2010 DRAGONFLY SOCIETY OF THE AMERICAS PRESENTATION ABSTRACTS

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82 Main Street
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PREDATION STRUCTURED ODONATA ASSEMBLAGES IN FISHLESS, SALMONID, AND CENTRARCHID PONDS IN MAINE

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P.G. deMaynadier, E. Gaenzle Schilling, and C.S. Loftin

While fishless ponds provide a potentially unique habitat for many aquatic invertebrates intolerant of vertebrate predation, widespread fish introductions have led to a decline in naturally fishless habitats throughout North America. We compared odonate assemblages associated with fishless ponds (n=5) in eastern Maine with those found at similarly located and sized (2.7 to 7.7 ha) ponds dominated by either salmonid (n=5) or centrarchid (n=5) fish predators. Three belt transects were established in littoral macrophyte zones at each study pond, and adult Zygoptera (23 spp) and larval Anisoptera (37 spp) were sampled in each transect during two survey periods in June and July 2004. We also quantified a number of site variables at each pond. Fishless ponds were slightly more acidic than centrarchid and salmonid ponds, but there were no differences in other site variables among pond types. Odonate richness and abundance were similar among the three pond types, but species assemblage composition differed significantly with pond type. Non-metric multidimensional scaling and multiple response permutation procedure revealed discrete differences in Zygoptera assemblages at fishless ponds, but not at salmonid and centrarchid ponds. Anisoptera assemblage composition differed among each of the three pond types. We conclude that fishless ponds provide habitat for native odonate assemblages that is unique from that of ponds hosting either warmwater or coldwater fish taxa.

WHEN ODONATOLOGISTS DATE: DIVERGENCE TIMES IN ANISOPTERA

Jessica Ware – Post Doc, American Museum of Natural History

A NEW APPROACH TO THE CONSERVATION OF NORTH AMERICAN DRAGONFLIES

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Is it possible to predict what dragonflies may be found at a river before grabbing the net and getting wet? Are characteristics of what defines a suitable river or a suitable watershed for a given species consistent? I theorize that not only can broad-scale distributions of North American species be defined based on climatic and regional parameters, but that the specific occupation of watersheds and river reaches can be predicted from watershed and reach-scale characteristics. I propose to use odonate distributional data from various sources to develop a niche model (habitat suitability model) for each species of odonate in North America, focusing on stream and riverine species and species with a significant North American range. In North America odonates restricted to flowing waters represent a minority of species, but the majority of our most imperiled species. This application of niche modelling will improve our understanding of odonate ecology by quantifying the most relevant characters defining species presence across multiple spatial scales These characters may be natural, such as mean annual rainfall, or anthropogenically influenced, such as watershed percent forest cover. A comprehensive analysis of the odonate data collected over decades by expert and amateur odonatologists may bolster conservation efforts of North America's most imperiled odonates.

THE MADICOLOUS NYMPHS OF HETEROPODAGRION (ODONATA: MEGAPODAGRIONIDAE)

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Five of the 14 Neotropical genera currently placed in the Megapodagrionidae are still unknown in the nymph stage. Only 29 of the 135 described New World species are known in the nymph stage (about 21%). The genus Heteropodagrion has remained undiscovered until now. I found nymphs in the western Andes Mountains of Ecuador by closely inspecting sheet flow on near-vertical rock faces along small waterfall streams. The nymphs are adapted for clinging in the shallow, swift running water. Details of their morphology, protective coloration and behavior will be presented.

THE RINGED BOGHAUNTER (WILLIAMSONIA LINTNERI HAGEN) IN MAINE: CHALLENGES AND STRATEGIES FOR HOW TO OVERCOME THEM

Mark Ward ecological consultant for the Maine Department of Inland Fisheries and Wildlife
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The ringed boghaunter, Williamsonia lintneri, was first discovered in Maine in 1995. Since that time the Maine Department of Inland Fisheries and Wildlife (MDIFW) has conducted annual surveys to assess the distribution and status of the species in the state. The biology of W. lintneri has presented several challenges for surveyors because of its early and brief flight period (April 27-June 11 in Maine), its tendency to spend most of its brief adult life stage in forested uplands, and the difficulty of definitively distinguishing its exuviae from those of the ebony boghaunter (Williamsonia fletcheri) – a species with considerably more general distribution and habitat preferences in Maine. Surveys to date have nevertheless improved our understanding of the habitat requirements and distribution of W. lintneri in Maine and resulted in: 1) the development of a habitat potential index to score wetland suitability, 2) the development of an evidence-based categorization of wetland breeding certainty, 3) preliminary data on distances adults travel from wetlands of origin, 4) analyses of exuvial microhabitat characteristics, and 5) the identification of several previously unknown populations. The results of this work will be summarized and directions of future inquiry will be outlined.

THE NEW YORK DRAGONFLY AND DAMSELFLY SURVEY 2005-2009: DISTRIBUTION AND STATUS OF THE ODONATES OF NEW YORK

Erin White, Paul Novak – New York Natural Heritage Program

The New York Dragonfly and Damselfly Survey (NYDDS) concluded its fifth and final year on March 31, 2010. The Survey began in 2005 and relied heavily on citizen scientists to help NYS DEC and NYNHP staff to collect data over a large geographic area. Its primary goal was to document the current distribution of all odonate species in New York State. Funding for the NYDDS was through New York State Wildlife Grant T-2-1 in cooperation with the U.S. Fish and Wildlife Service Division of Wildlife and Sport Fish Restoration. Survey efforts were directed toward under-surveyed regions, areas with potential high diversity, and locations with potential for harboring Species of Greatest Conservation Need (SGCN). Nearly 300 volunteers were trained in weekend workshops held throughout the state during the summers of 2005-2007. We focused most of our efforts primarily on surveying for adult odonates in or near aquatic breeding habitats such as lakes, ponds, bogs and fens, rivers and streams, marshes, swamps, and forest seeps. Data received were verified by experts for pre-determined species for which we required photo or specimen vouchers to ensure high data quality. Findings from the Survey included five species added to the list of known odonates for the state, bringing the cumulative total to 194 species. Participants visited over 2,170 survey sites statewide and a total of 4,383 surveys were conducted, including repeat visits. NYDDS yielded 1,111 new county records when compared with pre-existing county-level data. On average, each county's documented odonate richness increased by 18 species, and we documented at least 75 species in two-thirds of the counties. A report was submitted to NYS DEC in early April and a database was finalized containing over 18,000 confirmed individual species records based on our verification protocol. A list of species was compiled for each county as well as a distributional map and phenology chart for each species ever detected in New York. Full species accounts are included in this report for New York's 48 SGCN. A discussion of S-ranks for rare odonate species, future inventory needs, conservation and monitoring, and surveys for three threatened bluets, Ringed Boghaunter (Williamsonia lintneri), and Somatochlora hineana were also addressed. The report will become available on the project website at http://www.dec.ny.gov/animals/31061.html. Since odonates are noted indicators of water quality, biodiversity, and ecological change, our findings will help to inform future conservation efforts in freshwater habitats. Along with previous distribution information, it will provide excellent baseline information on the distribution and status of odonates in New York against which to measure future change. Much like the 2000-2005 Breeding Bird Atlas followed up on the 1980-1985 Atlas, leading to some fascinating analyses of distributional change over those 20 years, we hope that in the future this survey effort will be similarly revisited to assess changes in odonate distributions. Monitoring of this sort may be the only way to know whether we are maintaining New York's dragonfly and damselfly biodiversity in the face of continuing global change.

MISS MATTIE WADSWORTH (1862-1943) AND THE ORIGINS OF DRAGONFLY STUDY IN MAINE

Hal White, University of Delaware

Mattie (Martha) Wadsworth, an amateur entomologist who lived in Manchester, Maine, was one of the first people to publish on Maine Odonata. Her initial note in the first volume of Entomological News in 1890 and five subsequent supplements can be attributed to the efforts of Philip P. Calvert. Wadsworth was known among professional entomologists in the United States and Europe of the time through her correspondence and exchange of specimens. However, she remained close to home due to family responsibilities and poor health.

Her specimens, collected when time and health permitted, came from within two miles of her home. She lived her entire life in the same house, where she maintained her collections in a small room. At Calvert's request, the Academy of Natural Sciences of Philadelphia purchased Wadsworth's Odonata collection in 1920. After Wadsworth's death in 1943 almost all of the remainder of Wadsworth's meticulously-kept insect collection (mostly Lepidoptera, but no Odonata) was donated to the Bates Museum in Hinckley, Maine. Although Wadsworth died in relative obscurity, her name lives on in Celithemis martha, a dragonfly she discovered near her home, which was named in her honor by Edward B. Williamson.

DRAGONFLY LARVAE AS INDICATORS FOR MERCURY IN THE NORTHEAST: INTERDISCIPLINARY CITIZEN SCIENCE RESEARCH

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Mercury, in its toxic methylated form, is a potent neurotoxin that is delivered to ecosystems via deposition from a global atmospheric pool, and ultimately bioaccumulates in aquatic and terrestrial foodwebs. Around the Gulf of Maine, research sites in 'pristine' areas have fish and other biota that exceed thresholds considered safe for human consumption or wildlife protection. All Maine surface waters are under fish consumption advisory and are considered impaired with respect to mercury because of these patterns and the difficulty in predicting which systems are most affected. Our citizen science research is evaluating the utility of dragonfly larvae *(Odonata: Anisoptera)* as indicators of mercury status in the Gulf of Maine region. The average mercury concentration in dragonfly larvae sampled across Maine was 0.097 ppm, greater than the proposed wildlife safety criterion (0.077 ppm). At sites across the region, we used our data to address hypotheses regarding whether mercury varied with body size or by family; these characteristics were less important than a field site's landscape setting. Data from a survey of a variety of surface water sites in or near three National Park areas across the region confirmed that mercury in dragonfly larvae was more variable among sites than within a site, suggesting that they are useful indicators for mercury. However, limited information regarding dragonfly larval life history characteristics hampers our ability to develop a mechanistic understanding of this variability. The talk will conclude with a list of mercury-relevant questions about dragonfly larvae that aim to spark discussion and potential collaborations with DSA members.

Poster Presentations

WHAT DIFFERENCE DOES A BIG BOG MAKE?

Corwin Libby, Jezika Shepard – Old Town High School

The ways that wetlands influence the methylation of mercury have been studied, but data on the actual effects on mercury bioaccumulation in specific organisms in specific wetland landscapes are always welcome. Such "check-ins" with nature allow us to refine our concepts of how nature works. The Sunkhaze watershed (Milford, Maine) contains a major wetland, Sunkhaze Meadows. Streams originate in uplands, converge in this big bog, and exit the bog in one output stream. This arrangement allows for before-bog and after-bog studies. We propose to assess the influence of the bog on selected water chemistry measurements (pH, ANC, Ca2+, DOC, SO42-, Cl-) taken from four streams before they enter the big bog, and from one location after the big bog, at the outlet of the whole system. We will also use total Hg concentrations in dragonfly larvae from the same locations in an attempt to assess the influence of the bog on the bioaccumulation of mercury. The chemistry of the four input streams will be weighted by the stream discharges to characterize the average chemical input to the big bog. This input will then be compared to the output chemistry to allow us to find interesting chemical changes that could be related to what is known about mercury methylation. We will then compare Hg concentrations in dragonfly larvae, sorted by family and size, from the four input streams to get a sense of the variability in Hg before the big bog, and compare that variability to the range of Hg concentrations from dragonfly larvae after the after-bog. We hypothesize that if the big bog is also a big methylator of mercury, then the range of Hg concentrations in dragonfly larvae downstream of the bog will be shifted higher than the range of Hg concentrations in larvae upstream of the big bog.

HAVE THE DRAGONFLIES READ THE PAPERS?
Michael Malo – Old Town High School
Four measures of water chemistry, dissolved organic carbon (DOC), acid neutralizing capacity (ANC), pH, and total phosphorus have been related to Hg concentrations in fish. But will clear trends in these indicators within a specific watershed be predictive of the pattern of mercury bioaccumulation in invertebrate predators? Getting a better picture of mercury bioaccumulation dynamics in the invertebrate part of the trophic system may help us understand the influences on mercury concentrations in fish, which are of direct interest to more people. At five sites in the Sunkhaze watershed (Milford, Maine) we have measured DOC, ANC, and pH (but not phosphorus) twice in two years. The sites produce a nice range in each indicator, and the correlation between the three indicators in any combination is tight. Furthermore, sulfate decreases in a tight correlation with increasing DOC. This is consistent with sulfate being processed in the watershed's wetlands, which can lead to the methylation of ionic mercury, at the same time DOC is moving to stream water from the wetlands. I hypothesize that if these chemical indicators track the pattern of methylation and movement of mercury in the watershed, then the mercury concentration in dragonfly larvae will closely follow. Dragonfly Hg should increase with increasing DOC and decreasing sulfate.

HOW MUCH DOES FAMILY MATTER COMPARED TO THE NEIGHBORHOOD?
Natasha LeClaire, Lee Larry, Joshua Patterson – Old Town High School
Landscape differences in watersheds can lead to different mercury bioaccumulation patterns in aquatic food webs, but even with differences in landscape, are family-determined traits important in regulating the movement of mercury through invertebrate trophic systems in streams? We collected dragonfly larvae from four streams in the Sunkhaze watershed (Milford, Maine) and sorted them by family and by size. Multiple individuals of similar size within two families will be analyzed for total mercury. Previous Old Town High School students measured watershed land areas above each sampling site and stream discharges (cubic feet of water per second) at each sampling site. These measurements allow watershed area to stream water flow ratios to be calculated. In lake systems, smaller lakes in larger watersheds were related to higher mercury concentrations in fish. We will examine the variability in mercury concentrations in similar size Aeshnidae and Gomphidae dragonflies at the four sites. We hypothesize that two landscape differences will sway mercury concentrations in dragonfly larvae more than family. If landscape features are much more important than family-determined behaviors, we expect to see that mercury in both families will change more according to 1) land area above each sampling site and 2) the area-to-discharge ratio in each watershed. If family-determined traits are not an important control, then family differences in Hg concentration should be small and the Hg in both families should change the same way with the landscape variables.

TESTING THE ZOOPLANKTON MERCURY DILUTION EFFECT IN A STREAM SYSTEM AND WITH INVERTEBRATE PREDATORS.
Zachary Merchant, Christopher Kenney – Old Town High School
Recent research has correlated increasing zooplankton densities with decreasing total mercury concentrations in zooplankton and even in fish within lake systems. These findings have logically led to the claim that zooplankton densities are a control on the bioaccumulation of mercury in a lake system. We intend to test this generality of the "plankton dilution" claim by seeing if it applies to another type of system: streams within the Sunkhaze watershed (Milford, Maine). We also think the consistency of the dilution explanation should be tested by using invertebrate predators instead of fish predators. Previous Old Town High School students measured a range of zooplankton densities in four streams by counting zooplankters in known volumes of water. We collected dragonfly larvae, identified them to family, and sorted them by size from the four streams. These dragonflies will be analyzed for total Hg. We will correlate total Hg concentrations in dragonfly larvae with zooplankton densities. We hypothesize that the presence of abundant zooplankton could increase the food chain length from a dragonfly's perspective by providing filter feeders with a higher-mercury, zooplankton-rich diet compared to a situation where filter feeders consume more primary production. Results supporting this alternative claim would be a positive correlation: increasing dragonfly Hg concentrations with increasing zooplankton densities.

EMERGENCE OF ODONATA IN GUÁSIMA AND ARROYO, SANTIAGO DE CUBA
M.Sc. Adrian D. Trapero Quintana - Departamento de Biología, Universidad de Oriente