



Mountain Lake Echoes

UNIVERSITY of VIRGINIA

Produced by the University of Virginia's Mountain Lake Biological Station mlbs.org



NEPARC Returns to MLBS

by Brian Zarate, New Jersey Division of Fish and Wildlife,
Endangered and Nongame Species Program

When you consider the history and location of MLBS, it's hard to imagine a more perfect location to host a meeting focused on the field of herpetology. The Station hosted NEPARC (Northeast Partners in Amphibian and Reptile Conservation) meetings in 2007 and 2017, "and we hope to be back in 2027," proclaimed 2017 meeting host John (J.D.) Kleopfer, a herpetologist with the Virginia Department of Game and Inland Fisheries. This past August 8-10, 120 NEPARC members traveled from far and wide to convene at the Station to connect with colleagues, make new acquaintances, hear presentations, and strategize on conservation planning. More than half of this year's attendees were new to NEPARC and there was no better introduction to our NEPARC meeting model (low-cost, casual-atmosphere, productive) than being at MLBS. We offer an alternative to the more traditional professional conferences, choosing to gather in rural and rustic geographies of the host state. We enjoyed local field trips highlighting some of the region's salamanders and snakes.

Several moments to remember from this year include our featured presentation by the renowned Whit Gibbons, Professor Emeritus of Ecology, University of Georgia, and the 2017 NEPARC award for Excellence in Herpetofaunal Conservation to Jim Andrews, a herpetologist in Vermont who coordinates the state Herp Atlas program. Dr. Matt Gray from the University of Tennessee also lead a workshop on *Batrachochytrium salamandrivorans* (better known as *Bsal*), a fungal pathogen threat not yet documented here in the United States. In addition to providing six

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student registration grants, we acknowledged three additional student presenters with \$100 cash prizes for the categories of best oral presentation, best graduate student poster, and best undergraduate student poster. For more information on next year's annual meeting, visit our [website](#).

From the Director

The Fall shoulder season has been unusually busy this year, with groups visiting almost every weekend. These activities give MLBS a chance to share our piece of the mountain and community with new audiences, as well as to reconnect with folks from our past. Whether they are first timers from an area school, medical students from Richmond, or Mountain Lakers who got their first taste of the mountain some 30 years ago, we learn from every one of our visitors. We're thrilled to be able to open the doors to so many people every year.

I want to offer a public and sincerely heartfelt thanks to the individuals who make all those visits possible. Two people bear the whole load for these shoulder season activities, when

the extended staff are no longer in residence. Through their tireless efforts behind the scenes, these stars create the MLBS experience that feels so easy and productive for every user. Our Station Manager, Jaime Jones, and our Facilities Manager, Tom McNamara, pour much more time and soul into MLBS than can fairly be expected from them. I hear from users about what incredible work they do so often that I sometimes take it for granted. Please, next time you visit (and we hope it is soon!), remember to tell Tom and Jaime how grateful we are for their efforts!

Butch Brodie

SciComm Workshop 2017 - Drop the Jargon and Tell Your Story

by Alex Navarro, University of Maryland



It started with a simple prompt: share your experience at MLBS in just 3-5 minutes. Research Experiences for Undergraduates (REU) program students accepted the challenge and spent four days scripting and producing short videos. The result? Entertaining videos with carefully crafted messages.

The first step was to choose an experience or topic to focus on. This is where the REU's diverse perspectives shone through. Topics varied from zoonotic diseases and social insects to advice for future REU students at MLBS. After

choosing a topic, students were asked to identify a target audience and hone a one-point message for that audience. What seems like a simple task is actually quite a challenge!

Rather than choosing a broad audience, like children or non-scientists, we focused on a quantifiable group of people. In other words, the audience had to be small enough to fit in a conference hall. Having a clear, identifiable audience means that we can reach them on a more personal level. It lets us figure out what this group of people has in common, and what motivates them. Understanding the audience's motives is critical to making an effective video.

After narrowing down the audience, it was time to craft a simple message or call to action. To do this, students answered two questions. First, what does the audience care about in regard to your topic? Second, what do you want your audience to do? After answering these questions, students created a message to connect the audience's interests and the filmmaker's goal.

Next, the fun part – filming! With a bag full of lights, mics, and cameras, we headed into the field. One group ventured through the woods at sunrise to film a lab studying the forked fungus beetle. Another group focused on live-trapping of mice, shrews, and voles and examining them for disease.



Sylvie Finn, REU Participant

Several students interviewed resident scientists, and one student even filmed a stop motion whiteboard animation!

Students spent the final hours of the workshop editing videos and adding their own special touches. Videos were shared with the group at the end of the workshop, and screened for the entire Station at the end of the summer. Videos exceeded expectations, teaching us all something new and providing lots of good laughs.

While this was the first time we offered this workshop, I certainly hope it won't be the last! In a world of Tweets and ever-shorter attention spans, scientists with carefully crafted narratives can truly make a difference.



Hriju Adhikari, Calla Bush St George, C.J. Blair, and Adri Tompros working on the mouse crew.

Student Corner

by Lauren Miller, UVA



I was encouraged to come to Mountain Lake by a couple of students who took the Field Herpetology course the previous year, and I am so grateful that I followed their advice. Certainly upon arrival, I had my doubts as the

weather was gray and damp with not much evidence of such conditions changing in the near future. As it turned out, rain was no excuse to be stuck inside the classroom. On that first foggy morning we gathered around two old wooden tables in our small classroom to dive into the evolutionary relationships of amphibians and reptiles. Maybe two hours later, Professor Cox was bored of lecturing and ready to lead us into the wilderness to hunt the Station grounds for salamanders.

One of the best aspects of the Herpetology course was constantly being in the field and getting to go on several excursions throughout Virginia and down south. In South Carolina, we were guided around Spring Island where we found several snakes and were introduced to a newly caught and tagged alligator. We were also greeted by a kiddie-pool full of baby alligators at the Island's Visitor's Center, which provided quite the photo opportunity.

When our little class of 10 students wasn't hitting the road or out in the field, we got to enjoy the simple pleasures of life at the Station. Whether it be sitting on the porch playing guitar, joining the rest of the students for a lively match of sand volleyball, or sitting under the stars by the fire pit, there was always something bringing the students closer together and closer to nature. By getting the opportunity to learn with my hands instead of my textbooks, I truly got to appreciate how lucky I am to be a biology major at UVA and, like those previous students did for me, I will encourage everyone to come spend a summer at Mountain Lake Biological Station. It was an experience I will hold dearly for the rest of my life.



2017 Field Herpetology Course Students

View the Science Communication videos on our [Vimeo](#) site.

Research Spotlight

by Chloe Lash, University of Tennessee, Knoxville



An *Aphaenogaster* ant disperses a seed into her artificial nest box. *Aphaenogaster* ants (commonly called the Winnow ant) are the keystone seed dispersing genus of ants in eastern North America. Once in the nest, she will feed the elaiosome to the ant larvae.



The field set up for the project investigating the effects of ant handling on seed coat microbial communities. The plant by the flags is *Sanguinaria canadensis*, commonly known as bloodroot. Ants disperse its seeds.



Bruce Martin and Samantha Sturiale (REU participants) cutting elaiosomes off of seeds in the field.

If you hike around MLBS, or most forests in eastern North America, you're stepping over a whole world. If you stop and look at the ground for a moment, you're likely to see an ant or two cruising along the forest floor. Maybe she's (did you know most ants you see are females?) carrying some food for her nest mates or maybe she's locked in mortal combat with another ant who has invaded the nest. Or, if it's spring or summer, maybe she's taking part in an important forest mutualism by dispersing the seeds of herbaceous forest plants.

Myrmecochory, or seed dispersal by ants, is a relationship between ants and plants that occurs all over the world and is particularly abundant in eastern North American forests. Some herbaceous forest plants have seeds with fleshy appendages called elaiosomes on them. Ants are attracted to these elaiosomes and when seeds fall on the forest floor, ants use the elaiosome as a handle to take the seeds back to their nests. In the nest, the ants chew off the elaiosomes and feed them to their young. Then the seed stays either in the nest or is pushed out of the nest into a trash pile. Thus, the ants get food and the seeds get dispersed in this widespread mutualism. This seed dispersal mutualism is the focus of my dissertation, and I've now spent two full summers at MLBS working on questions associated with myrmecochory.

But my work also focuses on even smaller organisms within this ant-plant mutualism—organisms that you can't even see with the naked eye. Microbes (for example, bacteria and some fungi) are everywhere in our world; they even live inside of you. For my research, I look at the microbial communities on both ants and plants. Some of these microbes are helpful and some are harmful or pathogenic. Ants and plants have their own defenses against their own pathogens, and it's likely that these defenses affect their partners' microbes as well. For example, ants have glands that secrete chemicals that kill ant pathogens. When seeds are in the ant nest, they are likely exposed to some of these chemicals and that might affect the microbes on seed coats. This is what I spent my most recent summer investigating. With help from two REU students (Samantha Sturiale from the University of Virginia and Bruce Martin from Skidmore College) and two volunteer undergrads (Henry Davie and Grace Bloxom, both from Virginia Tech), I set up field experiments to look at how ant handling behaviors change the seed coat microbial community. This meant that we spent a lot of time in the field pulling elaiosomes off seeds! Then we cultured the microbes from the seeds, and I'm currently in the lab of my advisor, Dr. Charles Kwit, back at the University of Tennessee, Knoxville prepping the cultures for DNA extraction and identification. Stay tuned for results on how ant handling behaviors change the microbial communities on seed coats.

But, the ant lab isn't ignoring the ant side of this mutualism! This summer, Bruce and Sam, Research Experiences for Undergraduates (REU) participants, worked on different aspects of ants' defenses against their pathogens. Bruce looked at how colony size and prior exposure to a pathogen affects ant survival. Sam looked at potential for self-medication behaviors in ant colonies that were infected with a pathogen. Ants might self-medicate with elaiosomes, because they have antimicrobial chemicals too!

We hope that by adding the microbial third party to the ant-plant equation, we can better understand the seed dispersal mutualism. This research has implications for conservation (as invasive ant species arrive in local areas) and is a step to understanding the roles of microbes in forest ecosystems. So, the next time you're hiking around the Station, remember that there's a whole world under your feet.

Chloe Lash
Graduate Student
University of Tennessee, Knoxville

Lash is currently pursuing her PhD and is broadly interested in plant-animal interactions, chemical ecology, and animal behavior.





News & Notes

Station Hosts Multiple Groups This Fall

A wide variety of groups utilized the Station this fall for conferences (NEPARC, UVA Biology Department retreat), undergraduate field experiences (Virginia Tech Wildlife Field Techniques, Mary Baldwin ecology, Hampton University watershed diversity), high school trips (Western Albemarle HS Environmental Studies Academy, Springhouse Community School), external courses (SOLO's Wilderness First Aid, VCU's Immersive Experience in Comparative Physiology), and other purposes. We are excited to see our facilities increasingly used in the "shoulder seasons" by such diverse groups!

Mountain Laker Reunion

In October, the Station hosted a reunion (organized by Jim Dooley) of Mountain Lakers from the early 1980s. Participants reflected, "for so many of us, this is where it all began. MLBS taught us about building a rich and rewarding life. Faculty and others at the Station guided us in working to build a life around what was truly meaningful." The weekend was filled with warm reconnections, hikes, campfires, music, meals, a lot of storytelling, and an eagerness to return. Gatherings like this are wonderful to see, and enrich the MLBS family.



MLBS Reunion attendees in no particular order: Jack Colley, Debra Cranford, Jim Dooley, Ray Dueser, Kathryn Gubista, Akke Hulburt, Steve Hulburt, John Porter, Patrice Porter, Bernie Roche, Bill Spare, Roddy Spivey, John Steffens, Claude Stephens, Beth Henson, Jill Swearingen, and Warren Steiner.



Steve Hulburt, former MLBS caretaker, relaxing on Murray porch.

Open House

Over 265 guests visited the Station for this year's Open House, making it our largest crowd yet. Visitors of all ages enjoyed a gorgeous afternoon on the mountain learning about our research, interacting with our scientists, and getting up close and personal with our study organisms. Highlights included collecting insects with our entomology class, seeing a variety of snakes in the "snake lab," entering the disease ecology lab through a life-sized Sherman trap, collecting and observing caterpillars and other invertebrates under microscopes, playing "Block the Metapleural Gland on the Ant", learning how we study forked fungus beetles' social lives, seeing a variety of salamander species, hiking with our biologists, experiencing (and creating!) nature-inspired artwork, touring the National Ecological Observatory Network site (with its 96-foot-high tower), exploring the Station's biological collections, learning about the local plants, weeds, and natives, and so much more. We hope to see you all again next summer!



Visitors explore pond life up close.

Vertebrate Collection Rehab



David McLeod (Assistant Professor of Biology, James Madison University) spent two weeks at the station this summer curating the herpetological collection. David, a skilled museum scientist and collections

curator, re-jarred specimens, instituted a standard labelling system for the entire vertebrate collection, and photographed all the amphibians and reptiles. Back on Grounds, undergraduates Desmond Murrell, Pitchesinee Veerakajorn, and Anna Haikl entered specimen data into an online database accessible through iDigBio.

The entire MLBS herp collection can now be viewed online at mlbs.virginia.edu/collections.



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A Look Back at the 2017 Season

October 1, 2016 - September 30, 2017

Snapshot

5 summer courses
2 internship and professional programs
823 station users
42 institutions represented
24 visiting courses and programs
7 station activities
9 facility projects
\$33,074 in fellowships awarded
\$7,046 in donations received
41 research programs
39 journal publications



Summer Courses

- Plant Diversity and Conservation: Bioinformatics and Systematics
- Field Herpetology
- Science Writing: Creative Approaches to Biology and Ecology
- Field Biology of Fishes
- Field Biology of Insects

Internship and Professional Programs

- Research Experiences for Undergraduates Site program: Ecology, Evolution and Behavior Field Research at Mountain Lake Biological Station
- ArtLab

Station Users

6,732 person nights
823 individuals from 42 institutions, including
7 artists
138 faculty/staff/postdocs
215 undergraduate students
50 graduate students
150 K-12 students
30 K-12 educators

Visiting Courses and Programs

- Birdwatching group, New River Valley Bird Club, Blacksburg, VA
- Birdwatching group, Virginia Society of Ornithology
- Chesapeake Bay Watershed Biodiversity course, Hampton University
- Ecology class field trip, Mary Baldwin University
- Evolution Education Teacher Workshop, University of Virginia
- Fishes of the Central Appalachians, VA Institute of Marine Science, College of William and Mary
- Herpetology course, Hanover College
- Herpetology course, James Madison University
- Immersion Experience in Comparative Physiology, Virginia Commonwealth University
- Master Gardeners field trip, State of Virginia
- MLBS 1980s reunion
- Annual meeting, Northeast Partners in Amphibian and Reptile Conservation (NEPARC)
- Road Scholars birding group, Mountain Lake Lodge
- Animal Camp, Science Museum of Western Virginia
- Fall Experience, Springhouse Community School, Floyd, VA
- The Wildlife Society, Juniata College
- Department of Biology Retreat, University of Virginia
- VA Breeding Bird Atlas Western Training Workshop, Virginia Tech
- Environmental Studies Academy, Western Albemarle High School, Crozet, VA
- Wilderness First Aid and CPR/AED, MEDIC SOLO Disaster and Wilderness Medical School, Charlottesville, VA
- Wildlife Field Techniques course, Virginia Tech
- Youth Conservation Camp, Virginia Association of Soil and Water Conservation Districts
- Philadelphia ZooCREW Field Trip, Philadelphia, PA

Station Activities

- Annual Open House
- July 4th Festivities
- Team Triathlon
- Volleyball Tournament
- Walton Lecture and Reception
- Square Dance
- Gourmet S'more Cookoff

Facility Projects

- New roofs on Murray Dorm and Wilbur Lab
- New cottage signage
- Weight room floor renovation
- New trail signage
- New picnic tables at pavilion
- Increased internet bandwidth - now 100 Mbps
- New autoclave in Wilbur Lab
- Invasive plant removal
- Burns Garden improvements

Financial

Fellowships Awarded \$33,075
16 summer course students \$20,100
7 researchers \$12,975

Donations Received \$6,022
Walton Lecture \$325
Grad Students \$1,025
Undergrad Students \$650
Friend of MLBS \$4,022

Support MLBS

You can support the programs at Mountain Lake Biological Station by donating online.

All donations are tax-deductible.

mlbs.org

Research Programs

- Azalea butterfly pollination; production for PBS television
- Burrowing crayfish of the Mountain Lake region of Virginia
- Chemical compounds and microbial activity in myrmecochory
- Chemical ecology of multispecies interactions
- Coevolutionary arms races driven by conflict: A test in social amoeba
- Co-infection and disease tolerance in *Peromyscus*
- Comparing population dynamics of Red-backed salamanders across an elevation gradient
- Curation of MLBS herpetological collections
- *Daphnia* survey
- Eastern Asia and eastern North America floristic disjunctions
- Effects of between-sex gene flow on the evolution of sexual differentiation
- Environment as a selective force on plant reproductive traits
- Evolution of social behavior in *Bolitotherus cornutus*
- Flora of Mountain Lake Biological Station
- Fluctuating social context and selection in female forked fungus beetles
- Foliar traits and terrestrial ecosystem variability across NEON domains
- Global change impacts on microbiome mediated plant pollinator interactions
- Harvestmen: male strategic allocation in sperm and ejaculate in response to energetic constraints and female quality
- Integrative and evolutionary biology of the Dark-eyed Junco
- Integrative taxonomic studies of *Viola subsinuata*
- Interactions between disease and chemical communication in newts
- Juvenile hormone activity in young nymphs of *Cryptocercus punctulatus*
- Maternal behaviors as drivers of family-level response to selection
- Maternal effects and mating system evolution in American bellflower
- Mating system evolution in Leiobunine harvestmen
- Mid-Atlantic watershed amphibian diversity
- National Ecological Observatory Network atmospheric, soil, and biodiversity sampling
- Phenological LAI and multitemporal forest ecosystem physiology
- Pine bark adelgid infection of red spruce and white pine
- Pollination biology of *Rhododendron viscosum*
- Population genetics of the Northern Gray-cheeked Salamander (*Plethodon montanus*)
- Population variation in overwintering success of gypsy moth
- Postzygotic isolation between lineages of *Campanula americana*
- Potential influence of global warming on interaction between *Silene stellata* and its pollinating seed predator *Hadena ectypa*
- Re-description of the water bear species *Echiniscus virginicus* with an assessment of genetic and morphological variation
- Redirecting directed dispersal in a myrmecochory hotspot
- Role of mate preference and reproductive timing in population divergence of a seasonally sympatric species
- Sex steroid negative feedback variation in resident and migrant Dark-eyed Juncos
- *Silene* census 2017
- Taxonomic studies of violets in the Appalachian Mountain region
- Understanding local controls on wood decomposition in a regional context

2017 Highlights

The Secret Life of Scientists and Engineers

Video presentations by Danielle Whittaker, PhD. Published on PBS.org.

Our own Danielle Whittaker is featured in this PBS/NOVA web series. An Evolutionary Biologist and so much more!



It's Only Natural at Mountain Lake Biological Station

Story and video by Fariss Samarrai and Mitchell Powers, University of Virginia. Published by UVAToday, October 11, 2017.

MLBS Director Butch Brodie spotlights biological station life and science in this scenic presentation from the Station.

