

Welcome to OSU's Museum of Biological Diversity

The Museum of Biological Diversity (MBD) (mbd.osu.edu) is a research facility in the [Department of Evolution, Ecology and Organismal Biology](#) and it houses all of OSU's biological collections, except fossils. The collections are an irreplaceable repository of specimens and information on the biodiversity of Ohio, the USA and the world. We provide extensive information about our holdings to the scientific community and to the general public through publications, websites and online databases.

The main focus of the collections is the discovery, documentation and interpretation of biodiversity. Once a year, during the **Museum Open House**, we invite the public to tour our facilities and to interact with faculty, staff and students. This year the Open House will be on **Saturday, February 11, 2012**.

The **MBD Newsletter** is a quarterly publication featuring news and information on the collections at the MBD (*right*). In this issue we learn about the preservation of animal sound recordings, we are introduced to a treasured collection of immature insects and we travel with entomologists deep into the forests of Malaysia, plus a retrospect on the academic accomplishments of 2011 and the freshest news from the first months of 2012.

Enjoy the newsletter!

Biological Collection in the MBD:

- ✦ Acarology (ticks and mites)
- ✦ Borror Lab of Bioacoustics (animal sounds)
- ✦ Crustaceans (shellfish)
- ✦ Fishes
- ✦ Herbarium (plants)
- ✦ Molluscs (mussels & snails)
- ✦ Tetrapods (higher vertebrates)
- ✦ Triplehorn Insect Collection

Links to each collection website are available on the Museum website at

mbd.osu.edu

Acquisition of research collection of grebe recordings by Robert W Storer

A. Nelson, Borror Lab of Bioacoustics

The collection of animal sounds at the Borror Laboratory of Bioacoustics (BLB) holds almost 40,000 sound recordings of birds, mammals, amphibians, reptiles and insects. The collection grows mainly through sound recordings made by faculty, staff and students in conjunction with their research and by donations of collections from outside investigators. The latest additions to the BLB collection were recordings made by Robert W Storer, Professor of Biology and Curator of Birds at the University of Michigan.

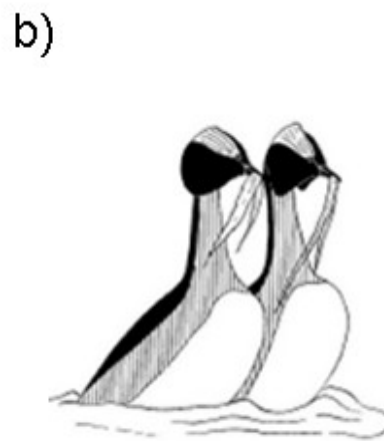


Fig. 1. a) Western Grebes in rush display; b) drawing of Horned Grebes performing the weed dance (from RW Storer 1969)

Storer's life-long interest focused on the biology of grebes - their behavior, anatomy, fossil history, parasites, etc. - and how this knowledge elucidated grebe evolutionary history. In pursuit of this goal, Storer made sound and motion picture recordings of the behaviors of several grebe species across North America, some in collaboration with Keith L Dixon, a colleague and Professor of Ornithology and Mammalogy at Utah State University. When Storer died in 2008, part of his collection of sound recordings was donated to the BLB, in part, because Dr. Storer had been the doctoral advisor of Dr. Douglas Nelson, Director of the BLB. Over the last year Sandy Gaunt, curator emeritus in the BLB, took on the task of organizing the collection and digitizing the recordings to preserve them.

Why digitize sound collections?

The Storer sound collection was made on open reel magnetic tapes from 1965-1974. Specimens, regardless of type (tangible remains of animals or ephemeral behaviors captured on storage media) are subject to deterioration and loss. Magnetic tape has a life expectancy of about 50 years, and thus historic sound collections are prone to progressive data loss and eventual complete deterioration. Migration to new tape or preferably to new digital format is critical to preserve these early sound recordings. Today the audio industry has switched to digital technology which makes it more difficult and expensive to find and maintain analog equipment to access these specimens, i.e. play the tapes. Furthermore, storage in digital format takes up less space than magnetic tapes on bulky reels and digital storage on computers allows for random, rapid access to the sound specimens.

The process of digitizing is rather slow: Sandy had to research the contents of each reel of tape for meta data (such as location and date of recording, as well as target species) and play reels, one recording session at a time, on a Studer studio tape deck through a computer interface. On the computer she monitored a scrolling spectrogram as each cut was digitized to ensure correct species identification and establish parameters of loudness and quality of the sound. The supporting meta data were entered into a database. A “header” with basic information was added to the stored sound file.

Additions to the collection

Through this process Sandy was able to add 111 recordings of five different grebe species to the collection; the Least grebe was a new species for which the BLB did not have any previous recordings. Grebes, members of the family Podicipedidae, are probably best known for their choreographed courtship displays, in which the birds rush across the water with their long necks extended (Fig. 1a), present weeds to each other (Fig. 1b) and eventually copulate. While performing these behaviors they also vocalize. Storer described these behaviors in detailed drawings (e.g. Fig. 1b) and used differences in display behavior (including vocalizations) to describe phylogenetic relations among grebe species. He also described three grebe species in “The Birds of North America” series and presented sonograms of vocalizations to illustrate species-specific differences. Some recordings were obtained simultaneously with motion picture filming in collaboration with Keith Dixon and may have accompanied a film illustrating the repertoire of courtship displays of the Western Grebe presented by Storer at the summer meeting of the American Society of Zoologists in 1966. The digitized recordings, including advertising calls, copulatory sequences (Fig. 2), aggressive and alarm calls, are now accessible to researchers in the future. ♣

Literature

- Storer, R. W. & Muller, MJ 1999. Pied-billed Grebe. (*Podilymbus podiceps*). In: The Birds of North America, No. 410 (A. Poole and F. Gill, eds.) The Birds of North America, Inc. Philadelphia, PA.
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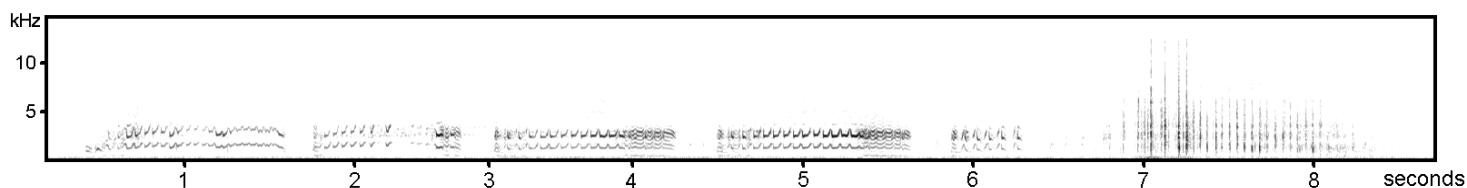


Fig.2. Sonogram of advertising and copulation calls of the Western Grebe recorded by RW Storer.

News & Updates

▪ **Databasing the Collections.** In the past year, an effort has been made to consolidate some of the biodiversity collection databases within the museum into a single, managed cloud service. The benefit of this approach is to give the individual data providing divisions freedom from worrying about the maintenance of computer resources while at the same time reaping the collective benefit of new application functionality which was requested by another group.

Since the data are stored in the biodiversity informatics “cloud”, we have to make sure that these data are not vulnerable to hard disk failure or catastrophic events. To alleviate hardware failure fears, database and resource file backups are performed daily to one of our two network attached storage (NAS) devices which store the data redundantly on multiple hard disks that effectively constitute 8.17 terabytes of storage space. An additional data backup precaution is to place essential files from the NAS devices onto an external hard drive that is then taken to the ASC Tech Application Development Office. The hard drive is subsequently stored within a fire-proof safe as an added safeguard.

Currently, the Entomology, Acarology, and Fish collections are using the biodiversity informatics infrastructure that provides them each a personalized web portal and joint data management tools to their data. Approximately 90k records, the entire fish division database, were migrated within the last eight months to this infrastructure that allows them to produce distribution maps, generate the number of species and specimens for a genus or family, and export the occurrence records for any taxon on the fly. Coupled with the dissemination of these data through the Global Biodiversity Information Facility (GBIF), the collections, their valuable specimens, and the department as a whole are given greater exposure and a more profound impact within any number of biodiversity sciences. (J. Cora, MBD Biodiversity Informatics Manager) ♣

▪ **Fish propagation.** Marc Kibbey continued to work with researchers at the Freshwater Mussel Conservation and Research Center, advising and assisting with efforts to propagate and reintroduce state endangered spotted darter *Etheostoma maculatum* and state threatened Tippecanoe darter *Etheostoma tippecanoe*. Successes realized this fall by Graduate Student Kristi Harraman included spawning and hatching of the spotted and Tippecanoe darters. Marc is also leading a project to reintroduce brindled madtom *Noturus miurus* to Leading Creek, an acid mine drainage impacted stream in Meigs County, Ohio. Michael Flores was hired as a student research assistant to aid in sampling, habitat evaluation, culturing and reintroductions. The first translocation of this species to Leading Creek was made late last year.

A portion of funds for purchase of fish propagation equipment come from the grants under the *Ohio Biodiversity Conservation Partnership (OBCP): Aquatic Mollusk Conservation, Research and Surveys, and Freshwater Mollusk Health Assessment* grants to Tom Watters. Other funds from an OBCP grant to collaborator and OSU SENR Professor Mazeika Sullivan also paid for equipment for the fish propagation facilities.

▪ **Fish Division Education and Outreach.** Ten undergraduate students enrolled in a course to receive undergrad individual credit for education and experience with the fish collections under the supervision of Dr. Meg Daly and Fish Division staff. Three sections were offered: “*Where are the Fish*”, focused on GIS issues; “*What is that Fish*”, focused on fish taxonomy and “*All the Fish in the Creek*”, focused on fish habitats and ecology.

High School student Maude Verber came to the Fish Division from the Graham School experiential program to internship with us. Maude has been learning fish taxonomy and helping us process our voucher specimens. (M. Kibbey) ♣

▪ **At the Triplehorn Insect Collection.** Congratulations to **Charuwat Taekul** (right), PhD candidate working with parasitic wasps in Norman Johnson's lab, won second place at the *Entomological Society of America Student Poster Competition* (Systematics, Evolution & Biodiversity Section 2) with his poster on the molecular phylogeny of Telenominae (see **Presentations**).



Charuwat Taekul

▪ **Visitors come for our bugs!** Every year the **Triplehorn Insect Collection** welcomes scientists and graduate students who are interested in studying our specimens. In early January, **Crystal Boid**, a graduate student from Colorado State University, came to study the OSU bee specimens from Colorado (3-7 January 2011). She examined many drawers and updated the determinations of many of our specimens. A few days later, the **Ohio Lepidopterist's Society** held its *Annual Meeting* at the MBD and the Triplehorn Insect Collection. The OLS Reference Collection, a synoptic collection of Lepidoptera found in Ohio, is housed in the Triplehorn Insect Collection (14 January 2012). In addition to the annual meeting, the group also comes in regularly in December for their "Identification Day", when members use the OLS collection to identify their own specimens.

Dr. Lubomir Masner, a leading authority in various groups of parasitic wasps, and long time collaborator of Drs. Johnson and Musetti, came to discuss ongoing projects in parasitic wasps and to examine our most recent additions to the Triplehorn Insect Collection (14-19 March 2011). He determined hundreds of wasp specimens of the family Platygasteridae and Diapriidae to genus level. Dr. Masner is officially retired, but continues actively working on his research with parasitic wasp, mentoring and providing technical advice to graduate students.

Dr. Kim Landsbergen (Professor of Cross-disciplinary Studies and Sustainability Research) and **Carl Garant** (Dean of Industrial and Interior Design) of the Columbus College of Arts and Design and their students provided us with a new and interesting experience. Kim, a biologist, and Carl, a designer, team-teach a Biomimicry course to design students at CCAD. Each student is assigned an insect (emerald ash borer, dung beetle, etc.) to work on. As the semester progresses, students learn biological concepts in class and do research on their particular insect – biology, ecology, morphology, etc. Ultimately, they have to develop a variety of design solutions informed by all that they learned in the course. The blending of art, design and science is a very innovative approach and, as I learned, one that is in high demand by the industry. During their visit to the OSU insect collection (14 September 2011), CCAD students examined specimens of their assigned insect, took photos, drew sketches and asked questions about “their” insect. The group was lively and inquisitive, their questions and their artistic approach to our insect specimens were refreshing and exciting. It was a great learning experience for us at the collection. The Biomimicry class was featured in the November 2011 issue of CCAD's *IMAGE magazine*.



CCAD's Design students from the Biomimicry course examine specimens of their interest at the Triplehorn Insect Collection

Jim McCormac, from the Ohio Division of Wildlife, visited to take pictures of several species of moths (9 December

2011). He is working on a publication on caterpillars to be published by the Ohio Division of Wildlife. Even though the stars of the publication are the caterpillars, he wanted to include images of the adults as well. Of the 18 species of moths he was looking for, we were able to provide specimens for all but one. Jim is an amazing wildlife photographer and his blog, "Ohio birds and biodiversity" at jimccormac.blogspot.com, is very popular and interesting. (L. Musetti) ♣

▪ **Herbarium reaches 140,000 specimens in imaging and databasing.** As part of an NSF-funded collections grant, the Herbarium has been working to image and database its specimens from Ohio in order to bring its resources to a broader community. They have now processed over 140,000 specimens with much of the coordination of day-to-day activities being provided by graduate student RAs Brandon Sinn, Jeff Rose and Abby Reft. Dr. Mesfin Tadesse, Curator of Vascular Plants, has been heavily involved with preparing specimens for processing. Over 20 undergraduates have been involved in the project thus far, imaging specimens and entering information from the specimen images into the database. The Herbarium's database is constructed using BRAHMS, an application developed at the University of Oxford. Images and specimen records can be accessed at the Herbarium's website, herbarium.osu.edu.



Live specimens of bryophytes

▪ **Bryophytes big at OSU Herbarium.** Though the plants are diminutive in size, mosses, liverworts and hornworts are an important part of our flora, especially in moist habitats. A statewide network of individuals that is informally based at the OSU Herbarium and is coordinated by our Cryptogam Curator, Dr. Cynthia Dassler, is making a significant contribution to our knowledge of these plants. This group, the Ohio Moss and Lichen Association, encourages study of both bryophytes and lichens. Through workshops and forays, interested individuals learn about bryophyte taxonomy and ecology, and enrich the Herbarium's collections. Forays are held in Ohio counties where bryophytes and lichens are under-collected. OMLA members have discovered 4 new species of mosses in Ohio thus far. In addition, collections by OMLA members have resulted in many new county records: 397 mosses, 62 liverworts, 1 hornwort, and 253 macrolichens, and the numbers continue to rise. From county records discovered by OMLA members and by surveying OSU's bryophyte collection, Barbara Andreas, a visiting scholar in the herbarium, Jeff Rose, a graduate student, and Diane Lucas, an OMLA member, are updating the 1996 Snider and Andreas publication, *A Catalog and Atlas of the Mosses of Ohio*. Other members of OMLA are working to create dot maps and county species lists that will be available on the OMLA website, ohiomosslichen.org.

The Herbarium is also a part of an NSF-funded project to digitize information from North American bryophyte and lichen specimens from collections across the United States. Interestingly, Columbus has a long historical tradition of involvement in bryophyte studies. William Starling Sullivant (*right*), son of Columbus co-founder Lucas Sullivant, pioneered work on bryophytes in eastern North America in the early nineteenth century. His own annotated copy of his published collections of mosses is part of the Herbarium's collection.

▪ **Visiting Scholars in the Herbarium.** The Herbarium is fortunate to have two visiting Scholars who contribute to our programs. Dr. Barbara Andreas, Professor Emerita from Kent State University, and Mr. Richard Gardner of ODNR's Division of Wildlife, lend their expertise to and utilize the Herbarium's collections. Barb specializes in bryophytes and is a part of the statewide bryophyte group, while Rick's interest lies with the Ohio vascular flora. (J. Freudenstein, M. Tadesse, C. Dassler) ♣



William Starling Sullivant

▪ **Re-organization of Mammal Scientific and Teaching Collection.** Over the summer Joshua Cano, EEOB major in zoology, reorganized the mammal scientific collection with funding from the Division of Wildlife at the Ohio Department of Natural Resources. Several hundred specimens could be added to the collection and cataloged, cabinets and drawers were labeled and specimens placed in taxonomic order.

Since fall quarter Andrew Scherrer, a zoology major, has re-organized the mammal teaching collection currently housed at Jennings Hall. Several specimens could be transferred to the scientific collection and others were added to establish a complete collection of Ohio mammals (skins and skulls) to be used in courses such as EEOB470: *Biology of the Vertebrates* and EEOB625: *Mammalogy*. (A. Nelson)♣



Mammal collection, before (left) and after (right). Photos by A. Nelson

▪ **People at the Mollusc Division.** In 2011 the Division of Molluscs had ten interns (for undergraduate research credit) and six paid part-time undergraduate students. We welcome a new PhD graduate student, Ieva Roznere. (G.T. Watters)♣

▪ **Visiting Class at the Tetrapod Collection.** Students in EEOB470: *Biology of the Vertebrates* taught by Assoc Prof John Hunter used the collections to review specimens such as amphibians, reptiles, birds and mammals. (A. Nelson)♣

The value of the Peterson Larval Collection: a user's perspective

Steven Passoa, USDA, Animal and Plant Health Inspection Service, Plant Protection and Quarantine



Alvah Peterson with the camera setup he used to take photos of insect eggs.

The classic text Borror and DeLong's "*Introduction to the study of insects*", latest revision by Triplehorn and Johnson, is known, rightfully so, as "the book". It has been translated into several languages and is an important teaching tool for entomologists worldwide. Less widely appreciated, is the "other blue book", Alvah Peterson's "*Larvae of insects*". Peterson graduated from the University of Illinois and spent most of his career as a professor here at Ohio State. Although the web is filled with beautiful color photos of insects and many other important contributions to the field of immature insects have followed, Peterson's book and associated collection are a unique source of careful morphological observations useful for identification and phylogeny. My goal is to describe this resource, with emphasis on Lepidoptera (the moths and butterflies), and to point out recent examples of its value to my USDA work and for systematic studies in general.

Peterson's collection (thousands of vials containing alcohol-preserved specimens) includes many exemplars identified by a label that says "drawing" inside the vial. These are the actual specimens that he studied and illustrated (vouchers) for his book. The book is essentially a pictorial atlas with little text, thus some questions on a structure cannot be answered by studying his illustrations, you need to see the actual insect. The Peterson collection, which is part the holdings of the **Triplehorn Insect Collection** at OSU, gives researchers the opportunity to examine Peterson's vouchers first hand. The vials containing vouchers are marked by a pin in the top of the rubber stopper, a system which makes them very obvious in the vial racks where they are stored. But the collection is more than just Peterson's vouchers: he often received donations of specimens, particularly pest species from economic entomologists. As a result, the Peterson collection contains a large selection of economically important insects, and more rarely, exotic pests.

Uses of the Peterson Collection

Diagnosis. The *European grape vine moth* is a new exotic pest recently discovered in the Napa valley, California. As such, it was a threat to the 800,000 acres of grapes grown for wine production. Being very similar to the native American

grape berry moth, it was hard to recognize and delimit the infestation, let alone apply any quarantines if needed. Time was of the essence and we were working with very limited data. A large series of the exotic species was available from the outbreak, but almost no collection had enough of the native insect pest for a comparison. The Peterson larval collection came to the rescue! There was a large series of the grape berry moth right here, enough for my coauthors and I to suggest an answer. We used the color of the antennae to tell the two species apart. More importantly, we showed that existing unpublished guides were wrong, leading to false positives. Eventually DNA studies and rearing was completed, but the Peterson collection was the early hero.

Pest exclusion. Most produce imported into the US must be checked carefully for invasive pests and collections such as Peterson's are routinely used to keep our food supply safe. The USDA has been trying to eradicate the *pink bollworm*, a serious pest of cotton, from the United States. A port of entry facility in Florida has been getting caterpillars from the Caribbean that look like the pink bollworm. Because the pink bollworm is now rare in the United States, the specimens in the Peterson collection are an important reference that cannot be replaced easily. By comparing the newly discovered specimens with specimens of pink bollworm preserved in the collection I was able to confirm the danger of letting these exotic caterpillars into the United States.

Phylogenetic Studies. Phylogenies are important for answering a number of evolutionary questions, for example, coevolution between insects and plants. Numerous characters depicted in Peterson's book are now recognized as defining characters for Lepidoptera families. The reduced number of prolegs of Gracillariidae (a leaf miner), the dorsal glands of the Lymantriinae (contains the *gypsy moth*), and the prothoracic gland of swallowtail caterpillars are just a few of the many examples. No one ever questions the value of the immature stages for insect phylogeny, the need is to get these stages preserved in a collection. This data set has hardly been touched. In fact, the Peterson collection will be a treasure of phenological data on Ohio Lepidoptera when the collection is eventually databased.

A final example of the value of the larval collection is to support the **training of future scientists**. Currently, there is a student studying crambine moths of Ohio (sod webworms). The Peterson collection contains specimens that will be useful in trying to figure out which species are the major pests in Ohio. ♣

Publications 2011

- Adamski, D., Jean-Francois Landry, S. Passoa, & R. A. Tracy. 2010. History, distribution, and identification of *Exoteleia dodecella* (L.) (Lepidoptera: Gelechiidae) in North America, with insights into the systematics of *Exoteleia* Wallengren using characters of the adult, immatures, bionomics, and DNA Barcodes. *Proceedings of the Entomological Society of Washington* 112(2): 183-206.
- Barrett, C. F. & J. V. Freudenstein. 2011. An integrative approach to delimiting species in a rare but widespread mycoheterotrophic orchid. *Molecular Ecology* 20: 2771-2786.
- Brown, J. W., M. E. Epstein, T. M. Gilligan, S. C. Passoa, & J. A. Powell. 2010. Biology, identification, and history of the light brown apple moth, *Epiphyas postvittana* (Walker) (Lepidoptera: Tortricidae: Archipini) in California: an example of the importance of local faunal surveys to document the establishment of exotic insects. *American Entomologist* 56 (1): 34-43.
- Bucheli, S. R., S. Passoa and J. W. Wenzel. 2010. A phylogenetic test of Ehrlich and Raven's theory of escape and radiation in insects that feed on toxic plants, based on nearctic *Depressaria* moths (Gelechioidea: Elachistidae: Depressariinae), with discussion of the evolution of genitalia. *Entomologica Americana* 116(3):1-24.
- Gilligan, T. M., M. E. Epstein, S. C. Passoa, J. A. Powell, O. C. Sage, & J. W. Brown. 2011. Discovery of *Lobesia botrana* ([Denis & Schiffermuller]) in California: an invasive species new to North America (Lepidoptera: Tortricidae). *Proceedings of the Entomological Society of Washington* 113(1): 14-30.
- Johnson, NF & L Musetti. 2011. Redescription and revision of the Neotropical genus *Pseudoheptascelio* Szabó (Hymenoptera, Platygasteridae, Scelioninae), parasitoids of eggs of short-horned grasshoppers (Orthoptera, Acrididae). *ZooKeys* 136:93-112.
- Kocyan, A, DA Snijman, F Forest, D S Devey, JV Freudenstein, J Wiland-Szymanska, MW Chase & PJ Rudall. 2011. Molecular phylogenetics of Hypoxidaceae – Evidence from plastid DNA data and inferences on morphology and biogeography. *Molecular Phylogenetics and Evolution* 60: 122-136.
- Mesfin Tadesse. 2011. Celebrating the end of a 30-year old project, the Ethiopian Flora Project and the beginning of a new one, the Gullele Botanic Garden. *Ee-JRIF* 3(1): 3-21. (www.nesglobal.org)
- Mesfin Tadesse. 2011. Passing on the torch after 30 years of Flora work - a personal view. *Acta Universitatis Upsaliensis. Symbolae Botanicae Upsalienses* 35 (2).

- Poesel, A, HL Gibbs & DA Nelson. 2011. Extrapair fertilizations and the potential for sexual selection in a socially monogamous songbird. *The Auk* 128(4):1-7.
- Profant, D, E Metzler & S Passoa. 2010. The slug caterpillar moths (Lepidoptera: Limacodidae), and other Zygaenoidea of Ohio. *Ohio Biological Survey Bulletin New Series*. Volume 16, number 3. Ohio Biological Survey. 66 pages.
- Simmons, MP & JV Freudenstein. 2011. Spurious 99% bootstrap and jackknife support for unsupported clades. *Molecular Phylogenetics & Evolution* 61:177-191.
- Talamas, E, L Masner & NF Johnson. 2011. Revision of the Malagasy genus *Trichoteleia* Kieffer (Hymenoptera, Platygasteroidea, Platygasteridae). *ZooKeys* 80:1-126.
- Talamas, EJ, L Masner & NF Johnson. 2011. Revision of the *Paridris nephta* species group (Hymenoptera, Platygasteroidea, Platygasteridae). *ZooKeys* 133:49-94.
- Tessler, NR, JF Gottgens, & MR Kibbey. 2012. The First Observations of the Eastern Sand Darter, *Ammocrypta pellucida* (Agassiz), in the Ohio Portion of the Maumee River Mainstem in Sixty-Five Years. *Am. Midl. Nat.* (2012) 167:198-204.
- Tiemann, JS, SE McMurray, MC Barnhart & GT Watters. 2011. A review of the interactions between catfishes and freshwater mollusks in North America. *American Fisheries Society Symposium* 77: 733-743.
- Watters, GT. 2011. Redescription and range extension of *Antillophos bahamasensis* Petuch, 2002 (Gastropoda: Buccinidae). *Novapex* 12: 47-48. ♣

Presentations 2011 · Posters & Talks

- Austin, AD, NF Johnson, AA Valerio, A Polaszek, H Klompen, E Talamas & C Taekul. "Phylogeny of parasitoid wasps of the superfamily Platygasteroidea (Hymenoptera): an expanded analysis, evolution of host relationships, and higher classification." **Oral Presentation.** Entomological Society of America Meetings, Reno, NV, 15 November 2011.
- Broe, MB & JV Freudenstein. "Monotropa hypopithys L. (Ericaceae) is a distinct genus with well-defined species segregates at the molecular level." **Oral Presentation.** Botany 2011 meeting, St. Louis, MO, 9-13 July 2011.
- Feldenkris, ER, MB Broe & JV Freudenstein. "A mitochondrial DNA and combined evidence analysis of relationships at the base of Ericaceae." **Oral Presentation.** Botany 2011 meeting, St. Louis, MO, 9-13 July 2011.
- Freudenstein, JV. "Getting back to my rhizomes: Systematic studies in the Coralroot Orchids." **Invited Oral Presentation.** The Hugh Iltis Lecture, Department of Botany, University of Wisconsin, Madison, 8 September 2011.
- Johnson, NF. "Parasitoid wasps of the superfamily Platygasteroidea (Hymenoptera) and the coming of age of taxonomy and systematics." **Invited Oral Presentation.** Department of Entomology, Ohio Agricultural Research and Development Center, Wooster, OH. 21 September 2011.

Johnson, NF. "Parasitoid wasps of the superfamily Platygastroidea (Hymenoptera) and the coming of age of taxonomy and systematics." **Invited Oral Presentation.** Department of Evolution, Ecology and Organismal Biology Seminar Series. 29 September 2011.

Johnson, NF. "Application and leverage of emerging data standards in taxonomic software applications." **Invited Oral Presentation.** SysEB Symposium, Entomological Society of America Meetings, 15 November 2011.

Johnson, NF, J Cora, AA Valerio, AD Austin, H Klompen & F Bin. "The genome of the egg-parasitoid wasp *Trissolcus basalus* (Wollaston) (Hymenoptera: Platygastriidae)." **Poster Presentation.** Entomological Society of America Meetings, Reno, NV, 16 November 2011.

Johnson, NF. "Is it time to reach for the cloud(s)? A service provider approach to collection databasing." **Invited Oral Presentation.** Entomological Collections Network Meetings, Reno, NV, 12 November 2011.

Mesfin Tadesse. "The Changing Role of Botanic Gardens and Herbaria." **Oral Presentation.** OSU Museum of Biological Diversity. 7 April 2011.

Musetti, L, NF Johnson, & L Masner. "The armilla group of genera of egg parasitoids in the family Platygastriidae (Hymenoptera)." **Poster Presentation.** Entomological Society of America Meetings, Reno, NV, 16 November 2011.

Nickley B, DA Nelson, HL Gibbs, JW Olesik & A Poesel. "Tracking fine-scale dispersal in birds using trace element analysis." **Poster presentation.** International Ethological Conference (IEC) and meeting of the Animal Behavior Society (ABS). Bloomington, IN. 25-30 July 2011.

Poesel, A. "Avian Adaptations." **Guest Lecture.** EEOB470: Biology of the Vertebrates. Department of Evolution, Ecology and Organismal Biology, Columbus, OH. 8 November 2011.

Poesel A, HL Gibbs & DA Nelson. "Extra-pair fertilizations and the potential for sexual selection in a socially monogamous songbird." **Oral Presentation.** International Ethological Conference (IEC) and meeting of the Animal Behavior Society (ABS). Bloomington, IN. 25-30 July 2011.

Randle, CP & JV Freudenstein. "The effect of within-replicate search strategies on jackknife support of clades of different size." **Oral Presentation.** Botany 2011 meeting, St. Louis, MO, 9-13 July 2011.

Rose, JP & JV Freudenstein. "A Tale of Two Pygmy Pipes: Quantifying Variation in *Monotropis* (Ericaceae)." **Oral Presentation.** Botany 2011 meeting, St. Louis, MO, 9-13 July 2011.

Simmons, MP & JV Freudenstein. "Spurious 99% bootstrap and jackknife support for unsupported clades." **Oral Presentation.** Botany 2011 meeting, St. Louis, MO, 9-13 July 2011.

Szeyller-Maccolley E, A Poesel & DA Nelson. "Transmission of structurally distinct song phrases in the white-crowned sparrow." **Poster presentation.** International Ethological Conference (IEC) and meeting of the Animal Behavior Society (ABS). Bloomington, IN. 25-30 July 2011.

Taekul C, NF Johnson, L Masner, A Polaszek & Rajmohana K. "World species of the genus *Platyscelio* Kieffer (Hymenoptera: Platygastriidae)." **Invited Oral Presentation** to Her Royal Highness Princess Maha Chakri Sirinhor and the Ministry of Agriculture and Cooperatives, as part of the celebrations of Outstanding ARDA Scholar Awards, Bangkok, Thailand. 4 February 2011.

Taekul, C, NF Johnson, AA Valerio & H Klompen. "Molecular data indicate that Telenominae is not monophyletic: (Hymenoptera: Platygastriidae)." **Poster Presentation.** Entomological Society of America Meetings, 14 November 2011.

Talamas, E & NF Johnson. "Predicted gustatory receptor genes in *Trissolcus basalus* (Hymenoptera: Platygastriidae)." **Oral Presentation.** Entomological Society of America Meetings, 14 November 2011.

Valerio, AA & AD Austin. "The systematic review of the arachnophilous genus *Odontacolus* Kieffer (Hymenoptera: Platygastriidae s.l.)." **Poster Presentation.** Entomological Society of America Meetings, Reno, NV, 15 November 2011.

Valerio, AA & AD Austin. "The systematic review of the genus *Odontacolus* Kieffer (Hymenoptera: Platygastriidae s.l.)." **Poster Presentation.** Invertebrate Biodiversity & Conservation and Society of Australian Systematic Biologists Joint Conference, Melbourne, Australia, 4-7 December, 2011.

Zimmerman, B.J., Justin S. Baker, Marymegan Daly, Charles Wentzel, & Marc R. Kibbey. "Ohio Fish Inventory and Distribution Project". **Poster presentation.** North American Native Fishes Association Annual Convention, Roanoke, Virginia, May, 2011., and the Annual Meeting of the Southeastern Fishes Council. Chattanooga, TN. November, 2011.

Zimmerman, B.J., Justin S. Baker, Marymegan Daly, Charles Wentzel, & Marc R. Kibbey. "Ohio Fish Inventory and Distribution Project". **Oral Presentation.** Lake County Metro Parks, August 2011.

Zimmerman, B.J., Justin S. Baker, Marymegan Daly, Charles Wentzel, & Marc R. Kibbey. "Ohio Fish Inventory and Distribution Project". **Oral Presentation.** Van Darby Hunting and Fishing Club, Mechanicsburg, OH, October 2011. ♣

Fellowships & Current Grants 2011

Beati, L, H Klompen, L Durden & NF 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.

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 and current record of freshwater fish distributions in Ohio, which will be used to help direct future research and management efforts. \$83,356. 2011-2012.

Gibbs, HL & A Poesel. "Curation of Mammal collection at the Museum of Biological Diversity at The Ohio State University". Ohio Division of Natural Resources. \$5,000. 2011.

Nelson, DA, A Nelson, DW Steadman & T Webber. Digitization of recorded sounds in the Florida Museum of Natural History, NSF, \$466,000. 2009-2012.

Nelson, DA, A Nelson, HL Gibbs & JW Olesik. Co-Principal Investigators. "Digitization of recorded sounds in the Florida Museum of Natural History," National Science Foundation, DBI-0846354, REU Supplement. \$5,998. 2010-2012.

Freudenstein, JV. "Systematics of Monotropoideae and Pyroloideae (Ericaceae)." National Science Foundation, 2009-2012.

Freudenstein, JV & M Tadesse. "Databasing of the Ohio Flora at The Ohio State University", National Science Foundation, 2009-2012.

Johnson, NF. "Fine-grained semantic markup of descriptive data for knowledge applications in biodiversity domains". National Science Foundation, \$50,490. (OSU Subcontract). 2010-2012.

Johnson, NF & AD Austin. "PBI: Diversity and the parasitoid life-history strategy — the superfamily Platygastroidea (Hymenoptera)", National Science Foundation DEB, \$2,600,000. 2006-2011.

OSU Herbarium. "Digitization TCN Collaborative Research: North American Lichens and Bryophytes: Sensitive Indicators of Environmental Quality and Change", collaborative with multiple institutions, National Science Foundation, 2011-2015.

Kelsey Fultz received a University Fellowship for study in the Evolution, Ecology & Organismal Biology graduate program, 2011-2012 school year. Kelsey started her PhD program in **Norman Johnson's** Lab in August 2011.

Charuwat Taekul, a PhD candidate in **Norman Johnson's** lab, was awarded a 3-year grant from the Department of Agriculture, Thailand, for the period of 2012-2015. The research title is "Taxonomy, identification, and distribution of platygastroid wasps (Hymenoptera; Platygastroidea) attacking rice stem borers, rice stink bugs, and brown plant hoppers in Thailand." Charuwat plans to graduate in 2012 and return to Thailand, where he has a position as Research Scientist.

Charuwat Taekul received an Outstanding ARDA Scholar Award from the Ministry of Agriculture and Cooperatives, Bangkok, Thailand. February, 2011. ♣

Museum of Biological Diversity Open House 2012

1315 Kinnear Road

February 11, 10AM - 4PM



"Backyard Biodiversity"

Field Work & Research Travel

Borrer Lab of Bioacoustics. Doug Nelson continued field work on “Cultural Evolution of Song Dialects in the white-crowned sparrow”, in Bandon, OR. (April 2011).

Angelika Nelson studied grasshopper sparrows *Ammodramus savannarum* at the Chester River Field Research Center, Maryland to investigate “Geographic Variation in two distinct songs of the grasshopper sparrow.” In collaboration with Jill A. Soha and Bernard Lohr we tested with song playback experiments, how male grasshopper sparrows, who do not closely imitate adult song, respond to geographic variation in buzz song and warble song (June 2011).

Angelika Nelson attended the European Bird Curator Meeting in Florence, Italy (24-25 November 2011). The meeting was the second of its kind to provide a forum for curators of bird collections in Europe and worldwide to share and discuss collection-related matters. Forty-four curators and collection managers from 15 different countries attended. The meeting was held at the Natural History Museum in downtown Florence and included a visit to the local zoological collection. Presentations ranged from updates of particular collections to examples of use of collection material in research to theft in scientific collections and how it can be avoided. Ample time was given for discussion and socializing. Overall, a successful meeting. (*A. Nelson*)♣

Fish Division. The past couple of years has seen an extraordinary reoccupation of several fish species in Ohio’s streams. In late 2010 we received a voucher for a species that for all intents and purposes was thought to have been extirpated from the state, the gilt darter *Percina evides*. The specimen captured by the environmental consulting group EAE Inc., from the Ohio River below the lock and dam below Gallipolis, represents the first gilt darter recorded from Ohio waters since 1888. Another species, the pirate perch *Aphredoderus sayanus*, was found by Brian Zimmerman and Justin Baker late last year at a locality near the area where the species was last collected in 1951.

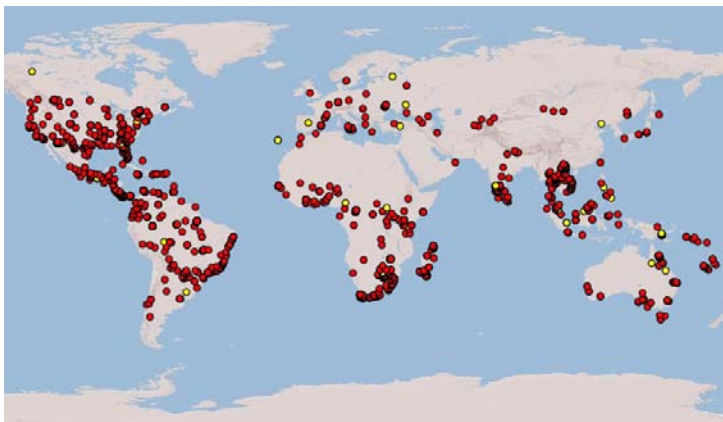
More results from collections by Brian and Justin under the “*Freshwater Fish Inventory and Distribution*” project showed reoccupations of historical areas and expansions into new localities of, in particular, *Etheostoma camurum*, *E. maculatum* and *E. tippecanoe*. They also picked up a voucher from a new locality for invasive northern studfish, *Fundulus catenatus*, from Captina Creek, near where the species was discovered a couple years ago at the eastern side of the state. (*M. Kibbey*)♣

Molluscs. As part of a study on the Caribbean land snail family Annulariidae (*right*), Tom Watters traveled twice in 2011 to collect specimens for phylogenetic work. One trip was to arid Curaçao (August). Although few taxa live on the island, they are crucial to understanding the zoogeography of the group. Did the family colonize the Antilles from South America or *vice versa*? Specimens were found at Hato Cave on the north coast. The second trip was to the Exuma Chain in the Bahamas (October). Although only a single species of the family lives there (found in abundance) it appears to be derived from ancestors in Cuba. (*G. T. Watters*)♣



Annulariid snail from Netherlands Antilles

Triplehorn Insect Collection. Norman Johnson, Luciana Musetti, Elijah Talamas & Joe Cora visited Dr. Lubomir Masner at the Canadian National Insect Collection, Ottawa (23-28 January 2011). The goals of the trip were to capture specimen data for species in the parasitic wasp subfamilies Telenominae and Gryoninae (Insect: Hymenoptera: Platygasteridae) and to discuss various ongoing projects that are being developed in collaboration with Dr. Masner.



Distribution of the genus Gryon (Hymenoptera: Platygasteridae)

Our data capture involves attaching a unique id number to each wasp specimen and transcribing the specimen label data (usually contains collecting locality, date of collection, collector, and more infrequently, locality coordinates, collecting method, even host record) into a spreadsheet. The information is then added to our database and made freely available online in various formats, including maps (*left*), at hol.osu.edu. Despite of the nordic cold (-26°F during the day!), our research trip was a great success, with thousands of specimen records databased.

Norman Johnson & Charuwat Taekul spent three days in Tucson, Arizona (24-26 March 2011), participating of the annual meeting of the project "*Fine-grained semantic markup of descriptive data for knowledge applications in biodiversity domains*" (see **Grants**), of which they are a part. This collaborative project, headed by Hong Cui (School of Information Resources and Library Science, University of Arizona), was designed to develop ways to tag and extract information (characters, taxonomy, distribution, phenology, etc.) from the vast amounts of biodiversity literature. The specific goals of that meeting were to recap their accomplishments, get some on-hands training with new software developed in the project, and to fine-tune plans for the upcoming year. (*L. Musetti*)♣

Collecting parasitic wasps in Borneo

N. F. Johnson, Triplehorn Insect Collection

Gunung Mulu National Park is located in the northeastern end of the Malaysian state of Sarawak, on the border with Brunei. It's a relatively new park, having only been hacked out of the forest in the late 1970's, but has been designated as a World Heritage Site. Its main claim to fame is the fantastic caves: the Sarawak Chamber, discovered in 1981, is the largest in the world. The ceiling of Deer Cave, highlighted on a number of televised nature programs, is 125 m high. The Clearwater cave system has been surveyed for 175 km, snaking through the limestone that makes up Gunung Api (fire mountain).

Our interest was not the caves themselves, although we did visit them, but the insect fauna, *minute parasitic wasps* (images available at specimage.osu.edu) in particular. For more than a year we have worked together with staff at the park on a long-term insect trapping program, sampling from the rich range of habitats in the park, from the lowland peat swamp, into the kerangas, the montane dipterocarp forests, and even on the windswept summit of Mount Mulu itself. In September, we had a chance to visit the Park ourselves, to collect and to renew relations with the Park personnel.

Our little expedition was composed of four entomologists: Elijah Talamas (PhD candidate, Entomology, OSU), Chris Darling (Curator, Entomology, Royal Ontario Museum, Toronto), Andy Polaszek (Keeper, Entomology, Natural History Museum, London), and me. Chris is the old-hand at field work in southeast Asia, having collected in Indonesia, the Philippines, and Vietnam.



View of Limbang

We flew into the city of Miri on the Sarawak coast, and then flew to the small town of Limbang (*above*). From there, it was an hour's drive to be picked up in longboats for the beginning of the trip upriver. After a few hour's boat ride we arrived at Kuala Medang, where we spent the night in a longhouse. The next day was spent traveling farther upriver to reach the northern park entrance at Mentawai. There we found very nice guesthouses with cooking facilities, but not much else in terms of amenities. Forest, just what we were looking for.



Gunung Mulu 2011 Expedition (L-R): Elijah Talamas, Chris Darling, Andy Polaszek, Norman Johnson.

There are two entrances into the Park. Most tourists enter by flying in to Mulu airport, an hour or so from Kota Kinabalu in the north or an hour from Kuching in the south. The Park headquarters is here along with the Royal Mulu Resort (Yes, one can still live in comfort while experiencing the Bornean rainforest!).

From headquarters there's easy access to most of the show caves, very popular with tourists from all over the world. The other entrance, on the north side, is an itinerary taken by few. That's where we chose to start.



The rivers at Gunung Mulu were very low due to lack of rain



Malaise trap in the forest near Headquarters, Gunung Mulu.

At Mentawai station, we spent three days collecting with pan traps and malaise traps (*left*). We contracted with an extremely talented guide to handle cooking and guiding for us, Mr. Veno Enar. He was fantastic: among other things we feasted on caught snakehead and freshwater shrimp that he caught while we collected!

From Mentawai it is a relatively short (20 minutes) boat ride to the beginning of the Headhunter's Trail – a 12 km track from Kuala Terikan to Camp 5. The camps (all four of them) were built by the British in the 1970's when the park was first laid out. Camp 5 is the staging area to hike the Pinnacles, a beautiful karst formation with bladeliike and knife-sharp limestone outcrops on the side of the mountain (*below*).

Three days at Camp 5, then an 8 km walk followed by a 2-hour boat ride to Park Headquarters. My recollection of the length of the boat ride is a little fuzzy as it was done in the midst of a tropical downpour.

Sarawak had been suffering from very low rains for months; as a result the rivers were generally very low. Perhaps boat ride is not quite the right term, for we regularly had to jump out and push the boats through the rapids. At headquarters – a very posh experience after several days in the backcountry – we were stationed in the Research Center, a building that caters to visiting scientists. It offers sleeping rooms, showers, a large central working area, and a fully functioning kitchen. Andy and I stayed at week at HQ; Chris and Elijah spent another week, pushing on up the slope of Mount Mulu to stay at Camp 1 in the dipterocarp forest.

A final note: I didn't see any hornbills on this trip, although Elijah and Chris did see one after I'd left. But I did see a very nice Lesser Fish Eagle, Paradise Flycatchers, a Great Slaty Woodpecker, babblers and spiderhunters among the birds; plenty of *Nepenthes* pitcher plants, especially in the kerangas; and of course lots of insects, including the Rajah Brooks birdwing butterfly which is common there. The trip was very successful – lots of samples to process – and an amazing experience. ♣



Pitcher plant

MBD Newsletter Winter 2012

Credits for this issue: Photos and illustrations are courtesy of the authors and contributors, as follows: A. Nelson, J. Freudenstein, L Musetti, S Passoa, G.T. Watters, NF Johnson.

We want to hear from our readers. Please send feedback, comments and story ideas to the Editor at osuc-curator@osu.edu.

Next issue of the MBDNewsletter - Spring 2012



Andy Polaszek at the Pinnacles



Camp 5: eating area and makeshift lab



Insects, like this beautiful caterpillar, are a common sight in the park