NORTH AMERICAN BLACK FLY ASSOCIATION

16TH ANNUAL MEETING

FEBRUARY 15-16, 2018

UNIVERSITY OF GEORGIA, ATHENS, GA

THURSDAY, FEBRUARY 15TH

8:30 AM – 8:45 AM	Introductions and Welcome! **John Walz**
8:45 AM – 9:10 AM	*Simulium vittatum* cytospecies IS-7 images and biological vignettes **Elmer W. Gray**, Peter H. Adler and Jena Johnson
9:10 AM – 9:35 AM	Black flies as vectors of the parasitic nematode *Onchocerca* in North America **Guilherme G. Verocai**, Department of Infectious Diseases, College of Veterinary Medicine, University of Georgia, Athens GA
9:35 AM – 10:00 AM	Pennsylvania Black Fly Suppression Program update **Doug Orr,** PA Department of Environmental Protection, Harrisburg, PA
10:00 AM – 10:30 AM	**BREAK**
10:30 AM – 10:45 AM	The Past and Future of Experimental Infections of Colony *Simulium vittatum* **David Blount**, Department of Entomology, College of Agriculture and Environmental Sciences, University of Georgia, Athens GA
10:45 AM – 11:10 AM	Cows or Killers? Endoparasiticide Use in Insecticidal Zoopropylaxis Against Mosquito Vectors! **Annie Rich**, University of Georgia, Athens, GA
11:10 AM – 11:35 AM	Valent BioSciences - Discovery, Development and Implementation **Jim Andrews**, Senior Sales Specialist, Valent BioSciences
11:35 AM – 12:00 PM	Honey bee update **Jennifer Berry**, University of Georgia, Athens, GA
12:15 PM – 1:15 PM	**LUNCH** (PROVIDED AT GEORGIA CENTER) **AND GROUP PICTURE**
1:30 PM – 1:55 PM	Estimating arbovirus transmission in the city: variation in microclimate and effects on vectorial capacity **Courtney Murdock**, University of Georgia, Athens, GA
1:55 PM – 2:20 PM	Ecological and societal considerations for the future of Maryland *Simulium jenningsi* management **Rebecca C. Wilson-Ounekeo** and William O. Lamp, University of Maryland, College Park, MD

THURSDAY, FEBRUARY 15TH (CONTINUED)

2:20 PM – 2:45 PM	VectoBac WDG: WALS™ strategy against container mosquitoes **Jacques Dugal**, Valent BioSciences
3:00 PM – 3:30 PM	**BREAK**
3:30 PM – 3:55 PM	MMCD Black Fly Control Program update **John Walz**, Metropolitan Mosquito Control District (MMCD), St. Paul, MN
3:55 PM – 4:20 PM	*Simulium vittatum* cytospecies IS-7 Survivability and Biting Rate Studies **Elmer W. Gray** and David Blount**,** University of Georgia, Athens, GA
4:20 PM – 4:45 PM	Black flies and Caddisflies of Bullhead City **Joe Iburg**, Bullhead City, AZ
6:00 PM	BBQ DINNER AT LAB (INCLUDES TOUR OF COLONY)

FRIDAY, FEBRUARY 16TH

(Optional)
GROUP TOUR OF BOTANICAL GARDENS OR OTHER ACTIVITY

PRESIDENT: JOHN WALZ
HOST SITE COORDINATOR: ELMER GRAY
PROGRAM EDITOR: CAREY LAMERE
T-SHIRT DESIGN: MOLLY NEE

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ABSTRACTS

The Past and Future of Experimental Infections of Colony *Simulium vittatum*

David Blount, Department of Entomology, College of Agriculture and Environmental Sciences, University of Georgia, Athens GA

The exploration into the role of Black flies (Diptera; Simuliidae) as vectors of disease is resurfacing as resistance of *Onchocera* to ivermectin has been reported. *Simulium* are known to play a role in vectoring many diseases in humans and both domestic and wild animals across most of the continents. As more research is being done to investigate the ecology and unravel the complexities of such systems, it is fortunate that the University of Georgia has a system to competently and continually provide uninfected specimens. By learning how to experimentally infect these flies, researchers can be certain of the source of their experimental infections and can learn more about the complex interactions between parasite host and vector. This talk aims to outline techniques used to experimentally infect *Simulium vittatum* reared in colony and discuss future paths to induce experimental infections.

Simulium vittatum cytospecies IS-7 Survivability and Biting Rate Studies

Elmer W. Gray and David Blount, University of Georgia, Athens, GA

The University of Georgia Black Fly Rearing and Bioassay laboratory continues to operate the only known black fly colony. The colony was started in 1981 at Cornell University as part of Dr. Ed Cupp's laboratory conducting Onchocerciasis transmission studies. Since 1991 our laboratory personnel have maintained the colony for use in larval feeding and larvicide research and development work. However, recent work has focused our efforts on adult behavior. Adult survival is one area of interest. This aspect becomes critical when using flies for disease transmission, pesticide evaluation or repellent evaluations. Flies were prepared using standard colony protocols and then stored in refrigeration at 5-7°C and at 25°C. Adult mortality was evaluated daily. Another aspect of adult biology that has been evaluated is the biting rates of recently emerged and post-oviposition adults. *Simulium vittatum* cytospecies IS-7 is autogenous, thereby being able to deposit their first batch of eggs without a blood meal. After oviposition the colony flies will actively bite, as has been observed by colony workers through the years. The biting rate becomes critical when attempting to develop a repellent testing protocol for the colony flies. Initial testing has evaluated the biting rate of 100 post-oviposition females in a small cage (18x18x19cm or 6,156 cm^3 in volume) and 200 post-oviposition females in a medium cage (29x29x29cm or 24,389 cm^3 in volume). Average landing/biting rates of 4-8/minute have been observed in the medium cages. The small cages seem too restrictive and encourage more landing activity due to the limited volume of the cage and random movement of the flies. Improved protocols have been developed.

Simulium vittatum cytospecies IS-7 images and biological vignettes
Elmer W. Gray, Peter H. Adler and Jena Johnson

The University of Georgia Black Fly Rearing and Bioassay laboratory continues to operate the only known black fly colony. *Simulium vittatum* cytospecies IS-7 is a morphologically large species and the colony specimens are particularly large representatives of the species. As a result, these specimens provided an excellent source of photographic subjects. Capitalizing on her presence in the UGA Entomology Department, Ms. Jena Johnson has recently worked with laboratory personnel photographing all life stages. Ms. Johnson is rapidly developing into one of the country's foremost insect photographers and is a longtime friend and colleague of Dr. Adler and I. In a collaborative effort we will display a sample of Jena's work and discuss the biological significance of the images presented. In addition, we will share a newly designed and hand drawn, life cycle image that was developed and drawn by Ms. Annebelle Wang a student in our laboratory.

Black flies and Caddisflies of Bullhead City
Joe Iburg, Bullhead City, AZ

Updates on the Clark County, NV and Bullhead City, AZ aquatic insect suppression program.

Estimating arbovirus transmission in the city: variation in microclimate and effects on vectorial capacity
Courtney Murdock, University of Georgia, Athens, GA

Most statistical and mechanistic models used to predict mosquito borne disease transmission incorporate climate drivers of disease transmission by utilizing environmental data collected at geographic scales that are potentially coarser than what mosquito populations may actually experience. Temperature and relative humidity can vary greatly between indoor and outdoor environments, and can be influenced strongly by variation in landscape features. In the *Aedes albopictus* system, we conducted a proof-of-concept study in the vicinity of the University of Georgia to explore the effects of fine-scale microclimate variation on mosquito life history and vectorial capacity (VC). We placed *Ae. albopictus* larvae in artificial pots distributed across three replicate sites within three different land uses – urban, suburban, and rural, which were characterized by high, intermediate, and low proportions of impervious surfaces. Data loggers were placed into each larval environment and in nearby vegetation to record daily variation in water and ambient temperature and relative humidity. The number of adults emerging from each pot and their body size and sex were recorded daily. We found mosquito microclimate to significantly vary across the season as well as with land use. Urban sites were in general warmer and less humid than suburban and rural sites, translating into decreased larval survival, smaller body sizes, and lower per capita growth rates of mosquitoes on urban sites. Dengue transmission potential was predicted to be higher in the summer than the fall. Additionally, the effects of land use on dengue transmission potential varied by season. Warm summers resulted in a higher predicted VC on the cooler, rural sites, while warmer, urban sites had a higher predicted VC during the cooler fall season.

Cows or Killers? Endoparasiticide Use in Insecticidal Zoopropylaxis Against Mosquito Vectors
Annie Rich, University of Georgia, Athens, GA

Malaria cases worldwide have been greatly reduced over time thanks to integrated management tactics against *Anopheles* mosquitoes. However, many rural agricultural regions are still significantly affected. Many of these communities keep livestock near residences, and human hosts have little physical protection from biting mosquitoes. A new slow-release eprinomectin injectable drug, LongRange, could provide additional protection when livestock are treated. To determine whether this formulation impacts mosquito survival when mosquitoes feed on these animals, we began by determining the LC_{50} in lab-dosed bovine blood. We then moved to the field to determine whether the drug would affect survival, fertility, and fecundity. The mosquitoes were fed on hosts, then returned to the lab to be observed for mortality, oviposition, and hatch rates. The drug successfully killed mosquitoes when fed in the lab, with an LC_{50} of 0.0118 µL/mL of bovine blood, which is lower than the label rate. However, survival was not affected in host-fed mosquitoes compared to our control groups. There were also no sub-lethal effects observed in surviving mosquitoes. Moving forward, the doses should be increased in the host, or different formulations may be tested to improve insecticidal zooprophylaxis use in mosquito control.

Black flies as vectors of the parasitic nematode *Onchocerca* in North America
Guilherme G. Verocai, Department of Infectious Diseases, College of Veterinary Medicine, University of Georgia, Athens GA

The role of different black fly (Diptera; Simuliidae) species as vectors of filarial nematodes of the genus *Onchocerca* (Nematoda; Onchocercidae) infecting in North America is scarcely known. Recent studies suggest that the biodiversity of *Onchocerca* nematodes infecting wild ungulates have been underestimated, and consequently, more complex associations with hosts and vectors and geographic distributions are expected. In addition, the emergence of *Onchocerca lupi*, a parasite of wild and domestic carnivores that also infects humans, is emerging in areas of the southeastern USA, however, the biology of this parasite and its putative vectors remain poorly understood. Investigating black fly-*Onchocerca* associations and host blood meal analysis in will provide new knowledge on black fly ecology, and their role as vectors of filarial parasites in the continent.

Ecological and societal considerations for the future of Maryland *Simulium jenningsi* management
Rebecca C. Wilson-Ounekeo and William O. Lamp, University of Maryland, College Park, MD

In September of 2017 the state of Maryland began a trial spray of *Bti* in the Potomac River to manage populations of *Simulium jenningsi*. If this pilot program shows success over the next year, it will potentially lead to a larger program in the future. Over the past five years our lab has conducted research on the ecological and societal factors related to the *S. jenningsi* nuisance in western Maryland, which is now providing baseline data for the management effort and identifying potential hurdles for the success of the program. Larval sampling has indicated productive locations within the Potomac for *S. jenningsi*, but some sites have a higher proportion of *Simulium luggeri*, which may indicate sites of lower priority for the management program. Replies from resident surveys suggest that public awareness of black flies, or "gnats," in Maryland is low outside of regions with relatively severe nuisance problems. Future outreach efforts will need to address the concerns of these residents if the program draws more state-wide attention.