

29<sup>th</sup> Annual Meeting of the Georgia Mosquito Control Association  
October 18-20, 2006

Oct 18<sup>th</sup>

1. Opening Remarks

- a) AMCA Washington Day
  - 1) funding concerns
  - 2) IPM - the way it is
  - 3) saw many representatives
- b) What the Board Has Done:
  - 1) AMCA Sustaining Membership
  - 2) GMCA Archivist position
  - 3) arbovirus testing issue
  - 4) GMCA website project
  - 5) AMCA Washington Day
  - 6) GMCA Sustaining Members
  - 7) Georgia Mosquito Control Manual
  - 8) lots of help from past presidents
- c) '07 Projects
  - 1) MANUAL!!!
  - 2) Atlanta Day
  - 3) ?????

2. Glynn County Mosquito Control

- a) county divided into spray areas
- b) biggest problem - salt marsh mosquitoes
- c) can get biting counts of 100+
- d) run 17 light traps and 4 gravid traps
- e) spoil areas big problem
- f) soil cracking creates lots of breeding sites
- g) alligator issues
- h) Larviciding
  - 1) 3 techs
  - 2) 1000+ catch basins a month
  - 3) helicopter application for large areas
- i) Adulticiding
  - 1) 5 spray trucks
  - 2) helicopter
  - 3) trucks spray 4-5 hour runs
  - 4) very little routine spraying - light trap catches and complaints
- j) 60 square miles under control
- k) have had education program in the past and will have again

3. Bloodmeal Analysis in South Georgia - Tanya Carter, Valdosta State University

- a) surveillance program uses CDC light traps and gravid traps
- b) also collecting using resting boxes and aspirator
- c) blood fed mosquitoes primarily found in resting boxes
- d) DNA Methods

- 1) DNA extractions
  - 2) PCR using specific primers
  - 3) electrophoresis
- e) molecular aims
  - 1) bird orders
  - 2) various native mammals
  - 3) several reptiles
- 4. GIS - Surveillance Mapping: Alan Carter, Valdosta State University
  - a) 28 traps in the field
  - b) used to determine where there is overlapping coverage and where the best monitoring sites should be located
  - c) simplifies operations
  - d) increases effectiveness of program
  - e) saves time
- 5. Industry Spotlight - Adapco, Paul Efirid
  - a) More, In Control
  - b) 4 Divisions
    - 1) product distribution
    - 2) technology development
    - 3) research & development
    - 4) contract services
  - c) largest distributor of mosquito control products and equipment
  - d) adulticides
    - 1) Aqua-Reslin
    - 2) permanone
    - 3) scourge
    - 4) fyfanon ULV
    - 5) dibrom - aerial
    - 6) trumpet EC - aerial
    - 7) pyrethrins
  - e) larvicides
    - 1) agnique - monomolecular film
    - 2) altosid
    - 3) aquabac
    - 4) Bti
    - 5) BVA2 - oil
  - f) spray equipment
    - 1) ULV truck-mounted equipment
    - 2) backpack sprayers
    - 3) electrostatic spray systems - for barrier sprays
  - g) RAMP test
  - h) proprietary equipment
    - 1) accuflow
    - 2) Tracker and Monitor® 3 series - GPS
    - 3) GeoFlow and GeoTracker - new 2005 (GPS)
    - 4) FFAST® injector - mixing system

- 5) Wingman™ GX and Skytracker™ - new 2005 (GPS)
- 6) Monitor 4 - to be released soon
- i) online catalog
- j) download/print labels & MSDS
- k) contract services
  - 1) ground and aerial applications
  - 2) hurricane relief
- l) www.myadapco.com
- 6. The Coming Storm - Ros Kelly
  - a) emergency mosquito trailer
  - b) emergency mosquito control issues
- 7. Overview of Mosquito Control in Florida - James Clauson, Environmental Manager
  - a) provides state funding to mosquito control districts
  - b) receive reports from supported districts - VCMS system
    - 1) equipment inventory
    - 2) chemical use
  - c) vector control support
    - 1) mosquito
    - 2) dog fly/stable fly control (*Stomoxys calcitrans*)
  - d) responsible for supporting and enforcing mosquito control law
    - 1) FS Chapter 388 (\$1800000 State grant money per year)
    - 2) FAC 5E-13
  - e) 58 participating districts
    - 1) 15 independent
    - 2) 43 dependent (County)
  - f) provide budgetary help
  - g) provide entomological support
  - h) Hurricane preparedness (Mosquito Control Incident Response Team)
    - 1) surveillance
    - 2) control - contingency contract
    - 3) state owns an aircraft
  - i) training and licensing
  - j) most counties have their own program and many have aerial capability
  - k) working towards electronic reporting, increased training
- 8. Highlights in Mosquito Control - Elmer Gray, Clarke County
  - a) dry year
  - b) decline in WNV notoriety
  - c) limited localized mosquito populations
  - d) *Ae albopictus* biggest problem - moved into Georgia in 1990
  - e) *Cx restuans* very common
  - f) occasional large emergences of *Ps ferox*
  - g) *Oc japonicus* - throughout piedmont area
  - h) mosquito control resurrected
    - 1) team format - multiple agencies
    - 2) primarily educational
      - i. mailings

- ii. media spots
  - iii. mascot
  - iv. fairs
- 3) not supportive of adulticiding
- 4) larvicide flooded standing water areas
- 5) provide Bti briquettes to citizens
- 6) habitat modification program
- i) program fits needs of community
- 9. Scrap Tire Recycling - Elmer Gray
  - a) money goes to a general fund
  - b) reimbursement requests are now being accepted by EPD
  - c) residential, not commercial
  - d) remove and recycle tires
  - e) elimination of tire dumps
- 10. Africanized Bees - Keith Delaplane, UGA
  - a) [www.ent.uga.edu/bees](http://www.ent.uga.edu/bees)
  - b) introduced to US in 1990
  - c) 2005 - established reproducing populations east of the Mississippi - primarily Florida
  - d) problem for anyone working outdoors
  - e) same species as honey bee found in hives throughout US - different race (subspecies)
  - f) European races tend to be relatively gentle
  - g) scutellata (africanized race) is very aggressive
  - h) Where it all began
    - 1) European races of bees introduced to tropical South American zones did not do well
    - 2) 1957 - brought a tropical race to area to breed with European race to increase productivity
    - 3) Africanized bee spread rapidly from this focal point
    - 4) 1990 - arrived in Hidalgo, TX
    - 5) south of Argentina - bees do not overwinter
    - 6) already found above this latitude on our continent
  - i) Africanized bees now found in most of the southwest and Florida
  - j) Africanized bees smaller and less toxic than European bee (smaller wing size)
    - 1) physically smaller, ecologically bigger
    - 2) produce less honey, pollinate more flowers
    - 3) ID is difficult - behavior is what matters
  - k) problem is dose - Africanized bees sting in larger numbers
    - 1) stimulus - as simple as a stick dropping on nest when you are near
    - 2) attack
    - 3) defense pheromone
    - 4) more attack
  - l) peridomestic
  - m) cavity and open-air nests

- 1) cans
- 2) tires
- 3) trash along road
- 4) underground water meters
- 5) under structures
- 6) hollow walls
- 7) underground
- 8) just about anywhere
- n) behavior can be explosive, or mild
- o) huge populations - 1000s can attack at nest site
- p) Very resistant to parasites (mites) currently devastating native populations???
- q) increased incidence of wild bee colonies - removal requires a specialized skill set
- r) precautions for the public
  - 1) use caution as for fire ants or snakes
  - 2) RUN, don't stand and swat
  - 3) keep running
  - 4) get inside - stay inside
- s) open-cab tractor drivers are at high risk
- t) emergency responders
  - 1) invest in bee suits
  - 2) establish a list of local beekeepers
  - 3) establish perimeter - needs to be large
  - 4) situate medical response team outside perimeter
  - 5) suit-up before leaving vehicle
  - 6) control
- u) a little toxicology
  - 1) local pain, redness, swelling - NORMAL
  - 2) 15-25 stings at one time: see a physician
  - 3) 1-5% populations will have an extreme (anaphylaxis) reaction
  - 4) LD<sub>50</sub> = 1000 stings (toxic reaction) NOT UNCOMMON WITH AFRICANIZED BEES
  - 5) epinephrine treats allergic reactions, not toxic reactions
- v) current Africanized bees being seen are nearly pure scutellata (genetic tidal wave) - gradient of gene expression
- w) Dept of Ag monitoring situation
- x) high numbers of human deaths
- y) control - increase the amount of beekeeping in area - brings in more European bees - increases genetic material

Oct 19<sup>th</sup>

1. Bird Flu Preparedness - Dana Cole, GDPH

- a) avian influenza in birds
  - 1) low path strains naturally-occurring in wild waterfowl
  - 2) problem occurs when wild waterfowl interact with poultry

- 3) low path strain passes amongst land-based birds
  - 4) mutates/combines with other strains in land-based birds
  - 5) converts to high path strain
  - 6) big die-off in poultry
- b) Asian strain - H5N1
- 1) probably happened about 1985 - mutation to high path strain
  - 2) circulating widely in poultry
  - 3) open air markets allow spread of high path strain in domestic and wild birds
  - 4) BIG QUESTION - how is this spreading
    - i. migratory birds - wild birds with immunity
    - ii. poultry moving virus when sold
    - iii. mixture of both scenarios
  - 5) human disease -
    - i. 256 ill, ?? died - high mortality rate
    - ii. killing and preparing sick birds for eating
    - iii. cohabitation with sick birds - birds inside house to keep bird warm
    - iv. fecal contamination of water a possibility
    - v. use of feathers of infected birds
    - vi. close contact with very ill family member
    - vii. eating birds does not seem to be a pathway - eating blood pudding made from bird blood is not considered properly prepared
  - 6) depopulating poultry has not lead to illness
  - 7) health care workers have not gotten ill - with a couple of exceptions
  - 8) commercial poultry farmers have not become ill
- c) Why the sudden spread/Why are we worried?
- 1) pandemic risk for human disease
  - 2) mixing with a human virus could lead to a jump to human population
  - 3) more normal route - mixing of human influenza virus and avian virus in a pig
  - 4) Indonesia - virus passed within family members, virus died out
  - 5) Contributing factors
    - i. animal movement
    - ii. open air markets
    - iii. persistence of virus
      - 56° C for 3 hours
      - 60° C for 30 minutes
      - water 4-30 days
      - manure 105 days
    - iv. 1 gram of infected manure can infect 1 million birds
    - v. mechanical vectors
- d) Risk to Georgia

- 1) largest poultry producer in US
  - 2) old world migratory birds rarely interact with new world birds - very low risk for virus transfer
  - 3) how could it get here
    - i. importation of exotic birds
    - ii. smuggling
    - iii. game cock fighting issues
  - 4) active and passive surveillance system in place through Georgia Dept of Ag
  - 5) USDA monitoring migratory birds
  - 6) USDA/APHIS closes importation of birds from infected areas
  - 7) TRAINING and exercises to deal with local-state-federal response
  - 8) flocks tested
2. What's all the excitement about? DDT: The Rise and Fall of a Miracle- Joe Conlon, AMCA Technical Advisor
- a) Al Gore - ban on DDT lead to saving of human population
  - b) National Academy of Science - DDT helped save human lives
  - c) DDT discovered 1897
  - d) used first for fly control in 1939
  - e) insecticidal properties
    - 1) high toxicity
    - 2) lack of immediate action
    - 3) persistence
    - 4) broad spectrum control
    - 5) better than other available products at the time
  - f) first large-scale use for lice
  - g) malaria eradication programs
    - 1) malaria cases have risen over 1000% since DDT use was banned
    - 2) cases dropped considerably during use
  - h) there was a cost - use of any chemical is a trade off
  - i) need to look at both costs and benefits, not just benefits
  - j) US use
    - 1) peak use 1962
    - 2) lowest use 1970
  - k) Silent Spring, published 1962
    - 1) positives - made us aware of over-reliance on pesticides and pointed out the benefit of an IPM approach
    - 2) emotional, lacking in science
  - l) Evidence Against DDT - "bad science can go both ways"
    - 1) causes liver/breast cancer - no evidence to this effect
    - 2) egg shell thinning - results equivocal, controls had poor hatchability as well in reported studies, results could not be reproduced (low calcium diets probably at fault)
    - 3) bio-accumulates - this is a fact
    - 4) persistent - this is a fact

- 5) bald eagle demise - potential for extinction reported before use of DDT
- 6) peregrine falcon populations also declining prior to DDT use
- 7) erroneous detection - some cross-reactivity with other products, may not be as wide-spread as is thought

m) EPA hearing

- 1) EPA reported extremely high levels of DDT ingestion by public erroneously
- 2) conclusion was that there was a need for essential use of DDT
- 3) banned as a political judgment
- 4) racial component??? - racially motivated statements about "only Mexicans and Negroes" being affected by ban of DDT and use of organophosphates are a matter of public record
- 5) increased population if DDT used to control malaria often stated - many developed countries have a much higher population and use many more of the earth's resources

n) most areas where DDT use would reduce the disease burden can not afford other solutions

o) resistance issue - needs to be monitored

p) banning of DDT described as Eco-Imperialism

q) Current use

- 1) made in India and China
- 2) used in 23 countries for malaria control to some extent
- 3) all other control methods have fallen short and malaria keeps rising
- 4) inter-domiciliary spraying needs to be reconsidered
- 5) environmental contamination largely occurred with agricultural use
- 6) need to consider use:
  - i. under specific circumstances where it will have a benefit
  - ii. with continued monitoring for resistance
  - iii. with oversight to make sure DDT is being used correctly
- 7) when the US bans something it tends to get banned world-wide
- 8) no longer made in US
- 9) Stockholm Conference on Persistent Chemicals - banned DDT use except in public health emergencies - malaria is a public health emergency

3. AMCA Update - Joe Conlon

a) world-wide in scope

b) 2007 meeting in Orlando, FL - Peabody Hotel, April 1-5

c) current issues

- 1) Clean Water Act ruling - mosquito control will be exempt
- 2) FEMA reimbursement policy
- 3) pesticide labeling & product registration - several products came up for re-registration recently



- 4) US Fish & Wildlife - national policy on mosquito control, significant issues with draft policy
  - d) WingBeats needs articles!!! PLEASE SUBMIT (Joe will write it if you hate to write - send him an outline)
  - e) useful publications for sale - see website ([www.mosquito.org](http://www.mosquito.org))
    - 1) user name is the email address you give to AMCA
    - 2) initial password is 1234 - this can/should be changed
  - f) Members Only section on web site contains good and useful information
  - g) Washington Day - opportunity to make your voice heard (May 7-9, 2007)
  - h) many old JAMCA journals now on AMCA website
  - i) Armed Forces Pest Control website also has lots of journals free for search/download
4. Industry Spotlight - B&G Vector Products, David Sykes
- a) wide range of vector control products
  - b) national distributor of all major brands of pest control chemicals
  - c) manufacturer of Phoenix fogger (ULV) and Stinger (larvicide) equipment
  - d) source for hard-to-find specialty products: example - bird repellent and exclusion equipment
  - e) larvicides
    - 1) variety of altosid formulations
    - 2)
  - f) Adulticides
    - 1) fyfanon
    - 2) aqualur - permethrin/PBO product with no set-back, new technology for water-based dilution issues (stable micro-emulsion)
    - 3) variety of others
  - g) all-terrain vehicles
  - h) bgchem.com
5. Industry Spotlight - Clarke Mosquito Control, Mike Leahy
- a) new products preview
    - 1) DUET - dual action adulticide
      - i. prallethrin and sumithrin (ETOC)
      - ii. benign agitation - mosquitoes agitated into flight so that resting mosquitoes are also impacted by spray
      - iii. rapid knockdown/kill
      - iv. ground or air application
    - 2) AquaAnvil - water-based formulation, sumithrin/PBO (macro-emulsion to increase stability)
    - 3) AquaHalt
      - i. natural pyrethrin/PBO product
      - ii. aid in product rotation to reduce/prevent resistance
      - iii. some labeling advantages - broader application
    - 4) VCMS system
      - i. Advanced Computer Resources bought by Clarke, Sept 2006
      - ii. informational integrated database
      - iii. reports, graphs, maps, spreadsheets...

- iv. very successful and useful product
- v. expandable and modifiable
- vi. can integrate with other systems
- 5) FlightMaster - software and hardware to aid in aerial spray accuracy and recording
- b) product roll-out at 2007 AMCA meeting
- c) cooperative agreement with Dynamic Aviation for aerial spray
- 6. Dengue: A Threat to the Southeastern US? - Gary Clark, Mosquito & Fly Research Unit, Gainesville, FL
  - a) an arbovirus transmitted by mosquitoes
  - b) 4 virus serotypes (DEN-1, 2, 3, 4)
  - c) causes breakbone fever and dengue hemorrhagic fever (GHF)
  - d) each virus serotype provides life-long immunity but only short-term immunity to other dengue serotypes
  - e) genetic variation occurs within serotype
  - f) primarily a disease of tropical area
  - g) human disease, not a zoonotic disease
  - h) associated with *Aedes aegypti* and *Aedes albopictus*
    - 1) *Aedes aegypti* has a strong preference for human blood - most important vector of dengue world-wide
    - 2) *Aedes albopictus* competent laboratory vector but is a more catholic feeder (feeds readily on many animals)
  - i) increase in reported cases in the Americas since 1989
  - j) common to have internationally-acquired cases of dengue reported in the US (CDC, MMWR)
  - k) is this potentially a problem in the US
    - 1) it has been in the past
    - 2) would need frequent reintroduction into areas when competent vectors are present in large enough numbers
    - 3) there is a susceptible population
    - 4) needs frequent vector-host contact
    - 5) the virus endemic in "nearby" countries
    - 6) doctors are not well aware of dengue - absence of clinical diagnosis
  - l) mitigating issues
    - 1) relatively short viremia
    - 2) housing conditions and lifestyle reduces mosquito-host contact
    - 3) number of vectors present may be low
    - 4) education about dengue - public health and physicians
    - 5) lab diagnosis available and up to par
    - 6) good monitoring and control of vectors
  - m) worst case scenario - infective person arrives in area without mosquito control living in substandard housing where vectors are present and do not receive medical care
  - n) indigenous transmission - 64 cases since 1964, all occurred in Texas
  - o) dengue endemic in Mexico (1980-1999, over 60,000 cases)

- p) study done in Texas at Mexican border in 2005 (CDC & Texas DOH)
    - 1) DEN-2 primarily
    - 2) epidemic occurring in Mexico
    - 3) serosurvey done in Mexico and Texas
    - 4) 23% of Matamoras population infected with DEN-2
    - 5) 2.5% of Brownsville's population infected
  - q) previous study done in 1999 in Laredo and Nuevo Laredo
    - 1) 16% IgM, 48% IgG in Nuevo Laredo
    - 2) lower percentages in Laredo
    - 3) large housing and lifestyle differences found - protective factor
  - r) conclusion - potential for transmission is present, large-scale outbreaks are unlikely to occur
7. Combined Sewer Overflow Follow-up: Tom Burkot, CDC
- a) John Shimmin, CSO manager
  - b) *Cx. quinquefasciatus* production in CSOs
  - c) WNV issue - May 2005 AJC, WNV May Have Sewer Link
    - 1) most of human cases in Fulton County associated with CSO location
    - 2) many positive mosquito pools found in neighborhoods adjacent to CSOs
  - d) CSOs marginally treat and screen waste and storm water and shunt water to a stream system when more water enters system than can be treated by the waste water treatment facility
    - 1) changes being made to system
    - 2) large underground tanks will be built to hold water during flood event
    - 3) impact on mosquito production ????
    - 4) more studies needed
      - i. incidence of WNV associated with CSO - evaluation of Fulton County data
      - ii. Jim McNelly's water quality study
      - iii. other studies looking at *Cx quinquefasciatus* dispersal
  - e) CSOs in Atlanta built in the 1920s
  - f) >700 CSOs in the US, 9 or 10 are in Atlanta - found in densely populated areas
  - g) goals and objectives
    - 1) understand habitats present in CSO
    - 2) mosquito productivity of CSO
    - 3) control
  - h) study done at Tanyard Creek CSO
  - i) found primarily *Cx quinquefasciatus* and *Cx restuans*, also found some *Cx nigripalpus*
  - j) Results
    - 1) mosquitoes found everywhere but some habitats were more productive than others
    - 2) difference seen in shady areas versus sunny areas

- 3) highest densities found in side pools, followed by creek edges, then the center of the creek
- 4) stagnant water had the highest density of mosquitoes, followed by slow moving water, then rapidly flowing water
- k) Events - effluence is released during storm
  - 1) 2005 - 567 events
  - 2) ranged from 104 kgal in 36 minutes to 173 mgal in 28 hours
  - 3) impact on mosquitoes
    - i. flooding followed by decrease in mosquito numbers
    - ii. more water released, fewer mosquitoes collected 1-5 days later
    - iii. above 10 kgal per minute reduces mosquito populations
    - iv. can always find larvae even after a flood event
  - 4) populations rebound rapidly
8. Vector Studies in LaCrosse Encephalitis Case Sites, Transylvania County, NC - Bruce Harrison
  - a) primary vector - *Oc triseriatus* (treehole mosquito)
  - b) 3 modes of transmission
    - 1) horizontal - between mosquito and host
    - 2) venereal - between male and female mosquitoes
    - 3) vertical - between female and offspring (transovarial)
  - c) known hosts
    - 1) foxes
    - 2) squirrels\*\*
    - 3) chipmunks\*\*
    - 4) rabbits
    - 5) ...
  - d) viremia in squirrels lasts about 5 days
  - e) extrinsic incubation period is about 12 days
  - f) cost of doing nothing
    - 1) medical costs: \$7,500 - \$175,000
    - 2) lifelong neurologic costs: \$49,000 - >\$3,000,000
    - 3) IQ and performance issues
    - 4) seizures common
  - g) cases in North Carolina appear to be increasing after *Ae. albopictus* was found in state - known vector
  - h) additional increases found after *Oc japonicus* was introduced - suspected vector
  - i) 2004 - Tropical Depression Francis hit NC, no LAC found after the storm came through, cases increased the following year
  - j) study looked at mosquitoes at case sites
    - 1) done late in year
    - 2) stopped when night-time temps reached 40°
  - k) Objectives
    - 1) mosquito abundance
    - 2) environmental factors

- 3) best collecting methods
  - 4) virus in mosquitoes
  - 5) antibodies in hosts
  - l) results - habitat evaluation
    - 1) treeholes readily found
    - 2) forested areas
    - 3) squirrels & chipmunks seen
    - 4) containers found - permanent & disposable
    - 5) larvae found in 3 of 7 sites - many containers had recently been dumped
  - m) 14 containers found positive for mosquito larvae
    - 1) 11- *Ae albopictus*
    - 2) 9 - *Oc japonicus*
    - 3) 3 - *Oc triseriatus*
  - n) trapped 7 sites for 10 days
  - o) used 5 different collection methods
    - 1) CDC traps with CO<sub>2</sub> and light not productive for these three species
    - 2) landing counts gave best results, esp for *Oc japonicus*
  - p) small mammal trapping
    - 1) 15 squirrels, 7 chipmunks, 3 shrews
    - 2) got neutralizing antibody from several specimens
  - q) risk factors
    - 1) long exposure time
    - 2) abundance of tires
    - 3) forests close-by
    - 4) many squirrels and chipmunks
    - 5) unscreened porches and decks
    - 6) high population density
    - 7) no solid waste ordinance
    - 8) vector present
9. *Culex coronator* - Bruce Harrison
- a) tropical species
  - b) 1944 - found in South Texas
  - c) spread west and north in 50s and 70s to AZ and NM
  - d) spread north and east in 2000s - OK, LA, MS, AL, FL
  - e) reached GA in 2006
  - f) distinguishing characteristics
    - 1) larval siphon long, thin, gradually tapering
    - 2) larvae similar to *Cx nigripalpus* and *Cx salinarius*
    - 3) adults have narrow white bands across joint
    - 4) found in ditches and ground water pools and grassy swales
    - 5) adults have abdominal bands similar to *Cx quinquefasciatus* and may have thoracic spots like *Cx restuans*
  - g) moving north - warmer winters???
  - h) may be involved in bird-to-bird transmission for WNV

- i) will bite mammals, including humans
  - j) found active late in season in MS
  - k) *Mansonia tittilans* also moving north
10. Industry Spotlight: Curtis Dyna-Fog, Bill Phillips
- a) manufacture aerosol generators
    - 1) pulse jet thermo-foggers
      - i. good penetration
      - ii. small uniform droplet size
      - iii. lower cost
    - 2) ULV generators
      - i. wide variety of machines of different sizes
      - ii. both larviciding and adulticiding
      - iii. electric models are very quiet
    - 3) can make machines for most any need
  - b) CDC and military light traps
    - 1) incandescent light
    - 2) UV light
    - 3) trapgates available
    - 4) dry ice container as well as CO<sub>2</sub> tank connector
    - 5) quick switch from rechargeable to D-cell batteries
    - 6) GPS systems
    - 7) [www.dynafog.com](http://www.dynafog.com)
    - 8) sold through Univar
11. Industry Spotlight - Valent Bioscience, Candace Royals
12. Industry Spotlight - Larry Motes, Pest Management Resources
- a) contract mosquito control
  - b) other pest control
    - 1) algae
    - 2) fire ants
    - 3) pest mammals
13. Program Spotlight - Dougherty County Mosquito Control
- a) 2006 - 3 WNV cases
  - b) increased control efforts
  - c) increased education efforts
  - d) tire pick-up program
  - e) community clean-up efforts
  - f) kept community and media involved - positive results
14. Mosquito Diversity and Seasonality at an Enzootic EEE Focus in TN - Abelardo Moncayo, TN Dept of Health
- a) "typical" cycle
    - 1) enzootic swamp cycle - birds and *Cs melanura*
    - 2) epizootic cycle - mammals and a variety of vector species
  - b) in humans, Case Fatality Rate is 50% on average
  - c) 35% of survivors have neurological deficits
  - d) in horses, CFR reaches 90% ('sleeping sickness')

- e) horse vaccine available
- f) human vaccine exists but is not available - still experimental
- g) TN - Sept 2005
  - 1) EEE+ horse reported from Chester County
  - 2) multiple cases seen by vets that were clinically EEE close by the initial confirmed case
  - 3) state looked at 10 cases
  - 4) media release on 9/15
  - 5) went to investigate
- h) objectives
  - 1) description of mosquitoes in area
  - 2) horse serosurvey
  - 3) map of horse case distribution
- i) no EEE human cases ever reported in TN
- j) trapped at blackwater swamp near area where horse cases were found - 50% of species collected were known potential vectors
  - 1) *Culex restuans/pipiens*
  - 2) *Cx erraticus*
  - 3) *Cq perturbans*
  - 4) *An quadrimaculatus*
  - 5) *Ae vexans*
  - 6) *An punctipennis*
  - 7) variety of other species
  - 8) no *Cs melanura*
- k) trapped again in 2006 using resting boxes and CDC light traps
  - 1) in light traps overall, *Cx erraticus* was the most abundant species, followed by *Cx pipiens/restuans*, *An quadrimaculatus*, and *Cq perturbans*
  - 2) very few *Cs melanura* found
  - 3) *Cq perturbans* found early summer
  - 4) *Cx erraticus* increasing at time of horse transmission
  - 5) resting boxes collected primarily *An quadrimaculatus* (>90%), followed by *An punctipennis* and *Cx erraticus*
  - 6) *An quadrimaculatus* appeared to be responding positively to rainfall
- l) why no human cases in TN
  - 1) *Cs melanura* replaced by *Cx erraticus* - possibly a less efficient enzootic vector (similar to what is seen in South America)
  - 2) fewer people in areas where transmission occurs
  - 3) horses vaccinated - no longer good for surveillance
- m) additional work on-going
  - 1) ID collections to species
  - 2) test mosquitoes for EEE and WNV
  - 3) test blood meals for host ID
  - 4) vector competency studies - *Cx erraticus*
  - 5) avian serosurvey

15. Arboviral Disease After Disasters - Carina Blackmore, FL Dept of Health

- a) Transmission Phases (WNV & SLE), Jon Day
  - 1) Maintenance Phase: Jan-March
  - 2) Amplification Phase: Apr-June, drought will bring birds and mosquitoes together
  - 3) Early Transmission Phase: July-Sept, rain disperses infected mosquitoes (human cases occur)
  - 4) Late Transmission Phase: Oct-Dec
- b) what changes in a hurricane
  - 1) negatives
    - i. mosquito mortality
    - ii. bird dispersal/mortality
    - iii. flooding of breeding areas
  - 2) positives
    - i. large amounts of wind and rain
    - ii. increased breeding habitats
    - iii. bird populations replaced by naive juveniles
- c) 2004
  - 1) seroconversion (chickens) began early
  - 2) outbreak occurred in Miami
  - 3) HURRICANE - 4 of them, and a Tropical Storm
  - 4) huge numbers of mosquitoes collected after the storm
  - 5) no disease transmission
- d) Response
  - 1) disease surveillance
  - 2) public information
  - 3) DEET distribution
  - 4) larvicide distribution
  - 5) pesticide exposure study (Naled)
  - 6) Adulticiding
- e) very little disease seen after the storms in 2004
- f) 2005
  - 1) no WNV seen in hurricane-impacted areas
  - 2) very few cases after the hurricane
- g) 2006
  - 1) no human cases of WNV seen in Florida
  - 2) MS - 151 cases, LA - 115 cases, TX - 200+
  - 3) this is fewer than in the past
- h) conclusions
  - 1) short-term: no effect, # cases declined
  - 2) long-term: follow-up needed
  - 3) surveillance needed

16. Regulatory Update - Jason O'Kane, Army Corp of Engineers

- a) healthy vs unhealthy wetlands
- b) 3 criteria to make a wetland
- c) mitigation banks / mitigation wetlands



- d) federal laws - some regional differences
- e) mosquito issues
  - 1) mosquito control is not an emergency
  - 2) new ditches likely need an individual permit
  - 3) ditches and disposal areas are both considered fills
  - 4) one small ditch can impact many acres of wetland or many linear feet of stream
  - 5) ditching can connect isolated wetlands
  - 6) a qualified environmental consultant should be on any design team
- f) permitting
  - 1) preapplication
  - 2) verified wetland/stream deliniation of property
  - 3) lots of paperwork
- g) [www.sas.usace.army.mil/permit](http://www.sas.usace.army.mil/permit)
- h) Piedmont Branch: 678-422-2731
- i) Coastal Branch: 912-652-5050
- j) [ftp.usace.army.mil/pub/sas/mosquito](http://ftp.usace.army.mil/pub/sas/mosquito)

Oct 20

1. Biological Control Basics - Candace Royals
  - a) use of natural agents to control mosquitoes
  - b) highly specific
  - c) low non-target and environmental impacts
  - d) used to control immatures and adults
  - e) types of biocontrol
    - 1) microbial - *Bacillus* bacteria
    - 2) parasites
      - a) fungi
      - b) nematodes
    - 3) introduced predators
      - a) gambusia
      - b) birds/bats
  - f) types of mosquito control
    - 1) source reduction
    - 2) larviciding
    - 3) adulticiding
      - a) last control measure to be used
      - b) first in case of disease control where infected mosquitoes are found
  - g) larviciding strategies
    - 1) map your sites
    - 2) establish treatment thresholds
    - 3) prioritize treatment and surveillance
    - 4) select appropriate materials and formulations
    - 5) deliver materials on target and on time

- 6) efficacy check
- h) larvicide choices
  - 1) bacteria
  - 2) insect growth regulators
  - 3) chemical
  - 4) oils/surfactants
- i) more on *Bacillus*
  - 1) two types available for mosquito control
    - a) Bti
      - 1) quick death
      - 2) no residual
    - b) *B. sphaericus*
      - 1) slower death - 48 hrs
      - 2) some residual - recycling effect
  - 2) need to be ingested to work - damage midgut
    - a) active ingredient is spores and crystals
    - b) needs to be activated by gut Ph
    - c) breaks down into prototoxins
    - d) toxins attack gut lining
    - e) breakdown lining and increase pore size
- j) When to use - Bti
  - 1) single brood control
  - 2) many formulations
- k) when to use *B sphaericus*
  - 1) developed for use in polluted waters (*Culex* control)
  - 2) best use is in more permanent waters or where there are many stages present
- l) product performance factors
  - 1) application timing - need to be ingested
  - 2) equipment calibration - saves waste of time and product (money)
  - 3) coverage - need to get product to larvae
  - 4) water quality and hydrology
  - 5) use the best formulation for the need
- m) product rotation can be beneficial
- n) all products have their strengths and weaknesses
- o) larviciding can be effective in winter months to control overwintering larvae and reduce broods coming off in the spring
- p) benefits of larviciding
  - 1) environmentally responsible
  - 2) public relations
  - 3) safety
  - 4) reduced liability
  - 5) improved service
  - 6) save money
- q) no method is right for every situation - get informed

2. Industry Spotlight - Wellmark, Charley Pate
  - a) name change - Central Life Sciences
  - b) mosquito control products division name is Zoecon
  - c) Altosid - many formulations for many different uses
    - 1) pretreat - can treat flood-prone areas and have control when areas flood
    - 2) residual control based on formulation used
    - 3) contact pesticide
    - 4) prevents emergence to adult stage
  - d) range in control length relates to organic content of water - bacteria break down methoprene
  - e) Barrier treatments
    - 1) mavrik
    - 2) controls resting mosquitoes
    - 3) apply with a backpack blower
    - 4) 3-4 weeks control
    - 5) pyrethroid (tau-fluvalinate)
  - f) source reduction literature available for hand outs to homeowners
3. Industry Spotlight - UNIVAR, Trey English
  - a) adulticides
    - 1) various permethrin products
    - 2) fyfanon
  - b) larvicides
    - 1) altosid products
    - 2)
  - c) barrier sprays
  - d) equipment (Dyna-Fog, GNC)
    - 1) ULV
    - 2) foggers
  - e) pumps
    - 1) diaphragm
    - 2) pump
    - 3) FMI
  - f) mosquito traps
  - g) other pest control
  - h) training program
  - i) [www.vectorbytes.com](http://www.vectorbytes.com)
  - j) [www.pestweb.com](http://www.pestweb.com)
4. Laboratory Update - Danny Mead, SCWDS
  - a) Arboviral Surveillance (and related projects) in Georgia, 2001-2006
    - 1) dead bird and mosquito surveillance
    - 2) decoy bird study
    - 3) serosurveys
    - 4) what next
  - b) dead birds
    - 1) submissions rose from 2000-2002, then started dropping

- 2) peak submission was about 2500 birds
- 3) about 7000 birds have been submitted for testing from Jan 2001- Dec 2005
- 4) 1,859 were positive
- 5) transmission season: consecutive birds positive
  - a) 4795 birds met this definition
  - b) 67% submitted corvids WNV+
  - c) 8% other birds WNV+
- c) mosquitoes
  - 1) # pools submitted each year increased
  - 2) in 2006, funding issues limited submission
- d) virus isolation
  - 1) EEE
  - 2) Highlands J
  - 3) Flanders
  - 4) South River
  - 5) LAC
  - 6) Potosi
  - 7) Keystone
  - 8) Cache Valley
  - 9) New Castle - birds
- e) Reporting of Dead Birds - DeKalb County trials
  - 1) 2 trials in 2003
  - 2) urban and rural areas
  - 3) crow decoys labeled with reporting instructions
  - 4) decoys placed close to roads
  - 5) monitored at 7 days
    - a) reported
    - b) missing
    - c) not reported
  - 6) results
    - a) 43% found, only 10% reported
    - b) urban - for every bird reported, 4 go unreported
    - c) rural - for every bird reported, 30 go unreported
- f) Fate of dead birds
  - 1) urban and rural sites
  - 2) 2 trials
  - 3) placed crow and sparrow carcasses at sites depending on permission
  - 4) carcasses placed in pairs
  - 5) monitored daily for 6 days
  - 6) cameras placed at site
  - 7) carcasses decreased more rapidly in rural environment
  - 8) 64% of scavenger visits did not result in removal of carcass
  - 9) 82% of carcasses disappeared within 6 days
  - 10) rural carcasses persisted 1.6 days

- 11) urban carcasses persisted 2.1 days
- 12) sparrow carcasses persisted a shorter time than crows
- 13) high carcass loss occurred on the first day
- g) future - depends on funding
- 5. UGA Dean of College of Agriculture and Science - Scott Angle
  - a) agriculture continuing to grow in Georgia
  - b) research and education arm of public health/mosquito control
  - c) resource for control industry
  - d) extension program
  - e) interns?? - Dr Joe Broder (Dean of Academic Affairs)
  - f) initiating program for training outside the classroom
- 6. Natural History of Fireflies/Lightning Bugs - Jonathan Copeland, Georgia Southern University
  - a) beetles - Family Lampyridae & Elateridae
  - b) firefly adults flash
  - c) world-wide distribution
    - 1) 92 genera
    - 2) 1900 species
    - 3) 20 genera & 150 species in US
  - d) two major genera
    - 1) diurnal firefly - *Ellychnia*
    - 2) Photinus
      - a) black & pink
      - b) yellow-colored fluorescence
      - c) male has large lantern, larger eye
      - d) female has reduced lantern
      - e) includes synchronous flashers
      - f) bitter flavor
    - 3) Photuris
      - a) larger
      - b) brownish
      - c) "meaner"
      - d) no bitter flavor
  - e) adults generally do not eat - exception are some female Photuris fireflies who eat males of other species (2 of the 10 species)
  - f) eating avoidance behaviors
    - 1) avoidance by some prey species
    - 2) spiders use fireflies to attract other fireflies
    - 3) many things will eat fireflies
  - g) life cycle
    - 1) egg - larvae (5-7 instars) - pupa - adult
    - 2) eggs and larvae glow - bitter taste
    - 3) whole cycle is 1-2 years
    - 4) adults are short-lived
    - 5) larvae primarily subterranean
    - 6) larvae eat soft-bodied organisms, all are predaceous

- 7) pupate within a mud cell
- h) firefly habitats
  - 1) water or high humidity are key
  - 2) forested areas
  - 3) variety of habitats
- i) communication
  - 1) species specific flashing
  - 2) female and male flashes either different and/or done in response to male flashing
  - 3) Barber, 1951 - species ID by flash pattern
  - 4) Otte, 1976 - species ID by flash pattern
  - 5) females will make flash gestures to specific males
  - 6) males will dim flash as they approach a chosen female
  - 7) complex dialogues are possible
  - 8) mating clusters can occur
- j) no evidence to suggest that mosquito control impacts firefly populations
- k) habitat destruction plays a big role in firefly demise

2007 meeting: Oct 17-19

2008 meeting: Oct 15-17

[www.GAmosquito.org](http://www.GAmosquito.org)