Mosquitoes of Georgia

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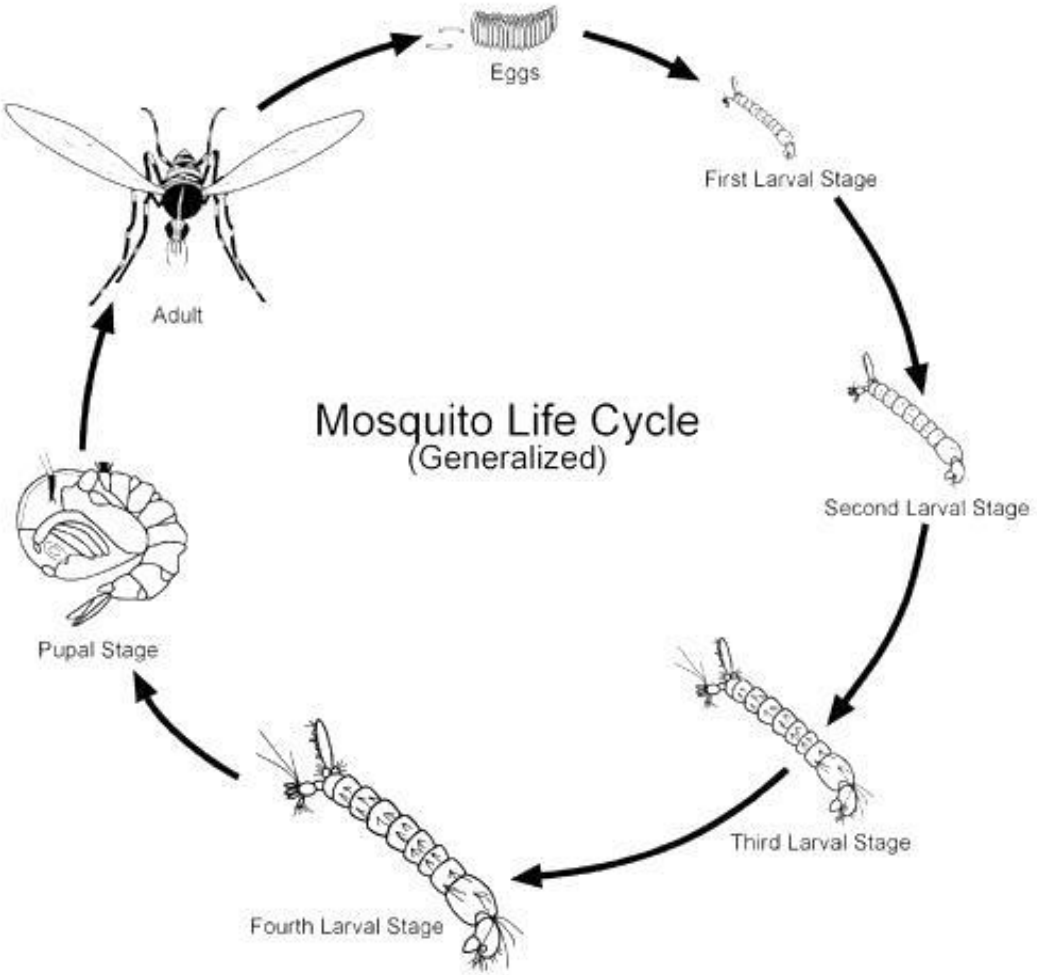
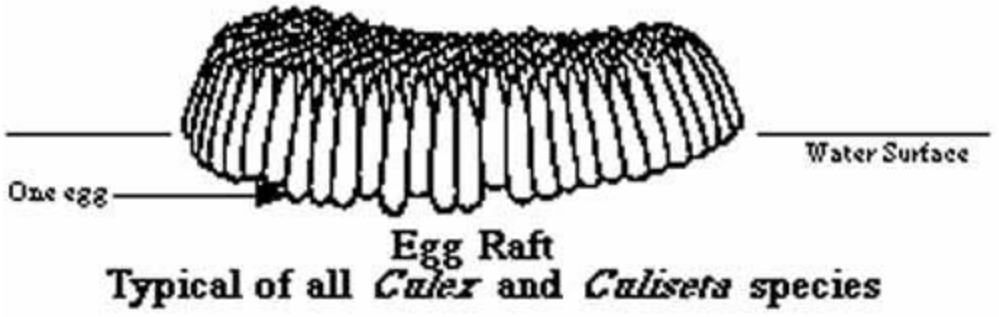
Life Cycle

- Egg
- Larva
- Pupa
- Adult



Complete Metamorphosis

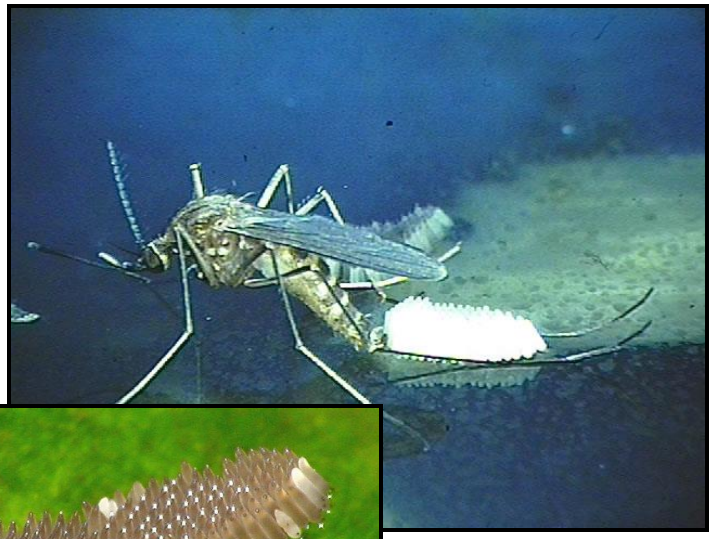
Eggs

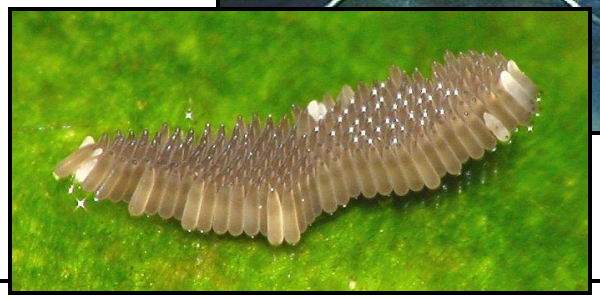


- After laying, eggs generally require 2-5 days of incubation before hatching
  - Eggs laid in permanent water will hatch after incubation
  - Eggs laid in tree holes, containers, or floodwater areas will hatch when covered with water after a period of incubation
- A female will lay between 100-150 eggs
- Most eggs are very resistant to environmental conditions
- Eggs may stay viable for many years

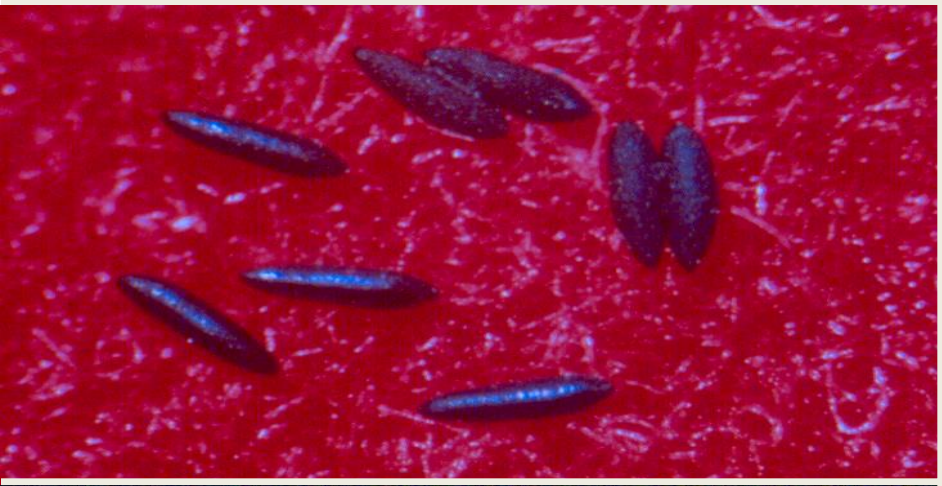
Eggs

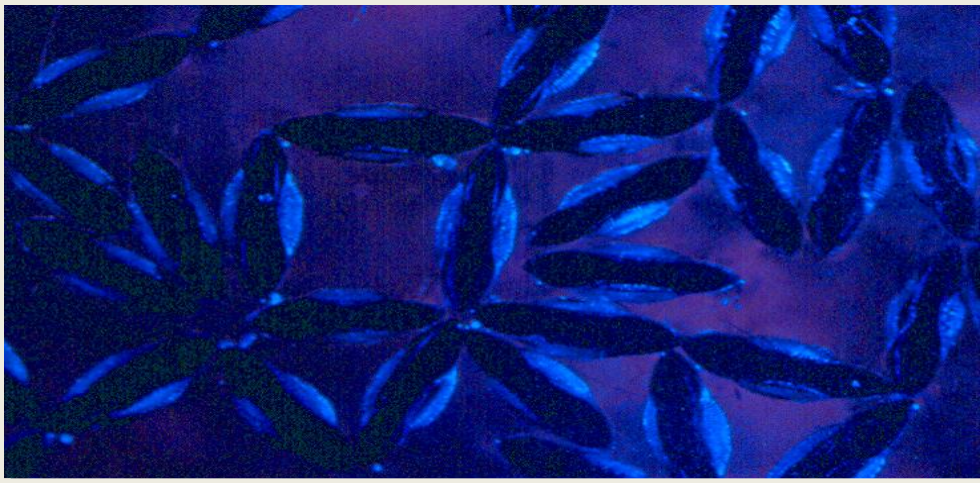
- Laid singly
  - On water
    - *Anopheles*
    - *Coquillettidia*
  - On land
    - *Aedes* & *Ochlerotatus*
    - *Psorophora*
- Egg rafts
  - *Culex* spp.
  - *Culiseta* spp.



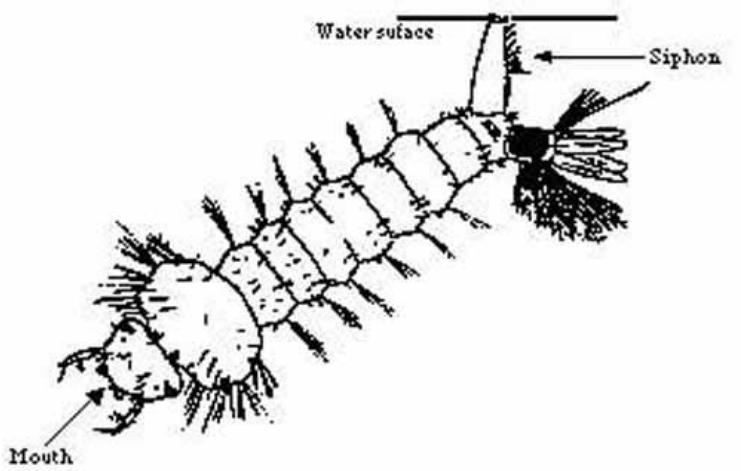


More Eggs





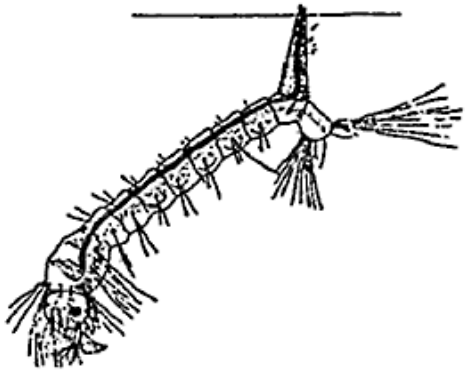
Larvae



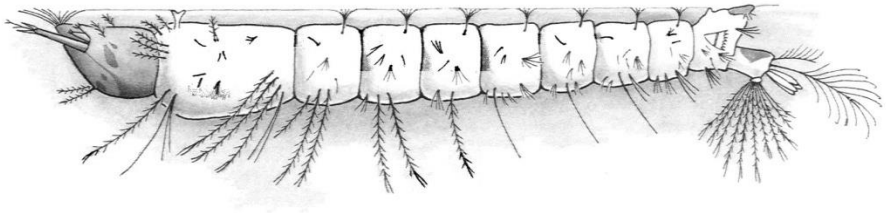
- Four instars
- It generally takes 3 to 7 days to complete development depending on food and temperature
- Most larvae are filter feeders
- Larvae breath air but can absorb oxygen through the body wall

Types of Larvae = “wigglers”

- **Culicine**: All genera other than Anopheles
  - Culex, Ochlerotatus, Aedes, Psorophora, Culiseta…

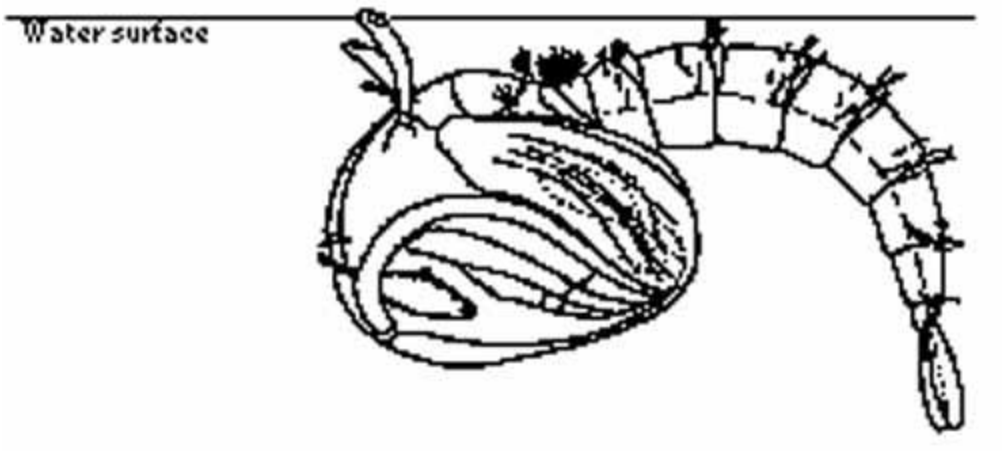


- **Anopheline**: All the Anopheles species



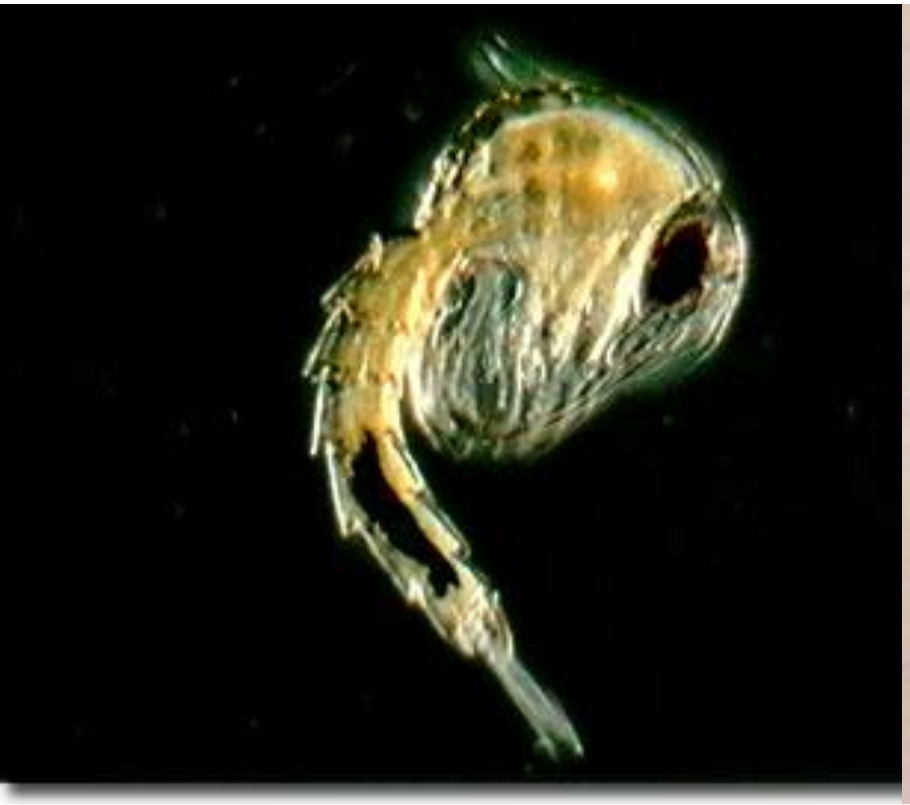
Larval Instars

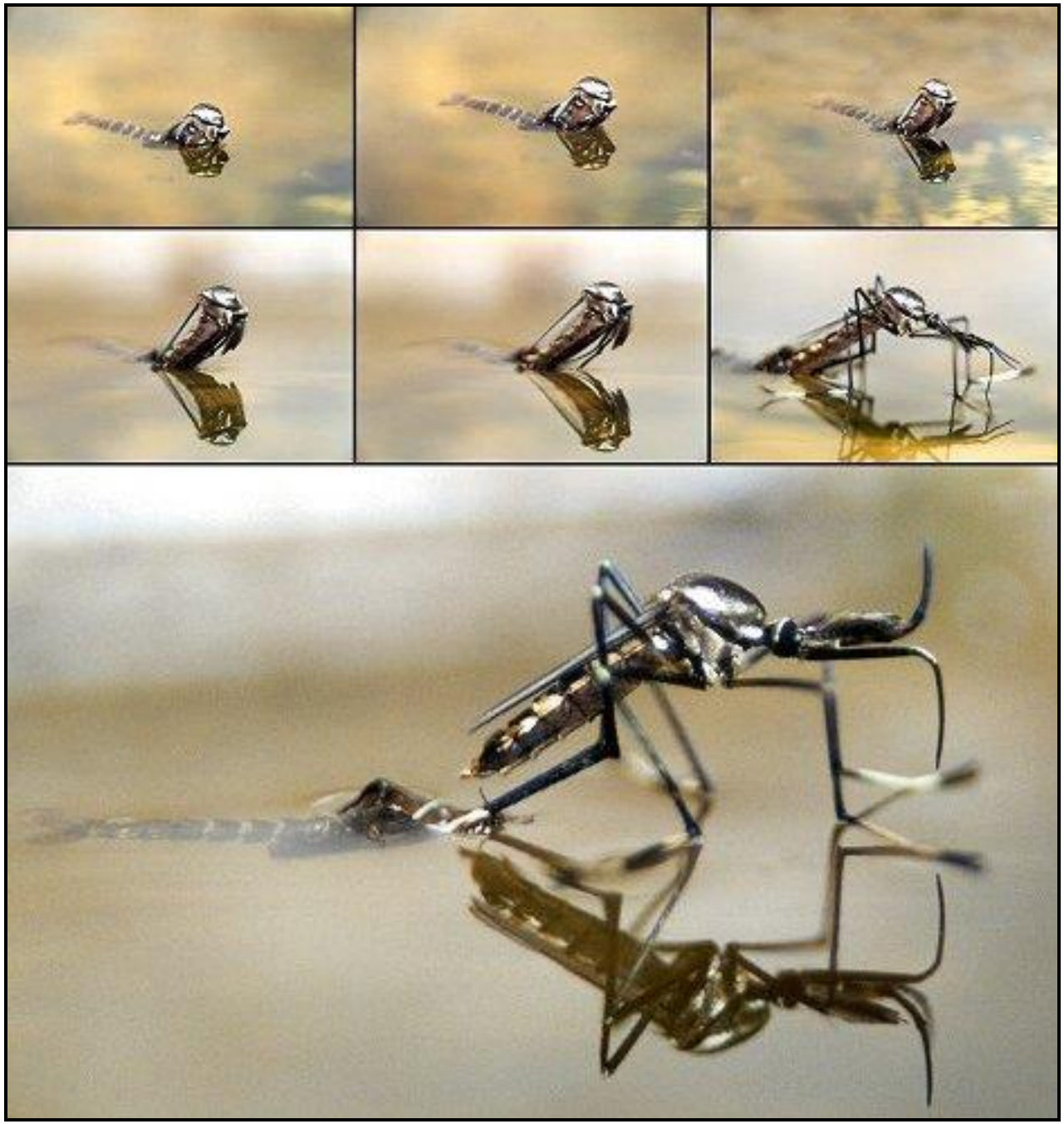
Pupae



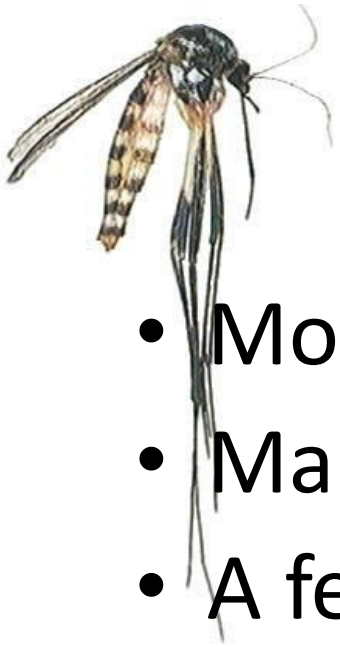
- Air breathers
- Do not feed
- Mobile
- Generally, takes 1-2 days before the adult emerges

Pupae = “tumblers”





Emergers



Adults

- Mosquitoes mate soon after emerging
- Male mosquitoes die soon after mating
- A female will lay approximately 100-150 eggs per one oviposition cycle
- A female will go through about 10 oviposition cycles
- Most female mosquitoes live about 2 weeks and may live 2 months or more

WHAT DO THEY EAT?

- Plant juices & nectar
- Females also need blood from other animals

The Blood Meal

WHY DO FEMALE MOSQUITOES NEED YOUR BLOOD?

They use the blood to help develop eggs

- Females generally begin blood feeding following mating

- Eggs are ready to be laid approximately 3 days following a blood meal

And now there will be *more* mosquitoes!

MOSQUITO LARVAE ARE FOUND EVERYWHERE AROUND THE WORLD, EXCEPT ANTARCTICA.

THEY ARE FOUND FROM 3,000 FT BELOW THE SURFACE IN MINES TO 16,000 FT ELEVATION IN THE HIMALAYA MOUNTAINS.

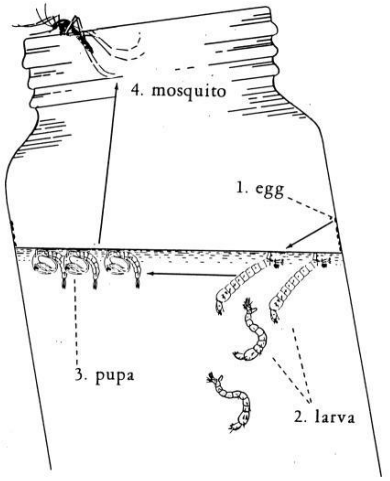
➢ A BASIC CLASSIFICATION OF LARVAL HABITATS INCLUDES:

I. <u>SOIL-BASED WATER COLLECTIONS</u>

- PERMANENT
- SEMI-PERMANENT
- TEMPORARY
  - FLOOD PLAINS
  - RAIN POOLS
  - BRACKISH WATER POOLS
- RUNNING WATER COLLECTIONS

II. <u>CONTAINER WATER COLLECTIONS</u>

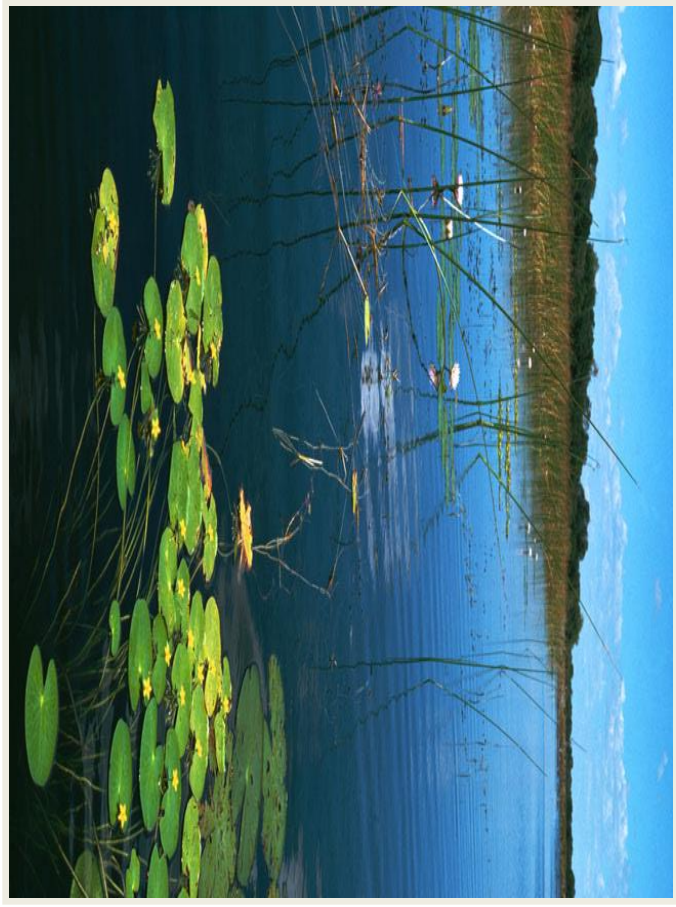
- ARTIFICIAL
- NATURAL

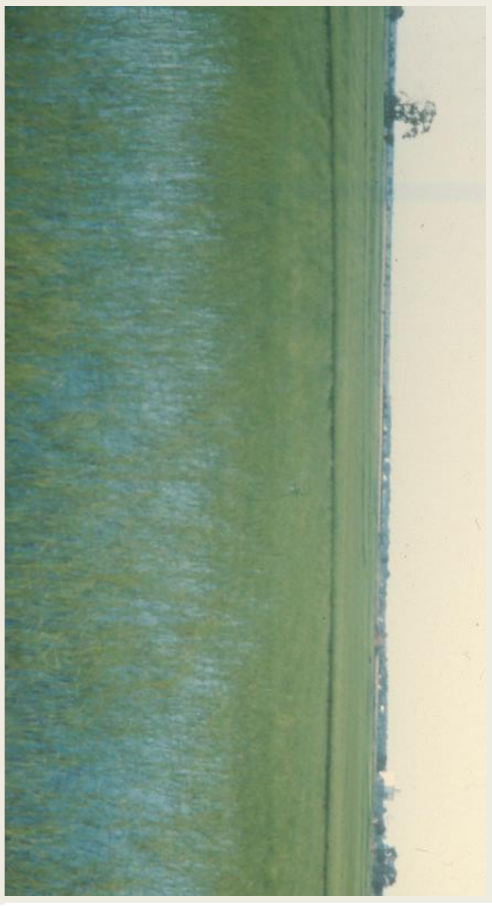


Habitats

- Fresh, Brackish, or Saltwater
  - Permanent water eggs (e.g., *Culex, Anopheles*) are laid directly on water - ponds, pools, and streams and hatch after incubation.
  - Floodwater eggs (e.g., *Psorophora, Aedes, Ochlerotatus*) are laid on moist soil - ditches, floodplains, depressions and upper marsh and hatch after inundation and incubation.
  - Eggs laid above water-line:
    - Natural containers like rock holes, water holding plants, and tree holes.
    - Artificial containers like buckets, birdbaths, flowerpots, rain gutters, tires, cans, and boats.

Permanent-water Mosquito Habitats



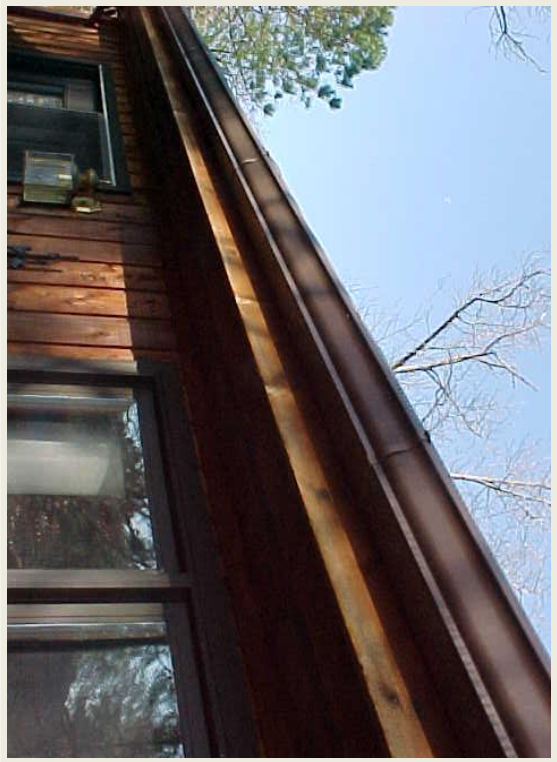



Flood-water Mosquito Habitats



Flood-water Mosquito Habitats


Container Habitats



Container Habitats

Tires are love at first sight for species such as *Ochlerotatus japonicus, Aedes albopictus* and *Oc. triseriatus*

A Specialized Habitat

Wyeomyia smithii

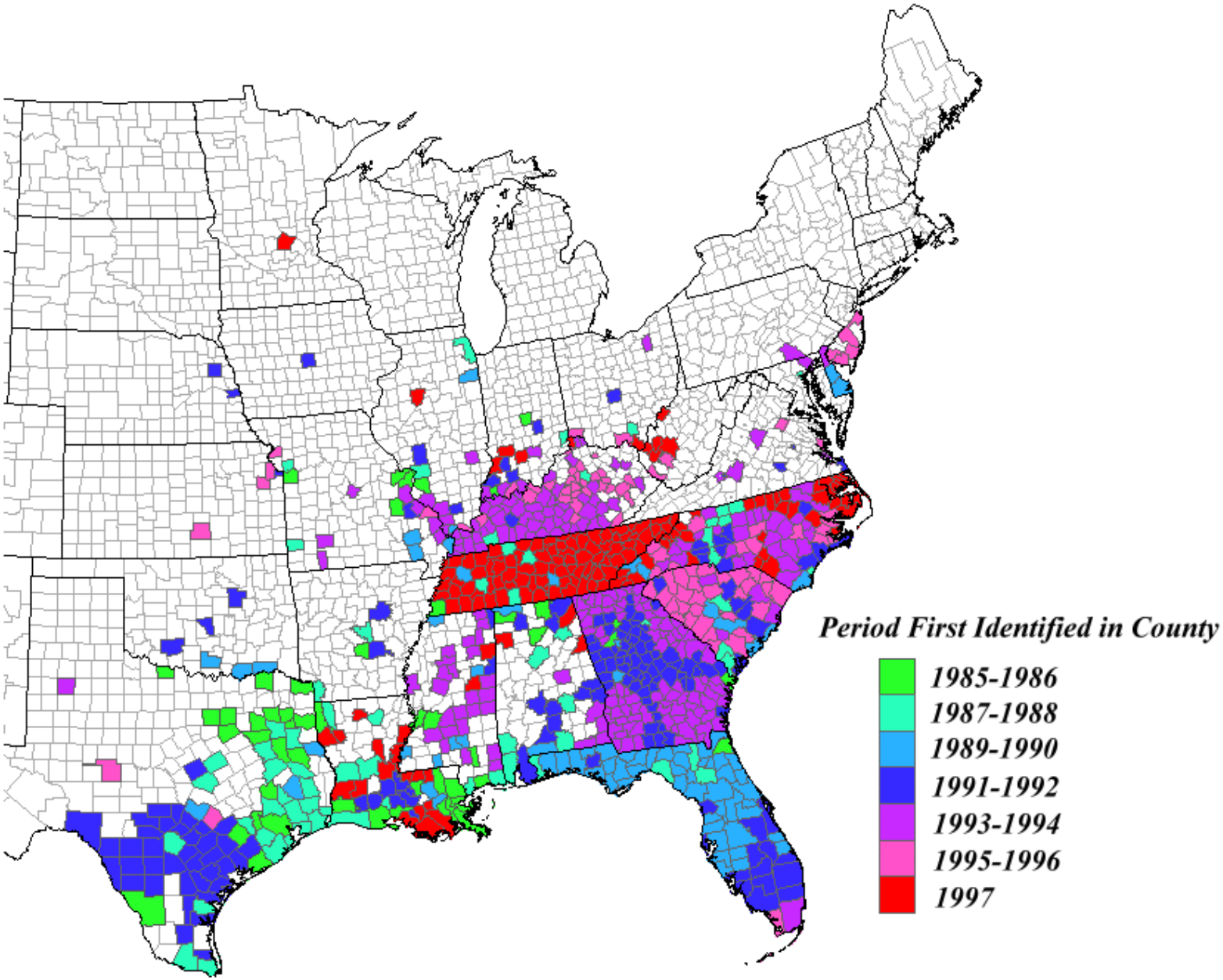
Every leaf has a water receptacle

Parker Whitt, NC PHPM, 2005

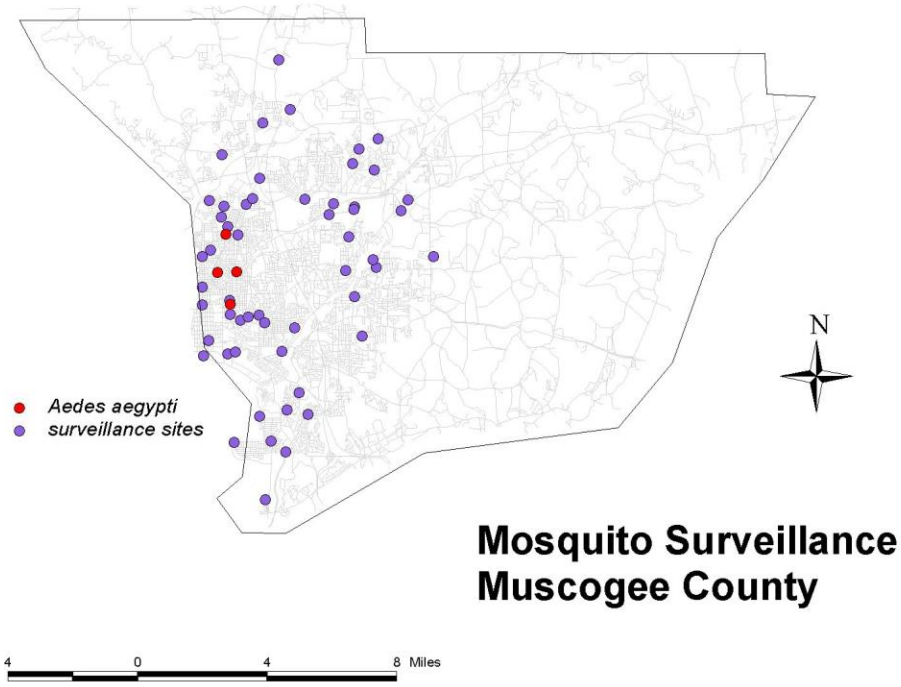
Some Common Georgia Species

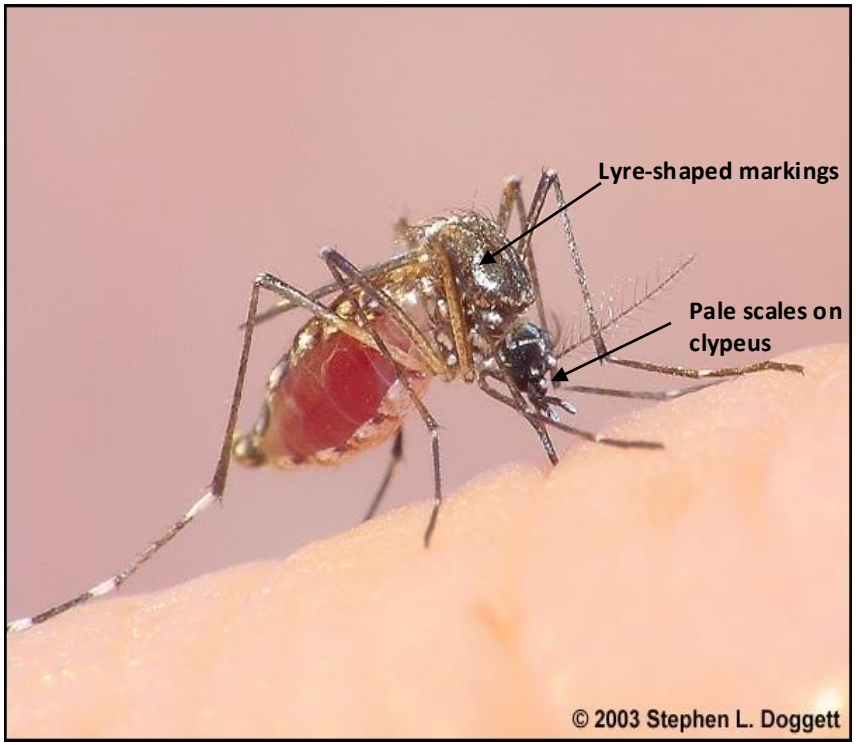
Aedes albopictus

Distribution of Aedes albopictus by U.S. County, 1985-1997

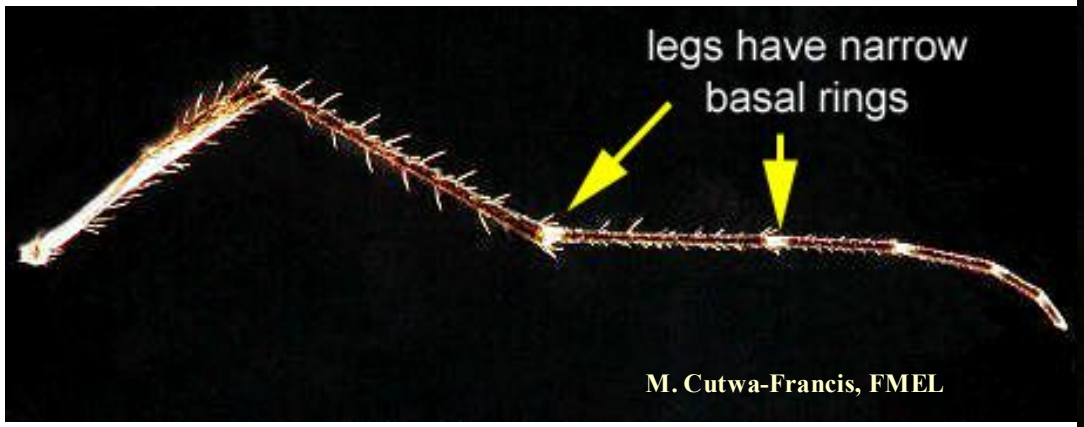


Aedes aegypti





Aedes vexans



Anopheles quadrimaculatus

Malaria in the United States

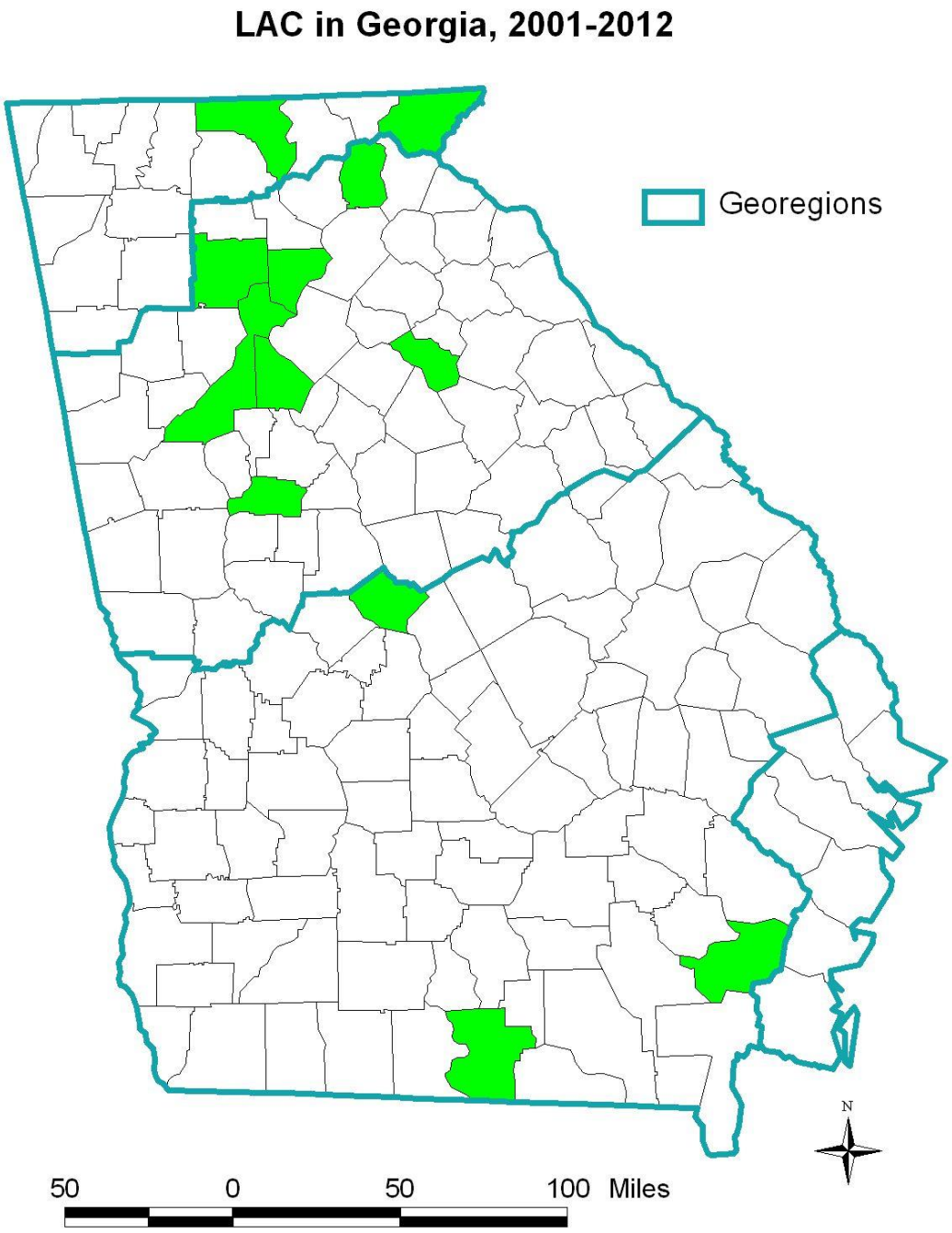
Anopheles quadrimaculatus is historically the most important vector of malaria in the eastern United States.

Malaria was a serious plague in the United States for centuries until its final eradication in the 1950s.

Primary La Crosse Vector
Ochlerotatus triseriatus, Tree-hole Mosquito

LAC is very under-reported in Georgia.

Ochlerotatus triseriatus is the primary vector of LAC.

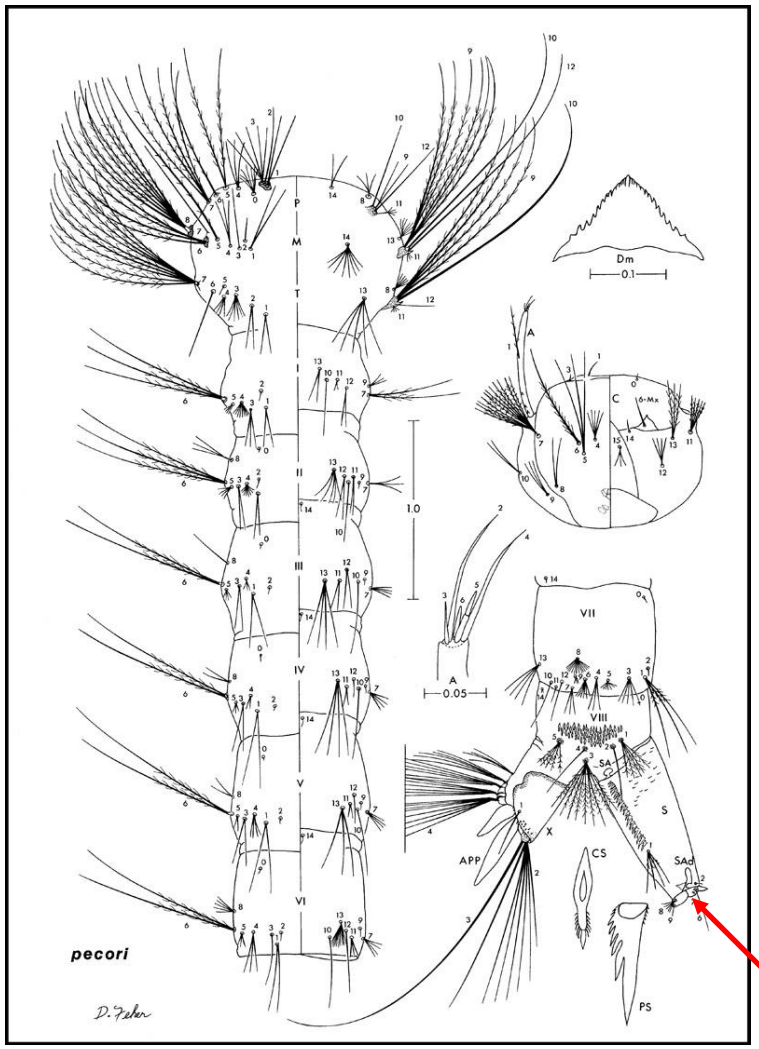


Ochlerotatus fulvus pallens

Ochlerotatus atlanticus/tormentor

Oc atlanticus - larval ID

Setal tuft on siphon(1-S) outside of pecten



Oc tormentor - larval ID

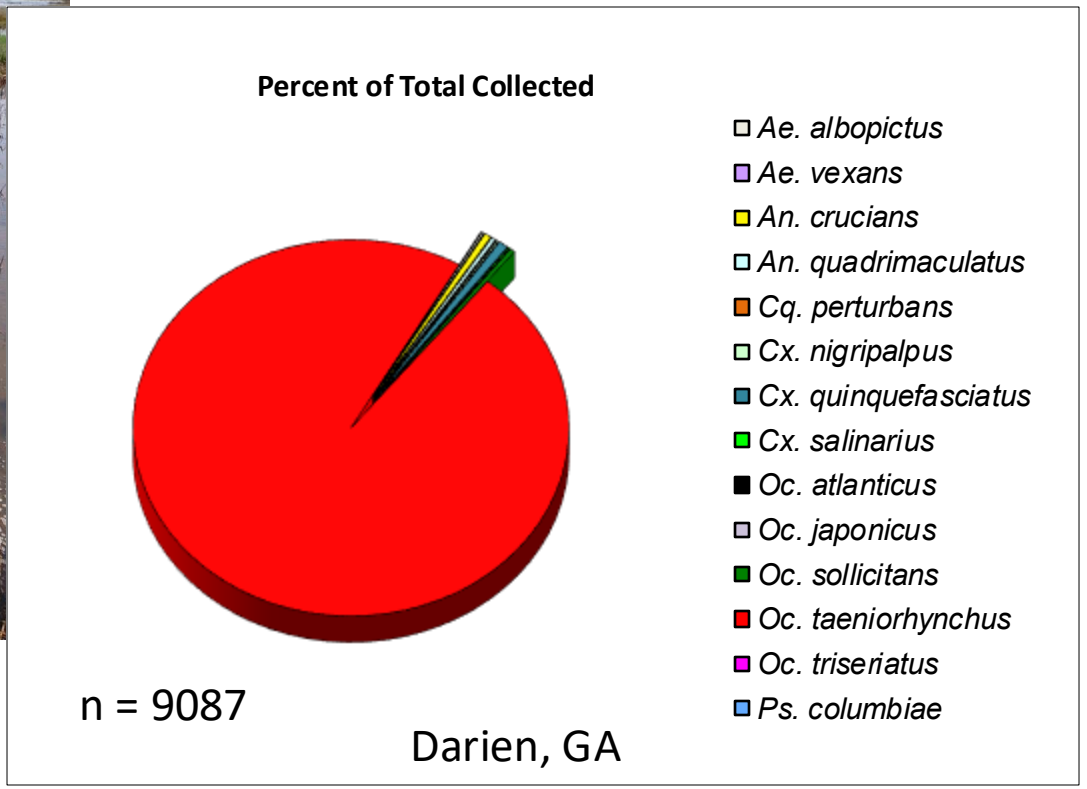
Setal tuft on siphon (1-S) inserted within pecten

Ochlerotatus taeniorhynchus

M. Cutwa-Francis, FMEL

Ochlerotatus sollicitans

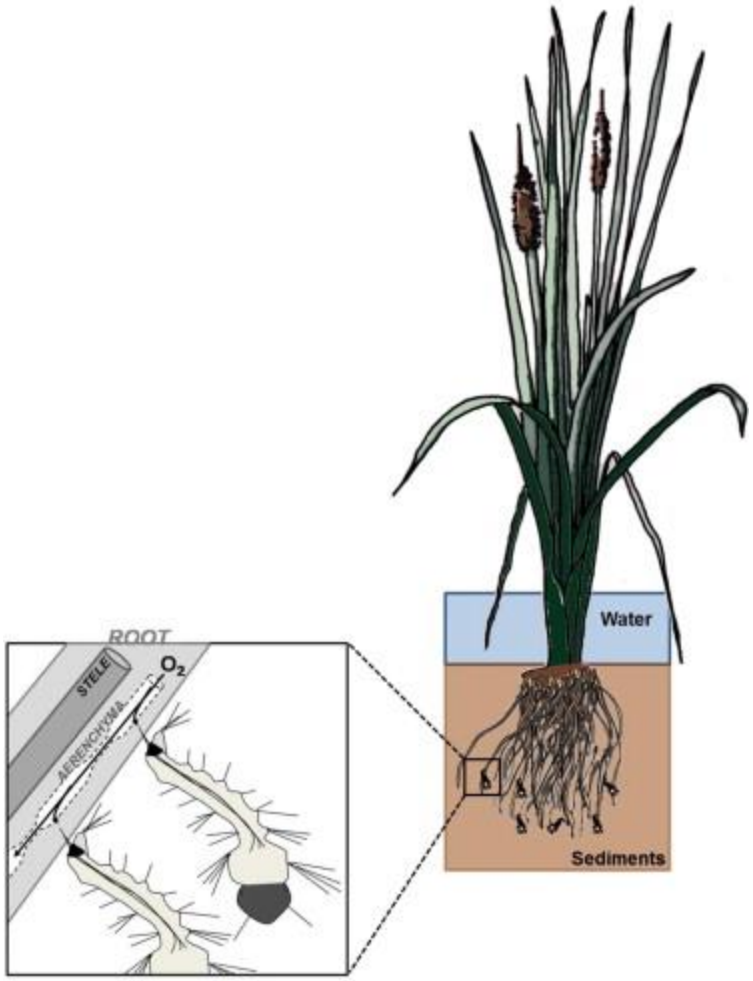
The brood of ‘99



n = 9087

Darien, GA

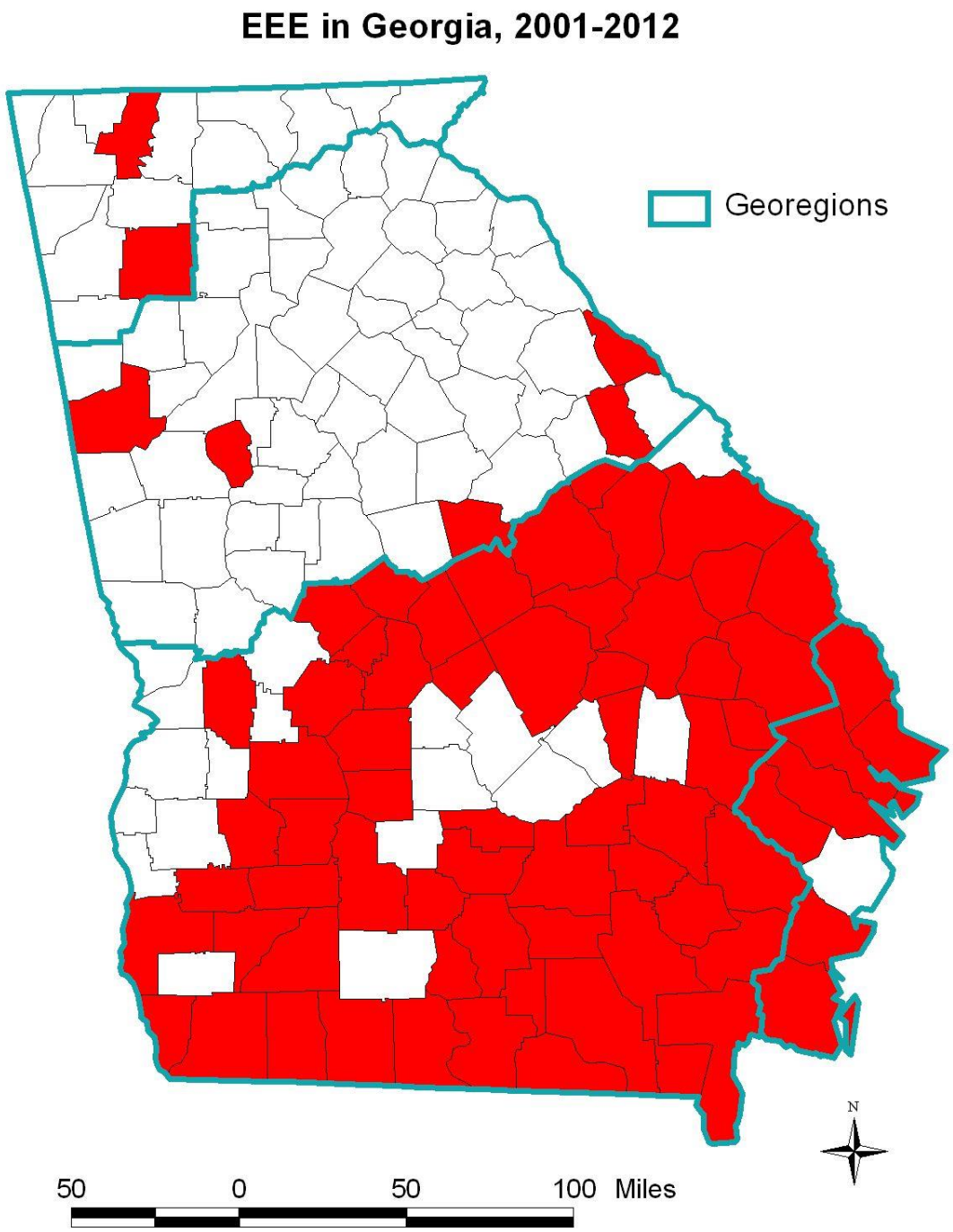
Saltmarsh Species



Coquillettidia perturbans

M. Cutwa-Francis, FMEL

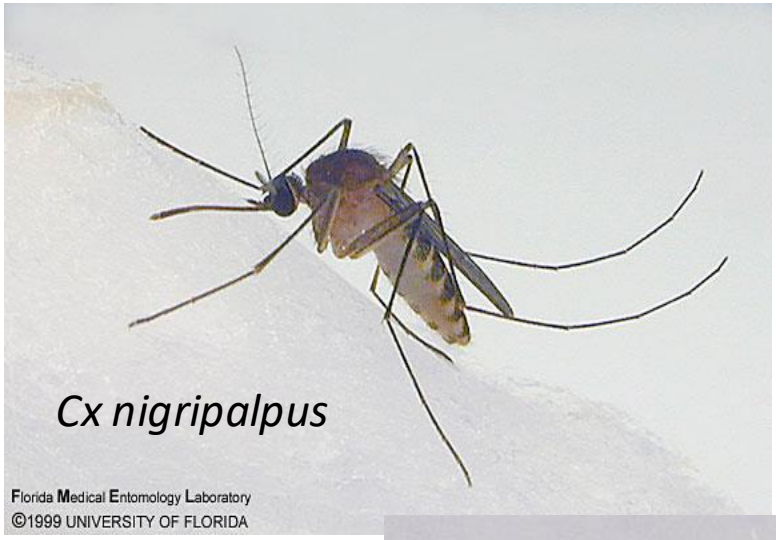
Culiseta melanura



EEE is endemic in south Georgia.

Culiseta melanura is the enzootic vector.

Culex spp

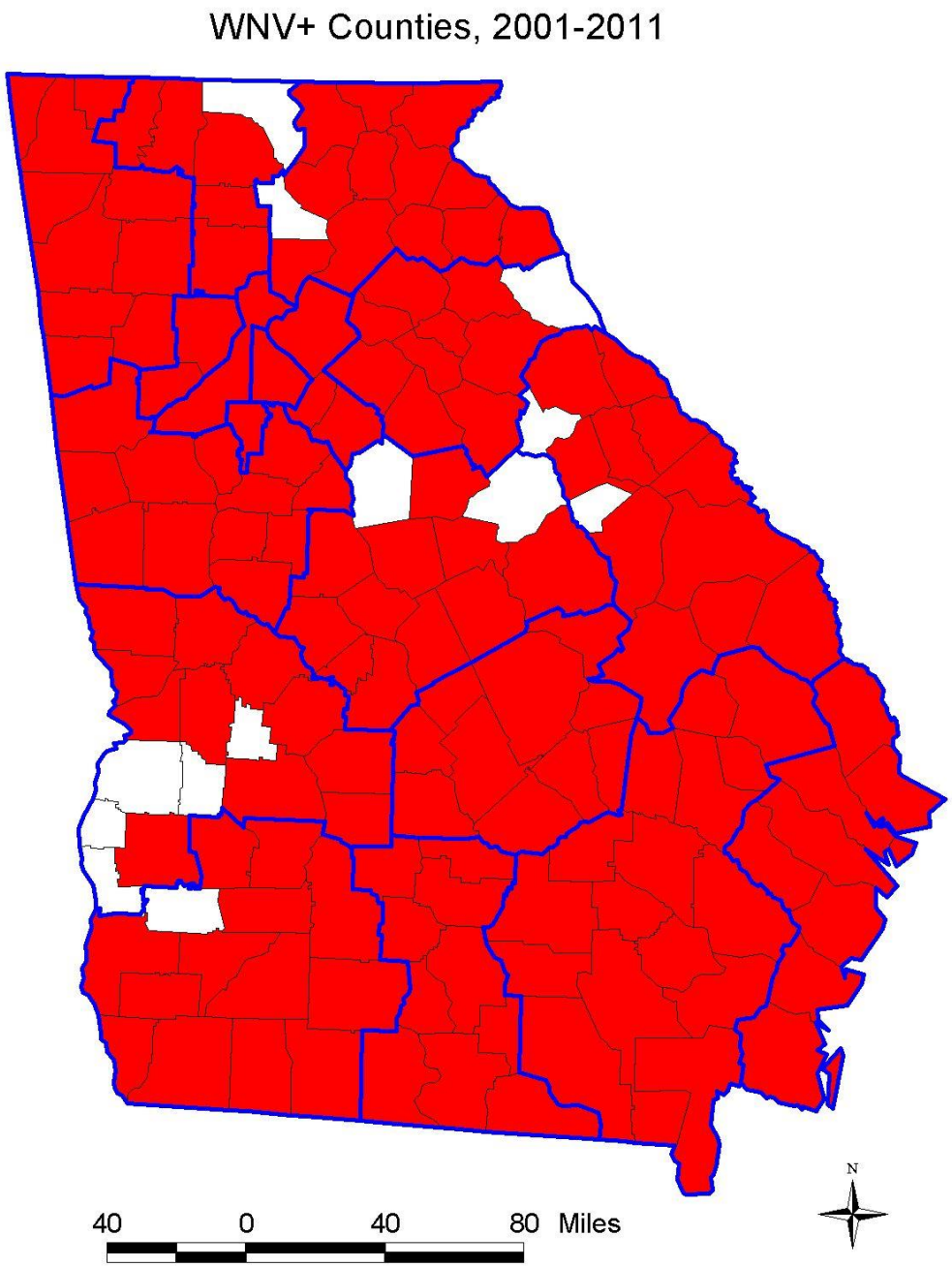


Cx nigripalpus

Cx salinarius

Cx quinquefasciatus

vectors of WNV



The map shows counties reporting WNV+ birds, horses and other livestock or companion animals, mosquitoes, and humans.

Counties with no reported positives have done little to no surveillance; WNV is considered endemic in Georgia.

Culex quinquefasciatus is the primary vector of WNV in Georgia.

Psorophora columbiae

Psorophora ferox

Psorophora ciliata

- Giant mosquito – “shaggy legged gallinipper”
- Adult females bite humans
- Larvae are predaceous on other mosquito larvae

A Beneficial Mosquito

Aedes	***Ochlerotatus***
Ae. aegypti	*Oc. atlanticus/tormentor*
Ae. albopictus	*Oc. atropalpus*
Ae. cinereus	*Oc. canadensis*
Ae. vexans	*Oc. dupreel*
	Oc. fulvus pallens
Anopheles	*Oc. hendersoni*
An. atropos	*Oc. infirmatus*
An. barberi	*Oc. japonicus*
An. bradleyi/crucians	*Oc. mathesoni*
An. punctipennis	*Oc. mitchellae*
An. quadrimaculatus	*Oc. sollicitans*
An. walkeri	*Oc. sticticus*
	Oc. taeniorhynchus
Coquillettidia	*Oc. thibaulti*
Cq. perturbans	*Oc. triseriatus*
	Oc. trivittatus
Culex	
Cx. coronator	***Orthopodomyia***
Cx. erraticus	*Or. alba*
Cx. nigripalpus	*Or. signifera*
Cx. peccator	
Cx. pilosus	***Psorophora***
Cx. pipiens	*Ps. ciliata*
Cx. quinquefasciatus	*Ps. columbiae*
Cx. restuans	*Ps. cyanescens*
Cx. salinarius	*Ps. discolor*
Cx. territans	*Ps. ferox*
	Ps. horrida
Culiseta	*Ps. howardii*
Cs. inornata	*Ps. mathesoni*
Cs. melanura	
	Toxorhynchites
Mansonia	*Tx. rutilus*
Ma. dyari	
Ma. titillans	***Uranotaenia***
	Ur. lowii
Wyeomyia	*Ur. sapphirina*
Wy. mitchelli	
Wy. smithii	

And then…

…there are the recent introductions.

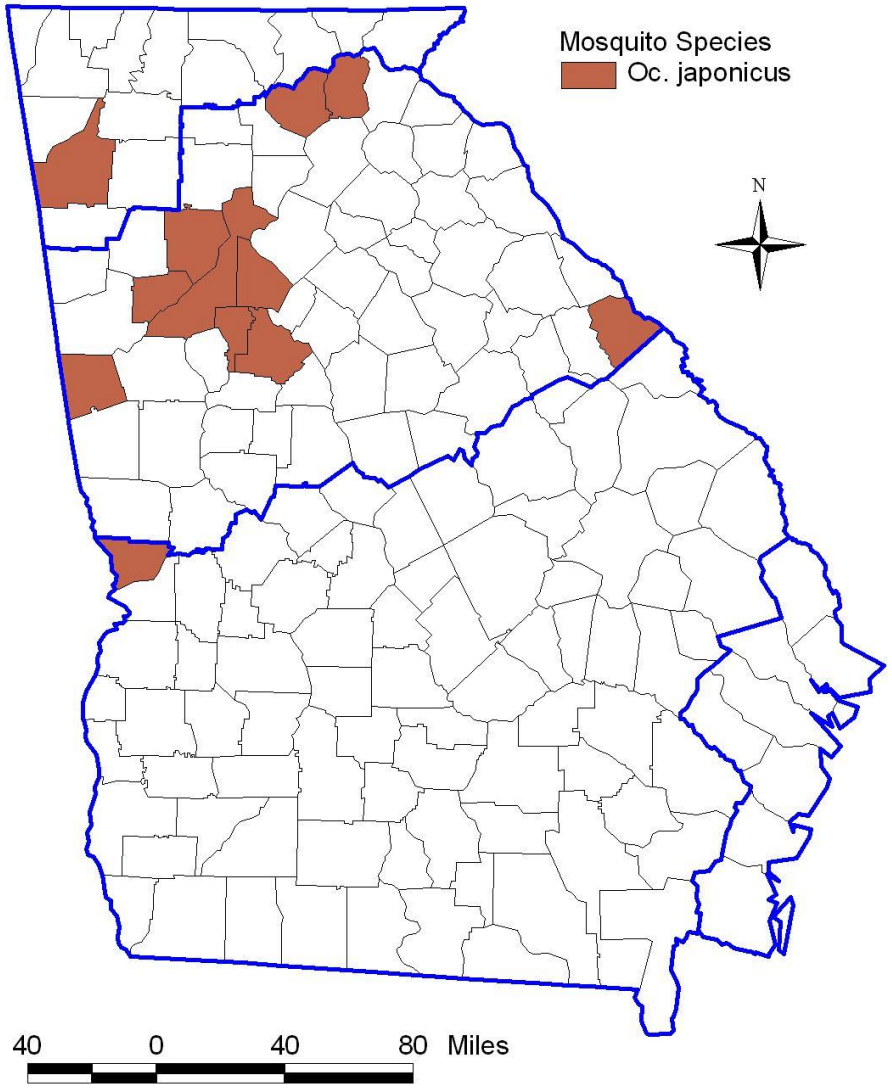
- *Ochlerotatus japonicus*
  - The 1st published record of *Oc japonicus japonicus* in Georgia (Rabun County) occurred in 2004.
  - This species was collected earlier (2002) in Fulton County.

And then…

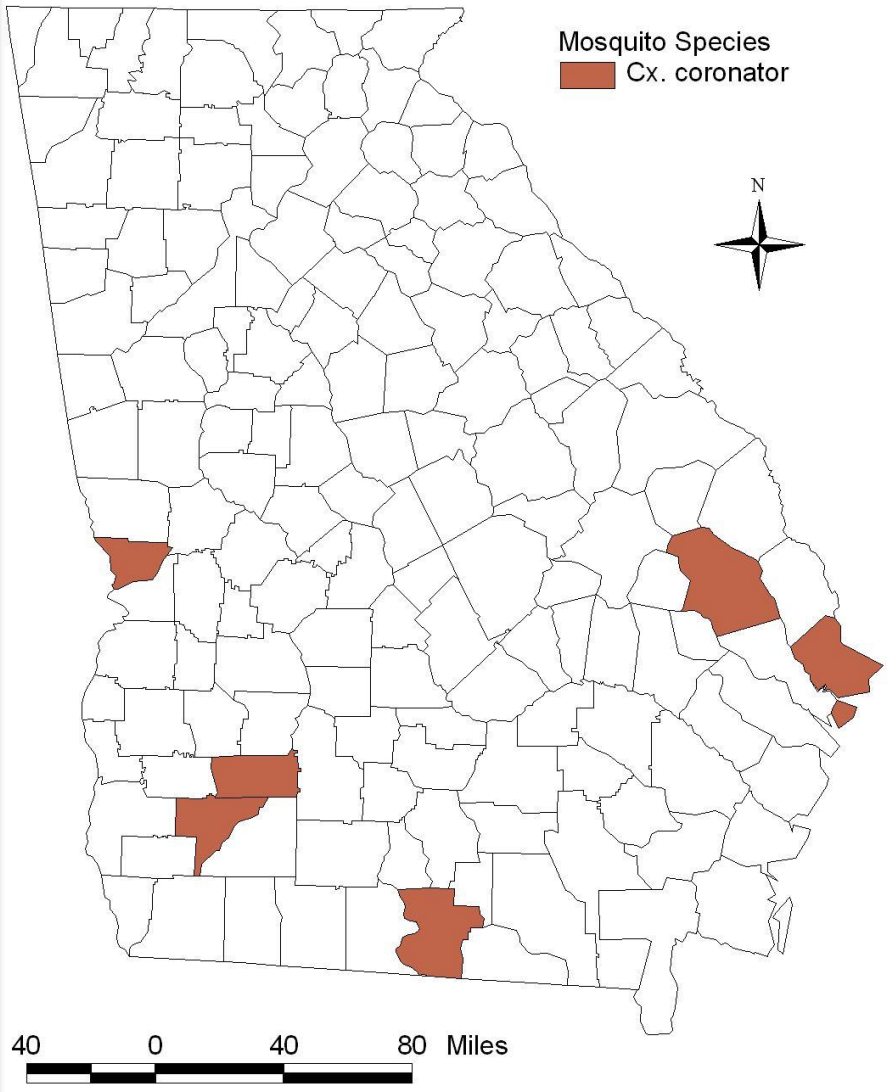
…there are the recent introductions.

- *Culex coronator*
  - A total of 10 female *Cx coronator* were collected from 6 different sites during routine mosquito-borne virus surveillance in Dougherty County in 2006.
  - In 2007, adult *Cx coronator* were collected in Chatham County, Georgia.

Mosquito Species Map



Mosquito Species Map



Any Questions?