thorax. Plate 4, A.

Maxillary palpus — Mplp — the pair of sensory organs that originate off the mouth, the singular is palpi. Plate 2 and Plate 3, A and B.

Medial — M — the fourth longitudinal vein, with four branches that reach the mosquito's wing margin, see Plate 5, C.

Mesokatepistemum — Mks — sclerite plate between the bases of the first and second legs on the sides of thorax. Plate 4, A.

Mesokatepisternal — MkSL and MkSU — locations of setae on the mesokatepisternum (Mks) sclerite plate on the side of the adult mosquito thorax. Plate 4, A.

Mesanepimeron — Mam — sclerite plate just above bases of the second and third legs on the sides of thorax, see Plate 4, A.

Mesospostnotum — Mpn — dorsal sclerite plate on back of adult mosquito just in front of the metanotum, the rear edge of the thorax. Plate 5 B.

Mesothorax — the middle third of the thorax that contains the front wings and middle pair of legs.

Metathorax — the hind third of the thorax that have the hind legs and hind wings or in the case of mosquitoes the halteres.

Notum — the dorsal portion of an insect's thorax, on mosquitoes, this area is covered by the scutum (Scu) sclerite on adult mosquitoes. Plate 4, A.

Occiput — Occ — the region of an insects head behind the crown. Plate 2 and Plate 3, C.

Palpi — one of the pair of sensory organs that originate from each side the head's proboscis and project forward. Plural is palpus and the abbreviation for maxillary palpus is MPlp. Plate 2 and 3 A and B.

Pecten — Pt — a flattened, thick, dark scale often with spines along one side.

Pedicel — Pe — the second segment, or antennomere, from the head at the base of the antenna called the scape. Plate 3 C.

Postprocoxal membrane — PM — the junction between the coxa of the front legs to the thorax. Plate 4 A.

Prespiracular — the region of the thorax just in front of the spiracle holes that allows air to enter the adult mosquito's body on both sides of the adult mosquito's thorax.

Proboscis — P — tubular feeding mouthparts that can pierce and suck up liquid food such as blood or nectar. Plate 2.

Proepistemum — Ps — a sclerite placed below at the front of the thorax below the heads similar to where our collar bones are placed above the base of the front leg. Plate 5, A and Plate 4, A.

Pronotum — the sclerite plate just behind the head on top of the thorax if present such grasshoppers and beetles, on adult mosquitos the scutum covers the entire top of the thorax.

Prothorax — front third of thorax that includes the front pair of legs.

Radial — R — the third longitudinal vein, with five branches that reach the mosquito's wing margin, see Plate 5, C.

Scape — Sc — the base segment of the antennae. Plate 3, C.

Sclerite — any of the hard chitinous plates that make up the exoskeleton of an insect.

Scutum — Scu — the dorsal area of the adult mosquito thorax. Plate 2, Plate 5, B and Plate 4 A.

Scutellum — Stm — the plate just behind the scutum, it can be rounded or lobed and may or may not have setae present on adult mosquitos. Plate 2, Plate 5, B and Plate 4 A.

Setae — stiff chitinous or sclerotised hairs or bristles on insect bodies; also known as chaeta or cheta.

Siphon — S — tube like structure on the end of the abdomen used by mosquito larvae to breath air at water surface.

Subcostal — Sc — the second longitudinal vein (behind the costal vein), that curves and joins the costal vein three — quarters of the length of wing, see Plate 5, C.

Tergites — Te — the dorsal sclerite plates of an abdominal segments of an insect. Plate 4, B.

Tarsomeres — Ta segment 2 through 5 the segments within the tarsus. Plate 3, D.

Tarsus — Ta — lowest leg segments that touch a walking surface. Plural form is tarsi. Plate 3, D.

Tibia — Ti — fourth leg segment, between femur and tarsus. Plate 3, D.

Trochanter — Tr — second leg segment, between coxa and femur. Plate 3, D.

Ventral — the underside of a body or wing.

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