ECOLOGY OF FLOODWATER MOSQUITOES

"Estimates suggest mosquito eggs in a floodwater habitat between 0.7-1.3 million eggs per acre."

Barry Alto
Florida Medical Entomology Laboratory
University of Florida

LARVAL HABITATS OF MOSQUITOES

- HABITAT AND CLIMATE LARGELY DETERMINE THE DISTRIBUTION OF MOSQUITO SPECIES
- LARVAL REQUIREMENTS MAY BE HIGHLY SPECIFIC OR GENERAL

Running water

Running Water
(Anopheles quadrimaculatus, Culex territans, Uranotaeia sapphirina)

Transient/floodwater

Woodland Pool
(Aedes stimulans)

Permanent water

Freshwater swamp
(Coquillettidia perturbans)

Container

Treehole (*Aedes triseriatus*)

LARVAL HABITATS OF MOSQUITOES (TEMPORARILY FLOODED LOCATIONS)

- AGRICULTURAL LANDS ARE ENORMOUS MOSQUITO PRODUCERS, INCLUDING *AEDES, PSOROPHORA*, AND *CULEX*.

Flooded pasture (*Psorophora ciliata*)

Fresh floodwater (*Aedes canadensis*)

Tidal floodwater (*Aedes sollicitans*)

LARVAL HABITATS OF MOSQUITOES (TEMPORARILY FLOODED LOCATIONS)

- AGRICULTURAL LANDS ARE ENORMOUS PRODUCERS, INCLUDING *AEDES, PSOROPHORA*, AND *CULEX*.
- TRANSIENT WATER SOURCES (FLOODED AREAS), SNOWPOOLS, AND DITCHES ARE USED AS BREEDING GROUNDS FOR SPECIES WHOSE EGGS CAN WITHSTAND DESICCATION (*AEDES, PSOROPHORA*).
- THEIR LIFE CYCLES REQUIRE ALTERNATING PERIODS OF WET AND DRY (KEY FEATURE OF THEIR BIOLOGY).
- OPPORTUNISTIC *CULEX*, MIGHT BE ABLE TO UTILIZE THE HABITAT FOR A SINGLE GENERATION DURING AN EXTENDED FLOODED PERIOD.

Flooded pasture (*Psorophora ciliata*)

Fresh floodwater (*Aedes canadensis*)

Tidal floodwater (*Aedes sollicitans*)

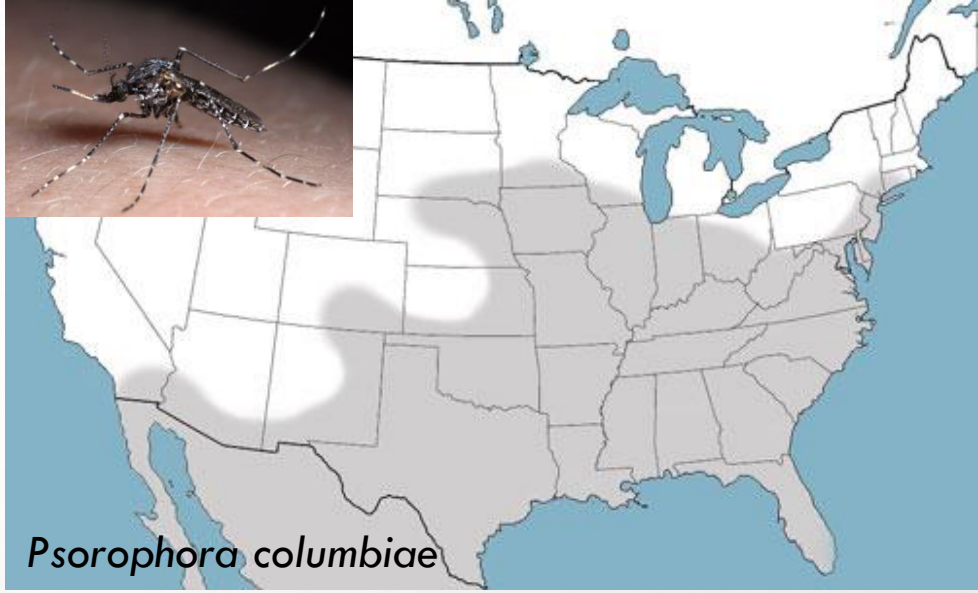
FLOODWATER MOSQUITOES

- MOSQUITOES IN GENERA *AEDES*, *OCHLEROTATUS*, AND *PSOROPHORA*
- SPECIES FROM THESE THREE GENERA ARE THE MOST IMPORTANT PEST SPECIES
- BITE HUMANS, LIVESTOCK, PETS
- LARGE POPULATIONS IN SPRING AND EARLY SUMMER

FLOODWATER MOSQUITOES

- EGGS ARE LAID ON THE SOIL SURFACE AT THE EDGE OF STANDING POOLS OF WATER THAT ARE LEFT FROM RAINS OR FLOODS
- OFTEN WOODLAND POOLS, ROADSIDE DITCHES OR LOW AREAS ALONG CREEKS RIVERS THAT COLLECT FLOOD WATER
- EGGS HATCH WHEN FLOODED BY RUN OFF FROM HEAVY RAINS OR FLOOD WATER

PSOROPHORA COLUMBIAE AND PS. CILIATA

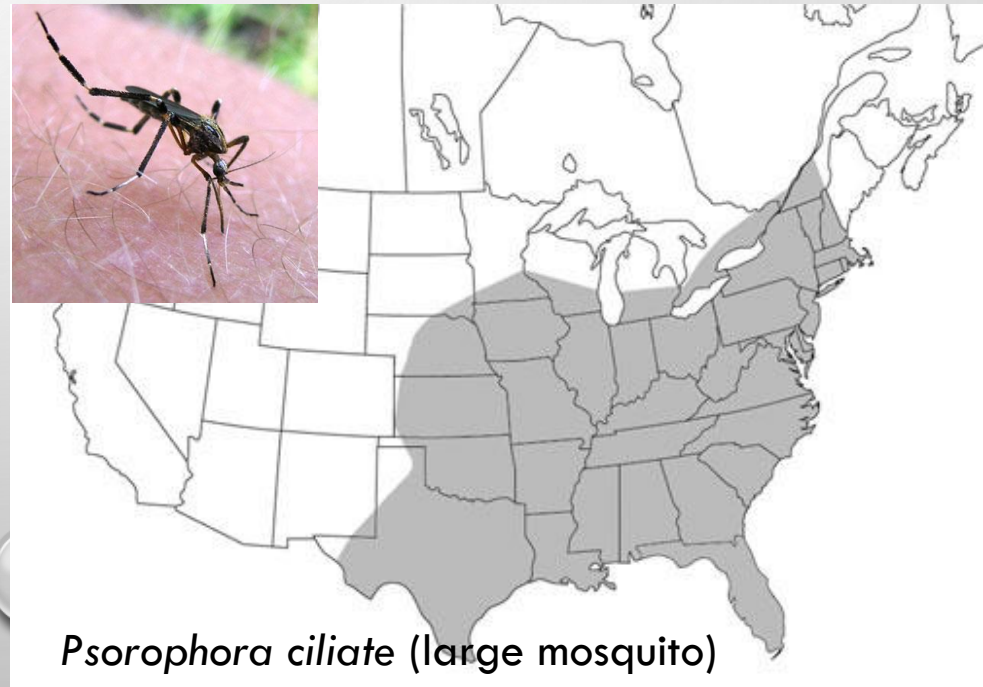


- ASSOCIATED WITH SUN-EXPOSED EPHEMERAL WATER (POOLED WATER IN AGRICULTURE LANDS AND DISTRIBUTED IN GRASSY LANDSCAPES) WITH OTHER *AEDES*

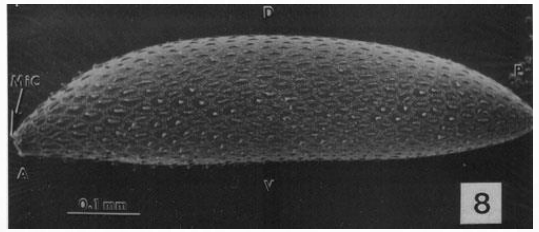
- HUGE ABUNDANCE OF *PS. COLUMBIAE* FOLLOWING PERIODS OF HIGH RAIN.

- COMMON NUISANCE TO LIVESTOCK, RABBITS, AND HUMANS

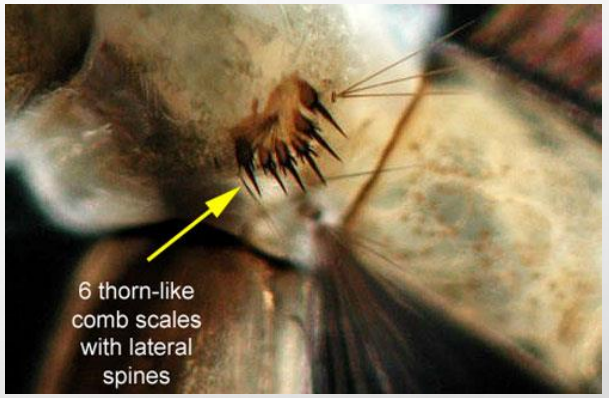
- PEAK ABUNDANCE IN JUNE-JULY, DEPENDING ON AVAILABILITY OF LARVAL HABITATS

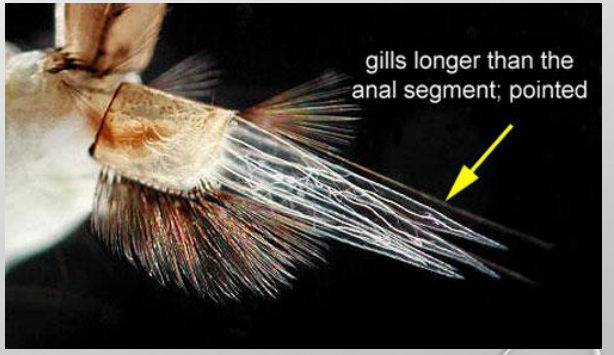

Psorophora ciliate (large mosquito)

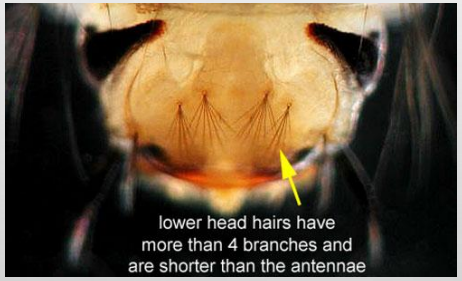
DARK RICE FIELD MOSQUITO (*PSOROPHORA COLUMBIAE*)



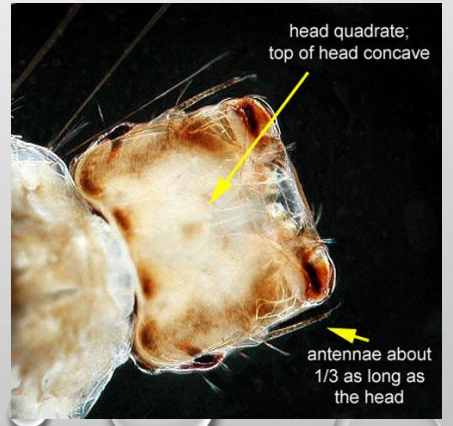
- **EGGS** ARE DEPOSITED IN HUMID SOIL BY GRAVID FEMALES (DARK WITH SPINE-LIKE TUBERCLES TO ADHERE TO SUBSTRATES)
- **LARVAE** ARE PALE TO WHITE, HEAD MORE BROAD THAN LONG, 4 CLUSTERS OF SETAE LOCATED AT TOP OF HEAD, EACH WITH MORE THAN 4 BRANCHES
- 6 BARBED, THORN-LIKE COMB SCALES ON 8TH ABDOMINAL SEGMENT.
- ANAL PAPILLAE ARE LONG, TRANSLUCENT, AND TAPER TO A POINT (LONGER THAN 10TH ABDOMINAL SEGMENT)







Ps. columbiae

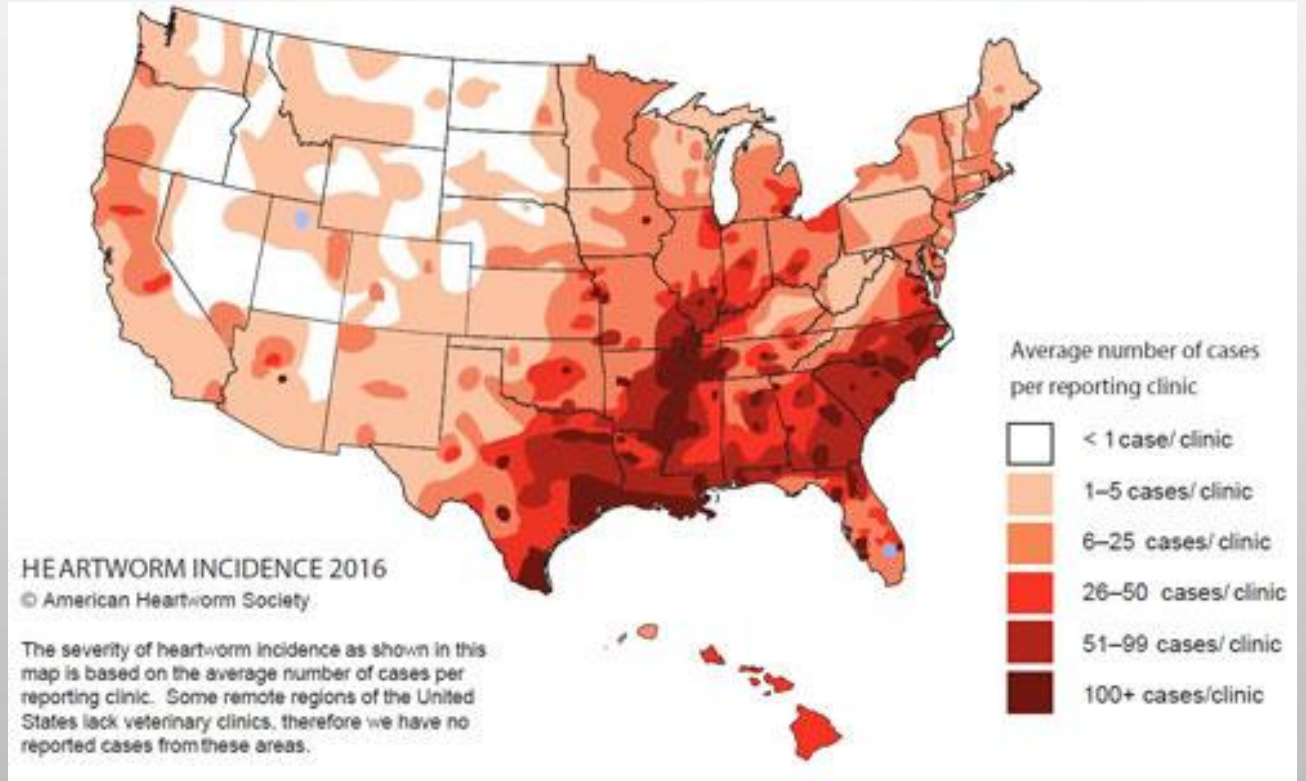


Ps. ciliata

C.S. Bibbs, D. Mathias, N. Burkett-Cadena. EDIS. 2019.

PSOROPHORA

- *PS. COLUMBIA*: POSSIBLE VECTOR OF CANINE HEARTWORM (ALTHOUGH 25 SPECIES OF MOSQUITOES CONTRIBUTE TO TRANSMISSION THROUGHOUT THE SAME RANGE). MAY BE VECTOR OF EPIDEMIC STRAINS OF VEEV
- *PS. CILIATA*: NO EVIDENCE AS A BRIDGE VECTOR FOR VIRUSES, DESPITE BEING DETECTED POSITIVE (WNV, VEEV, WEEV, TENSAW)



MEDICAL IMPORTANACE

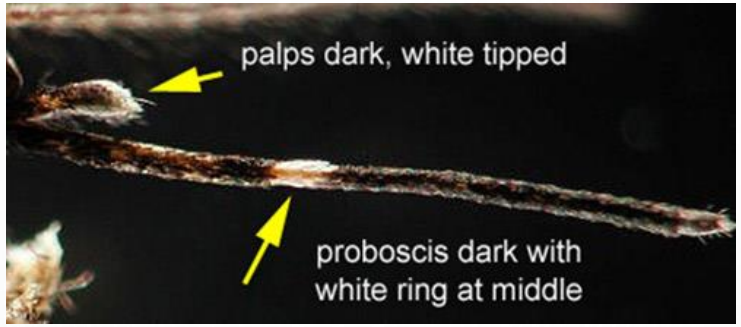
Ps. ciliata

- *PS. CILIATA* ARE PRIMARILY MAMMALIAN BLOOD-FEEDERS (RUMINANTS, ARMADILLOS, RACCOONS, RABBITS).

- THIS MOSQUITO WILL FEED READILY ON HUMANS AND CAN BE ANNOYING IN LARGER NUMBERS

AEDES TAENIORHYNCHUS, AEDES SOLLICITANS

Black salt marsh mosquito




Eastern salt marsh mosquito

LARGE EMERGENCES AND AGGRESSIVE BITER

NOT CONSIDERED A PRIMARY VECTOR OF MAJOR DISEASE CONCERNS, BUT MAY BE INVOLVED IN EEE, VEE, AND DOG HEART WORM

FOUND ALONG THE ATLANTIC AND CALIFORNIA COASTS BREEDING IN SALT MARSHES.

FLOODWATER, HOG WALLOWS, RAIN POOLS, ROADSIDE PUDDLES, OTHER TEMPORARY BODIES OF WATER

EGGS LAID IN MOIST SOIL THAT ARE SHELTERED HIGH ENOUGH ABOVE THE WATER LINE TO BE AFFECTED ONLY BY SUFFICIENT FLOODING

- INTEGRATED MOSQUITO MANAGEMENT
- LARVICIDING, SOURCE REDUCTION (IMPOUNDING AND DITCHING)

DIGGING A DRAINAGE DITCH FOR MOSQUITO SOURCE REDUCTION

AEDES VEXANS

LAY THEIR EGGS INDIVIDUALLY ON MOIST SOIL ABOVE THE WATERLINE IN A VARIETY OF AQUATIC HABITATS, AFTER A SHORT PERIOD OF DRYING, THE EGGS MUST SUBSEQUENTLY BE FLOODED WITH WATER TO HATCH. DURING PERIODS OF DROUGHT, EGGS CAN REMAIN DORMANT FOR YEARS

MULTIVOLTINE. ABLE TO PRODUCE SEVERAL GENERATIONS EACH SEASON. ADULTS LIVE 3-6 WEEKS, ALLOWING THEM TO LAY SEVERAL BROODS OF EGGS

CONSIDERED TO BE PRIMARILY A BITING NUISANCE MOSQUITO

CULEX NIGRIPALPUS

- EGGS REPORTED IN MOST TYPES OF AQUATIC HABITATS, BUT BEST DESCRIBED AS A FLOODWATER *CULEX*
- ONE OF THE MOST IMPORTANT DISEASE VECTORS IN FLORIDA
- SUBTROPICAL DISTRIBUTION; U.S. CARIBBEAN, MEXICO, CENTRAL AMERICA, AND NORTHERN SOUTH AMERICA
- LARVAE DEVELOP IN RICH ORGANIC MIXTURE IN SHALLOW FLOODED DITCHES

Day, J.F. EDIS. 2017

CULEX NIGRIPALPUS

- INVOLVED IN EPIDEMIC TRANSMISSION OF SLE AND WNV VIRUSES (EEE?)
- WHAT IS UNUSUAL ABOUT THE BIOLOGY AND BEHAVIOR OF THIS SPECIES THAT MAKES IT A PROMINENT VECTOR?
- OPPORTUNISTIC IN CHOICE OF HOSTS, IN PART DUE TO HOST ABUNDANCE, FEEDING DURING CREPUSCULAR PERIODS

- THIS SPECIES IS AN EFFICIENT ARBOVIRUS VECTOR DUE TO ITS "EGG DUMPING" BEHAVIOR.
- FEMALES PREFER TO LAY EGGS IN FRESHLY FLOODED DITCHES, AND LONG DROUGHTS DURING THE SUMMER LIMIT THESE SITES.
- DURING THIS PERIOD THE NUMBER OF GRAVID FEMALES INCREASES (~90%)
- AFTER RAINFALL, GRAVID FEMALES OVIPOSIT, SEEK HOSTS, AND BLOOD FEED IN A CYCLE SYNCHRONIZED WITH THE RAINFALL EVENT.
- IF THE PERIOD OF DROUGHT IS 10-14 DAYS MOSQUITOES COMPLETE THEIR EIP AND HAVE GREAT POTENTIAL TO TRANSMIT ARBOVIRUSES UPON BITING.

Day JF, Curtis GA. 1994. Am. Entomol. 40: 162–167.

END

THANK YOU