



Dr. Spitsbergen's lab.

HAPPY HOLIDAYS FROM BIOLOGICAL SCIENCES AT WESTERN MICHIGAN UNIVERSITY

Department of Biological Sciences 2016 Newsletter



WESTERN MICHIGAN UNIVERSITY

Department of
Biological Sciences

INSIDE THIS ISSUE:

Letter from the Chair

Dear Alumni and Friends,

It gives me great pleasure to introduce the Department of Biological Sciences newsletter for 2016. As you will see by reading through the newsletter, we continue to work to enhance our research capabilities, educational opportunities for our students and community outreach and engagement.

The past year was an eventful one for our department. We had two faculty members retire, Dr. Alexander Enyedi and Ms. Kathleen Onderlinde, and we were able to hire two new term faculty members. The new faculty include Dr. Tiffany Schriever, whose teaching and research interests are in the area of wetland ecology and Dr. Monica McCullough, a faculty specialist with expertise in the area of physiology.

Our undergraduate and graduate programs in Biological Sciences are thriving and have seen steady enrollments over recent years. Our students have received numerous awards from within and outside the university and many students have

given research presentations at local, national and international scientific conferences.

I hope you enjoy this update from your department. As you read through this newsletter, do not hesitate to contact me with any comments you may have concerning our successes and failures, and I would greatly appreciate any suggestions for ways we may improve the service we provide to our students, alumni and friends.

Finally, I want to thank you, our alumni and donors, for your generous support of our students and programs. Your generosity enhances the teaching and research mission of our department by providing expanded opportunities for student travel to distant research sites, travel to scientific conferences, and supports fellowships and awards for scholarship and research by our outstanding students.

Go Broncos!

John Spitsbergen, Chair
john.spitsbergen@wmich.edu

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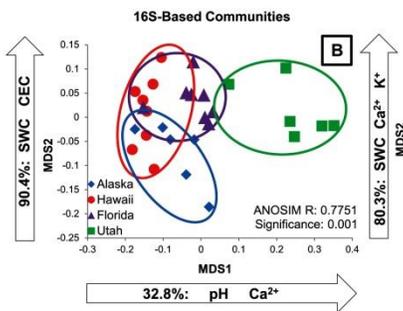


Department Chair: John Spitsbergen

Editors: Cindy Linn and Wendy Beane

FACULTY FOCUS:

Kathryn Docherty



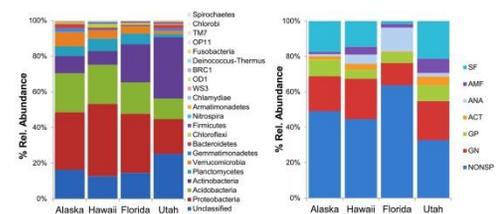
Dr. Kathryn Docherty joined the faculty of the Biological Sciences Department in 2011. She is originally from upstate New York, where she went to Marist College in Poughkeepsie, NY, a small liberal arts college. It was through her undergraduate education and research experiences that she discovered her passion for scientific inquiry and microbial ecology. Specifically, Kathryn became interested in understanding how microbial capabilities can be used to rectify existing environmental problems. Following graduation, she went to the University of Notre Dame, where she studied how microorganisms from wastewater treatment plants can be used to biodegrade new types of chemical solvents. She graduated with her PhD in 2007. Over the next four years, she took several postdoctoral research positions focused on how global climate change factors impact soil microbial community carbon storage, or release of greenhouse gases to the atmosphere.

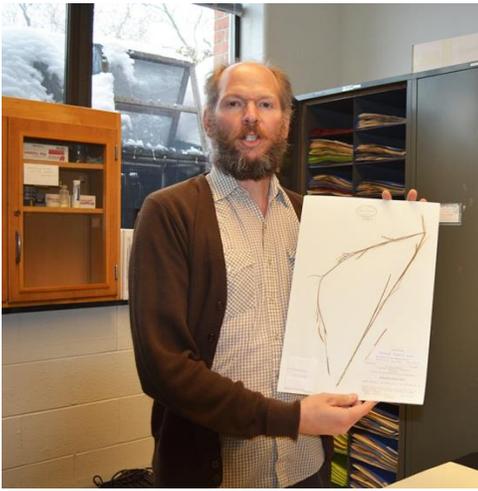
Here at WMU, Kathryn's research program focuses on this central theme: Microbial communities can be impacted by human activities, which can lead to larger ecosystem consequences, but also microbial communities can provide solutions to environmental issues. Currently Kathryn is leading three major team projects within this research focus. 1) In a project funded by the National Science Foundation, they are exploring how urbanization influences the types of microorganisms that are present in the atmosphere. 2) In a collaboration with geoscientists, they are examining how road salt deicers influence the microbial ecology of urban lakes. 3) Working with local land management groups, including the Edward Lowe Foundation, they are exploring how soil microbial inoculates could be used to improve belowground restoration success in tallgrass prairies.

Kathryn's research and educational program has a strong focus on getting

students involved in research. During her time at WMU she has mentored 3 graduate students and 16 undergraduate students, several of whom have prepared and defended a thesis through Lee Honors College. Strongly influenced by her own undergraduate experiences, Kathryn's classes incorporate real data collection, analysis and synthesis to provide a true scientific experience for her students.

When she's not in the lab or the office, Kathryn is usually spending time wearing out her highly energetic dog. She has developed a knack for home repairs since purchasing her first house in Kalamazoo in 2012. She has also taken up some new hobbies that are more fun, including downhill skiing and scuba diving.





Faculty Focus: Todd Barkman

When I began my career at WMU in 2000, it was largely a homecoming event because I grew up in Pinckney, Michigan on the southeast side of the state. I was eager to get back to the Great Lakes region to raise a family in my home state with its abundant freshwater and towering sand dunes. It wasn't until I had spent time at University of Texas and Pennsylvania State University that I realized how great Michigan is!

In the last 16 years, I have enjoyed developing a career that embodies the three pillars of WMU's mission to be learner centered, discovery driven and globally engaged. My degrees were all granted from Botany departments; therefore, I have been responsible for training WMU students in diverse aspects of plant biology. The classes I teach are heavily influenced by my time at MSU taking forestry classes in which we frequently went into the field to study living organisms and had numerous hands-on activities. Thus, the Systematic Botany course at WMU (BIOS 4270) meets for eight hours/week so that we have time to take field trips to see species making up the varied plant communities in the state. Regular highlights from those trips include surveys of our

state-protected species, Pitcher's Thistle, as well as identification and "sampling" of wild cranberries. At the other end of the spectrum, the Molecular Biology Laboratory class (BIOS 5260) meets for eight hours/week in order to have enough time to clone genes from campus and greenhouse plants into bacteria, express the genes to produce the plant proteins and characterize their biochemical activities. In the class, students perform novel research since the genes usually have not been cloned previously from the particular species they will have chosen to work with.

Since 1994, my research has included the study of plants of Malaysian Borneo. In fact, one of the attractions of WMU for me was the large number of Malaysian and Indonesian students here because of the strong "Twinning" programs we have with those countries. The main emphasis of our work there is to describe and understand the biodiversity of tropical rainforest species. Much of that work has centered on *Rafflesia*, (the largest flower in the world), orchids, mistletoes and umbrella plants. In the case of umbrella plants (*Schefflera*), we are in the process of naming 15 new species. This work is critical because if species are not formally named, they don't exist; if particular species don't exist, they cannot be protected or conserved! At the other end of the biological hierarchy, our lab spends considerable time trying to understand how plant genomes evolve and acquire novel functions. In particular, one of our more *stimulating* studies has been to uncover how chocolate, citrus, tea and coffee plants evolved to produce

caffeine, which many of us joyfully ingest on a daily basis. Work on these various projects has involved students, both undergraduate and graduate, from Brazil, Malaysia, China and Michigan. There are too many lab alumni to list in total but some students who worked on our various projects include Talline Martins, Noah Sorrelle, Katrina Kuipers, Jessica Barbolino, Pam Laureto, Jamie Lim, Aida Ahmad-Puad, Ruiqi Huang & Andrew O'Donnell.



Callerya nieuwenhuisii is a climbing vine in the bean family that is commonly encountered on the forest floor in Borneo. Its curved wooden stems are often used to make machete handles.



Although we often have our eyes on global matters, we try to never lose sight of local biodiversity. In various classes over the years, we have used DNA sequences to definitively provide identifications of rare species that either hadn't been known from southwest Michigan before or hadn't been seen for more than 40 years. Those discoveries subsequently led to partnerships amongst WMU students, staff and community members to actively engage in habitat preservation and restoration to help preserve those rarities in and around WMU. Several BIOS students have figured prominently in these efforts including Olivia Walser, Scott Warner, Weston Hillier, Dean Simionescu, Allyson Wentela, Jessica Barboline and Shaana Way.

Finally, one of the best parts about living in Michigan has been raising a family here amongst family and friends. My wife Carol and I have three children: Amanda, Andy and Alex. While former students may remember them as tiny tots, Amanda is now a student at WMU while Andy and Alex are in high school. Together, we have explored the mountains of Borneo and tromped around the bogs here in Michigan and visited many places in between. In recent years, the main family activity has been rock climbing. That hobby has taken us to cliffs in Kentucky, West Virginia and Arizona for camping and adventure!



Summit of Mount Kinabalu, Sabah, Malaysia stands at 13, 650 ft high and is our favorite peak to climb.

Dr. Todd Barkman and students



2016 Biological Sciences Distinguished Alumni Achievement Award

Dr. Bill Bowerman



top of the food web. As such, they are a model system to analyze the bioaccumulation effect that compounds in the environment have on animal survival. Dr. Bowerman described how the pesticide, DDT, wasn't banned until 1973. Before the ban, the number of eagles significantly declined due to effects of DDT on egg laying and eagle survival. However, since the ban, the eagle population has recovered nicely and there are now over 900 mating pairs in Michigan alone.

Today, one of Dr. Bowerman's projects involves looking at the effect of climate change on eagle health and survival. Dr. Bowerman has documented how nesting occurs sooner as the seasons get warmer earlier. We thank Dr. Bowerman for sharing his exciting story with us and are very proud that Western Michigan University was able to play such an important role in his life.



From left to right: Chair of Biological Sciences at WMU (John Spitsbergen), Dr. Bowerman and Dean of the College of Arts and Sciences (Carla Koretsky)

Our Biological Sciences Alumni Achievement Award Recipient in 2016 was Dr. Bill Bowerman. Dr. Bowerman is a native of Michigan and obtained a B.S. in Biology from Western Michigan University in the 1980s. After writing a research proposal for ecology in Dr. Richard Brewer's class (emeriti faculty), he was encouraged to submit his grant proposal and go to graduate school to pursue his lifelong interest of studying eagles. Dr. Bowerman attributes his 32 year flight with eagles to that one meeting with Dr. Brewer.

Department of Environmental Science and Technology at the University of Maryland. Dr. Bowerman has had a long and illustrious career. He has written over 80 publications, has attracted millions of dollars in external funding for his eagle studies and has graduated 33 M.S. studies and 12 Ph.D. students to date.

During his inspiring seminar at Western Michigan University, Dr. Bowerman described the major eagle research projects he has been involved with over the years and stressed that eagles are at the



Dr. Bowerman with Emeriti faculty, Drs. Richard Brewer and Joe Engemann

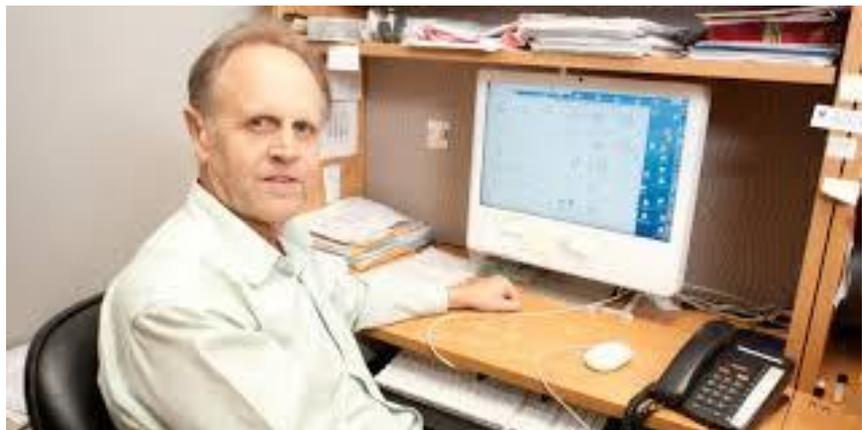
2016 Biological Sciences Bach Lecturer

Dr. Robert Anderson

In February, Dr. Robert Anderson, gave a stimulating lecture in Biological Sciences entitled, “Molecular, cellular and global networks in hemorrhagic viral pathogenesis.” Dr. Anderson is a Professor in the Department of Microbiology and Immunology at Dalhousie University and Associate Director for the Canadian Center for Vaccinology.

Dr. Anderson’s research focuses on vaccine design and the mechanisms of respiratory and hemorrhagic viruses, in part through collaborations with Universities in Taiwan and Thailand. In particular, Dr. Anderson investigates viral glycoproteins and how they contribute to disease pathogenesis. His work, on the respiratory syncytial virus (the number one cause of serious respiratory diseases in infants) and more recently the dengue virus, has placed him at the forefront of international infectious disease collaboration. There are 100 million cases of dengue fever each year—a painful, debilitating mosquito-borne disease for which no vaccine currently exists. The dengue virus causes flu-like symptoms, severe joint aches, headaches, skin rashes and (in severe cases) internal bleeding.

Dr. Anderson’s group is investigating how the dengue virus infects human cells, and in particular the role played by the envelope (E) glycoprotein in binding to certain cells and platelets, which in turn provokes the body’s immune system into damaging blood vessels. His research, aimed at developing a vaccine to the dengue virus, can also be applied to help combat the closely related West Nile virus. WMU’s Bach Lecturer is sponsored each year by the Michael K. Bach Distinguished Visiting Lectureship Endowment Fund and the Department of Biological Sciences. We thank Dr. Anderson for his visit and for the insight into his exciting research.



Student and Faculty Research Activities

The majority of faculty members in our department have active funding for their research programs. Included below is a list of current external grants, publication in scientific journals, and presentations by faculty and students at scientific conferences. As you can see, our faculty and students are active in publishing in top scientific journals and in giving presentations at national and international scientific conferences. We are convinced that a strong and vibrant research environment enhances our student's educational experience and adds value to a degree from our department.

Faculty Grant Activities

A. External Funding

Dr. Todd Barkman

Title: Ghosts of Evolution Past: Resurrecting an Extinct Ancestral Enzyme to Understand the Origins of Modern-day Biochemical Activities.
Source: National Science Foundation

Dr. Wendy Beane

Title: EAGER: Collaborative Research: Some Effects of Weak Electric and Magnetic Fields on Biological Systems (NSF# 1644384)
Source: National Science Foundation

Dr. Christine Byrd-Jacobs

Title: Olfactory Bulb Cell Genesis and Survival in a Model of reversible Deafferentation.
Source: National Institutes of Health

Dr. Kathryn Docherty (co-PI)

Title: The Influence of Road Deicers on the Chemistry of Michigan Lakes.
Source: Michigan Dept of Environmental Quality

Dr. Kathryn Docherty

Title: Examining Vertical Changes in the Air Microbiome Associated with Land Use and Seasonality.
Source: Michigan Space Grant Consortium

Dr. Kathryn Docherty

Title: Enhancing Soil Microbial Services in an Agricultural Ecosystem
Source: Edward Lowe Foundation

Dr. Kathryn Docherty

Title: Exploring Ecosystem Contributions of Microbial Diversity to the Vertical Atmosphere.
Source: National Science Foundation

Dr. Kathryn Docherty

Title: Research Experience for Undergraduates, supplemental funding for two students.
Source: National Science Foundation

Dr. Karim Essani

Title: Experimental Oncolytic Virotherapy and Colorectal Cancer.
Source: National Institutes of Health

Dr. Rob Eversole (co-PI)

Title: Flubendazole Efficacy Study
Source: Bill and Melinda Gates Foundation

Dr. John Geiser (Dr. Susan Stapleton co-PI)

Title: Developing Scientists as Teachers; Developing Students as Scientists: A Dual Approach to Transforming the Culture of Undergraduate Biology Education
Source: Howard Hughes Medical Institute

Dr. Sharon Gill

Title: Integrating approaches from behavior and engineering to explore how male songbirds respond to anthropogenic noise
Source: National Science Foundation

Dr. Sharon Gill (co-PIs, Maarten Vohof, Kathleen Baker and Nate Fuller)

Title: Conserving soundscapes at local preserves: a pilot program
Source: Eppley Foundation
Source: Howard Hughes Medical Institute

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Source: National Science Foundation

Dr. Sharon Gill (co-PIs, Maarten Vohof, Kathleen Baker and Nate Fuller)

Title: Conserving soundscapes at local preserves: a pilot program
Source: Eppley Foundation

Dr. Pam Hoppe

Title: Molecular genetic analysis of UNC-82 kinase function in *C. elegans* muscle
Source: National Institutes of Health

Dr. Charles Ide

Title: Protein Expression Changes that Underlie Neuropathology in MSA Cerebellum
Source: Miracles for MSA Research Fund

Dr. David Karowe (co-PI)

Title: Biosphere-Atmosphere Interactions in a Changing Global Environment, a research experience for undergraduates (REU).
Source: National Science Foundation

Dr. Cindy Linn

Title: Prevention of RGC loss in an in vitro excitotoxic model and an in vivo model of glaucoma using an alpha7 nACh receptor agonist.
Source: National Institutes of Health

Dr. Yan Lu

Title: Identifying and Understanding Connections between Photosynthesis and Amino Acid Metabolism.
Source: National Science Foundation

Dr. Silvia Rossbach

Title: Biogeophysics for Optimized Mitigation of Hydrocarbon Contaminated Soils: From Theoretical Developments, Laboratory Experiments to Field Validation.
Source: Oklahoma State University and Chevron Corporation

Dr. Silvia Rossbach

Title: Influence of different iron oxide minerals on hydrocarbon degradation.
Source: Enbridge Energy

Dr. Maarten Vonhof (Dr. Robert Eversole, Co-PI)

Title: Additional testing of the efficacy of chitosan to limit the growth of *seudogymnoascus destructans* on experimentally-infected bats.
Source: US Fish and Wildlife Service

Dr. Maarten Vonhof

Title: Examining Urban and Rural White-Tailed Deer: Mortality, Dispersal, and Relatedness
Source: U.S. Fish & Wildlife Service

Dr. Maarten Vonhof

Title: Testing chitosan as a potential treatment for white-nose syndrome.
Source: Nature Conservancy and Bat Conservation International

B. Papers Published in 2016

As a result of faculty research in the department and collaborations within WMU and around the world, a large number of quality journal articles have been published in 2016. These publications add significant value to a degree from our department and emphasize the Department's commitment to undergraduate and graduate education.

(Bold = Biological Sciences Faculty, underlined = Biological Sciences Graduate Student, italicized = Biological Sciences Undergraduate Student)

Ruiqi Huang, Andrew J. O'Donnell, Jessica J. Barboline and Todd J.

Barkman (2016) Convergent evolution of caffeine in plants by co-option of exapted ancestral enzymes. Proceedings of the National Academies of Sciences. <http://www.pnas.org/lookup/suppl/doi:10.1073/pnas.1602575113/-/DCSupplemental>

Deochand ME, Birkholz TR, Beane WS. (2016) Temporal regulation of planarian eye regeneration. *Regeneration (Oxf)*. 2016 Oct 28;3(4):209-221.

Morton JM, Saad MA, Beane WS. Surgical Ablation Assay for Studying Eye Regeneration in Planarians. *J Vis Exp*. In press.

van der Sleen, P., and **Bloom, D.D.** (In Press). The Family Engraulidae – Anchovies IN: *Field guide to the genera of fishes in the Amazon-Orinoco basins*, J. Albert & P. van der Sleen, Eds., University of California Press.

Darcy M. Trimpe and Christine Byrd-Jacobs. Patterns of olfactory bulb neurogenesis in the adult zebrafish are altered following reversible deafferentation. *Neuroscience*, 2016.

Hentig, J.T. and C.A. Byrd-Jacobs. 2016. Exposure to zinc sulfate results in differential effects on olfactory sensory neuron subtypes in adult zebrafish. *International Journal of Molecular Sciences* 17:1445; doi:10.3390/ijms17091445.

Trimpe, D.M. and C.A. Byrd-Jacobs. 2016. Patterns of olfactory bulb neurogenesis in the adult zebrafish are altered following reversible deafferentation. *Neuroscience* 331:134-147.

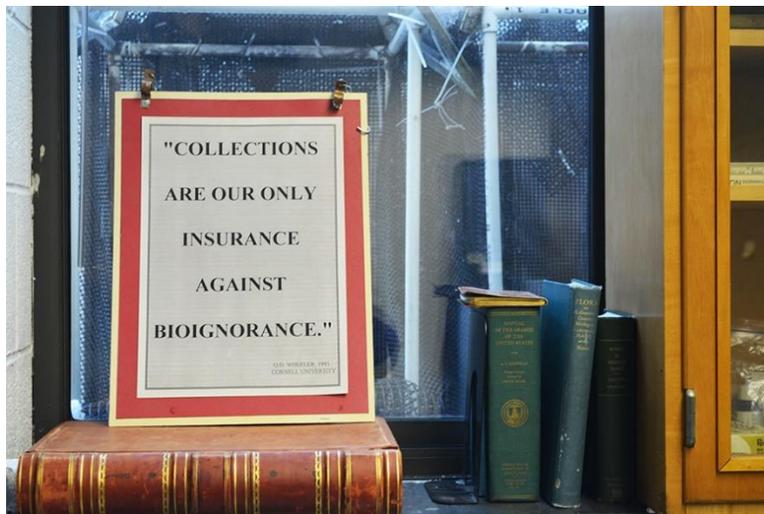
Alisawi, W.A1, Rahbarirad, S., Walker, K.A., Venter, A.R., **Docherty, K.M.**, Szymczyna, B.R. (2016) Identification of metabolites produced during the complete biodegradation of 1-butyl-3-methylimidazolium chloride by an enriched activated sludge microbial community. *Chemosphere*.

Tiantian Zhang, Yogesh R. Suryawanshi, Dennis H. Kordish, Helene M. Woyczesczyk, David Jeng, **Karim Essani.** Tanapoxvirus lacking a neuregulin-like gene regresses human melanoma tumors in nude mice. *Virus Genes*. 2016 Oct 13:1-11.

- Tiantian Zhang, Yogesh R. Suryawanshi, Helene M. Woyczeszcyk, Karim Essani. Targeting melanoma with cancer-killing viruses. *The Open Virology Journal* 2016. In press.
- Tiantian Zhang and Karim Essani. Tanapoxvirus lacking the 15L gene inhibits melanoma cell growth in vitro by inducing interferon- λ 1 release. *Virus Genes* 2016. Submitted.
- Job, J. R., S. L. Kohler & S. A. Gill. 2016. Song adjustments by an open habitat bird to noise, urban structure, and vegetation. *Behavioral Ecology*
- Job, J. R., K. Myers, K. Naghshineh & S. A. Gill. 2016. Uncovering spatial variation in acoustic environments using sound mapping. *PLoS ONE*
- Homola, J. J., C. R. Reutz III, **S. L. Kohler**, and R. A. Thum. 2016. Complex post-glacial recolonization inferred from population genetic structure of a sedentary fish in tributaries of eastern Lake Michigan, U.S.A. *Journal of Fish Biology* 89:2234-2250.
- Ryan, J. A., and S. L. Kohler 2016. Distribution, prevalence, and pathology of a microsporidian infecting freshwater sculpins. *Diseases of Aquatic Organisms* 118:195-206.
- Gossman C, Linn DM, Linn CL. 2016. Glaucoma-inducing procedure in an *in vivo* rat model and whole-mount retina preparation. *J. Vis. Exp.* 109: e53831.
- Gossman AC, Christie J, Webster MK, Linn DL, Linn CL. 2016. Neuroprotective strategies in glaucoma. *Curr. Pharmacol. Des.* 22:1-15.
- Birkholz PJ, Gossman CA, Webster MK, Linn DM, Linn CL. 2016. Prevention of glaucoma-induced retinal ganglion cell loss using alpha7 nAChR agonists. *J. Ophthalm. Vis. Sci.* 1(1): e1003.
- Linn CL.** 2016. Retinal ganglion cell neuroprotection induced by activation of alpha7 nicotinic acetylcholine receptors. *Neural Regen. Res.* 11:918-919.
- Nath, K., O'Donnell, J.P., and Lu, Y. (2016). "Chlorophyll fluorescence for high-throughput screening of plants during abiotic stress, aging, and genetic perturbation," in *Structures, Mechanisms, and Applications of Photosynthetic Apparatus*, ed. H.J.M. Hou, M.M. Najafpour, G.F. Moore, and S.I. Allakhverdiev (Dordrecht: Springer), Accepted.
- Lu, Y.** (2016). Identification and roles of Photosystem II assembly, stability, and repair factors in *Arabidopsis*. *Front. Plant Sci.* Accepted.
- Nath K, Wessendorf RL, Lu Y. A Nitrogen-Fixing Subunit Essential for Accumulating 4Fe-4S-Containing Photosystem I Core Proteins. *Plant Physiol.* First published on October 26, 2016. doi: 10.1104/pp.16.01564.
- Fulford, J.M. & **Rudge, D.W.** The Portrayal of Industrial Melanism in American Textbooks, *Science & Education – accepted pending revisions.*
- Williams, C. T. & **Rudge, D.W.** Using History of Genetics to Influence Pre-service Teachers' Nature of Science Views. *Science & Education - accepted pending minor revisions*
- Rudge, D. W.** Industrial Melanism. Pp. 255-258 In Kliman, R. & Smocovitis, V. (eds.), *Encyclopedia of Evolution*. Amsterdam, Netherlands: Elsevier. -invited essay
- Carol L. Beaver, Anja E. Williams, Estella A. Atekwana, Farag M. Mewafy, Gamal Abdel Aal, Lee D. Slater and Silvia Rossbach. Microbial communities associated with zones of elevated magnetic susceptibility in hydrocarbon-contaminated soils. *Geomicrobiology Journal*, 2016.
- Schriever TA** and DA Lytle. 2016. Convergent diversity and trait composition in temporary streams and ponds. *Ecosphere* 75(5):e01350. [10.1002/ecs2.1350](https://doi.org/10.1002/ecs2.1350)
- Talbot, B., **M. J. Vonhof**, H. Broders, B. Fenton, and N. Keyghobadi. 2016. Range-wide genetic structure and demographic history in the bat ectoparasite *Cimex adjunctus*. *BMC Evolutionary Biology* 16:268.
- Patrick, L. E., J. Just, and **M. J. Vonhof.** 2016. Non-invasive bat species identification from mixed-species samples using a microarray. *Conservation Genetics Resources*. doi:10.1007/s12686-016-0613-0
- Vonhof, M. J., S. K. Amelon, R. R. Currie, and G. F. McCracken.** 2016. Genetic structure of winter populations of the endangered Indiana bat (*Myotis sodalis*) prior to the White Nose Syndrome epidemic: implications for the risk of disease spread. *Conservation Genetics* 17:1025-1040.
- Warburton, E. M., and M. J. Vonhof. 2016. Relationships between host body condition and immunocompetence, not host sex, best predict parasite burden in a bat—helminth system. *Parasitology Research* 115:2155-2164.
- Warburton, E. M., S. L. Kohler, and M. J. Vonhof. 2016. Patterns of parasite community dissimilarity: the significant role of land use and lack of distance-decay in a bat—helminth system. *Oikos* 125:374-385.
- Brierley, L., **M. J. Vonhof**, K. J. Olival, P. Daszak, and K. E. Jones. 2016. Quantifying global drivers of zoonotic bat viruses: A process-based perspective. *American Naturalist* 187:E53-E64.

Xin, X., K. Nomura, K. Aung, A. C. Velásquez, **J. Yao**, F. Boutrot, J. H. Chang, C. Zipfel and S. Y. He. Bacteria establish an aqueous living space in plants crucial for virulence. (2016) *Nature* 539: 524-529.

Liu, L., F.M. Sonbol, B. Huot, Y. Gu, J. Withers, M. Mwimba, **J. Yao**, S.Y. He and X. Dong. Salicylic acid receptors activate jasmonic acid signalling through a non-canonical pathway to promote effector-triggered immunity. (2016) *Nature Communications* 7: 130999.



Birkholz TR and **Beane WS**. (2016) Planarian Photophobic Behavior is Mediated by Both Ocular

and Dermal Phototransduction. 47th Annual meeting, Michigan Chapter of the Society for Neuroscience, East Lansing, MI.

Birkholz TR, Bacher J, **Beane WS**. (2016) Planarian "Vision": A Combination of Ocular and Dermal Phototransduction. WMU Research and Creative Activities Poster Day. BEST GRADUATE STUDENT POSTER AWARD WINNER

Beane WS and Deochand ME. (2016) Identifying Calcium-Dependent Processes During Planarian Regeneration. WMU Research and Creative Activities Poster Day

Dickens, J.M. and **C.A. Byrd-Jacobs**. 2016. Plasticity of mitral cell dendritic morphology in the adult zebrafish olfactory bulb following chemical deafferentation. Kalamazoo Community Medical and Health Sciences Research Day; Michigan Chapter of the Society for Neuroscience Annual Meeting; WMU Annual Research and Creative Activities Poster Day.

Dickens, J.M. and **C.A. Byrd-Jacobs**. 2016. Mitral cell dendritic arbors recover morphology after chronic deafferentation in the adult

C. Faculty and Student Presentations

Our faculty and students are active in giving presentations at local meetings as well as at major national and international scientific conferences. Presentations help develop our students' ability to discuss their research data and introduces research done in the Department of Biological Sciences locally, nationally and at an international level.

(Bold = Biological Sciences Faculty, underlined = Biological Sciences Graduate Student, italicized = Biological Sciences Undergraduate Student)

Beane WS. More than Meets the Eye: Photoreception and Eye Regeneration in Planarians. Grand Valley State University, Biomedical Sciences Department Seminar Series, Nov. 2016

Beane WS. The Body Electric: How Ion Transport Shapes Tissues During Regeneration. University of Richmond, Department of Biology Seminar Series, Sept. 2016.

Birkholz TR, Deochand ME, **Beane WS**. (2016) Planaria as a Model for Optic Nerve and Photoreceptor Regeneration. Gordon Research Conference, Visual Systems Development, West Dover, VT.

Morton JM, *Czajka J*, Cyrus J, Barnes F, and **Beane WS**. (2016) Weak Magnetic Field Manipulation Disrupts Regenerative Outgrowth in Planaria. BioEM 2016, the joint annual meeting of BEMS (the Bioelectromagnetics Society) and EBEA (the European Bioelectromagnetics Association), Ghent, Belgium.

Beane WS and Deochand ME. (2016) The Temporal Regulation of Optic Nerve and Photoreceptor Regeneration. 47th Annual meeting of the Michigan Chapter of the Society for Neuroscience, East Lansing, MI.

zebrafish olfactory bulb. Soc. Neurosci. Abstr.

Hentig, J.T. and **C.A. Byrd-Jacobs**. 2016. Zinc sulfate affects ciliated olfactory sensory neurons more than microvillous olfactory sensory neurons in the adult zebrafish. Kalamazoo Community Medical and Health Sciences Research Day. Katbamna, Bharti, Beebe, Thomas, **Ide, C.F.** (2015) Ectopic Sox2 cells and neuroglial heterotopia in the hindbrain of the frog model of fetal alcohol syndrome. Society for Neuroscience Abstracts, Chicago, Illinois

Maser, T.L. and **C.A. Byrd-Jacobs**. 2016. Loss of specific olfactory sensory neurons in zebrafish after chemical exposure. Kalamazoo Community Medical and Health Sciences Research Day; Michigan Chapter of the Society for Neuroscience Annual Meeting.

Var, S.R., D.M. Trimpe, and **C.A. Byrd-Jacobs**. 2016. Immune response following injury in the adult zebrafish brain. Kalamazoo Community Medical and Health Sciences Research Day; Michigan Chapter of the Society for Neuroscience Annual Meeting.

Var, S.R. and **C.A. Byrd-Jacobs**. 2016. Deafferentation and direct injury cause different microglial responses in the adult zebrafish olfactory bulb. Soc. Neurosci. Abstr.

Docherty, K.M. Up, up and away: Using the NEON framework for investigating distribution of airborne microbial communities. In IGNITE Session: "NEON's First Light" 101st ESA Annual Meeting, Ft. Lauderdale, FL (August 2016)

Docherty, K.M. Restoring for resilience: Strategies for reducing the effects of warming on restored soil microbial communities. In Symposium 6 - Soil: A Manageable

Filter, Critical Threshold, or Irreversible Tipping Point in Ecological Restoration? Ecological Society of America Annual Meeting, Ft. Lauderdale, FL. (August 2016)

Docherty, K.M., Toward belowground restoration: understanding the effects of land management on soil microbial communities in a tallgrass prairie. Mid-west Great Lakes Chapter Society for Ecological Restoration Annual Meeting, Bloomington, IN (April 2016)

Docherty, K.M., Toward belowground restoration: understanding the effects of land management on soil microbial communities in a tallgrass prairie. Kellogg Biological Station/Michigan State University. (March 2016)

Mooney, M., Spring, A., Domingue, K., Kerber, T., Lemmer, K.M., **Docherty, K.M.** Air Microbiome Project. Michigan Space Grant Consortium Annual Poster Session, Ann Arbor, MI (October 2016)

Carter, D., **Docherty, K.M.**, Gill, S., Baker, K., Vonhof, M. Land Use Alters the Microbiome of Wild Birds. International Society for Microbial Ecology Meeting, Montreal, Quebec, Canada (August 2016)

Pearce, D.S., Hoover, B., Nevitt, G.A., **Docherty, K.M.** The Role of Environmental and Genetic Factors in Shaping the Microbiome of a Highly Olfactory Bird Species. International Society for Microbial Ecology Meeting, Montreal, Quebec, Canada (August 2016)

Tiantian Zhang, Dennis Kordish, Yogesh R. Suryawanshi and **Karim Essani**. Tanapoxvirus expressing interleukin-2 regresses human melanoma tumors by a T cell independent mechanism in mice, the XXI International Poxvirus, Asfarvirus and Iridovirus Conference,

July 1-6 2016, the Bischenberg Conference Center near Strasbourg, France (**poster presentation**)



Ph.D. graduate student,
Yogesh Suryawanshi

Tiantian Zhang, Yogesh R. Suryawanshi, Dennis Kordish, Helene Woyczesczyk, David Jeng and **Karim Essani**. Tanapoxvirus lacking a neuregulin-like gene induces interferon- λ and regresses human melanoma tumors in nude mice, XXI International Poxvirus, Asfarvirus and Iridovirus Conference, July 1-6 2016, the Bischenberg Conference Center near Strasbourg, France (**oral presentation**)

Tiantian Zhang, Yogesh R. Suryawanshi, Dennis Kordish, Helene Woyczesczyk, David Jeng and **Karim Essani**. *Experimental Virotherapy of Human Melanoma Tumors in Nude Mice with 15L-knock-out Tanapoxvirus*, the 34th Annual Kalamazoo Community Medical and Health Sciences Research Day, Kalamazoo, MI, May 4th, 2016 (**oral presentation**) *Awarded the Best Clinical Research Presentation.

Tiantian Zhang, Dennis Kordish, Yogesh R. Suryawanshi and **Karim Essani**. *Tanapoxvirus Expressing Interleukin-2 Regresses Human Melanoma Tumors by a T-cell Independent Mechanism in Mice*, the 34th Annual Kalamazoo

Community Medical and Health Sciences Research Day, Kalamazoo, MI, May 4th, 2016 (**poster presentation**) *Awarded the First Place Poster.

Grabarczyk, E. E. and Gill, S. August 2016. What drives altered signaling in noise? A study of male house wren (*Troglodytes aedon*) note use and song composition across a noise gradient. *North American Ornithological Conference*, Washington, D.C., USA. – Poster

Webster MK, Bach H, Linn CL. 2016. Mammalian retinal regeneration in response to an alpha7nAChR agonist. *Allied Genetic Conf.* Orlando, FL.



Ph.D. graduate student, Mark Webster, winning poster award.

Christie J, Byers E, Essani K, Linn CL. 2016. Oncolytic potential of tanapoxvirus in retinoblastoma. *Research and Creative Activity Day.* WMU, Kalamazoo, MI.

Christie J, Byers E, Essani K, Linn CL. 2016. The oncolytic potential of tanapoxvirus for the virotherapy of retinoblastoma. *Michigan Chapter Society for Neuroscience Annual Meeting.*

Webster MK, Bach H, Linn CL. 2016. Retinal regeneration of adult mammalian neurons in response to an alpha7nAChR agonist. *Research and Creative*

Activity Day. WMU, Kalamazoo, MI.

Webster MK, Bach H, Linn CL. 2016. Proliferation of adult mammalian retinal neurons after application of an alpha7 nicotinic acetylcholine receptor agonist. *Michigan Chapter Society for Neuroscience Annual Meeting.*

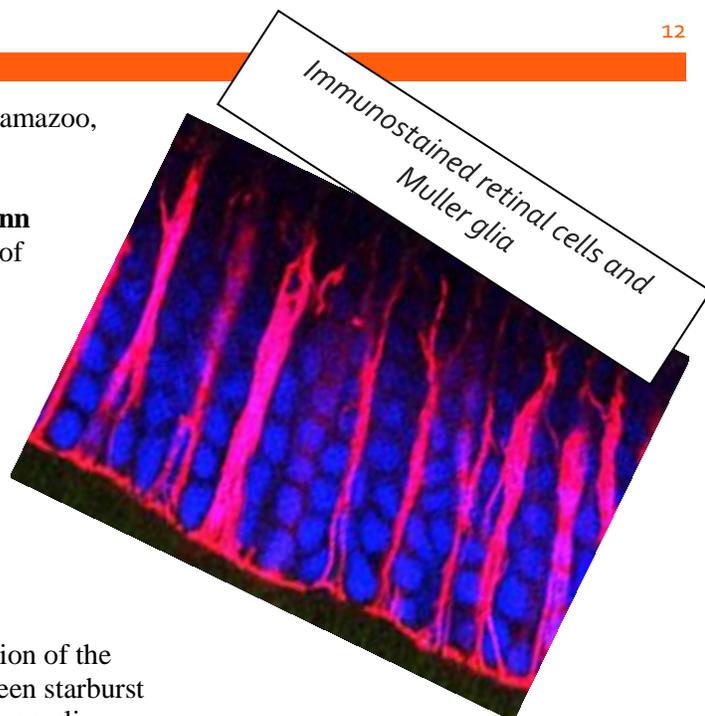
Gossman CA, Linn CL. 2016. Characterization of the cholinergic synapse between starburst amacrine cells and retinal ganglion cells in a rat glaucoma model. *Michigan Chapter Society for Neuroscience Annual Meeting.*

Bach H, Webster MK, Linn CL. 2016. Migration of BrdU positive cells in adult mammalian retina after treatment with an alpha7 nAChR agonist. *Michigan Chapter Society for Neuroscience Annual Meeting.*

Fulford, J.M. & Rudge, D. W. “The Impact of a Story-Based Lesson on Student Learning and Attitudes.” *Research and Creative Activities Poster and Performance Day*, Western Michigan University, 14 Apr 2016-Poster

Schriever, T.A. 2016. Interspecific overlap in trophic niche of larval amphibians in temporary ponds. Joint meeting of Ichthyologists and herpetologists. 7-10 July 2016 DOI: 10.13140/RG.2.1.5012.2485

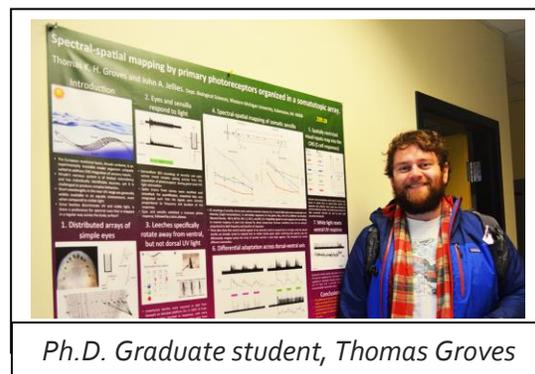
Alicia Boynton and John M. Spitsbergen. Glial Cell Line Derived Neurotrophic Factor Protein Secretion by Skeletal Muscles is Altered by Activity of L-Type



Calcium Channels. *Experimental Biology*, 2016.

Greg Wallace and John M. Spitsbergen. Myostatin inhibition alters GDNF expression in skeletal muscle. *New England Science Harvard Symposium*, 2016.

Gabriel Almeida Alves, John-Mary Vianney and John M. Spitsbergen. The Effects of Calcitonin Gene-Related Peptide on the Expression of Nerve Growth Factor and Glial Cell Line-Derived Neurotrophic Factor in Cardiac Cells. *Integrative Biology of Exercise*, 2016.



Ph.D. Graduate student, Thomas Groves

Graduate Student Activities.

The past year has been an outstanding one for our graduate students in Biological Sciences. Graduate students were included 27 times as co-authors on papers published in peer-reviewed scientific journals (see above), gave 36 presentations at scientific conferences (see above) and received numerous grants and awards (see below).



Graduate Student Awards Presented to Students in the Spring 2016

Distinguished Biological Sciences Graduate Student – Justin Hackett

Hazel Wirick Scholarship – Nicolas Martin

Leo C. Vander Beek Graduate Student Plant Biology Award – Ruiqi Huang

Department Nomination for Graduate Research and Creative Scholar - given by the Graduate College

Masters – Teaching – Matthew Deighton

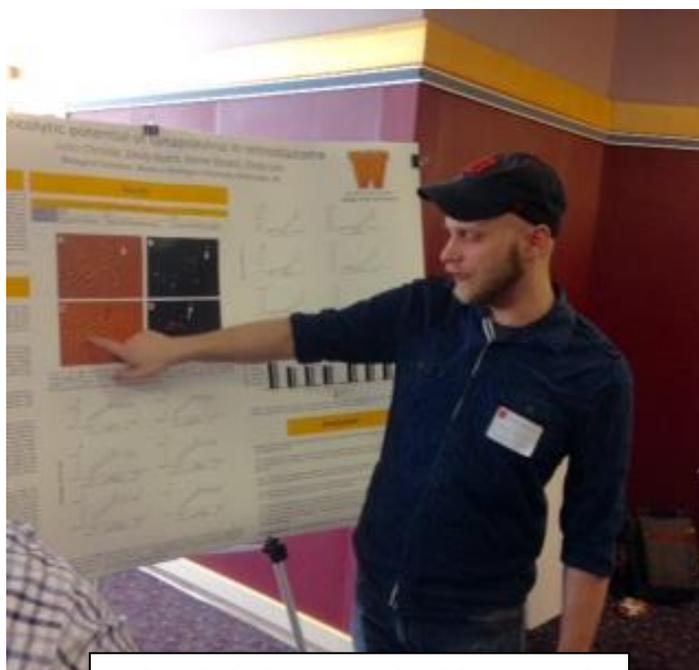
Masters - Research – John Christie

Ph.D. – Teaching – Natasha Schiller

Ph.D. – Research – Carol Beaver

MPI Outstanding Graduate Research Award –
Master's level – Diana Carter

MPI Outstanding Graduate Research Award –
Doctoral level – Carol Beaver



John Christie presenting his research

Graduate Student Focus

Carol Beaver



My name is Carol Beaver, and I am a PhD student in Dr. Silvia Rossbach's lab. I am studying hydrocarbon-degrading bacterial communities and their effects on the geophysical characteristics of sediments impacted by oil spills. Specifically, I have looked at the relationship between magnetic susceptibility and oil degrading microbes. Magnetic susceptibility could be a useful geophysical technique for monitoring the biodegradation of oil spills. This is due to the ability of iron-reducing bacteria to precipitate magnetite while oxidizing hydrocarbons, resulting in an increase in magnetic susceptibility. Traditional geochemical and microbiological testing is expensive and time consuming, so using magnetic susceptibility as a tool to monitor bioremediation could be a useful and cheaper alternative.

Before I started graduate school, I taught music, was a member of the Marine Corps, and was a restaurant manager for several years. I went back to college for a second degree in Biomedical Sciences at WMU several years ago, and decided that I wanted to go on to grad school. I became interested in environmental microbiology, and joined Silvia Rossbach's lab.

In my spare time, I like to spend time with my family. My husband is a retired veteran, who was previously a member of the National Guard and the Marine Corps. I have three children, Harley, Wesley, and Joey. When I am not working on my dissertation, or spending time with my children, I like to read or ride my bike.



Carol Beaver with mentor Sylvia Rossbach (2nd from left) and other students from the Rossbach lab.

Undergraduate Student Activities and Focus

Student Activities.

The past year has been outstanding for our undergraduate students in Biological Sciences. Undergraduate students were included on 8 peer-reviewed journal articles and 17 undergraduate students gave presentations at scientific conferences (see above) and received numerous awards (see below) in 2016.

Student Grants and Awards.

Undergraduate Students

Presidential Scholar in Biological Sciences – Joseph Barnett

Distinguished Senior in Biomedical Sciences – Jacob Morton

Distinguished Senior in Biology – Shaana Way

Distinguished Pre-Professional in Biological Sciences – Matthew Pate

Merrill Wiseman Award in Microbiology – Michael Monaco

Margaret Thomas Du Mond Award – Keith Meyers

Hazel Wirick Scholarship—Christian Visser and Allyson Wentala.

Colin J. Gould Memorial Scholarship—Allison Spring

MPI Outstanding Undergraduate Research Award – Harrison Bach



Joseph Barnett collecting data in Dr. Linn's lab

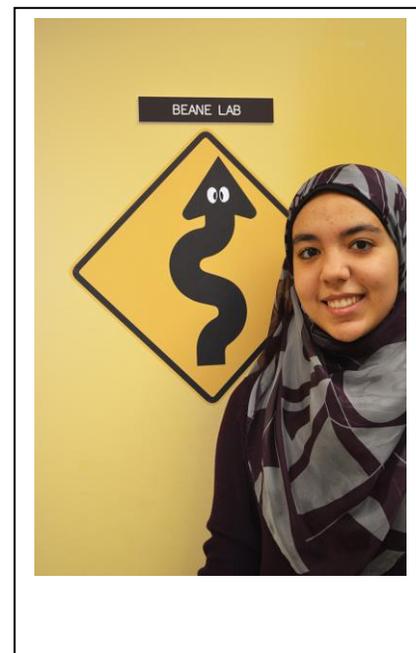


*Harrison Bach
winning MPI
outstanding
undergraduate
Research
award*

Undergraduate Student Focus: Marwa Saad



I am a sophomore and biomedical science major at WMU. I grew up in Egypt, where my passion about learning and research thrived. My high school was the first turning point in my life. It was a boarding school where I got a great social and learning experience, and it opened the doors for my new goal of studying abroad. I applied for a



scholarship program of *Scholarships and Training for Egyptian Professionals (STEP)*, which is funded by the United States Agency for International Development (USAID) for candidates to study in the United States. It was a dream with a one-year selection process. It started with the regular process of applications and interviews. At each step, less than half of the candidates were selected to continue to the next step. It was very competitive when it came to the end: a three day camp in which we had to do different activities (such as building a bridge out of recycled materials) and discussions (about social and cultural issues). I got selected with 22 other girls from more than three hundred all over the country. I still remember that moment when I got my acceptance letter from WMU. It was a new start for a wonderful life experience.

Studying at WMU has been a great experience since my first day in college. My passion for learning has increased day by day, especially when I started interacting directly with professors. I have been interested in biology since I was in high school, but here I found the tools that helped me enrich this passion. Dr. Vonhof was the first professor to guide me by encouraging me to join a research lab. Because I was interested in cellular and molecular biology, I joined Dr. Beane's Lab, which was the second turning point in my life. I couldn't believe that I have already started preparing for my research experience while I was in my freshman year. I was not sure if I could balance between my study and the lab work, but it was the best decision. I have been working in Dr. Beane's Lab for almost a year now, and I have been trained in molecular techniques, some immunohistochemistry, and eye ablation for planarian flatworms. Doing research makes me sure that this is what I am interested in for my career, after completing my graduate studies.

Coming to the United States was, and is still, a great chance for meeting people from all over the world. I got to know more about different cultures, such as the American, Japanese, and Indian cultures, and the uniqueness of every one. This beauty of diversity made me mentally more open to different points of view. I also got a chance to enroll in different activities, such as volunteering with Habitat for Humanity in which I did some painting and wood cutting. In addition, I enrolled in a swimming class this year, which was fun and a stress-reliever. Finally, I am so thankful to my family, professors, and friends who helped me through this long path of success.

The alumni quote this year was provided by Jamie Hentig who is currently pursuing a PhD degree at Notre Dame in the lab of Dr. David Hyde: Jamie is a recent graduate of WMU.

My time at Western influence(d) my career/life by:
 “offering me opportunities I just would not have had elsewhere. I spent the majority of my undergrad working in a research lab, where instead of working under a graduate student, I worked side by side with my advisor driving a project from beginning to publication. My research experience gave me a huge advantage when it came time to apply for graduate school! I am a proud Fighting Irish, but I will always be a Bronco!”

Jayme Hentig
 U.S. Army (Ret.)|PhD Student|Hyde Lab
 Galvin Science Center, University of Notre Dame, IN



Special Awards: Besides active interest in research, each faculty member is dedicated to teaching excellence at the undergraduate and graduate level. This year, the Dr. Darrell R. Latva Biological Sciences Teaching Excellence Award was issued to Dr. David Karowe. We congratulate Dr. Karowe on his research and teaching success!

Please Support Biological Sciences

In times when state funding is decreasing, the support we receive from friends and alumni is vitally important. To help support the mission of the department, you can donate online (via credit card) by going to MyWMU using the following link.

<https://www.mywmu.com/givetobiology>

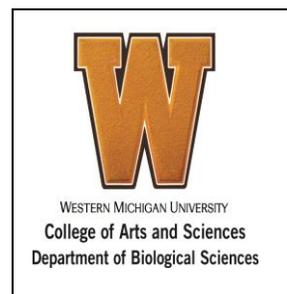
To donate by mail, send a check to the following address:

Gift Processing

WMU Foundation

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Please make your check payable to the WMU Foundation and indicate Biological Sciences department in the memo line. Thank you for considering a gift to the WMU Department of Biological Sciences. Have a happy holiday season! Go Broncos!!!!



Graduate student, Cynthia Cooley-Themm, showing her holiday hair style