North American Black Fly Association
Seventh Annual Meeting

Meeting Abstracts

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Presentations Titles with Abstracts for the 2009 NABFA Meeting

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TECHNICAL SPECIFICATIONS FOR PONTOON BOAT APPLICATIONS TO MEDIUM/LARGE RIVERS (COLORADO RIVER)

Christopher T. Bramley, Clark County Vector Control, Las Vegas, NV

No abstract submitted

HISTORY OF MOSQUITO AND BLACK FLY CONTROL IN MINNESOTA

John Walz, Metropolitan Mosquito Control District, St. Paul, MN

Metropolitan Mosquito Control District (MMCD) celebrated its 50th anniversary in 2008. The MMCD black fly program will celebrate its 25th year in 2009. Several historical photos will be shared along with a 20-minute video documentary.

CURRENT STATUS OF THE BLACK FLY GENOME AND PROTEOME PROJECTS

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Laboratory work on the black fly genome and proteome projects have been underway for over one year. The genome project is initially focusing on chromosome arm IIL of *Simulium squamosum*. The Post laboratory has constructed and characterized a genomic BAC library from wild-collected *S. squamosum*. DNA from IIL has been microdissected, and amplified. This DNA is serving as a probe in differential hybridizations to choose IIL-specific BAC clones. The clones will be sequenced using the massively parallel sequencing capabilities of the Center for Genomics and Bioinformatics of Indiana University (Bloomington). The other focus of the project is the transcriptome of *Simulium vittatum* s.str. RNA from egg masses, mixed-stage larvae, male and female late instar larvae, pupae, and male and female adults is being used to produce cDNAs which will also be shot-gunned sequenced at Bloomington. We anticipate that the raw data transcriptome will be available to begin annotation soon.

BACTIMOS PT - A NEW OPTION IN MIDGE SUPPRESSION

Elmer W. Gray[1], Robert A. Fusco[2] and Candace G. Royals[2]
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Non-biting midges of the family Chironomidae (Diptera) have long been recognized for their extensive nuisance potential. Operationally, midge control has proven to be difficult and labor intensive with a limited number of active ingredients available as effective

control options. Valent BioSciences has developed a new, extruded pellet formulation of *Bacillus thuringiensis* subsp. *israelensis* designed specifically for midge suppression. Field trials were conducted in man-made ponds on Hilton Head Island, SC. Applications were conducted with a Maruyama backpack blower at a rate of 26.8 lbs/acre. Efficacy was evaluated using Eckman dredge samples to evaluate larval populations pre and post-treatment and as compared to an untreated control pond. The primary nuisance species present was *Glyptotendipes paripes*. Larval surveillance indicated that the majority of the larval development was occurring around the banks of the test sites in firm, sandy substrates. As a result, larval sampling was conducted within a band of 10-20 feet from the banks of the treated and untreated ponds. Larval samples were washed on a USA Standard Testing Sieve No 50 (300 micrometers) to reduce the volume of the sample and facilitate accurate larval counts. Larval populations were reduced by an average of 95% during the first week post-treatment, 77% fourteen days post-treatment and 59% at twenty-one days post-treatment for the four trials conducted.

VERTICAL DISTRIBUTION OF BITING FLIES IN BOREAL FORESTS OF SWEDEN

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How height influences the host-seeking behavior of hematophgaous flies can be used to improve vector surveillance and provide ecological insights. The goal of this study was to map the vertical distribution of biting flies in two boreal forests of Sweden. Dry-ice baited Centers for Disease Control light traps were placed at 1.5, 5.0, and 10.0 m in a Scots pine forest and a spruce forest. Lightless traps were operated for 20-25 hr for 7 periods in June 2007. More than 40,000 hematophagous flies were collected, including 36,092 black flies, 606 biting midges, and 4,029 mosquitoes. Analysis of variance of the ranked data showed that the distribution of 3 taxa of black flies, 3 species of biting midges, and mosquitoes of the genus *Ochlerotatus* differed significantly with height. Seven taxa of black flies, 2 species of biting midges, and mosquitoes of the genus *Ochlerotatus* differed significantly between sites. Significant height-site interactions were found for three taxa of black flies and one species of biting midge. A majority (mean = 66.4%) of mammalophilic species were collected at 1.5m, and a majority (mean = 43.8%) of ornithophilic species were collected at 10.0 m. This study demonstrates that biting-fly species composition changes with height, emphasizing the importance of trap height in vector-surveillance and ecological studies.

MOSQUITO AND BLACK FLY SURVEILLANCE METHODS, MAPS AND MORE

Carey LaMere, Metropolitan Mosquito Control District, St. Paul, MN

The Metropolitan Mosquito Control District (MMCD) conducts larval and adult mosquito surveillance to determine levels of mosquitoes present, measure annoyance, and to detect the presence of disease vector species. MMCD produces maps from surveillance data to help direct control measures effectively. The MMCD black fly program incorporated maps in 2007 and 2008 to help monitor black fly populations in the District.

LARVAL MORPHOLOGY OF *SIMULIUM BIVITTATUM*

Kenneth Pruess, University of Nebraska, Lincoln, NE

Simulium bivittatum has 8 larval instars based on measurement of postgenal length in 1200 larvae. This conclusion is supported by antennal, labral fan, mandible, and anal hook characters. Change in size of most characters closely follows Dyar's Law for instars 1-7 but with some departures between instars 7 and 8. Caution is required in using many of the examined characters for species discrimination unless last instar larvae are used and variation within that instar is known.

BLACK FLY PATHOGENS

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No abstract submitted

THE INFLUENCE OF ANTHROPOGENIC DISTURBANCE ON TWO GROUPS OF LOTIC FILTER-FEEDING ORGANISMS, HYDROPSYCHIDAE AND SIMULIIDAE, IN THE SOUTHERN INNER PIEDMONT ECOREGION OF GEORGIA

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Disturbance plays an important role in influencing the abundance and distribution of lotic filter-feeding macroinvertebrates. Anthropogenic alteration of watersheds can increase disturbance in stream ecosystems through the alteration of natural hydrological regimes, physical degradation, reduced water quality, and the input of contaminants. Aquatic organisms are exposed to contaminants in various ways, but filter-feeding organisms are particularly vulnerable to hydrophobic contaminants through the ingestion of contaminant-bound suspended particles. In this study, ten streams were assessed to determine the effects of differing land uses on water quality and the subsequent impact on two groups of riffle-dwelling organisms, microfilterers (Simuliidae) and macrofilterers (Hydropsychidae). Sites were selected in an effort to capture the diversity of land uses present in the inner piedmont ecoregion of Georgia and were sampled quarterly for a year, quantitatively sampling riffle habitats. Agricultural land use appeared to increase nutrient levels and sedimentation, and urban land use had the strongest positive relationship with specific conductance, most likely reflecting Ca^{2+}, Cl^{-}, and Na^{+} concentrations. Organic contaminants were detected in all of the streams. Data will be analyzed to determine the role of anthropogenic disturbance, particularly the impact of hydrophobic contaminants, on macrofilterers (Hydropsychidae) and microfilterers (Simuliidae) that share a common riffle habitat.

REPRODUCTIVE PROTEOMICS
Dathe Benissan-Messan, Creighton University, Omaha, NE

No abstract submitted

EMERGENCE PATTERNS OF *SIMULIUM JENNINGSI* IN HUNTERDON COUNTY, NEW JERSEY
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No abstract submitted

MICROSATELLITE ANALYSIS OF THE *SIMULIUM ARCTICUM* SPECIES COMPLEX FROM MONTANA, USA
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Cytological analyses reveal that black fly morphospecies are often composites of chromosomally distinct populations. Whether these entities are considered reproductively isolated depends on their stage of chromosome evolution. In this study, we aim to understand the molecular basis of chromosomally induced speciation. Specifically, we will test whether cytologically defined taxa reflect underlying genetic structure. Larvae of the diverse *Simulium arcticum* species complex will be collected from the Rocky Mountains of Montana, USA, in the spring of 2009 and subsequently assigned to their respective cytospecies or cytotype designation. Genomic DNA from these larvae will be amplified and sequenced at eleven polymorphic microsatellite loci in order to: (1) genetically characterize members of the complex; (2) estimate pair-wise differentiation and gene flow between cytological taxa; (3) identify the number of genetic populations; and (4) understand how genetic data correlates with chromosomal divergence. In this way, genetic analyses of variable microsatellite loci can elucidate the evolutionary mechanism involved in the speciation of members of the *S. arcticum* complex and of black flies in general.

COMPARISON OF LARVAL MORTALITY IN FIELD APPLICATIONS CONDUCTED AT LEGAL SUNSET AND MID-MORNING
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Field applications of Vectobac 12AS® (*Bacillus thuringiensis* var. *israelensis*) were evaluated to determine if mortality was effected when applications were conducted at

legal sunset as opposed to mid-morning. Six applications were conducted in the Chattahoochee River near Helen, Georgia. River flows were measured prior to each test and treatments were conducted at 1 ppm during a 1 minute application. All treatments were conducted via carboy with the prescribed volume of B.t.i. being diluted in 15 liters of river water and applied across the river. Larval samples were collected 2 hours post application, placed in 1 liter containers of river water, stored in a cooler with ice until returning to the laboratory. Samples were aerated with aquarium pumps and at approximately 24 hours post-treatment each sample was poured into a white enamel pan and percent mortality was determined. Average larval mortality for the sunset treatments was 69% as opposed to 61 % for the daytime treatments. Consequently, we see no negative aspect to conducting field applications until legal sunset when operational factors require such actions.

BARBARIANS AT THE GATE: THE RESPONSE OF BLACK FLIES TO CLIMATE CHANGE IN NORTHERN NORTH AMERICA.

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The Arctic is among the most fragile ecosystems on Earth; it is also under immense environmental pressure as the effects of global warming are felt most acutely at northern latitudes. The Biological Survey of Canada plans to document changes in Canada's arthropod fauna by repeating the half-century-old Northern Insect Survey (NIS) — an unprecedented initiative that sampled diversity at 75 arctic and subarctic localities across northern North America. Plans for the new NIS will be presented, with special reference to biting flies. Preliminary results suggest that black flies can respond rapidly warming temperatures. The consequences of this phenomenon for northern birds and mammals are discussed.