2nd ANNUAL SYMPOSIUM OF THE METROPOLITAN SOCIETY OF NATURAL HISTORIANS

Sunday, January 19th, 2014

Richard Gilder Graduate School,

American Museum of Natural History

SCHEDULE

3:00 PM	**Sean K. McKenzie**	**Welcome and Ode to Charles Darwin**
3:10 PM	**Zachary Calamari**	**Exploring cranial evidence of common ancestry in Bovids**
3:20 PM	**Lee Dietterich**	**Restoration and succession in a heavy metal contaminated Superfund site**
3:30 PM	**Stephan Schaffrath**	**Biotyping of scorpions under field conditions based on mass fingerprints of peptide toxins**
3:40 PM	**Jason Barton**	**Lichens and Fire in the Midatlantic Coastal Plain; A further consideration for conservation**
3:50 PM	**REFRESHMENTS**	
4:20 PM	**Buck Tribble**	**Sociometry of mass fingerprinting in the fire ant *Solenopsis geminata***
4:30 PM	**Stephanie F. Loria**	**Across Southeast Asia in 65 days: Tales from a scorpion hunter**
4:40 PM	**Robin Sleith**	**Combining current and historic collections to assess Characeae Diveristy in Wisconsin**
4:50 PM	**Hafiz Muhammad Tahir**	**Preventing and Exterminating Bed Bugs**

PRESENTATION SUMMARIES

Exploring cranial evidence of common ancestry in Bovids

Zachary Calamari

Richard Gilder Graduate School, American Museum of Natural History

Advances in molecular phylogenetics have made large-scale studies of diverse groups feasible, sometimes to the exclusion of morphological evidence. This is especially apparent in the Bovidae (Artiodactyla, Mammalia), a family of mammals comprising a great diversity of taxa across many habitats. Modern studies have found it easier to use molecular data to produce well-supported phylogenies (evolutionary trees) of the Bovidae, thus morphological work has floundered. In this study, I performed a total evidence analysis, which included 29 taxa and 17,106 characters (134 morphological, behavioral, and soft tissue, and 16,972 base pairs from the complete mitochondrial genome) in order to recover synapomorphies (shared derived morphological characters) of Bovids. Evaluation using a Maximum Parsimony analysis (MP) produced four evolutionary trees and recovered seven groups. Two true synapomorphic characters were discovered, as well as a suite of locally synapomorphic characters that were phylogenetically informative. A stable position for one of two fossil taxa included in the study was recovered. Morphological character results suggest future work must include a larger number of hard-tissue (i.e., bone and tooth) characters to further facilitate the inclusion of fossil taxa in phylogenetic analyses.

Restoration and succession in a heavy metal contaminated Superfund site

Lee Dietterich

Department of Biology, University of Pennsylvania

The restoration of disturbed habitats may be broken down into two components: initial revegetation and subsequent succession. In order to ensure that a devegetated site develops into a desired target ecosystem, land managers must both successfully induce a plant community to grow in the site, and then monitor the community as it develops over time to make sure it develops in the desired way. My research site, The Palmerton Zinc Pile Superfund Site in Palmerton, PA consists of over 2000 acres on a mountainside that experienced major soil contamination and erosion due to emissions from 82 years of zinc smelting. By the time the smelters shut down in 1980, the mountain was largely barren, but restoration efforts begun in 2003 have succeeded in revegetating over 80% of the site.

In 2003, the Palmerton land managers set up 30 one-acre plots to test the efficacy of planting different combinations of species (three groups of grass species) and applying various soil amendments (five types of compost) in re-establishing plant cover. Gross vegetative cover was measured in these plots in 2004 to inform a site-wide restoration treatment, but they have not been monitored since then. In summer 2012, I conducted a vegetation census, measuring percent cover of all herbaceous and woody species in 36 subplots in each of these 30 plots. I asked whether the current plant communities in these plots differ as a result of the initial restoration treatments applied nine years earlier, or if they have all converged to become more or less the same. I found that the different species combinations initially planted do not account for any current variation among the plots, but that different soil amendments were associated with differential species diversity within the plots, as well as differential cover by several ecologically important plant species. These results highlight the importance of both careful selection of initial restoration treatments, and long-term monitoring of restoration sites.

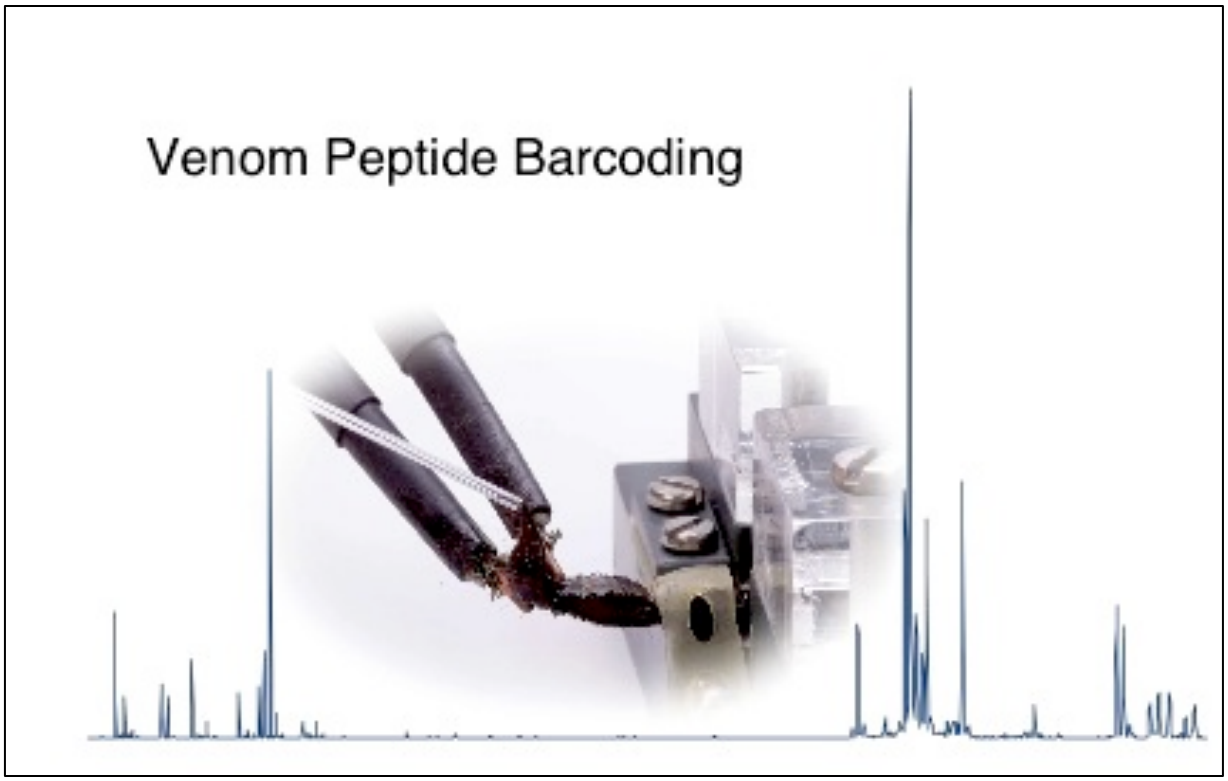
Biotyping of scorpions under field conditions based on mass fingerprints of peptide toxins

Stephan Schaffrath

Zoological Institute, University of Cologne, Cologne, Germany

Scorpion venoms contain many species-specific peptides, which target ion channels in cell membranes. Without harming the scorpions, these peptides can easily be extracted and detected by MALDI-TOF mass spectrometry. So far, only few studies compared the venom of different species solely for taxonomic purposes. Here, we describe a very simple protocol for venom extraction and mass fingerprinting that was developed for peptide barcoding (venom code for species identification) and facilitates reproducibility if sample preparation is performed under field conditions. This approach may serve as a suitable basis for a taxonomy-oriented scorpion toxin database that interacts with MALDI-TOF mass spectra.

Altogether, we collected and analyzed the venom of 57 scorpions from Namibia belonging to 9 species. One of the species (*Uroplectes planimanus*) was collected along a 400 km transect. It is obvious that mass fingerprinting provides a useful tool to assign specimens (regardless of sex and/or developmental stage) to already mapped species and this will help to overview the diversity of scorpions in the near future.



Lichens and Fire in the Midatlantic Coastal Plain; A further consideration for conservation

Jason Barton

New York Botanical Garden

The implementation of prescribed fire plays a significant role in shaping ecosystem structure and function. While extensive work has been done examining the effects of fire on plant communities, there is sparse information detailing the role fire plays in shaping lichen assemblages. This study assesses how prescribed burns effect lichen diversity, abundance, structure, and occurrence in Pine-Oak stands of Delmarva, Maryland. Four treatments including a control, thinned, once burned, and twice burned stands were used for comparison. Results show strong differences between treatments for diversity and abundance, as well as substrate preference and location. This work will provide an assessment for field ecologist on how to mitigate lichen eradication in burned habitats in eastern North America.

Sociometry of mass fingerprinting in the fire ant *Solenopsis geminata*

Buck Tribble

Rockefeller University

The social insect colony has been considered a "superorganism," with sometimes hundreds of thousands of individuals behaving as a coherent unit. These insect colonies are selected upon as single individuals under natural selection and thus contain many adaptive colony-level phenotypes. To discover and study such phenotypes, one must investigate the broad attributes of the colony, measuring the numbers and characteristics of the workers, sexuals, and brood that comprise the colony, and how these attributes vary with season and colony size. Such an undertaking is termed a "sociometry." Here I present a sociometry of the tropical fire ant, *Solenopsis geminata*, in Monteverde, Costa Rica. I sampled colonies in November 2011, May 2012, July 2012, and February 2013. At each sampling date, 7-12 colonies across a range of sizes were fully excavated into a large bin, weighed, and then a representative sample of ants was collected from each colony. These samples were exported to the United States and used to estimate many traits of the excavated colonies, including colony mass, number, size, and type of workers, brood, and sexuals, and colony-level investment in reproduction and growth rate, providing information as to how these parameters vary across the range of colony sizes and throughout the seasons. I also describe single-queen and multiple-queen colonies in the studied region, the first records of multiple-queen *S. geminata* in Central America, and found results that may suggest an atypical mode of reproduction for these multiple-queen colonies. Finally, I found multiple species of staphylinid beetles in the tribe Xantholinini inside fire ant colonies, which may be previously undescribed myrmecophiles. This sociometric analysis provides important basic biological data about *S. geminata* that may be used for conservation management and fuel further investigation of the fire ants.

Across Southeast Asia in 65 days: Tales from a scorpion hunter

Stephanie F. Loria

Richard Gilder Graduate School, American Museum of Natural History

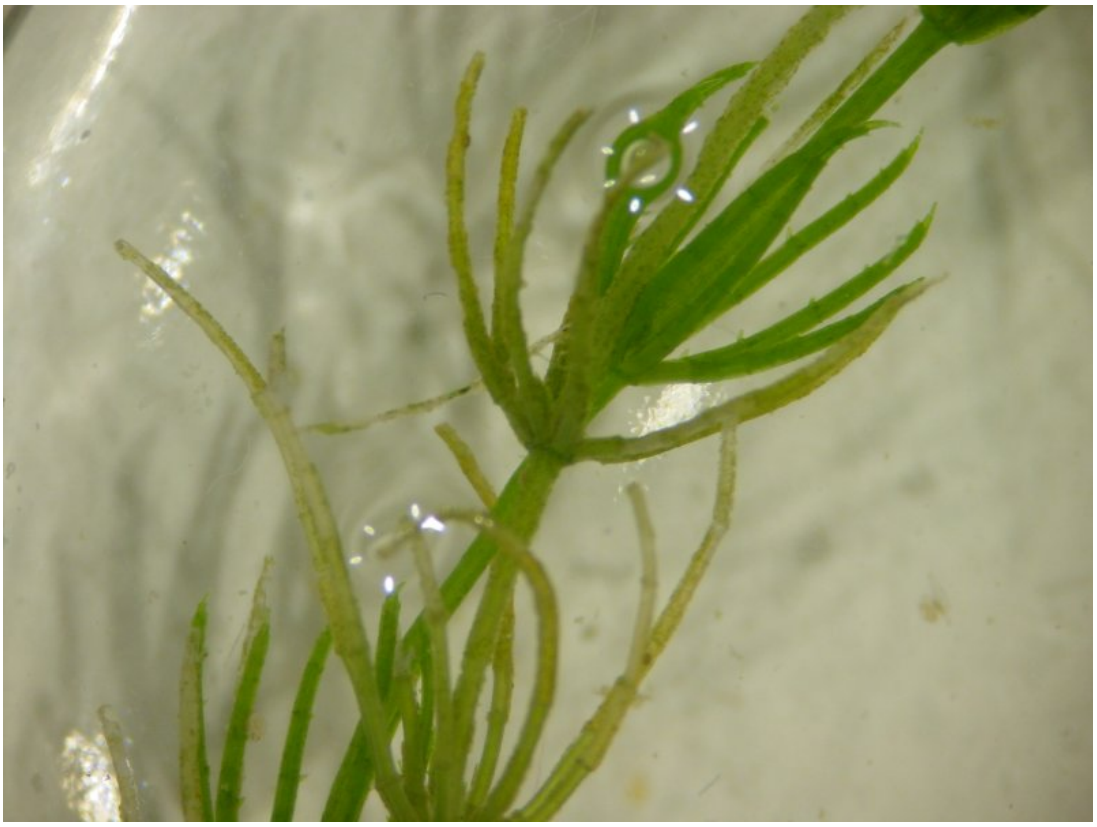
My dissertation research is focused on presenting the first phylogenetic analysis (evolutionary tree) of the scorpion family Chaerilidae using both molecular and morphological data. This family includes 37 described species distributed across South- and Southeast Asia. In order to obtain DNA quality tissue samples for my research, I have had to travel across Southeast Asia for the past three years to collect these scorpions. Scorpions are nocturnal and flouresce under ultra-violet light, making night collecting with UV lamps the most effective method for obtaining specimens. However, collecting at night can be quite dangerous, especially when you are UV-ing along the edge of steep, slippery slopes or in areas with dangerous megafauna. During our field trips, we have collected in forests populated with tigers, deadly snakes, leeches and have encountered both gunfire and explosions. In my presentation, I will discuss a few of my travel tales, highlighting some of the most memorable moments, people and places along the way.

Combining current and historic collections to assess Characeae Diveristy in Wisconsin

Robin Sleith

City University of New York, New York Botanical Garden

The Characeae are a family of freshwater green algae found throughout Wisconsin. They are important fish and waterfowl forage, and play a critical role in aquatic ecosystems. The diversity and distribution of Characeae was surveyed by combining historic herbarium specimens with recent living collections. Traditional morphological characters combined with DNA barcoding methods were used for identification. Four genera (*Chara*, *Nitella*, *Lychnothamnus*, *Tolypella*) and 36 species were identified in Wisconsin. The most common genera were *Chara* and *Nitella*, with *C. contraria* and *N. flexilis* being the most common species. Recent collections of *Lychnothamnus* represent the first records in the New World, and it remains unclear whether the algae has been introduced or eluded collectors. New localities of a rare charophyte will be presented. This project sets an important baseline of charophyte diversity in Wisconsin lakes. An invasive charophyte, *Nitellopsis obtusa,* has invaded surrounding states and if it does invade Wisconsin waters this effort will allow monitoring of charophyte community changes.



Preventing and Exterminating Bed Bugs

Hafiz Muhammad Tahir, Ph.D.

Department of Biological Sciences, University of Sargodha, Pakistan

Bed bugs are parasitic insects of the cimicid family that feed exclusively on blood. Their infestations are common throughout the world including the United States. Insecticides of different chemistries are being used for their control but they have gained resistance against many insecticides. Elevated levels of metabolic enzymes (i.e, esterases, glutathione S-transferases and mono-oxygenases), cuticular forming proteins and mutation in the sodium ion channels are major mechanisms of insecticide resistance in bed bugs. Bed bugs are highly active after mid-night. Low temperature treatment is a quick but short-term solution to avoid bed bugs bites.