

A close-up photograph of a snail with a light-colored, textured shell and a pale, wrinkled body, resting on a brown branch. The background is a soft-focus green, suggesting foliage. The text is overlaid on the image in a light orange color.

The Ohio State University

Museum of  
Biological  
Diversity

*Newsletter*  
Summer 2013



**Dear Readers:**

Welcome to another action-packed issue of the MBD Newsletter! We hope you enjoy it!

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The **MBDNewsletter** is a publication featuring news and information on the collections at the **Museum of Biological Diversity**. The newsletter is produced by the Curators of the collections, with contributions from faculty, staff, students and associates of the collections. The **MBDNewsletter** is available **online** at [mbd.odu.edu/newsletter](http://mbd.odu.edu/newsletter).



# Newsletter

Editor: L. Musetti

## Special feature: Summertime!

In this issue we celebrate the season with stories from summers, past and present, from our faculty, staff and students.

### Diving after sea anemones.

by Jason Macrander & Ben Titus

Jason Macrander and Ben Titus (*left*) recently spent eleven days in the Florida Keys and Ft. Lauderdale collecting specimens for their respective PhD projects. Jason is interested in the diversity of sea anemone venoms and the evolution of venom in species associated with symbionts. Ben is focusing on the dynamics of the anemone-cleaner shrimp symbiosis.

Of the several species Jason and Ben collected, the turtle grass anemone (*Viatrix globulifera*) contains the most potent venom for humans, capable of causing pain and paresthesia that can last for days. Living affixed to turtle grass, they retract their tentacles into the bulbous, nematocyst-filled column during the day to protect themselves from potential predators. Several corkscrew anemones (*Bartholomea annulata*) were found in association with snapping shrimp (*Alpheus* sp.); these shrimp have powerful claws that they use to deter predators for themselves and their host anemone. Although *B. annulata* has venom, its association with symbionts may influence selective processes acting on these venom genes. ♣



Jason Macrander



Jason Macrander

Jason and Ben (*above*) collecting sea anemones in the Florida Keys. *Viatrix globulifera* (*left*) contains stinging capsules (nematocysts) with venom that can cause pain and nerve damage to humans.

### Searching for Ohio's most imperiled fishes.

by Justin Baker

The Fish Division field collection crew of two, Brian Zimmerman and Justin Baker, have made some exciting finds over the past several months since the start of the field season in mid-March. An isolated population of the state endangered **spotted darter**, *Etheostoma maculatum*, was discovered in Walnut Creek of the Scioto River drainage. A clue of the population's existence came from Ohio EPA records in 2005 and 2010 of several individuals caught at two locations. Further intensive stream surveys by Brian and Justin using kayaks revealed their presence within a 6 mile stretch of the stream.



Brian Zimmerman

A male Spotted Darter from Walnut Creek.

A string of good luck has also accompanied Brian and Justin during recent surveys for some of Ohio's rarest fishes, including the **pirate perch**, *Aphredoderus sayanus*, **popeye shiner**, *Notropis ariomus*, **pugnose minnow**, *Opsopoeodus emiliae*, and **western banded killifish**, *Fundulus diaphanus menona*. The crew has confirmed the presence of these species at certain historical localities, as well as adding new localities for the western banded killifish in adjacent stream reaches of the Middle Branch Portage River.

Recently the field crew has been teaming up with members of the Ohio Division of Wildlife (Kipp Brown and Mike Greenlee)





Justin with a specimen of Blue Sucker at the Great Miami River.

to perform electrofishing surveys on the lower reaches of major tributaries to the Ohio River.

These surveys are targeting Ohio's threatened and endangered large river species, **blue sucker**, *Cycleptus elongatus* (left), and shortnose gar, *Lepisosteus platostomus*, among others. Major river drainages that will be surveyed include the Muskingum River, Hocking River, Raccoon Creek, Scioto River, Little Miami River, Great Miami River, and Ohio Brush Creek. ♣

## ***A lab away from home.***

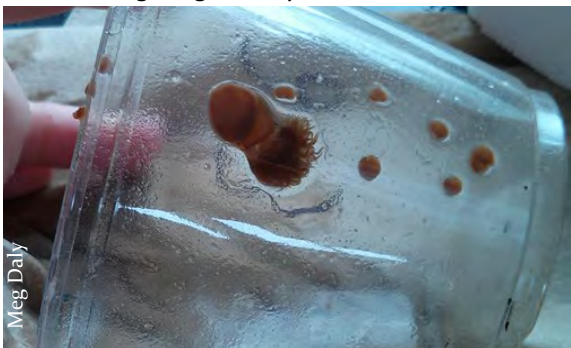
*by Meg Daly*

For the second year I am spending the months of June and July as a visiting fellow at the Mount Desert Island Biological Lab in Salsbury Cove, Maine.

Built in 1898 as a summer research station, MDIBL is now a year-round center for comparative study of marine animals, with most researchers using marine organisms to understand mechanisms of regeneration, physiology, and development.

My own research aligns with their emphasis on comparative and environmental biology: I come to MDIBL to study population biology and behavior of a common

North Atlantic sea anemone called *Metridium senile*. Having established during my last visit that individuals of this species show consistent and measurable differences in their patterns of movement, this year we are exploring the ecological and evolutionary consequences of these differences. Members of *Metridium senile* fight with other members of the same sex for access to space and reproductive opportunity using specialized tentacles. We are testing whether fighting ability is correlated with



As *Metridium senile* moves, small pieces of tissue are torn off. These regenerate into new polyps.



Research labs are clustered around Salsbury Cove. Our lab, shown from the opposite side of the cove, is the so-called "Kidney Shed," named for the work conducted there in the 1940s and 1950s.

movement, and if so, how: do movement and fighting ability represent competitively equivalent strategies, with "movers" compensating for less effective fighting skills, or do they represent a synergistic strategy of high movement and high fighting ability? The behavioral experiments are being complemented by population-level genetic analysis, conducted in collaboration with a student in the MDIBL REU program. ♣

## ***Collecting fishes in Belize – an adventure.***

*by Marc Kibbey*

In 2007 my wife and I took a trip to Belize, a country south of Mexico. One of the fish species caught on this trip was a Mayan sea catfish, *Ariopsis assimilis*, one of the "hardhead catfish", so named for the condition of the groove in the skull, normally open in many similar catfishes, that is either completely or partly occluded in the *Ariopsis*. This species is endemic to Central America, but members of the genus *Ariopsis* are found on both the Pacific and the Atlantic coasts of the Americas. A few species are strictly freshwater, while a few others remain in marine environs up to 150 meters deep, but the majority dwell primarily in brackish estuarine or coastal waters and travel up and down rivers. This Mayan catfish was caught on the Belize River, over a boat ramp at the village of Burrell Boom, courtesy of the owner of one of the hotels there. Surrounded by the sound of howler monkeys and birds, we ran the seine net over the boat ramp and along the sandy shore, catching some of the "pike minnows" often found in pet shops here in the U.S., as well as several other fish species. After leaving the hotel and helping out at a local clinic we traveled to the mountains near Guatemala, and then to the coast at the village of Placencia, where we stayed in a rickety cabana that swayed in the wind and were awakened daily by the 5:00AM vocal serenade of the alcoholic Douglas, a former musical performer cum caretaker of the buildings. Douglas helped drink some of the rum that I used to preserve the fishes in temporarily until I was

able to find formalin. Formalin, or diluted formaldehyde, is used as a preservative to eliminate all the decaying organisms and fix the molecular structure of most of our voucher specimens. The odor also discourages customs agents from dallying over a bag full of specimens, particularly since they are assured nothing could live in the toxic liquid.♣

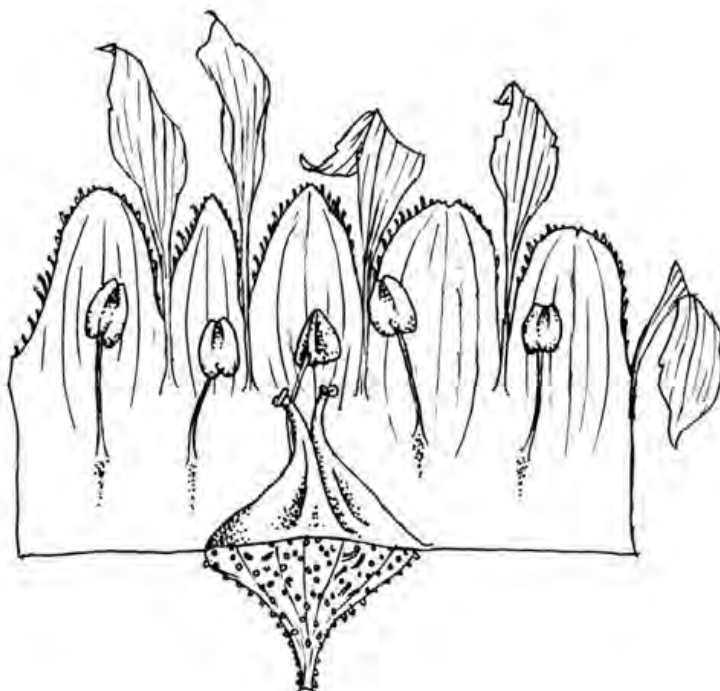
## ***A summer of species descriptions.***

*by Ryan Folk*

However frequently one comes across odd comments that systematics will soon be “finishing up,” many of us practicing systematists find no shortage of undescribed or poorly described diversity with which to occupy our summers. In fact, according to a recent paper in *Science* (Costello *et al.* 2013, 339:413-416), the number of papers describing new species is going up, not down. If anything systematists are hurting for time at the dissecting scope and not problematical study material.

My research organisms, alum roots, genus *Heuchera*, form no exception despite the fact that botanists have been adding new species for the past 250 years. While the diversity of these plants in and around Ohio is not likely to turn up anything new, the mountains of Mexico seem to have enough surprises to keep me busy for the summer. With the assistance of Mesfin Tadesse and John Freudenstein, I have obtained nearly a thousand loan specimens of these infrequently collected high-altitude plants and studied their morphology for the past two years. I still remember quite clearly my first sight of *Heuchera lakelae*, the first of several new species. The process of discovering a new organism was in this case not so much a product of long analyses as a double-take the moment I unwrapped the specimen. Some plants are so similar that describing them as different species is a matter of weighing the evidence, but in other cases new species are so striking they are simply begging to be described. *Heuchera lakelae* is quite similar to *Heuchera sanguinea*, the old standard coral bells of Grandma’s garden, but possibly even more decorative with its delicate pink flowers and much larger petals. Its namesake is Olga Lakela, who trod 80 years ago the same path I have as a student of *Heuchera*.

In addition to *Heuchera lakelae*, whose description is now in press, I am preparing descriptions of 5 more taxa (2 more species, 2 varieties, and a new subsection) in a second manuscript. If these many new plants are floating around in museums right now, how many new plants have yet to be collected at all?♣



*Heuchera lakelae*, illustration by Ryan Folk.

## ***In the Herbarium: The summer of lichens and the loss of a friend.***

*by Cynthia Dassler*

Lichens, those curious organisms that consist of a fungus and an alga living together, dominate curation activities in the herbarium this summer. Curator Cynthia Dassler and undergraduate, Evelyn Jasinek, are up to their knees in lichens (well, at least Evelyn is) - 8451 specimens to be exact! Around Christmas time 2012, the herbarium received a gift of lichens from Don Flenniken and his family.

Don Flenniken was one of Ohio’s foremost experts in lichen identification. He passed away in Oct. 2012 and willed his lichen collection to The Ohio State University Herbarium. Don’s specimens are an invaluable addition to the collection because of his expertise in lichen identification and the care with which he labeled and processed his specimens.

As with all gifts of specimens to the OSU Herbarium, the number, the type, and the quality of the donated specimens was assessed. Counting and assessing Don’s 8,451 lichen specimens was a tremendous task, and was accomplished during the spring by Cynthia, Evelyn and members of The Ohio Moss and Lichen Association. The specimens nearly double the number of specimens in OSU’s lichen collection.



Lichens at a gravestone, a substrate from which Don Flenniken liked to collect.





Evelyn Jasinek "knee deep" in lichen specimens as she alphabetizes Don Flenniken's collection.

Over the summer Evelyn is charged with freezing all of Don's specimens to kill any bugs that might potentially damage herbarium specimens. This task takes several months since each batch of specimens must stay in the freezer at least one week. Following freezing, Evelyn alphabetically arranges the lichens by genus in anticipation of incorporation into the herbarium collection. In addition, for Don's specimens and for some specimens already in the OSU collection, Evelyn is typing labels, repackaging damaged and unpackaged specimens, and updating nomenclature. At the end of our lichen summer, we will need additional cabinets in which to house the new specimens!

For Ohio, the loss of Don Flenniken and his lichen expertise is tragic. Personally, he will be missed deeply by many. Don authored *The Macrolichens in West Virginia* and co-authored *The Macrolichens of Ohio* with Ray Showman. He was one of the founders of the Ohio Moss and Lichen Association (OMLA) and was a teacher at

heart, generously teaching anyone about lichens. His enthusiasm for lichens dates back to at least the 1960's, as evidenced by the oldest dates on his specimens. His passion for lichens was manifest in poems that he wrote for the OMLA newsletter, *OBELISK*. Don's legacy will live on through his specimens in the OSU Herbarium. ✨

## ***Travels on the West Coast: Documenting change in bird song dialects.***

*by Doug Nelson*

Among their many uses, research collections document the geographic distribution of organisms. They can provide information about the plants or animals that currently exist, and, in many instances, can inform us about changes in distribution over time that may have occurred in response to biological or climatic factors. The most dramatic examples are provided by specimens of organisms that are now extinct, such as the passenger pigeon and ivory-billed woodpecker, represented in the museum's tetrapod collection. Less dramatic are changes in the distribution of animal behavior, changes which can happen quite rapidly in certain cases.

The museum's Borror Laboratory of Bioacoustics houses recordings of animal sounds going back to 1948, from shortly after the invention of the portable tape recorder. Among the 42,000+ recordings are over 5,900 of the white-crowned sparrow, one of the most extensively-studied song birds on earth. Sparrows, in common with all song birds such as cardinals and blue jays, learn their songs as youngsters by imitating the songs of adult males where they grow up. As a result, "vocal dialects" result in which birds of the same species sing slightly different songs in different geographic locations. We now have an extensive series of recordings of how these vocal dialects have changed over the past four decades.

The Puget Sound white-crowned sparrow breeds along the Pacific coast from northern California into British Columbia. Scientists beginning with Luis Baptista have recorded a system of about 12 vocal dialects in this subspecies' song beginning in 1970. For a stretch of 30-100 km along the coast, most males sing the same song, and then a different song occurs along the next stretch of coast. A white-crowned sparrow enthusiast can tell more-or-less where they are along the coast simply by listening to the song of this species. Thanks to the help of students and emeritus Curator



White-crowned Sparrow singing.



Sandy Gaunt, Baptista's recordings have been digitized and added to the BLB collection.

Over the past several years, BLB staff Doug and Angelika Nelson have re-visited many of Baptista's recording locations to identify whether changes have occurred in the songs over the intervening 40+ years. This spring we found that most of the dialects visited were very similar to what they were back in 1970; however, one dialect had changed even since our visit in 2003, and we found a new dialect in an area on the south Oregon coast never before visited. We hope to continue exploring how the process of song learning produces change or stasis in song over time. ♣

## Taxonomy to the rescue.

by Norman Johnson

Perhaps you noticed them as the weather warmed up in the spring, when it cooled off last fall, or in gardening chores around the house. They seem to be everywhere these days, in the house and in the trees and shrubs. Who are they? Stink bugs! We have another invasive species to worry about, this one from China: the brown marmorated stink bug. (Known lovingly by entomologists as BMSB). These bugs – true bugs – are generally about ½" – ¾" long, mottled gray-brown in color, with a distinctive black alternating with white pattern around the edge of their body. They're benign to humans: they don't bite, but they do emit a pungent alarm chemical if they're roughed up. For plants, though, it's a different story. These bugs feed on a wide variety of plants and are serious pests of tree fruits and, potentially, crops such as soybeans. As a newly introduced pest, they've disrupted the pest control programs that have been painstakingly developed over the past 40 years in apple orchards, and now growers feel that they have to revert to the extensive use of insecticides in order to avoid damage.

One of the reasons that the BMSB is a problem here and not in its original home, China, is probably because the natural enemies that keep it in check in its native range did not accompany it when it arrived in North America. Our native parasites and predators are either not interested in these bugs, or they're unable to successfully attack them. So researchers at the USDA lab in Newark, Delaware are looking at the possibility of releasing into the United States those parasitic wasps that attack the BMSB in China, Korea and Japan.

These wasps, the genus *Trissolcus*, place their own eggs inside the eggs of the stink bug. The wasp larva that then hatches consumes the contents of the stink bug egg, thus killing it. Before these species can be released, however, we need a better idea of just how our native species are doing and what other stink bugs these Asian wasps might attack. Not all stink bugs are pests: there are quite a number that are beneficial predators of other insects. So this year



J. Obermeyer, Purdue University

BMSB – Brown Marmorate Stinkbug.



Specimens of the genus *Trissolcus* emerging from stinkbug eggs.

there will be an intensive effort across the country to monitor parasitism of BMSB eggs to see just which species are attacking them and how well they are performing.

In early June, I participated in a workshop at the New Jersey Agricultural Experiment Station near Vineland, NJ that was devoted to teaching researchers how to identify the species of *Trissolcus* and other wasps that they're likely to find attacking stink bug eggs.

Identifying these wasps to species is not an easy thing to do: individuals are only about one millimeter long, so good microscopes and sharp eyes are needed. Even then, though, you have to know what to look for in order to tell them apart. That was precisely the question that I worked on years ago: what are the species of *Trissolcus* and how do we recognize them? It may sometimes seem that the questions that systematics researchers ask are relevant only in the ivory tower of academia. So it was very gratifying to find that the time, money and effort that went into investigating this question is finally paying off! ♣

## **Bird skinning leads to behavioral information for wind turbine research.**

by *Stephanie Malinich*

Typically when you hear about research investigating bird behavior and wind turbine placement you imagine researchers out in fields observing bird species and recording what height they are flying at. For my research I perform the typical outdoor field work of observing birds around OSU's Columbus campus area, and in addition to that I conduct studies at the Museum of Biological Diversity in the Tetrapod Collection.

I am currently working on preparing new specimens for the bird collection which in turn provide new information for my wind turbine research. When preparing a specimen I am looking at several pieces of information: cause of death, location of death, type of specimen, gender of specimen, and date of collection/date of death. I use this information to map out birds that are dying from striking buildings around the central Columbus area. I am specifically focusing on specimens whose localities include a building address as well as a cardinal direction of what side of the building the bird was found. Using this information I find the approximate height of the building which the bird hit, adding it to the height information I have already gathered in my field observations. Taking into account the height of the building that birds strike creates similar circumstances of a bird colliding with a wind turbine. Working on this project not only benefits my research project, it also benefits the tetrapod collection by increasing the amount of bird specimens that can be used in future research.♣



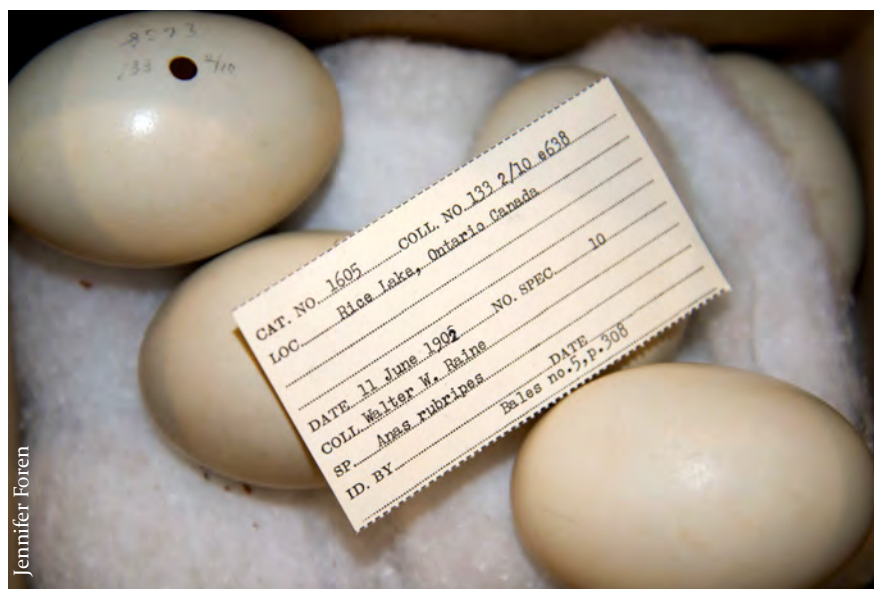
Stephanie Malinich preparing a bird study skin.

## **Avian eggshell reflectance research.**

By *Jennifer Foren*

Birds are often a common topic of interest. Still, many people may not be aware that most bird species perceive light in the UV-spectrum, something that humans are not capable of. There is evidence that UV-reflectance may be an indicator of the signaler's health, especially when measured in a bird's plumage. Bird eggs can also be very colorful and there have not been many studies on UV-reflectance in bird eggshells. The importance of a bird's egg is often overlooked. Eggs provide protection, nourishment, and possibly a means of communication by signaling a female's investment into the eggs. While the museum's bird eggshell collection is extensive, it has not been utilized to its full potential (and even contains specimens from the late 1800's!).

This summer, I am conducting research on bird eggshell reflectance with an undergraduate research fellowship and advised by Drs. Jackie Augustine and Angelika Nelson. Including both passerines and non-passerines, I am measuring the UV-reflectance



Eggs of an American Black Duck.

and pigmentation of eggs of 28 different bird species. For data analysis, these species are divided into pairs by their family. One species from each pair builds a cavity nest, while the other one builds an open cup nest. I test the hypothesis that the difference in light availability to the eggs will have an evolutionary effect on the UV-reflectance. I expect to see a significantly higher rate of UV-reflectance in eggs in cavity nests, than in open cup nests. This may suggest that there is an evolutionary advantage to greater UV-reflectance in eggshells that are found in low light conditions. Perhaps UV-reflectance offers an advantage in locating or discriminating the own eggs from others. Some species lay eggs into another birds nest, such as Brown-headed Cowbirds. My data will document variation in UV-reflectance among a diverse range of bird species, and will also lay the foundation for further study on bird eggshells.♣



## Land snailing in the hinterlands of Jamaica.

Tom Watters

Jamaica is where land snails go on vacation. The island is literally crawling with them. In my research on the phylogenetics and zoogeography of Caribbean land snails Jamaica occupies a special place. Isolated from all other land masses since perhaps the Cretaceous, snail evolution has proceeded apace without outside influences. Add to this a karst topography resulting in numerous isolated “haystacks” – limestone hills - with each one acting as an island to the calciphile snails, and you have a recipe for extreme endemism.



*Thelodromus aspera*, a large, ubiquitous, and rather ugly snail (left). One of the many large pleurodontid snails on the island. The shells can be nearly 7 cm in diameter (middle). An annulariid snail (right).

The Jamaican interior is not for the faint-of-heart. Suicidal drivers, switch-back pot-hole laden roads, stampeding goat herds, clouds of mosquitoes, colonies of fire ants, swarms of ticks, and an occasionally hostile populace all make for a memorable adventure. There is good reason to heed the advice to stick to the tourist areas. But that is not where the snails are.



Much of the lowlands are company-owned sugarcane plantations for making rum. Cockpit Country in the background.

In May-June I was part of a small team that collected within the interior of the island. We drove over 2000 km and sampled 38 sites over 12 days, usually collecting and driving 12-14 hours/day, including night collections by headlamp. We visited classic collecting sites such as Quickstep, Bogwalk, Fern Gully, and the Windsor Cave region of the Cockpit Country. Cockpit Country is the wildest region of Jamaica (in more ways than one), a largely inaccessible forest of countless haystacks.

The goal of my study was to sample the DNA of the snail family Annulariidae for a phylogenetic study. The trip was a great success - we managed to collect samples from nearly every genus. The information gleaned from these specimens will provide invaluable insights into the evolution of land snails in Jamaica and the zoogeography of the Caribbean in general. ♣



This is Dango, a very nice gentleman who acts as the guardian of the Windsor Cave area (left). A “haystack” in the Cockpit Country. Snails live on the cliff face and can only be collected if they fall off (middle). Your guess is as good as mine (right).



# News & Updates

▪ **Borrer Laboratory of Bioacoustics (BLB) & Tetrapod Division.** New people – Jennifer Foren, advised by Drs. Jackie Augustine and Angelika Nelson has started her undergraduate research project entitled “Bird eggshell reflectance in differing nest light environments”.

**Meeting** – The all-day **Annual Meeting of the Ohio Bird Records Committee**, sponsored by the Ohio Ornithological Society, took place on 13 April at the Museum of Biological Diversity. The review status of the federally endangered Kirtland's Warbler and Piping Plover, and two others species (Common Raven and Eurasian Collared-Dove) was retained, and Northern Goshawk was added to the Review List. Strategies for dealing with proliferating informal reports of rarities on various electronic sources – social media and eBird, for example – were discussed. A new Secretary, Greg Miller was elected, with thanks to Ned Keller for over a decade of excellent service. Three new members, Jay Stenger, Rick Nirschl, and Doug Vogus, were elected to replace Su Snyder, Matt Anderson, and Gabe Leidy. The lengthy consideration given to an OSUM Museum specimen identified as a Bicknell's Thrush continues. DNA studies by Herman Mays were not conclusive, but we plan to accept his offer to look at a larger tissue sample, which would, if accepted, be a new Ohio species as well as its farthest west occurrence in North America. Angelika Nelson has volunteered to oversee this exchange. Several pending records were discussed. Finally, members examined some specimens from the OSU collection – three subspecies of *Branta canadensis*, a meadowlark hybrid, and several examples unique for Ohio – and discussed the implications for the state list now and in the future. (B. Whan)

**Loans & Visitors** – Daniel Strain, a science writer working for Maryland Sea Grant, an organization affiliated with the University of Maryland, used a recording of long-tailed ducks in a podcast relating to seaducks living in the Chesapeake Bay.

The BLB provided Ohio Frogs & Toads CDs for the **Annual Vernal Pool workshop** organized by the Ohio Environmental Council (<http://www.theoec.org/VernalPools>).

Spring is the peak in bird research activity and numerous researchers used sound recordings from the BLB for their projects. We have continued our collaboration with **Columbus Audubon**, in particular Darlene Sillick, and provided bird specimens for the monthly meetings through spring. Visitors enjoyed taking a close-up look at birds that matched each evening's theme. The new series of talks will start in September and details will be posted on the Columbus Audubon website at <http://www.columbusaudubon.org/> under education events.

Joel Davis, science teacher at Columbus Academy in Gahanna borrowed bird specimens for a Form & Function class. Al Fulford, wood carver, researched several grebe species for his next carving. Al is an established carver who takes pride in modeling his pieces closely to nature and this has earned him several prizes in advanced wood carving competitions.

Again this spring, what seems to become an annual event, 60 first graders from **Tremont Elementary School** visited the bird collection (left). The students studied many specimens close-up, learned about bird behaviors and how researchers study bird behavior. They all enjoyed being ornithologists for a day! (A. Nelson)♣

▪ **Herbarium. New People** – Retirement? What's that? The Herbarium is happy to welcome home Professor Emeritus Tod F. Stuessy (right) this July after many years away from Columbus. Tod retired as Professor from the Department of Botany at OSU in 1995 after 27 years on the faculty, moving to the Los Angeles Natural History Museum for two years and then to Vienna, Austria, to become Professor and Head of the Department of Systematic and Evolutionary Botany at the University of Vienna, where he has been since. Now, just having retired from that post, Tod returns to OSU as Emeritus Professor to continue his work in plant systematics. His specialties include systematics of Asteraceae and floristics of temperate South America. Tod was an early proponent of cladistic studies in plants and is the author of the award-winning textbook “Plant Taxonomy: the Systematic Evaluation of Comparative Data,” now in its second edition. His office will be located in the Herbarium. (J. Freudenstein)♣



Clarissa Bey, Ieva Roznere, Jackie Halmbacher.



Tod F. Stuessy

▪ **Molluscs. Conesville Earth Day** – In May, members of the Division of Molluscs (left) participated for the fifth year at the Conesville Earth Day. Organized by American Electric Power and held at their Conesville generation plant, agencies and researchers are invited to talk with students about ecology, conservation, and natural history. All sixth graders in Coshocton County attend, usually 500-600 students. It is a rare opportunity to expose so many students to conservation issues in one day. (T. Watters)♣



▪ **Triplehorn Insect Collection. New people – Zach Hurley** has joined our staff as a Research Aide. He has worked with us as an undergraduate curatorial assistant since 2012. Zach says: “My main responsibilities at the moment include sorting target specimens from Malaise trap samples from across the globe (I am currently working through the Kenya material), curation of dry specimens (moving specimens to new, archival quality storage units, databasing, etc.), as well as imaging microscopic parasitic wasps. This summer a lot of effort has been put into geo-referencing localities for the purpose of databasing. So far this summer has been quite interesting with my new duties.”

**Curation** – We have concluded the transfer of the ground beetles (Order Coleoptera, Family Carabidae) to archival quality storage units. It really looks awesome! A significant portion of the specimens (15,556 to date) has already been databased and the information is available online at our newly updated website (<http://osuc.osu.edu/search.html>). In addition to the curation of the beetles, in the past few months we dove in on some curatorial “unfinished business” in the Hymenoptera area. We are now close to completing the databasing of the Mutillidae (velvet ants, aka cow killers) and the Sphecidae (thread-waisted wasps). This summer we are also working on the re-organization of some parasitic wasp families. The goal is to have all of them properly re-housed and completely accessible for study by the end of the summer. Many thanks to our stellar curatorial staff (Sara Hemly, Zach Hurley) and undergraduate assistants working during the summer (Matt Elder, Jessica Albright, Victor Zeinner and Laura Shaffer). (L. Musetti) ♣

## Recent Publications

**Burks, R.A.**, L. Masner, **N.F. Johnson** and A.D. Austin. 2013. Revision of the Indo-Malayan and Palearctic species of *Oxyscelio* (Hymenoptera: Platygasteridae s.l.). *ZooKeys* 292:1-263.

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**Johnson, N.F.** 2013. Hymenoptera. Pages 177-184, in S.A. Levin, ed., *Encyclopedia of Biodiversity*, second edition. Vol. 4. Academic Press, Waltham, MA.

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## Fellowships & Current Grants

Beati, L., **H. Klompen**, L. Durden & **N.F. Johnson**. “REVSYS: Exploiting a large existing resource for biogeographical and host-parasite data: linking immature and adult amblyommine ticks. National Science Foundation DEB, **\$298,865**. (OSU Subcontract). 2010-2013.

## Samples of toe pad and feathers from bald and golden eagles aid research on eagle behavior.

David Nelson, Todd Katzner & Maria Wheeler

Maria Wheeler, PhD candidate in the Department of Biological Sciences at Duquesne University, visited the **OSU bird collection** in April to take feather and toe pad samples from our Bald and Golden Eagle specimens. This was done for a research project in collaboration with Drs. David Nelson (University of Maryland Center for Environmental Science Appalachian Laboratory) and Todd Katzner (West Virginia University). The goal of the research project is to use stable isotope data to understand if and how the diets (using  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) and summering grounds (using  $\delta\text{D}$ ) of eastern and western golden eagles have changed during the past ~150 years. The team has performed these analyses on feathers of 53 modern (post-2006) golden eagles that were captured by Dr. Katzner’s group as part of his ongoing studies. The researchers would like to put these modern data in a historical context using similar data obtained from historical specimens. They have analyzed 17 samples from historical (pre-1965) western golden

**Fish Division.** “Freshwater Fish Inventory and Distribution project.” Under the *Ohio Biodiversity Conservation Partnership*. We will synthesize existing records from the Fish Division with records from the ODOW, OEPA and other sources. The results will guide new collection efforts to generate an accurate, current record of freshwater fish distributions in Ohio, which will be used to help direct future research and management efforts. **\$153,100**. 2013-2014.

**Freudenstein, J.V.** “Systematics of Monotropoideae and Pyroloideae (Ericaceae).” National Science Foundation, 2009-2013.

**Freudenstein, J.V. & M. Tadesse.** “Databasing of the Ohio Flora at The Ohio State University”, National Science Foundation, 2009-2013.

**Johnson, N.F. & A.D. Austin.** “PBI: Diversity and the parasitoid life-history strategy — the superfamily Platygastroidea (Hymenoptera)”, National Science Foundation DEB, **\$2,600,000**. 2006–2011. (extended until August 2013).

**Johnson, N.F.** “Fine-grained semantic markup of descriptive data for knowledge applications in biodiversity domains”. National Science Foundation, **\$50,490**. (OSU Subcontract). 2010–2012. (extended until 2013)

**Molluscs Division.** Aquatic Mollusks Inventory and Distribution, ODNR ODW, **\$47,517**. 2012-2013.

**Molluscs Division.** Freshwater Mussel Health Assessment, ODNR ODW, **\$32,087**, 2012-2013.

**Molluscs Division.** Aquatic Mollusks Conservation, Research & Surveys, ODNR ODW, **\$61,838**, 2012-2013.

**Nelson, D.A., A. Poesel, H.L. Gibbs, J.W. Olesik.** “Digitization of recorded sounds in the Florida Museum of Natural History”. National Science Foundation, DBI-0846354, REU Supplement. **\$5,998**. 2010 - 2012 (extended through December 2013).

**Nelson, D.A., A. Poesel, D.W. Steadman, T.W. Webber.** “Digitization of recorded sounds in the Florida Museum of Natural History.” National Science Foundation, DBI-0846354. **\$466,581**. 2009 - 2012 (extended through December 2013).

**OSU Herbarium.** “National Science Foundation, “Digitization TCN Collaborative Research: North American Lichens and Bryophytes: Sensitive Indicators of Environmental Quality and Change”. Collaborative with multiple PIs. Total funding: **\$4,198,841**. 2011-2015. ♣

eagles from collections at the Utah Museum of Natural History and Carnegie Museum of Natural History and were now able to add specimens from the bird collection at the OSU Museum of Biological Diversity.

So how does stable isotope analysis of bird feathers yield information about eagle behavior? Stable isotope analysis of feather keratin from birds is a well-established approach for assessing the composition of bird diets (e.g. marine vs. terrestrial and C3- vs. C4-plant based foodwebs). This approach takes advantage of differences in  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values of producers and consumers that birds, including golden eagles, feed upon. Stable isotope analysis is also highly useful for estimating the geographic patterns of movement of migratory organisms, such as golden eagles, thanks to predictable continental-scale gradients in  $\delta\text{D}$  of precipitation that are incorporated into feather keratin.

Golden eagles are apex predators and thought to have a large effect on the population dynamics of their prey, with follow-on effects on ecosystem-level processes. Golden eagle populations are currently in decline throughout North America as the result of a variety of threats, including loss of habitat, loss of prey, collision with wind turbines, and poisoning. Unfortunately, the basic ecology, including migratory pathways, linkages between breeding and wintering areas, and food sources, of these birds remains largely unknown.

This research will provide insight into the migration patterns and sources of prey of golden eagles during the past ~150 years, thus providing details about temporal variation in their movements and trophic dynamics during a period of large anthropogenic disturbance. Such information will help inform efforts to conserve and reestablish golden eagle populations in North America. ♣



Eagle specimens in the OSU bird collection.



## *Our heartfelt appreciation to all the contributors!*

**Frequent Contributors:** (in alphabetical order, by last name)

- Marc Kibbey, Associate Curator, Fish Division.
- Luciana Musetti, Curator, Triplehorn Insect Collection.
- Angelika Nelson, Curator, Borror Lab & Tetrapod Division.
- Mesfin Tadesse, Curator, Herbarium.
- G. Tom Watters, Curator, Division of Molluscs.

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- Todd Katzner, Research Assistant Professor, Forestry and Natural Resources, West Virginia University.
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- Doug Nelson, EEOB, Professor, Director, Borror Laboratory of Bioacoustics.
- David Nelson, Assistant Professor, University of Maryland Center for Environmental Science, Appalachian Laboratory.
- Maria Wheeler, Undergraduate Assistant, Department of Biological Sciences, Duquesne University.
- Ben Titus, EEOB, Graduate Research Assistant, Marine Invertebrates.
- Bill Whan, Researcher and Former Editor of the "Ohio Cardinal" Magazine.



**Next issue of the MBDNewsletter coming up Fall Semester 2013**

**We greatly enjoy hearing from our readers!**

Please send your feedback to the Editor

at [osuc-curator@osu.edu](mailto:osuc-curator@osu.edu)







## About us

The **OSU Museum of Biological Diversity (MBD)** is a research and academic facility dedicated to the **preservation, documentation** and **interpretation** of biological diversity & the **training** of the next generation of biodiversity scientists.

We fulfill our mission by creating and disseminating knowledge on evolution and biological diversity through the publication of collections-based research, books, online databases and websites; by providing loans of specimens to qualified users for study and identification; and by training undergraduate and graduate students.

Our collections hold about **9 million specimens**, from bird and mammal skins, to fishes, to plants, to snails, to mites, to insects, and much more.

*“Collections are one of the basic building blocks of modern science.”*

Once a year, during our **Annual Open House**, we invite the community to tour our facilities and to interact with our professors, technical staff and scientists in training.

We also host visits from classes taught at OSU and the individual units also welcome local school and community groups for guided tours by appointment. Contact [osuc-curator@osu.edu](mailto:osuc-curator@osu.edu) for more information.

Links to the collections websites are available on the Museum website at [mbd.osu.edu](http://mbd.osu.edu).

## *A gift for biodiversity*

Please consider giving to the **OSU Museum of Biological Diversity**. A gift to any of the **funds** listed below helps support academic excellence, preservation of the collections, training of undergraduate and graduate students, community outreach and much more. We are grateful to our friends for their generosity!

To join our community of supporters, please **contact** Samara Preisler, Associate Director of Development ([preisler.7@osu.edu](mailto:preisler.7@osu.edu)), (614) 292 6059 **OR go online** to <http://www.osu.edu/giving/collegeofartsandsciences.html>.



### **Funds Associated with the OSU Museum of Biological Diversity:**

- **George and Mildred Wharton Endowment for Acarology Fund** (607675): Supports the Acarology Laboratory.
- **The Hoogstraal Memorial Acarology Student Fund** (603280): Supports Acarology students at the OSU Acarology Summer Program.
- **Donald J. Borror Fund for Bioacoustical Studies** (600654): Supports bioacoustical research, teaching and service programs.
- **D.J. and J.N. Knull Fund in Entomology** (603756): Supports systematic Entomology research and curatorial work in Entomology.
- **The Josef N. Knull Memorial Fund in Entomology** (603759): Supports systematic Entomology research and curatorial work in Entomology.
- **The Ichthyology Research Endowment Fund** (603357): Supports research and publication in the Fish Collection.
- **Friends of the Herbarium Fund** (305104): Supports the OSU Herbarium.
- **The David H. Stansbery Bivalves Endowment Fund** (606910): For the enrichment and maintenance of the Bivalve Mollusc Collection, including expeditions, purchase of collections, and related expenses.
- **The Museum of Zoology Fund** (607989): Supports expeditions, purchase of collections and related expenses of the Museum of Zoology.



# *Discovery, Documentation, Preservation, Education*

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*www.biosci.ohio-state.edu/~acarolog/collection*

### **Borrer Laboratory of Bioacoustics**

*blb.osu.edu*

### **Fish Division**

*www.biosci.ohio-state.edu/~paleoich*

### **Herbarium**

*herbarium.osu.edu*

### **Molluscs Division**

*www.biosci.ohio-state.edu/~molluscs/OSUM2*

### **Tetrapods Division**

*tetrapods.osu.edu*

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