

FIELD IDENTIFICATION OF ADULT AND LARVAL MOSQUITOES

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BASIC INFORMATION

- ☛ **No one can field-ID all of the species in a given area!**
- ☛ **Definition of field-ID – Visually identifying live or dead specimens as you collect them in the field. This can be done with or without the use of a hand lens.**
- ☛ **Field-ID is a basic throw-back to the era when most mosquito workers did not use microscopes.**
- ☛ **Field-ID is a preliminary method that is guesswork based on experience and knowledge of mosquitoes and is prone to mistakes.**

Basic Information (Cont.)

- Beginners are very prone to mistakes, while experienced identifiers will be much more accurate, but **never** completely accurate.
- **All field identified specimens should be confirmed by examination under a microscope!**
- With the advent of newer non-morphological ID techniques (like chromosomes, electrophoresis, and DNA) that have discovered complexes of sibling species in what were originally considered one species, more caution is now required when using field-ID.

Basic Information (Cont.)

Regardless of the above cautions, field ID is a very valuable preliminary tool in determining the species in an area. It can also be of real value in establishing and carrying out control measures.

Advantages of Field-ID

- 1. Provides instant knowledge of some of the species and their numbers in an area**
- 2. Can identify the species biting humans in an area, and confirm or refute the validity of complaints**
- 3. Can pinpoint the time of day a given species is attacking humans**
- 4. Can reduce trips and man-hours needed in an area**
- 5. Provides on-site information important in locating nearby larval habitats**
- 6. Provides on-site information that will help in adult and larval control**

IMPORTANT STEPS IN LEARNING HOW TO FIELD-ID

- o You should know how to recognize mosquitoes from other flies with a similar appearance**
- o You should know enough about the anatomy of a mosquito adult or larva in order to quickly see critical characters**
- o You should learn the diagnostic characters of the species that occur in your area. This takes hundreds, if not thousands, of hours examining specimens and reading books and papers that provide ID information about those species**

IMPORTANT STEPS IN LEARNING HOW TO FIELD-ID (CONT.)

- o You should know the phenology (seasonality) of each species**
- o You should know the habitats used by the different species in your area**
- o You should know the behavior of each species (biting, landing, distance of flight, shade vs. sunlight, etc.)**
- o Last and most importantly, you must know the species possessing unique characters that are easily seen.**

TOPICS WE WILL COVER FOR ADULTS

- **Posture is the first difference to look for**
- **Adults you should not try to ID in the field**
- **Groups of species that offer different degrees of difficulty in identifying female mosquitoes**
 - **(1) Accurate IDs**
 - **(2) Ballpark IDs**
 - **(3) Size IDs**
 - **(4) Difficult IDs**

Coquillettidia perturbans



M. Cutwa-Francis, FMEL

Ochlerotatus fulvus pallens



M. Cutwa-Francis, FMEL

Oc. fulvus pallens

M. Cutwa-Francis, FMEL

scutum is
yellow with
2 large
black spots

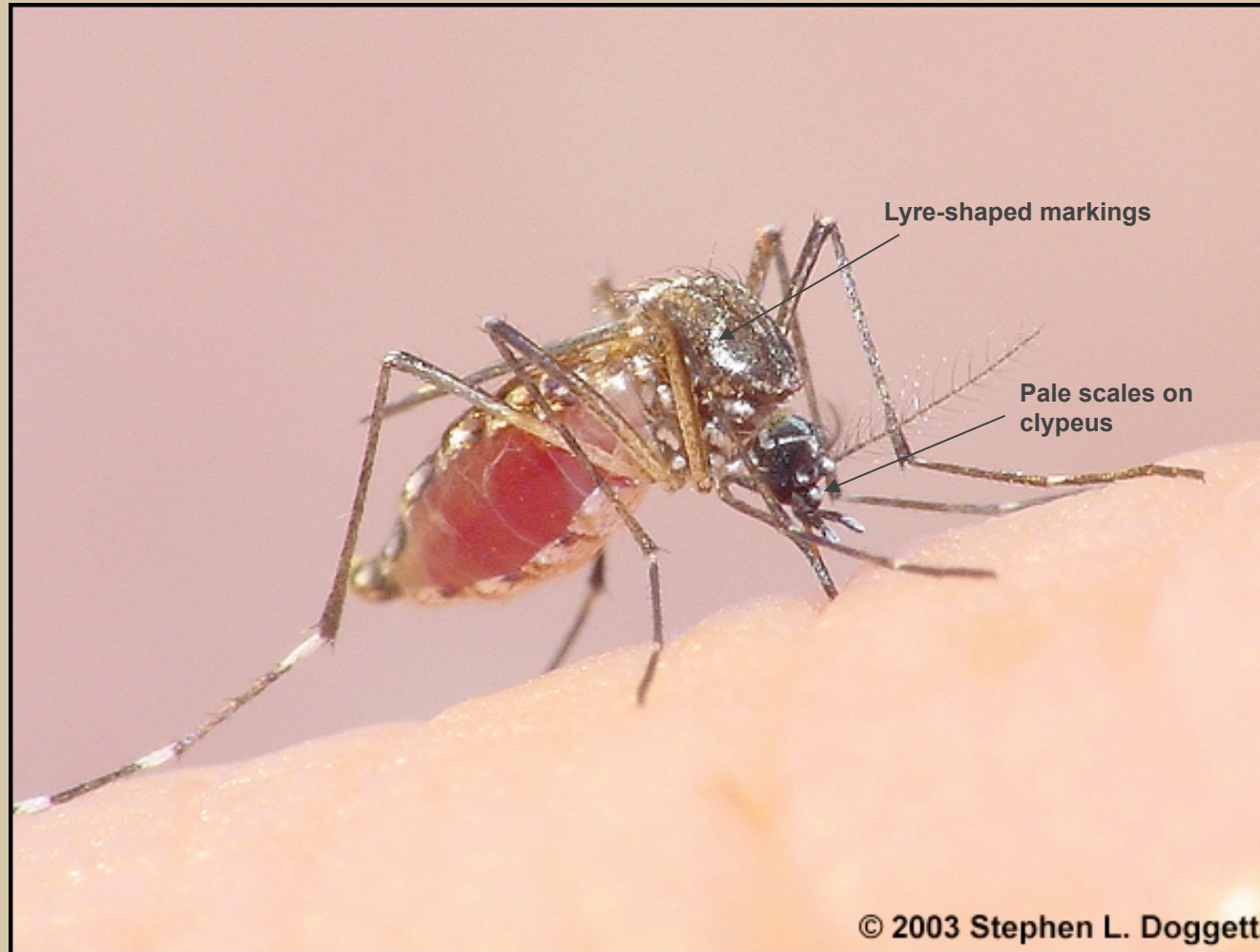


Ochlerotatus j. japonicus



Courtesy of Mike Sardelis, Ft. Detrick

Aedes aegypti



Aedes aegypti



WALTER REED BIOSYSTEMATICS UNIT

Aedes albopictus



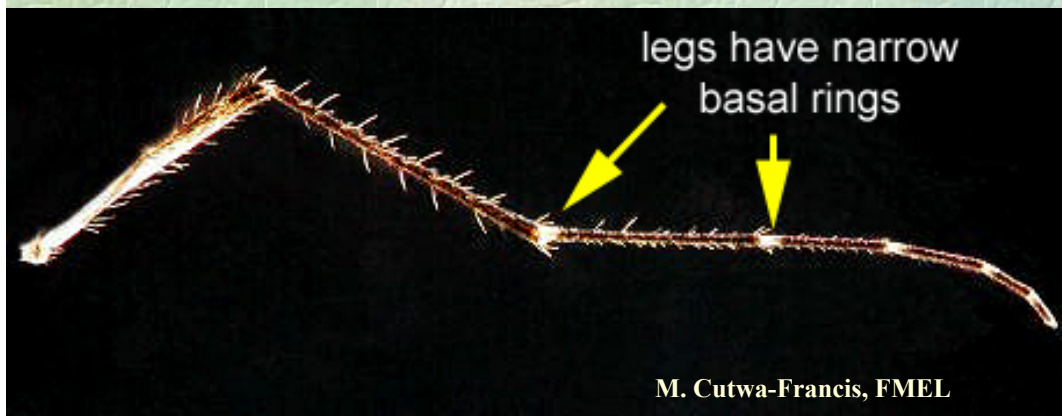
Courtesy of H. J. Harlan, AFPMB

Aedes albopictus

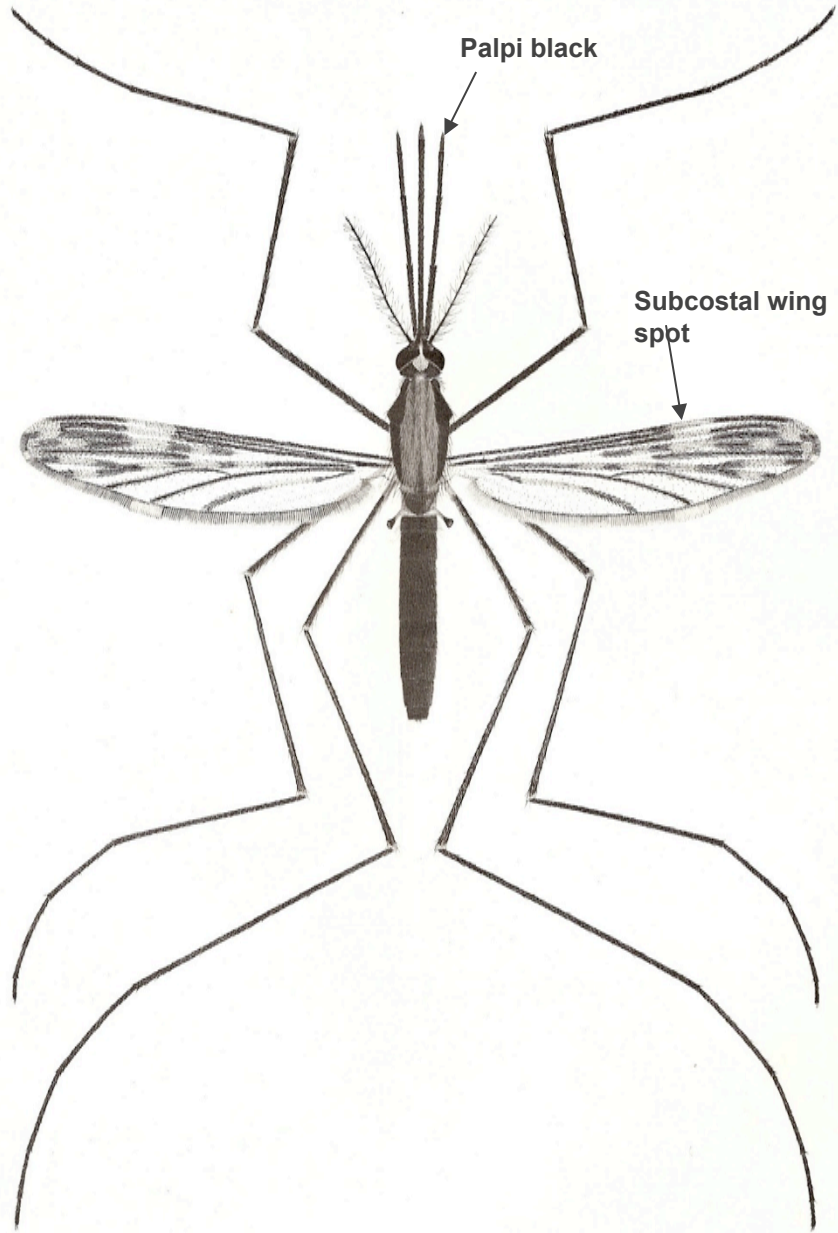


WALTER REED BIOSYSTEMATICS UNIT

Aedes vexans



Anopheles punctipennis



Bruce Harrison, NC PHPM

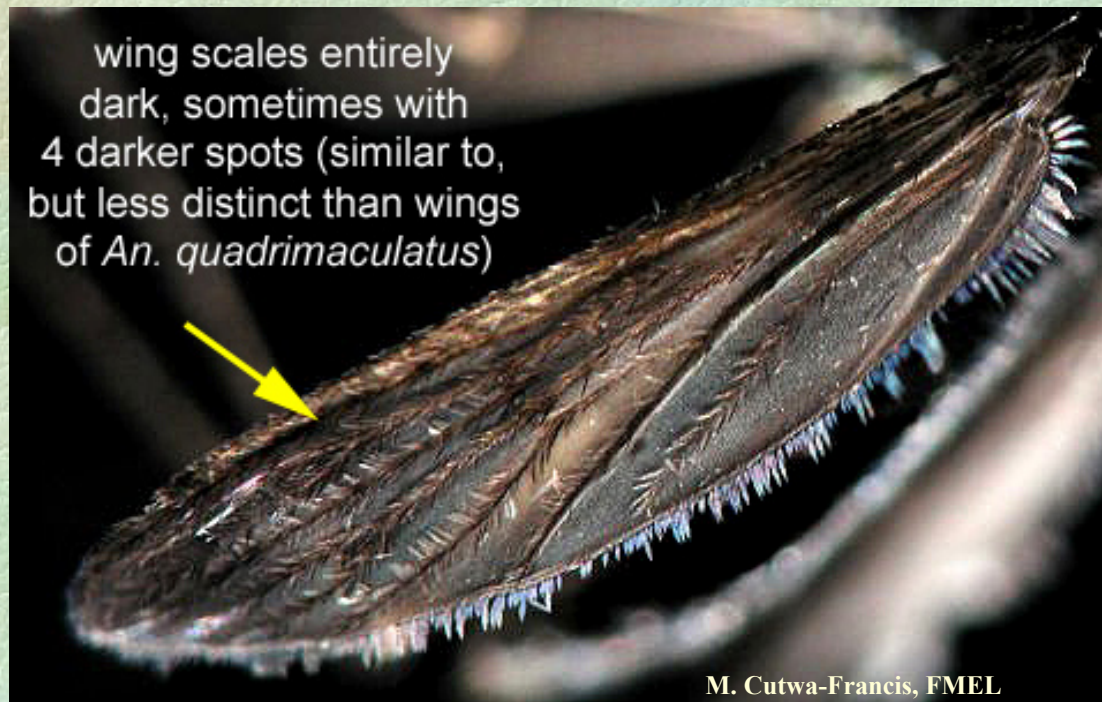
Anopheles walkeri

palps have narrow
white rings



M. Cutwa-Francis, FMEL

wing scales entirely
dark, sometimes with
4 darker spots (similar to,
but less distinct than wings
of *An. quadrimaculatus*)



M. Cutwa-Francis, FMEL

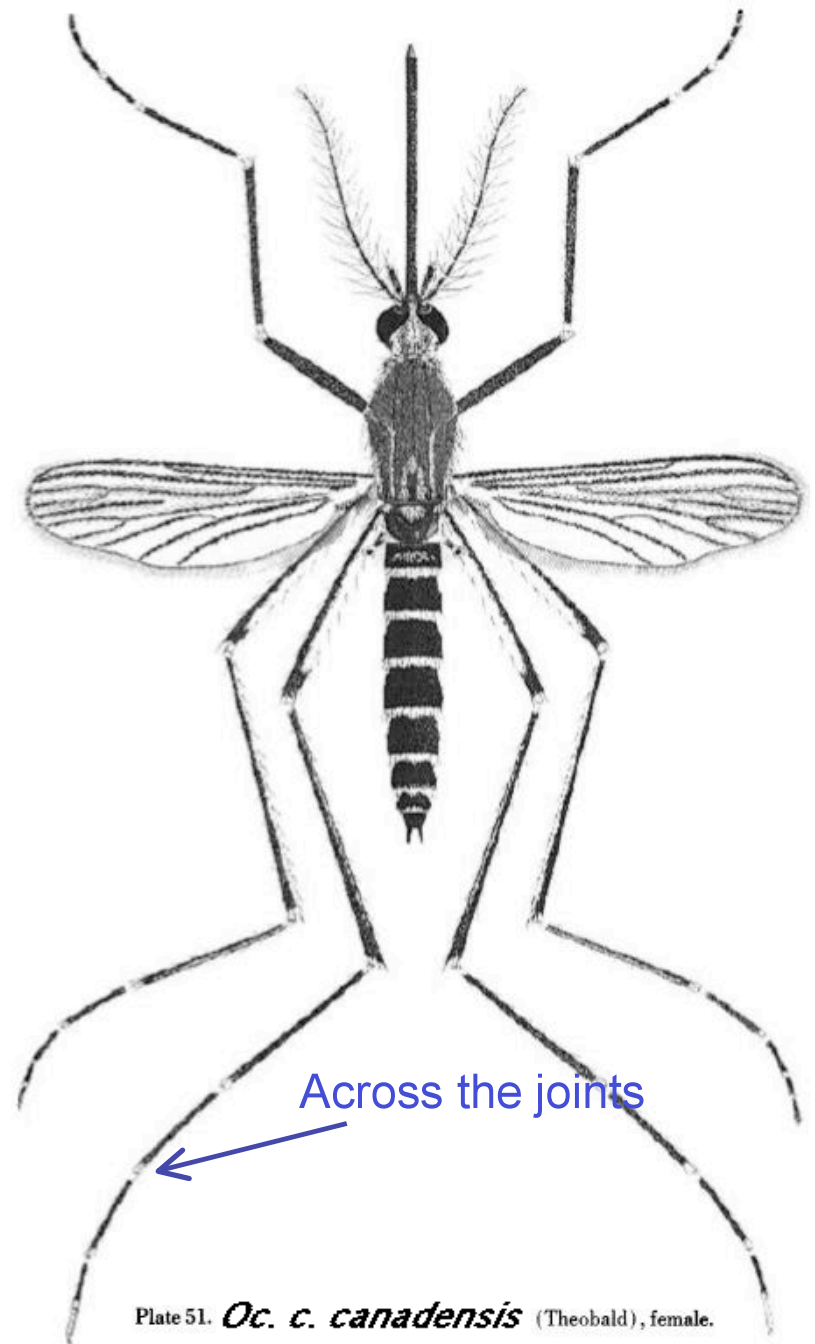
Ochlerotatus atlanticus/tormentor



Alice Anderson, NC PHPM

Ochlerotatus canadensis

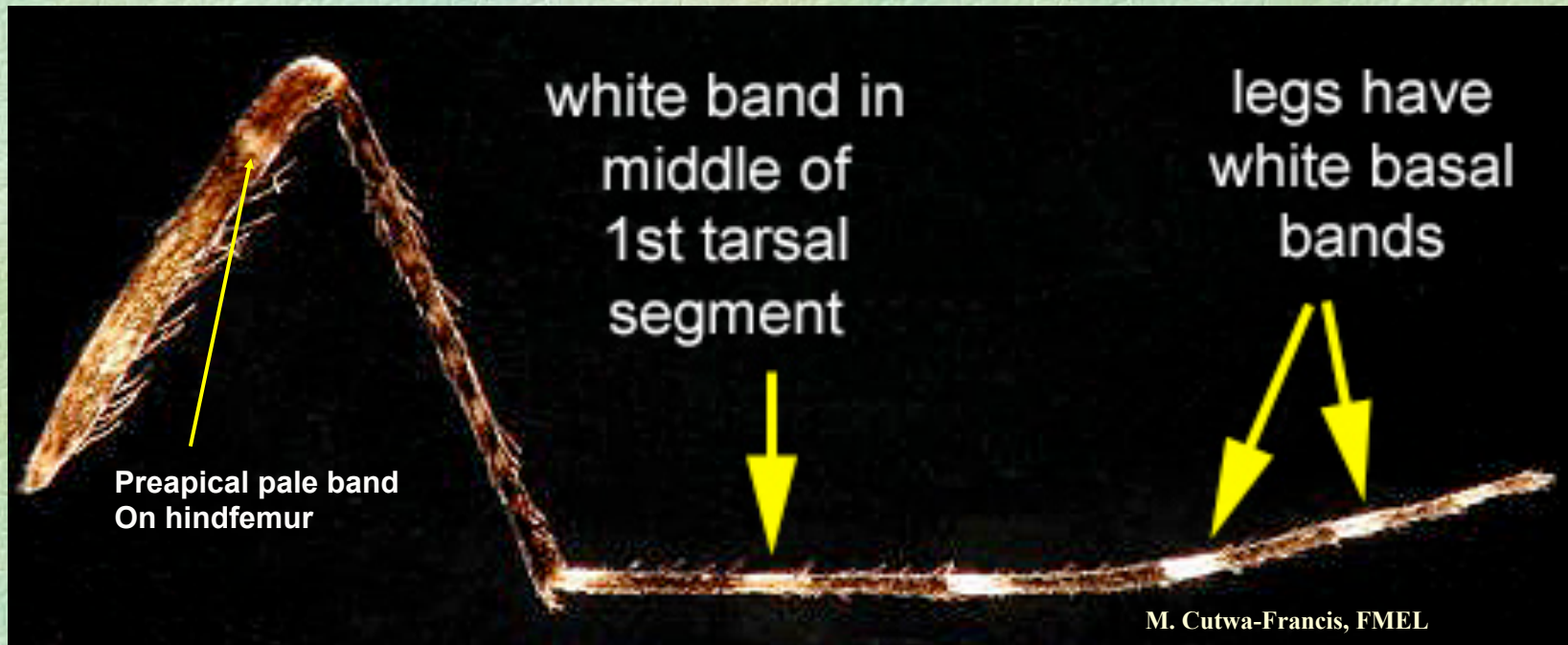
1. Hind tarsi banded across the joints
2. Brown/golden/reddish scutum
3. Ht5 pale



Psorophora columbiae



Psorophora columbiae



Ochlerotatus infirmatus



scutum has broad
white patch that
reaches from the
anterior margin
to just beyond
the middle

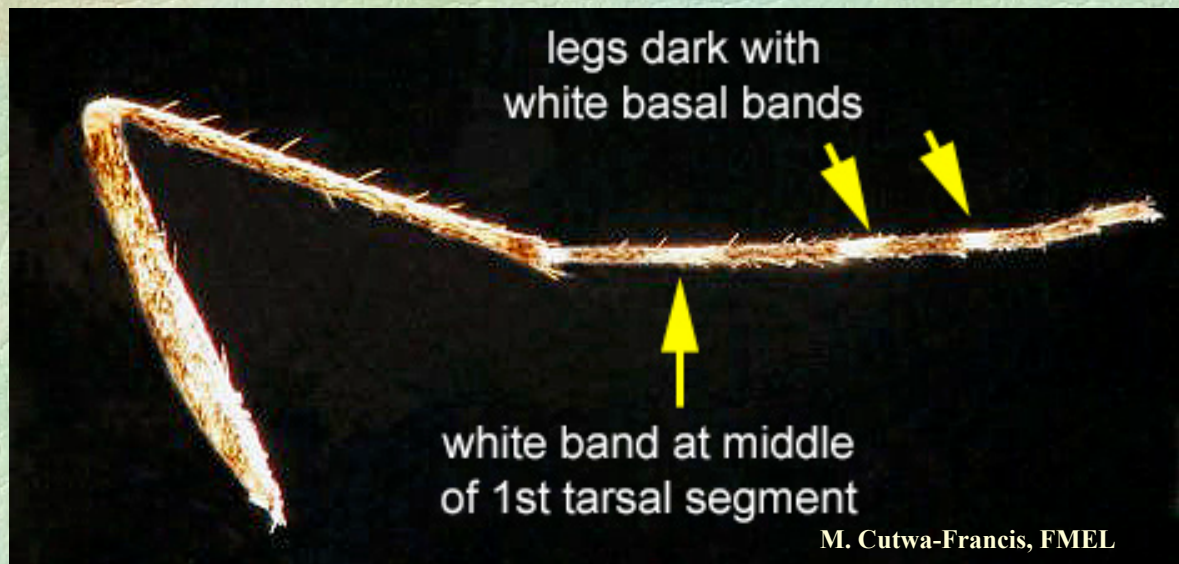
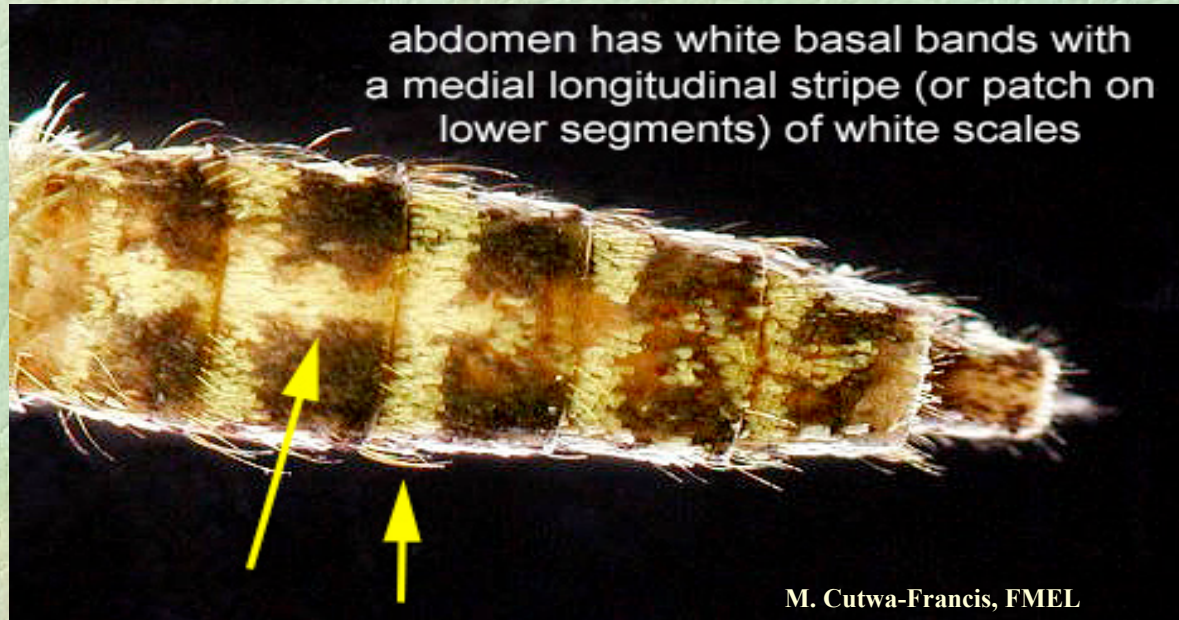
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Ochlerotatus sollicitans

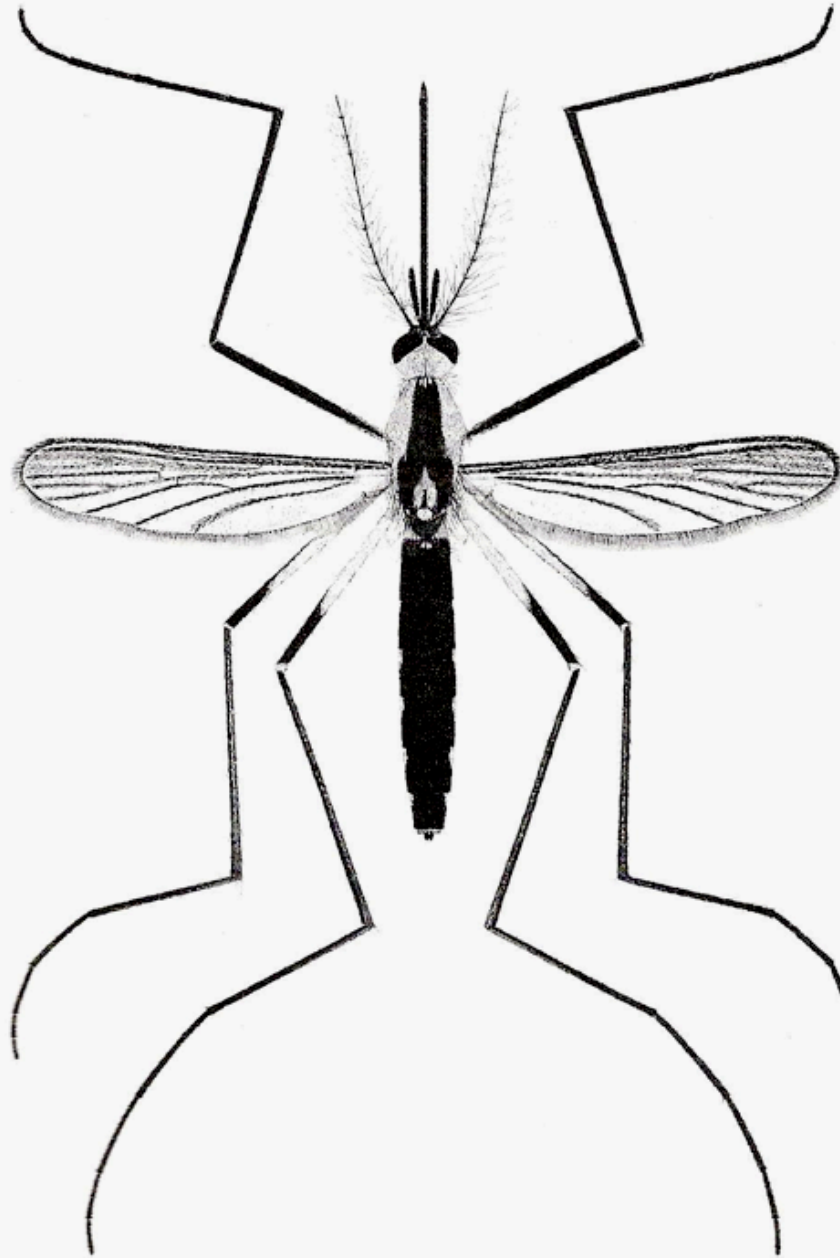


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Ochlerotatus sollicitans



Ochlerotatus triseriatus



Mansonia titillans

1. Tip of abdomen rounded (blunt)
2. Prespiracular setae absent
3. Postspiracular setae present
4. Broad black and white wing scales
5. Palpi at least 30% length of the proboscis
6. Hindtibia without preapical pale band
7. Hindtarsomere 1 without median pale band

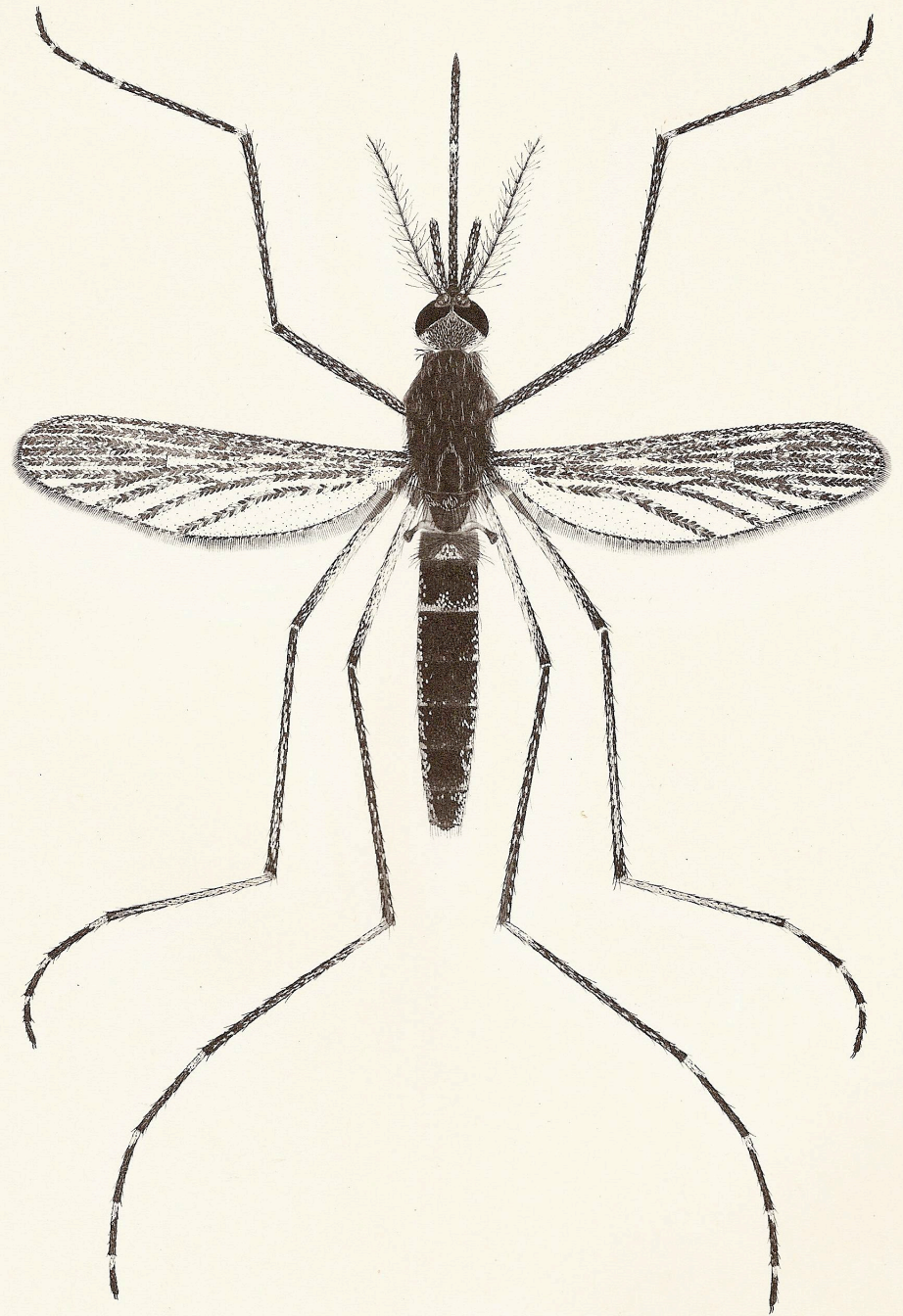


Plate 30. *Mansonia titillans* (Walker), female.

Mansonia dyari



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Orthopodomyia signifera

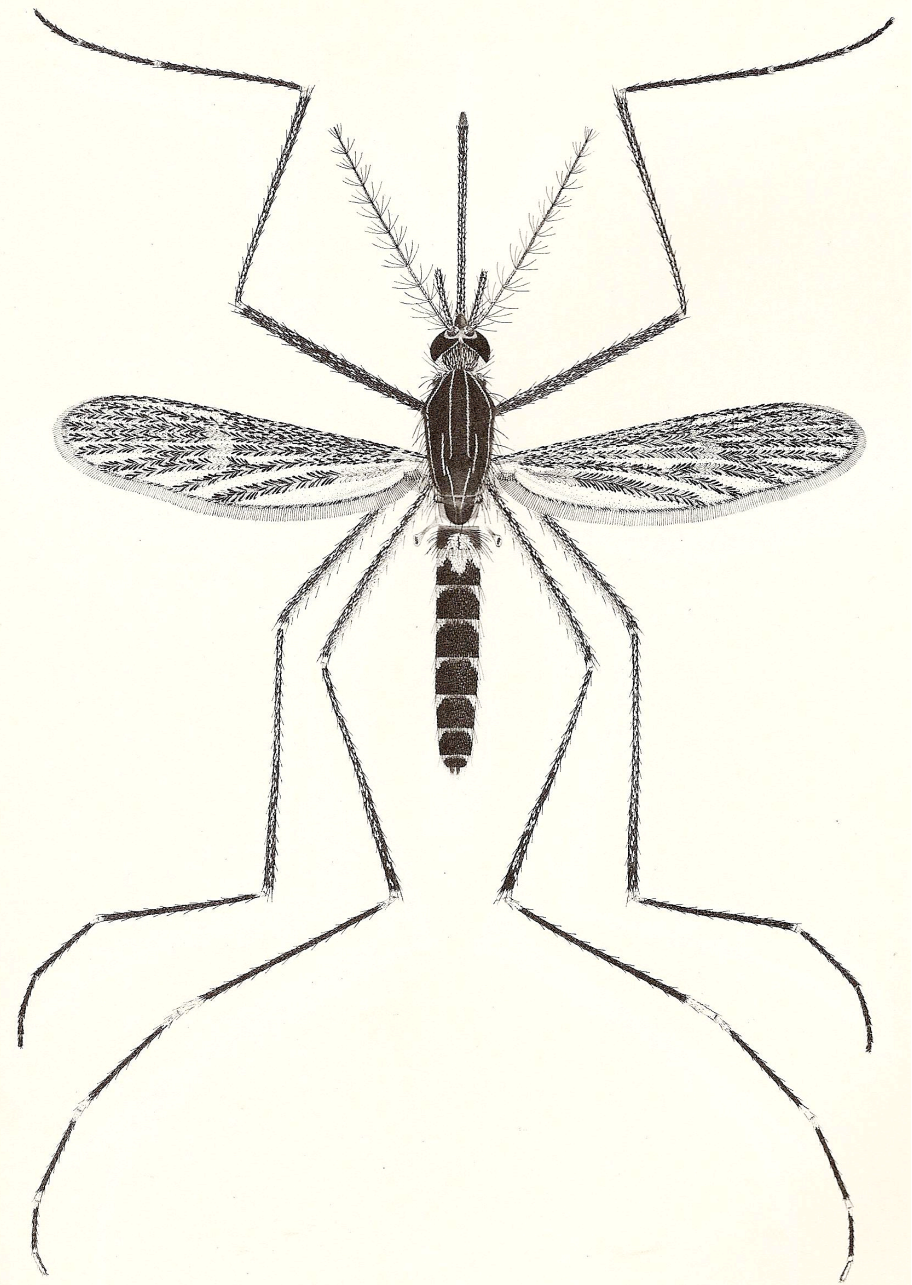
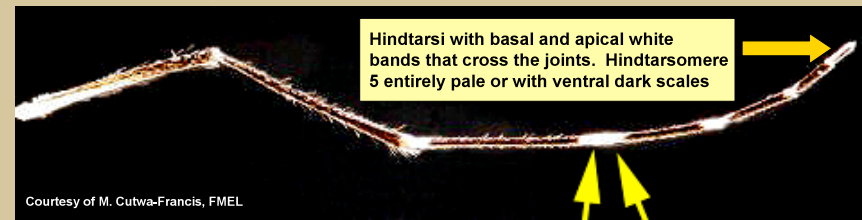
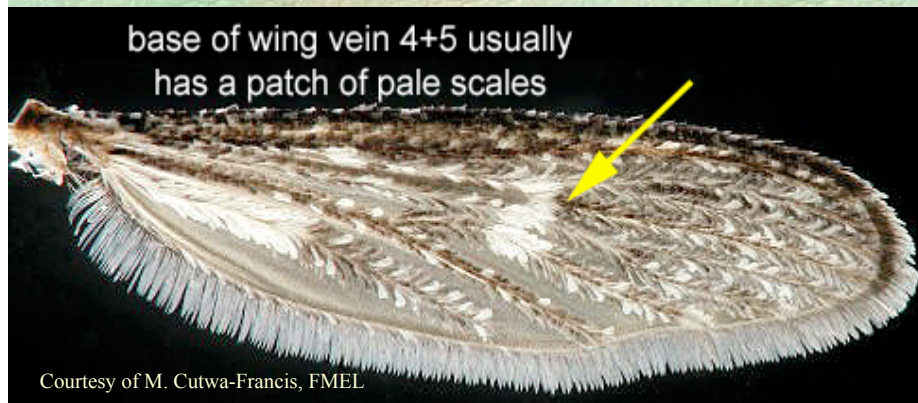
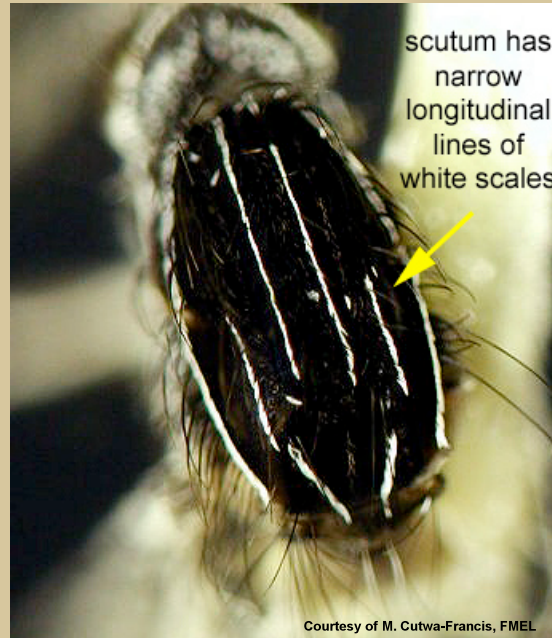


Plate 28. *Orthopodomyia signifera* (Coquillett), female.

Orthopodomyia signifera



Psorophora ciliata

1. Giant mosquito
2. Adult females bite humans
3. Larvae are predaceous on other mosquito larvae



Psorophora ciliata

scutum has a
longitudinal
stripe of
gold scales



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Psorophora ferox



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Psorophora ferox

scutum dark
with some
golden scales;
no distinct
pattern



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legs shaggy,
dark & purplish



tarsal segments
4 & 5 white



M. Cutwa-Francis, FMEL

FIELD-ID OF LARVAL MOSQUITOES

- **Field-ID of larvae is much more difficult than that for female mosquitoes. You must find the larvae, but the females find you.**
- **Because of difficulties inherent in field-ID of larvae, most specimens cannot be identified until they are heat killed (tepid, not boiling water), preserved in 80% ethyl alcohol, and examined under a microscope with at least 60X or higher magnification.**
- **Before you can find larvae, you must find the correct habitat where the target larvae may or may not occur. Larvae of many species have specific habitat requirements**

Field-ID of Larval Mosquitoes (cont.)

- ☞ Once you find larvae, they are still difficult to collect because they are generally small, very active, and often hide to avoid detection.**
- ☞ Stealth is usually required in collecting larvae. Heavy footsteps, stepping in the water, casting a shadow where you plan to dip, and indiscriminate dipping without fore-thought about where the larvae might be will usually send the larvae to the bottom and your dipper will come up empty.**

Field-ID of Larval Mosquitoes (cont.)

- **When you collect larvae they do not hold still for you to examine them with a hand lens, thus the normal technique is to observe them in the dipper. This is often complicated by having turbid or stained water in which the larvae cannot be seen.**
- **However, if you are successful in collecting larvae and able to learn larval field-ID it presents a number of advantages to you.**

Field-ID of Larval Mosquitoes (cont.)

- **Field-ID is very important for proactive mosquito control.**
- **Field-ID of larvae can help you verify complaints about adult mosquitoes.**
- **Using field-ID you can confirm that larvae you collected are responsible for complaints and you can initiate immediate on-site control measures. This can quickly eliminate an ongoing problem or stop a problem before it occurs without having to visit the site a second time.**

Field-ID of Larval Mosquitoes (cont.)

- **FIELD-ID OF LARVAE CAN HELP YOU SAVE MANPOWER, \$\$\$\$, AND TIME.**

How do you learn to field-ID larvae?

- o You must be able to distinguish mosquito larvae from the immature stages of other insects.**
- o You must know the anatomy of a mosquito larva in order to quickly see important characters.**
- o You must be able to distinguish early (1st – 2nd) instars from late (3rd – 4th) instars because key characters are normally based on 4th instars.**

How do you learn to field-ID larvae? (cont.)

- o You must learn the diagnostic characters for the larvae of species in your area. This requires examining hundreds, if not thousands, of killed preserved larvae under a microscope. It also requires reading books and papers that provide larva ID information for the species in your area.**
- o You must learn the phenology (seasonality) of each species in your area.**
- o You need to know the different types of larval habitats in your area.**

How do you learn to field-ID larvae? (cont.)

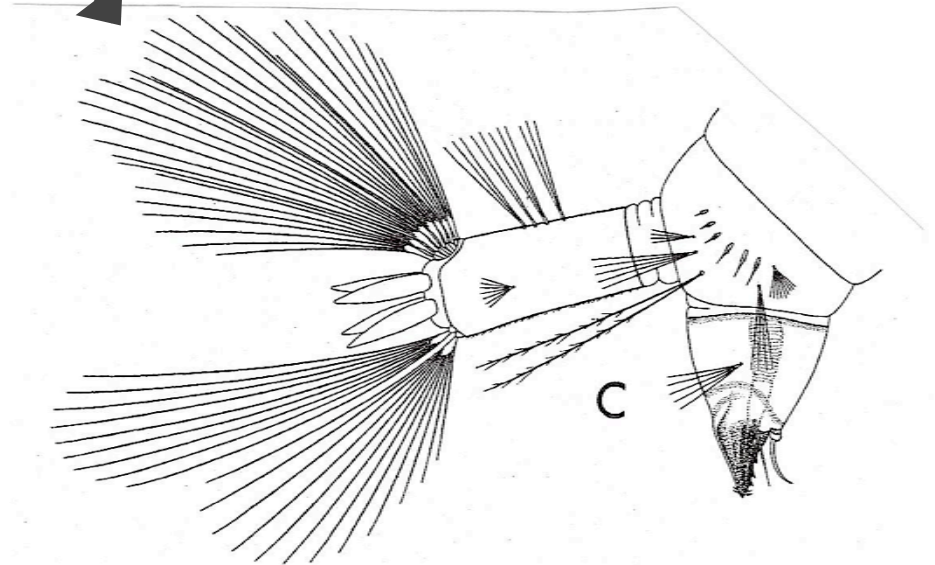
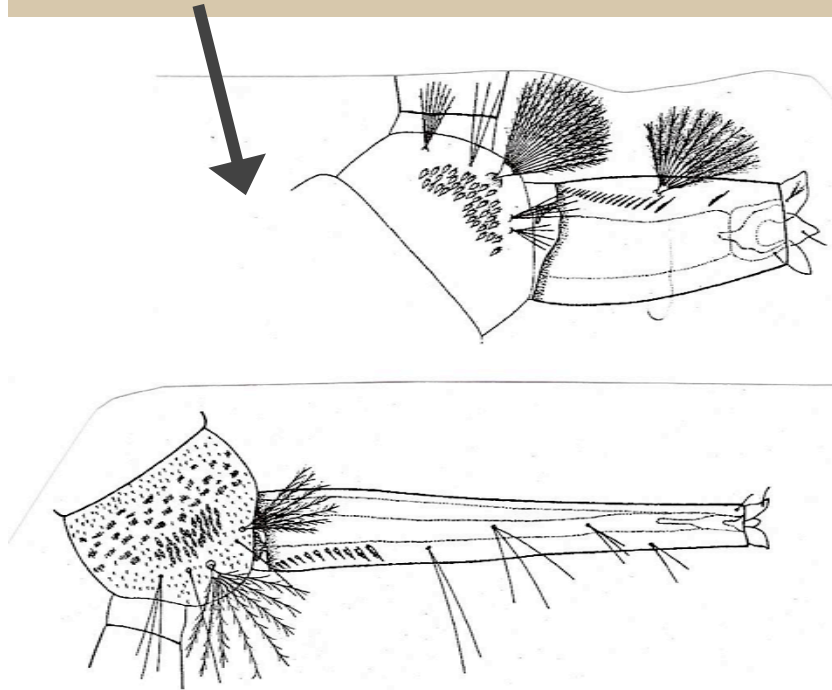
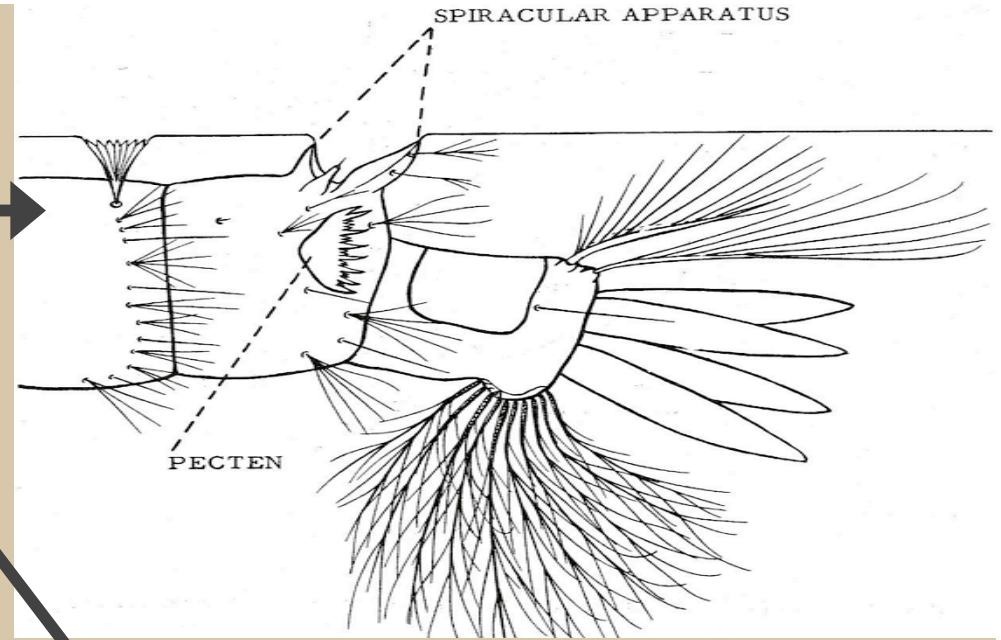
- o You must know the habitat requirements for each species in your area.**
- o Knowing the larval behavior patterns can greatly assist in finding larvae of certain species.**
- o You must know the species that possess unique characters that are easily seen in the field.**

Topics we will cover for larvae.

- o Initial sorting**
- o Sorting for control purposes**
- o Unique characters that can be used to identify 4th instar larvae of certain species**

Initial Sorting By Siphon

1. No siphon = *Anopheles*
2. Small sharp-pointed siphon = *Coquillettidia* & *Mansonia*
3. Distinct tubular siphon of different lengths = all the other genera



***Anopheles* = CONTROL!**



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NOTE: colors cannot be used to separate larvae of *Anopheles*, as some species can be green, blue, red, cream, brown, black or with black and cream longitudinal stripes

Sharp-pointed siphon

= *Coquillettidia* or *Mansonia*

CONTROL!



Coquillettidia perturbans

GIANT LARVAE

1. Giant *Toxorhynchites* larvae are normally red. These are our friends as they eat many larvae of dangerous species. The females do not bite. **DO NOT CONTROL!**
2. Giant *Psorophora* larvae (2 species) are predators and usually gray in color. They eat many other larvae, but the adults bite us – **OUCH!** **CONTROL!**



Short larvae

= *Culex*, *Culiseta*,
some *Aedes*,
Ochlerotatus, and
Psorophora

CONTROL!



Culex



Ochlerotatus



Culex



Psorophora

Long Larvae

= *Aedes* and
Ochlerotatus in
container habitats

CONTROL!



Ochlerotatus



Ochlerotatus



Aedes

All pictures courtesy of M. Cutwa-Francis, FMEL

Identifying larvae by colors and color patterns

1. Solid colors

- (A) Pink to red orange
- (B) Creamy white
- (C) Green

2. Banded or other color patterns

- (A) Banded with dark and pale colors
- (B) Antennae and siphon dark brown

Pink or red orange

Orthopodomyia

Saddle-like plates on
segment VI-VIII



Robert Collins, NCMVCA

Toxorynchites

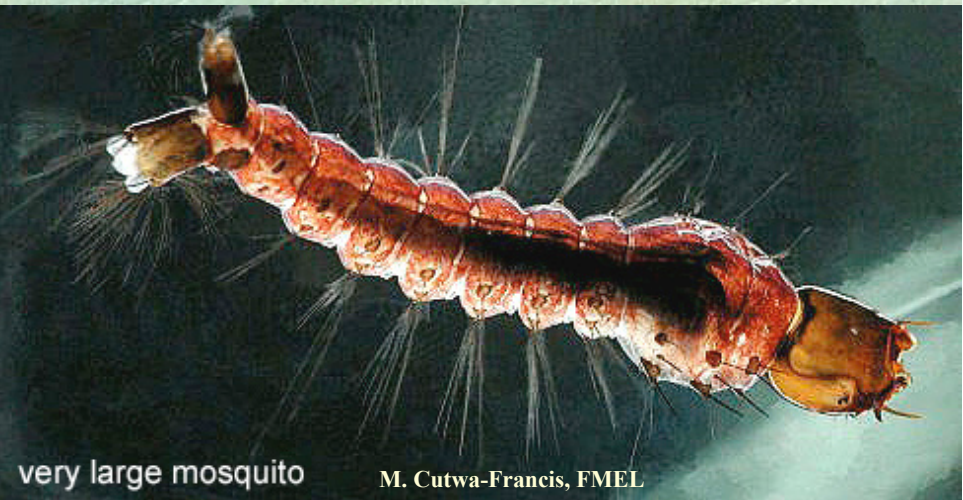


Robert Collins, NCMVCA

Toxorynchites
second instar

Orthopodomyia
fourth instar

Robert Collins, NCMVCA



very large mosquito

M. Cutwa-Francis, FMEL

Creamy white larvae

In pitcher plant
or bromeliads

- Wyeomyia mitchellii*
- Wyeomyia smithii*



In containers and tree holes

- Aedes aegypti*
- Ochlerotatus hendersoni*
- Orthopodomyia alba*



Banded *Ochlerotatus*



Robert Collins, NCMVCA

Oc. fulvuspallens



Oc. atlanticus
Oc. tormentor



Oc. infirmatus

Sketches adapted from Bickley and Harrison (Mosquito Systematics, Vol 21 (3) 1989)

Banded *Culex*



Cx. territans
Cx. erraticus

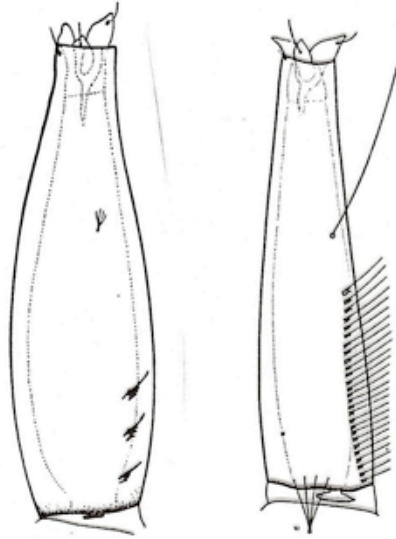


Cx. peccator

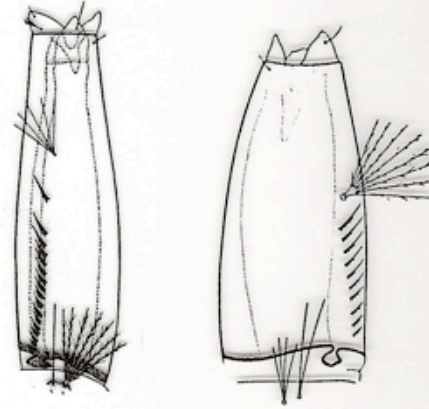
Sketches adapted from Bickley and Harrison (Mosquito Systematics, Vol 21 (3) 1989)

Types of siphons

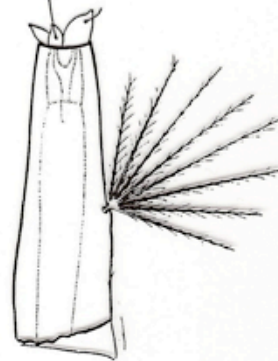
Psorophora



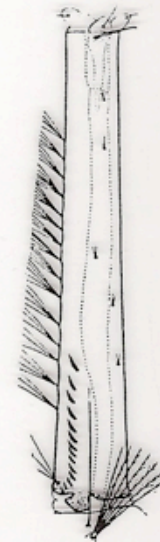
**Aedes
Ochlerotatus**



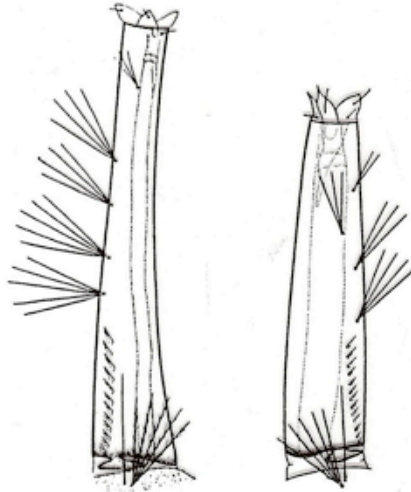
Orthopodomyia



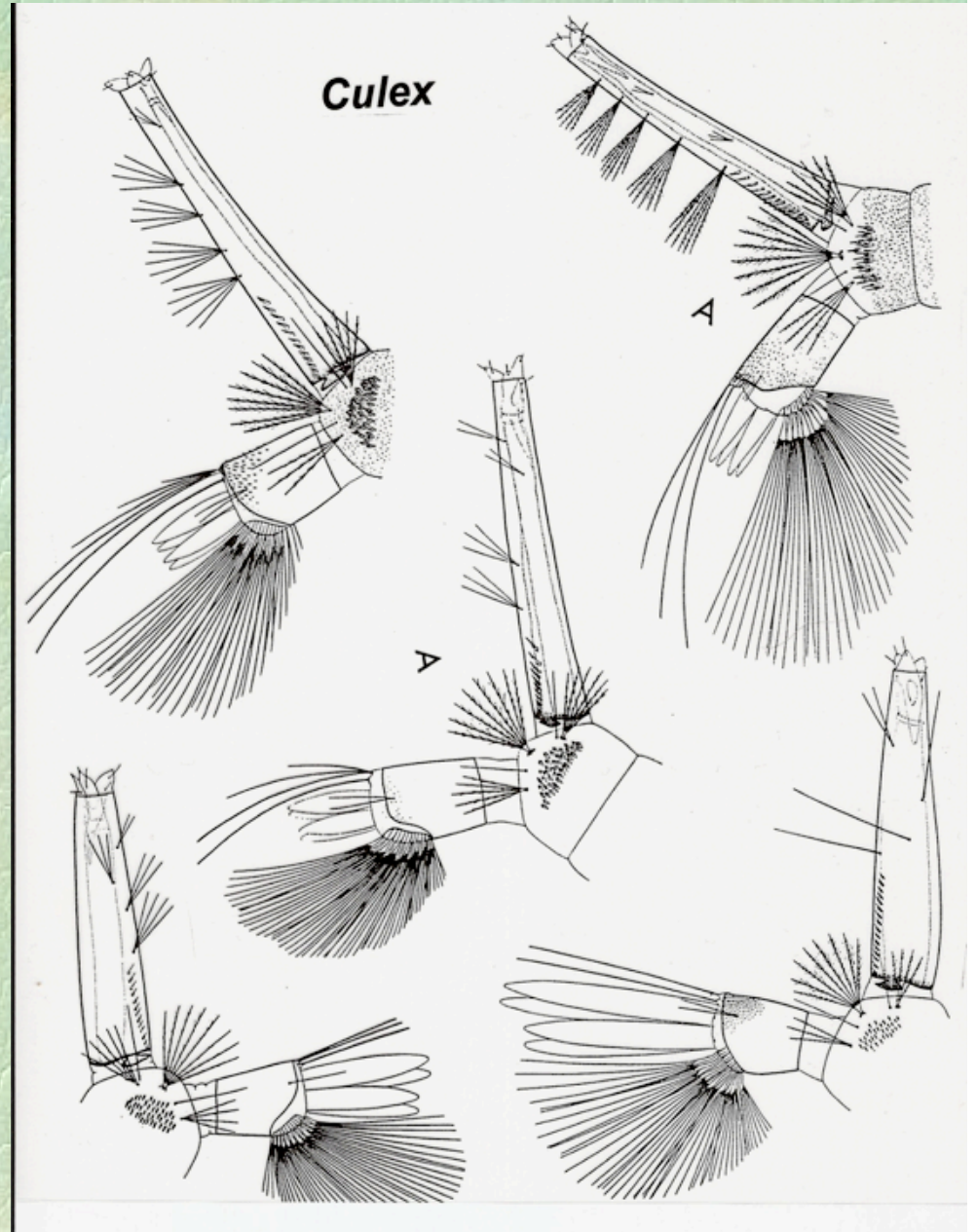
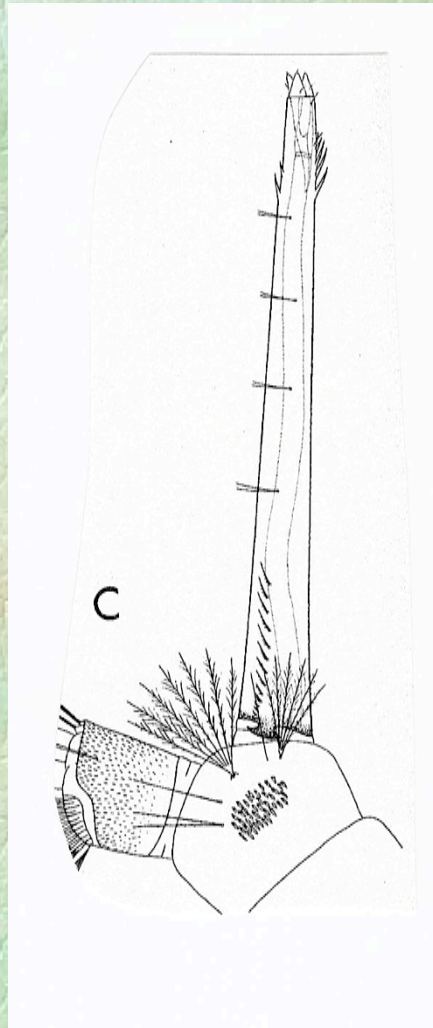
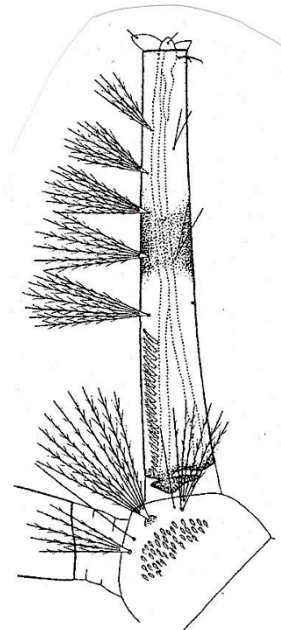
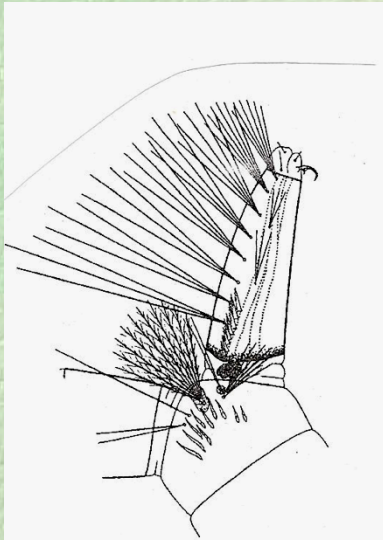
Culiseta



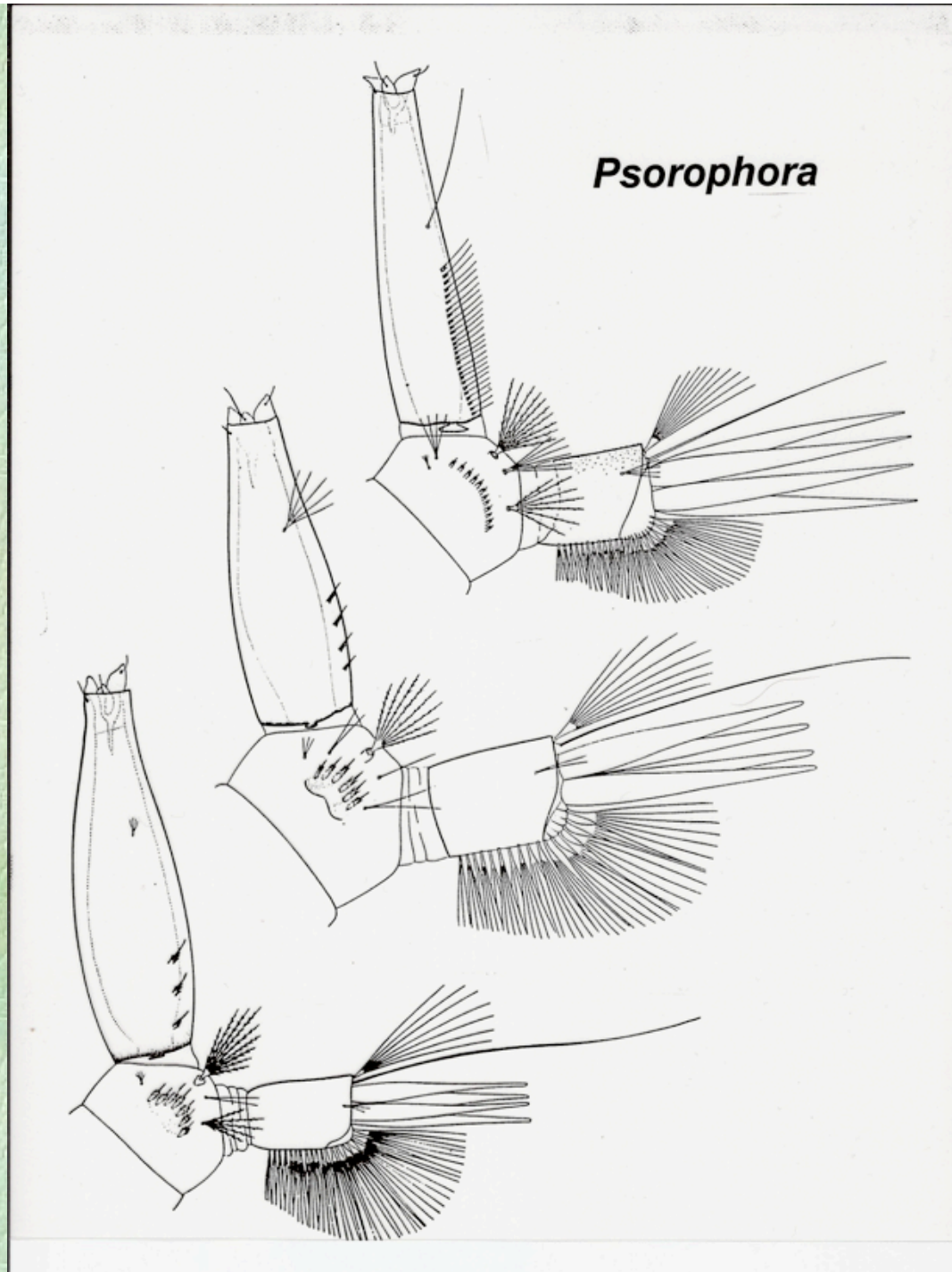
Culex



Types of *Culex* siphons



Types of siphons on *Psorophora*



Field-ID makes field work more interesting and fun, particularly when you discover you can do it!