2019 Student Award Winners from Biological Sciences

# Department of Biological Sciences 2019 Newsletter

WESTERN MICHIGAN UNIVERSITY
Department of
Biological Sciences

HAPPY HOLIDAYS FROM BIOLOGICAL SCIENCES AT WESTERN MICHIGAN UNIVERSITY

# Letter from the Chair

Dear Alumni and Friends,

It gives me great pleasure to introduce the Department of Biological Sciences newsletter for 2019. It was another action-packed year for our department, with several departures and several new additions. As you will see from this newsletter, our faculty and staff continue to work hard to enhance our research capabilities, educational opportunities for our students and outreach and engagement with our surrounding communities.

This past year saw the departure of Ms. McKenzie Vliek, our part-time Administrative Assistant. Thanks McKenzie for your service to our department! Fortunately we were able to hire Ms. Sandra Molvern as our new part-time Administrative Assistant. Welcome Sandra!

This past year year also saw the retirement of two long time professors in the department, Drs. Steve Malcolm and Chuck Ide. Thanks to both Drs. Malcolm and Ide for many years of outstanding support of our staff, students and your faculty colleagues! We hope you both have enjoyable and productive retirements!! Joining our ranks as a new professor in the department is Dr. Benjamin Koestler, Assistant Professor in Biological Sciences. Welcome Dr. Koestler! We also held an inaugural department Advisory Council this fall and look forward to working with the council members as they learn more about the mission of our department.

Our undergraduate and graduate programs in Biological Sciences continue to thrive, to the point where we now have one of the highest numbers of majors of any department in the College of Arts and Sciences at WMU. 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. Thank You Very Much! **Go Broncos!**

John Spitsbergen, Chair
john.spitsbergen@wmich.edu

**Inside This Issue**



*Editor: Cindy Linn*


# FACULTY FOCUS:

## Benjamin Koestler

Dr. Ben Koestler joined the WMU faculty in Fall 2019. His work focuses on how *Shigella*, a single-cell bacteria, senses its surroundings in different parts of the human body to cause disease.

Ben attended Calvin College where he took a microbiology class and was hooked. He spent one summer working with Dr. Bob Leunk studying the microbial ecology of psittacine birds. They collected samples from birds at the John Ball Zoo in Grand Rapids, and the team identified organisms associated with healthy birds because, at the time, nothing was known about the normal microbial profile of the digestive tract. During college, Ben also worked at a private laboratory in Grand Rapids, conducting food and water safety tests. These experiences in the lab confirmed that Ben wanted to get a graduate degree in microbiology.

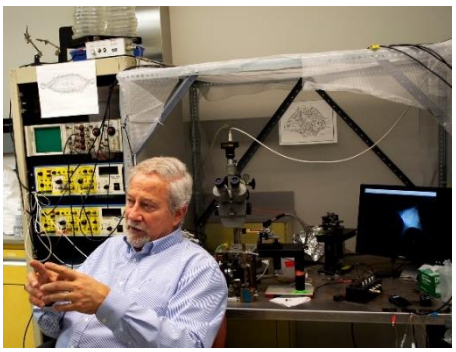

Ben enrolled in the Microbiology and Molecular Genetics Department at Michigan State University. He joined the Waters Lab, where he studied the environmental regulation of Cyclic di-GMP signaling in cholera with Dr. Chris Waters. Ben found that cholera uses cyclic di-GMP to sense bile and bicarbonate in order to protect itself while travelling through the small intestine. Ben also worked with collaborators across the countries to quantify cyclic di-GMP in many different types of bacteria using mass spectrometry. In addition, Ben collaborated with Dr. Andy Amalfitano to develop the use cyclic di-GMP as a vaccine adjuvant against *Clostridium difficile*.

Following the completion of his PhD, Ben moved to Austin for a postdoc at the University of Texas. He worked with Dr. Shelley Payne, examining the role of carbon metabolism in *Shigella* pathogenesis. *Shigella* is a foodborne pathogen that causes dysentery and is rapidly acquiring antibiotic resistance. Because animals can't be infected with *Shigella*, Ben developed a new technique to infect "mini guts," miniature intestines grown in the lab from intestinal stem cells, with *Shigella*. He discovered that *Shigella* communicate with each other inside a host cell using the metabolic byproduct formate.

During his postdoc, Ben collaborated with Dr. Krista Milich, a primate anthropologist at Washington University in St. Louis, to determine if *Shigella* is present in wild, non-human primate populations in South America. During this time, Zika virus emerged as an epidemic in South America. Ben and Krista developed a technique to screen non-human primates for Zika virus. They are currently using that technique to see the extent of the presence of Zika virus in South American non-human primate populations. Also during his postdoc, Ben and his wife had two daughters (who are now almost four and almost one years old).

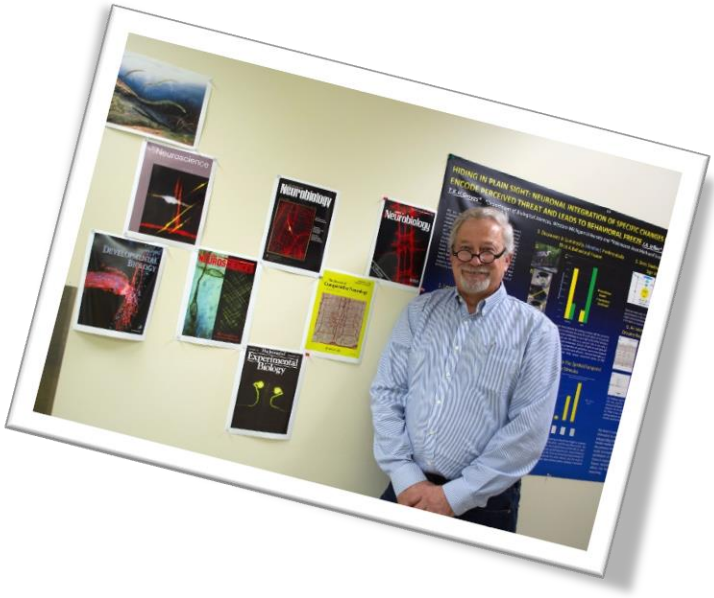
At WMU, the Koestler Lab studies how *Shigella* causes disease, dependent on its ability to sense and adapt to different locations in the human body. They explore mechanisms used by bacteria to integrate host-specific signals into virulence regulation. They use tissue culture models, such as "mini guts," to study how *Shigella* senses metabolic byproducts to control the expression of key virulence genes, and how cyclic di-GMP signaling regulates *Shigella* pathogenesis.

When not in the lab, Ben enjoys cooking elaborate meals and using his background in microbiology to brew beer. He's happy to be back in the Midwest and is teaching his daughters (two tiny Texans) about how to play in the snow.



# Faculty Focus: *John Jellies*

I am a professor of Biological Sciences specializing in Neurobiology. I was born on a military base in Maryland when my father was working in space, satellite and submarine communication research during the Korean conflict. My mom had been a model, artist and musician.



I spent most of my childhood in the Chicago suburbs and SW Michigan. My early interests were in the arts, electronics and natural history. It was a real decision whether to go to art school, professional school or liberal arts. I ultimately majored in biology at Blackburn College. My baccalaureate research included the role of protein synthesis in behavior of insects and the biophysics of water loss in xeric and mesic Arachnids. For a master's degree in biology at Illinois State, I specialized in physiological ecology. Using wild type and learning mutant flies, I found that larvae trained to respond to olfactory cues would retain that memory through metamorphosis. This sent me on a decades-long quest to understand how nervous systems guide behavior. My doctoral work at the University of Texas at Austin prepared me in membrane biophysics, single cell electrophysiology, fluorescent imaging, optical and electronic technology. I worked on how command neurons integrate sensory cues and coordinate defined motor output. As a postdoctoral researcher (apprentice) at the University of California at San Diego I learned how to use a model system, the leech, to examine neural development and the neural bases of behavior. After a stint as a professor at the University of Alabama at Birmingham School of Medicine in Physiology and Biophysics I came to WMU (when my parents retired to this area I was highly motivated to return). For almost 25 years I have taught here and worked on issues related to neuronal development, motor control and sensory integration. Most recently we have focused on visual integration and feature extraction by simple neural circuits. I have been a Fellow of the Alfred P. Sloan foundation, held multiple NIH and NSF grants, been the recipient of the Distinguished Alumni Award from Blackburn, and am the recipient of WMU's Distinguished Faculty Scholar Award. As I have matured I have also discovered that one of my passions is training and guiding students and colleagues to discover **their** passions. I enjoy my students, colleagues, friends, wife and family. I am blessed with kids, their partners and my grandchildren. I am active locally in environmental protection and lake stewardship. I draw, paint in oils, and carve wood and stone. I am a metalworker, love to design jewelry, work in gold, silver, copper and steel. Hand engraving is my favorite outlet and I also cut many of my own precious stones for jewelry pieces. I weld steel, mostly for sculptural and artistic pieces, (though I can fix metal stuff that is broken) and get a kick out of machining parts and tools from scratch. One of my avocations is beekeeping. The joy of cultivating these wee creatures is an education in its own right. WMU continues to offer me an opportunity to share my love of learning, passion for the natural world and fostering the growth and development of others. I am eternally grateful.

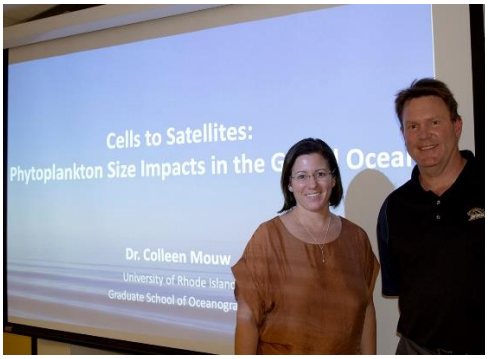
# 2019 Biological Sciences Distinguished Alumni Achievement Award

## Dr. Colleen Mouw

Our Biological Sciences Distinguished Alumni Speaker in 2019 was Dr. Colleen Mouw. Dr. Mouw gave an inspiring seminar in October at WMU entitled, "Cells to Satellites: Phytoplankton size impact in the global ocean."

Dr. Mouw earned her BS from the Department of Biological Sciences at Western Michigan University in 2000, where she reminisced about being introduced to the exciting world of plants and photosynthesis while taking a class from one of our faculty, Dr. Alexander Enyedi. She went on to earn a Ph.D. at the University of Rhode Island from the graduate school of Oceonography.

Dr. Mouw's research team uses visible satellite remote sensing and optics to address questions related to phytoplankton ecology and physiology, primary productivity, carbon cycling, biogeochemistry, and physical drivers of biological variability in marine and freshwater systems. Her team is particularly interested in the ecological and physiological response of phytoplankton to climate change and the role that community structure plays in carbon cycling and ecosystem functioning as phytoplankton are responsible for producing more oxygen on Earth than all plant life. These interests are investigated through the combination of remotely sensed imagery, *in situ* data sets and collaboration with biogeochemical numerical modelers. Her work encompasses a variety of spatial scales ranging from single lakes to the global ocean by analyzing phytoplankton at cellular levels as well as at a global level. During Dr. Mouw's seminar, she stressed the importance of phytoplankton size, the absorption properties of different sized plants, the function of biomass at different water depths, export flux and how these variables change regionally and globally over time.

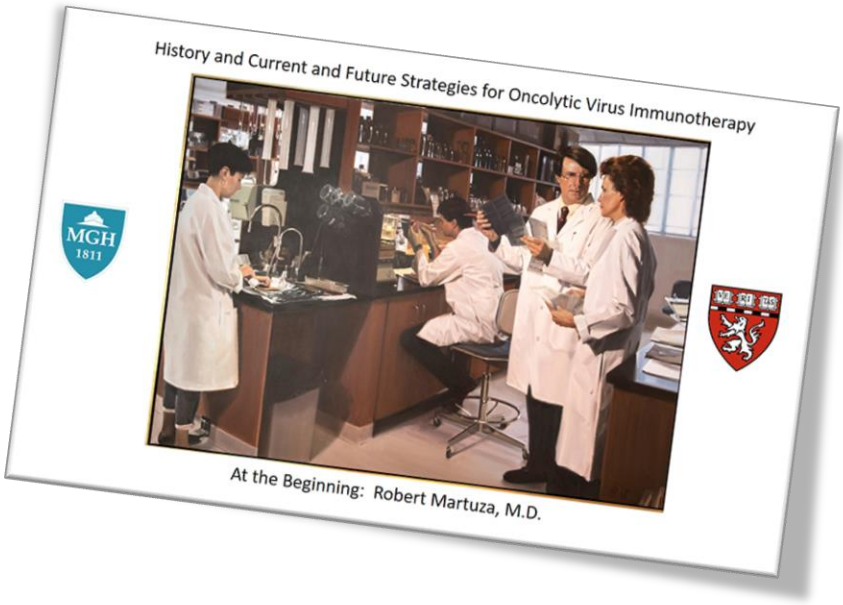



In 2006, Mouw was an assistant professor of oceanography in the Department of Geological and Mining Engineering and Sciences at Michigan Technological University and a scientist in the Great Lakes Research Center. Her work with NASA satellites earned her the prestigious Presidential Early Career Awards for Scientists and Engineers (PECASE) in the spring of 2016. She received the award in Washington D.C. from Barack Obama in 2016. Dr. Mouw is currently an associate professor at the University of Rhode Island in Oceonography. We thank Dr. Mouw for her visit and her thought provoking seminar.

Dr. Mouw with our Chair, Dr. Spitsbergen

# 2019 Michael K Bach Distinguished Visiting Lectureship Series

## *Robert Martuza M.D.*



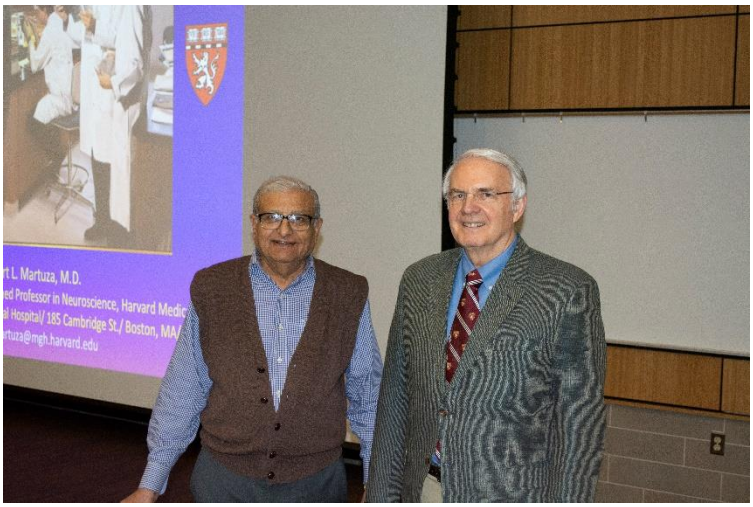

In April, Dr. Robert Martuza (M.D.), gave a stimulating lecture in Biological Sciences entitled, "History and current and future strategies for oncolytic virus immunotherapy." Dr. Martuza is a William and Elizabeth Sweet Distinguished Professor of Neuroscience at Harvard Medical School.

Dr. Martuza's research analyzes the use of viruses as cancer therapy and gave an inspiring seminar looking at the past history of oncolytic immunotherapy as well as the direction for oncolytic virus immunotherapy in the future. His talk began with a discussion of the first genetically engineered oncolytic virus and the rationales for selecting specific types of virus for different types of cancers. His work with Herpes Simplex-1 for the treatment of malignant gliomas in the brain has led to a "Renaissance from the Dark Ages." From phase 1 trials using this virus to treat gliomas, his research focused on "in-situ vaccination," where the amplification of the virus was used to elicit an anti-cancer immune response. This began the start of current day immunovirotherapy. Current oncolytic viruses are used to express efficacious but systemically toxic molecules locally in malignant tumors.

Today, three oncolytic viruses are approved for use world-wide: Adenovirus in China, Reovirus in Europe and Herpes in USA. However, each cancer offers unique pathologies and will likely require multiple synergies with other therapies including immunotherapy, chemotherapy, radiotherapy, anti-angiogenic, and specific cancer cell pathway modulators. Dr. Martuza's team and many others are now looking to expand into many cancers using various synergies.

As of 04/01/19, there are 55 different oncolytic virus clinical trials in 72 sites across the world working towards eradicating cancer.

We thank Dr. Martuza for his visit to WMU and for the insight into his exciting cancer research.



Sponsor Dr. Karim Essani with Dr. Martuza

# A. 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.

Current Funding for 2019

**Todd Barkman**
Title: Characterization of fatty acid methyl transferase enzymes from plants: testing hypotheses about the biosynthesis of volatiles important for flowers and fruits
Source: WMU FRACAA

**Wendy Beane**
Title: Molecular mechanisms regulating neural regeneration in planarians
Source: National Science Foundation CAREER Award

**Devin Bloom**
Title: Systematics and Evolution of Migration in Clupeiformes (Herring, Sardines, Shads, Anchovies and Their Allies)
Source: National Science Foundation, Division of Environmental Biology

**Kathryn Docherty**
Title: EAGER NEON: Exploring Ecosystem Contributions of Microbial Diversity to the Vertical Atmosphere
Source: National Science Foundation.

**Jeremy Duncan**
Title: Determining the molecular landscape necessary for hair cell development.
Source: National Institutes of Health (NIDCD)

**Jackie Eng**
Title: Skeletal and 3D geometric morphometric analysis of human vertebral trauma: characterizing traumata and identifying demographic patterns.
Source: WMU SFSA

**Sharon Gill (Co-PI Maarten Vonhof)**
Title: Examining Impacts of Military Noise on Bird Communication and Singing Behavior
Source: Department of Defense, EQ1 Basic Research Program

**Pam Hoppe**
Title: Defining the role of the protein kinase UNC-82 in organizing muscle contractile filaments
Source: WMU FRACAA

**Chuck Ide (Marla Fisher and Carson Reeling Co-PIs)**
Title: Independent Risk Analysis for the Straits Pipeline
Source: State of Michigan Grant (subcontract from Michigan Technological University)

**Chuck Ide**
Title: Cell and Molecular Basis of Neurodegeneration in Multiple System Atrophy
Source: MSA Private Ongoing Grants

**Don Kane**
Title: G2 control of the cell cycle in the vertebrate embryo
Source: WMU FRACAA

**Dave Karowe**
Title: Research Experience for Undergraduates (University of Michigan Biological Station)
Source: National Science Foundation

**Terri Kinzy**
Title: Regulators of translation elongation factor eEF1A
Source: National Institutes of Health (NIGMS)

**Cindy Linn**
Title: Evidence of BrdU positive neurons in adult mammalian retina after treatment with an alpha7 nAChR agonist.
Source: National Institutes of Health, National Eye Institute

**Cindy Linn**
Title: Activation of retinal pigment epithelium induces neurogenesis in an adult mammal.
Source: WMU FRACAA

**Hector Quemada**
Title: Gene drive training
Source: Foundation for the National Institutes of Health

**Silvia Rossbach**
Title: Bacteria to the rescue: a compass for cleaning up oil spills.
Source: WMU FRACAA

**Silvia Rossbach**
Title: Influence of different iron oxide minerals on hydrocarbon degradation
Source: Minnesota Pollution Control Agency.

**Dave Rudge, Co-PI (PI Heather Petcovic)**
Title: MI STAR
Source: Michigan Technological University

**Tiffany Schriever (Co-PI Devin Bloom)**
Title: Tracking biodiversity, community assemblage, and gene flow among interdunal wetlands in the Great Lakes
Source: Michigan Sea Grant Core Research

**Tiffany Schriever**
The hydrology of Great Lakes interdunal wetlands and the effects on their macroinvertebrate assemblages.
Source: WMU FRACAA

**Susan Stapleton**
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

**Brian Tripp**
Title: Characterization of Salmonella typhimurium Flagellin Disulfide Bond Variants.
Source: WMU FRACAA

**Maarten Vonhof**
Title: Field Application of Chitosan to Halt the Progression of White-Nose Syndrome in Bats
Source: National Fish and Wildlife Foundation

## B. Papers Published in 2019

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 2019. These publications add significant value to a degree from our department and emphasis the Department's commitment to undergraduate and graduate education.

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

Su, H.-J., **T. J. Barkman**, W. Hao, S. S. Jones, J. Naumann, E. Skippington, E. K. Wafula, J.-M. Hu, J. D. Palmer and C. W. dePamphilis 2018[2019]. A novel genetic code and record-setting AT-richness in the highly reduced plastid genome of the holoparasitic plant Balanophora. Proceedings of the National Academy of Sciences, USA. 116: xx-xy.

Straight, B., B. L. Needham, G. Onicescu, P. Wanitjirattika, **T. J. Barkman**, C. Root, J. Farman, A. Naugle, C. Lalancette, C. Olungah, and S. Lekalgitele (2019). Prosocial Emotion, Adolescence, and Warfare: DNA Methylation Associates with Culturally Salient Combat Variables (2019). *Human Nature* https://doi.org/10.1007/s12110-019-09344-6

James H. Leebens-Mack, **Todd J. Barkman**, et al. One thousand plant transcriptomes and the phylogenomics of green plants. Nature, 2019.

**Beane WS**, Adams DS, Morokuma J, Levin M. (2019) Live imaging of intracellular pH in planarians using the ratiometric fluorescent dye SNARF-5F-AM. Biol Methods Protoc. 2019;4(1):bpz005.

Alanna V. Van Huizen, *Jacob M. Morton*, *Luke J. Kinsey*, Donald G. Von Kannon, *Marwa A. Saad*, Taylor R. Birkholz, *Jordan M. Czajka*, Julian Cyrus, Frank S. Barnes, and **Wendy S. Beane**. Weak magnetic fields alter stem cell–mediated growth. Science Advances, 2019; 5 : (Feb 1).

Burns, M.* and **Bloom, D.D.** Accepted. Migratory lineages rapidly evolve large body sizes in ray-finned fishes. *Proceedings of the Royal Society of London B: Biological Sciences.* *Bloom lab postdoc

**Bloom, D.D.,** Kolmann, M.A., Foster, K., *Watrous, H.* In Press. Mode of miniaturization influences body shape evolution in New World Anchovies (Engraulidae). *Journal of Fish Biology*

Var SR and **Byrd-Jacobs CA**. 2019. Microglial response patterns following damage to the zebrafish olfactory bulb. *IBRO Reports*, 7:70-79.

Calvo-Ochoa, E. and **C.A. Byrd-Jacobs**. 2019. The olfactory system of zebrafish as a model for the study of neurotoxicity and injury: Implications for neuroplasticity and disease. International Journal of Molecular Sciences 20(7):1639-1657. Featured on cover.

Pozzuto, J.M., C. L. Fuller, and **C.A. Byrd-Jacobs**. 2019. Deafferentation-induced alterations in mitral cell dendritic morphology in the adult zebrafish olfactory bulb. Journal of Bioenergetics and Biomembranes 51: 29-40 doi.org/10.1007/s10863-018-9772-x

*Scheib, J.J.*, J.M. Pozzuto, and **C.A. Byrd-Jacobs**. 2019. Reversible deafferentation of the zebrafish olfactory bulb with wax plug insertion. Journal of Neuroscience Methods 311:47-56.

**Docherty, K.M.** and Gutknecht, J.L.M. Soil microbial restoration strategies for promoting climate-ready prairie ecosystems. *Ecological Applications*.

Dupuis, D., Sprague, E.I., **Docherty, K.M.**, Koretsky, C.M. The influence of road salt on seasonal mixing, redox stratification and methane concentrations in urban kettle lakes. *Science of the Total Environment*. Volume 661, 15 April 2019, Pages 514-521.

Sihang, Y., Zheng, O., Yang, Y., Yuan, M., Ma, X., Chiariello, N.R., **Docherty, K.M.**, Field, C.B., Gutknecht, J.L.M., Hungate, B.A., Niboyet, A., LeRoux, X., Zhou, J. (2019) Fire affects the taxonomic and functional composition of soil microbial communities, with cascading effects on grassland ecosystem functioning. Global Change Biology. Accepted.

Y. Yang, S., Zheng, Q., Yuan, M., Shi, Z., Chiariello, N.R., **Docherty, K.M.**, Dong, S., Field, C.B., Gu, Y., Gutknecht, J.L.M., Hungate, B.A., LeRoux, X., Ma, X., Niboyet, A., Yuan, T., Zhou, J., Yang. (2019) Long-term elevated CO2 shifts composition of soil microbial communities in a Californian annual grassland, reducing growth and N utilization potentials. *Science of the Total Environment*. 652: 1474-1481. https://doi.org/10.1016/j.scitotenv.2018.10.353

**Jeremy S. Duncan**, Bernd Fritzsch, Douglas W. Houston, Elizabeth M. Ketchum, Jennifer Kersigo, Michael R. Deans & Karen L. Elliott, Topologically correct central projections of tetrapod inner ear afferents require Fzd3. Scientific Reports. 2019. 10.1038/s41598-019-46553-6

Schmidt, C. W., Remy, A., Van Sessen, R., Willman, J., Krueger, K., Scott R, Mahoney P, Beach J, Mckinley J, d'Anastasio R, Chiu LW, Buzon M, de Gregory R, Sheridan S, **Eng JT**, Watson J, Klaus H, Willman JC, Da-Gloria P, Wilson J, Krueger K, Stone A, Sereno P, Droke JL, Perash R, Stojanowski C. 2019. Dental microwear texture analysis of Homo sapiens sapiens: Foragers, farmers, and pastoralists. *American Journal of Physical Anthropology*, 169(2), 207-226.

Grabarczyk, E.E. & **S.A. Gill**. 2019.A female perspective: testing the effects of anthropogenic noise masking on signal transmission patterns inside the nest box. Behaviour (In press)

Grabarczyk, E.E. & **S.A. Gill**. 2019. Anthropogenic noise masking diminishes house wren (*Troglodytes aedon*) signal transmission in urban natural areas. Bioacoustics DOI: 10.1080/09524622.2019.1621209

Grabarczyk, E.E. & **S.A. Gill**. Anthropogenic noise affects male house wren response to but not detection of territorial intruders. PLoS ONE 14(7): e0220576 doi: 10.1371/journal.pone.0220576

*Stuart, C.J.*, Grabarczyk, E.E., **M.J. Vonhof** & **S.A. Gill.** Social factors, not anthropogenic noise or artificial light, influence onset of dawn singing in a common songbird. The Auk: Ornithological Advances doi.org/10.1093/auk/ukz045

Tetiana Petrachkova, Laura A. Wortinger, Amber J. Bard, Jyotika Singh, Rachel M. Warga and **Donald A. Kane**. Cyclin B1 is necessary, and competes with Cyclin B2 to regulate the zebrafish cell cycle. Developmental Biology.

Webster MK, *Barnett BJ*, Stanchfield ML, Paris JR, Webster SE, Cooley-Themm CA, Levine E, Otteson DC, **Linn CL.** 2019. Müller glia dependent neurogenesis in the adult mammalian retina is induced by an α7 nAChR agonist acting on retinal pigment epithelium. *IOVS.* 60(2):570-579.

Wessendorf RL, **Lu Y** (2019) Introducing an Arabidopsis thaliana thylakoid thiol/disulfide-modulating protein into Synechocystis increases the efficiency of PSII photochemistry. Front. Plant. Sci.

Kimak, C., D. Ntarlagiannis, L. D. Slater, E. A. Atekwana, C. L. Beaver, **S. Rossbach,** A. Porter, and A. Ustra (2019) Geophysical monitoring of hydrocarbon biodegradation in highly conductive environments. Journal of Geophysical Research: Biogeosciences 124:353-366 DOI:10.1029/2018JG004561

Williams, C. & **Rudge, D.** Effects of Historical Story Telling on Student Understanding of NOS. *Science & Education* (Accepted for publication August, 2019)

**Schriever TA** and DA Lytle. 2019. Energy flow and isotopic niche variation in desert stream top predators. Hydrobiologia. doi.org/10.1007/s10750-019-04115-x

Montaña CG, S Silva, D Hagyari, J Wagner, L Tiegs, C Sadeghian, **TA Schriever**, and C Schalk. 2019. Revisiting 'What do tadpoles really eat? A ten-year perspective. Freshwater Biology 64:2269-2282.

## 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 performed 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)*

Birkholz TR, Kha CX, Tseng AS, and **Beane WS**. (2019) *Probing Conserved Regenerative Pathways: V-ATPase Signaling and Eye Regeneration*. Society for Developmental Biology (SDB) 78th Annual Meeting, Boston, MA.

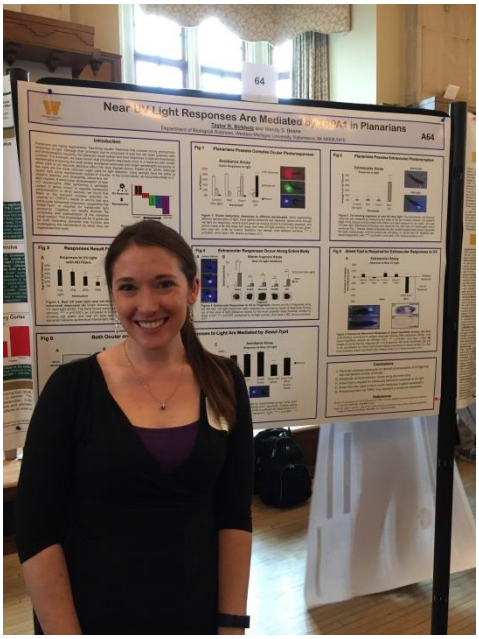
Kinsey LJ, Van Huizen AV, *Saad MA*, and **Beane WS**. (2019) *Reactive Oxygen Species (ROS) Signaling Regulates Stem Cell Activity During Planarian Regeneration.* Society for Developmental Biology (SDB) 78th Annual Meeting, Boston, MA.

Van Huizen AV, Kinsey LJ, Barnes F, and **Beane WS**. (2019) *Weak Magnetic Fields as a Modulator of In Vivo Stem Cell Proliferation.* Society for Developmental

Biology (SDB) 78th Annual Meeting, Boston, MA.

**Beane WS**, Van Huizen AV, Kinsey LJ, and Barnes F. (2019) *Non-linear Effects on Stem Cell-Mediated Regeneration Following Weak Magnetic Field (WMF) Exposure*. BioEM 2019, the joint annual meeting of BEMS (the Bioelectromagnetics Society) and EBEA (the European Bioelectromagnetics Association), Montpellier, France.

Birkholz TR, Kha CX, **Beane WS**, and Tseng AS. (2019) *Bioelectrical Signaling Regulates Eye Regeneration.* BioEM 2019, Montpellier, France.



Van Huizen AV, Kinsey LJ, Barnes F, and **Beane WS**. (2019) *Manipulation of Weak Magnetic Fields Alters Stem Cell Proliferation During Regeneration.* BioEM 2019, Montpellier, France.

Barnes F, Gurhan H, Kandala S, and **Beane WS**. (2019) *Effects of Weak Static Magnetic Fields on ROS Concentrations and the Growth Rates of Cancer Cells and Planarians.* 21st International Conference on Oxidative Stress Reduction, Redox Homeostasis and Antioxidants (Redox World Congress), Paris, France.

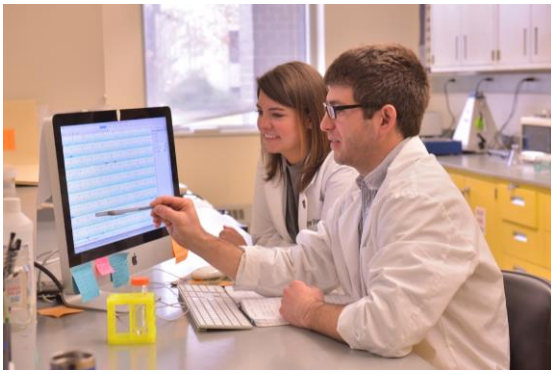
Foster, K., Lujan, N., *Everts, R.K.*, Sidlauskas, B.L., López-Fernández, H., and **Bloom, D.D.** Top down diversification: the adaptive landscape of South American Darters (Crenuchidae: Characiformes) across a benthic/pelagic habitat axis. *Joint Meeting of Ichthyologists and Herpetologists*. Snowbird, UT.

Burns, M.D.* and **D.D. Bloom**. 2019. Migratory lineages rapidly evolve large body sizes in ray-finned fishes. *Joint Meeting of Ichthyologists and Herpetologists*. Snowbird, UT. *Bloom lab postdoc

Smith, S.E., Palkovacs, E.P., Weidel, B.C. and **Bloom, D.D.** 2019. Evolutionary ecology of Great Lakes alewives: an analysis of phenotypic patterns and rates of change. *International Association for Great Lakes Research*. Brockport, NY

Nienhaus, H.M., **Bloom, D.D.** and T.A. Schriever. 2019. Population and landscape genetics of aquatic insect species from interdunal wetlands along Lake Michigan's shoreline. *International Association for Great Lakes Research*. Brockport, NY (poster).

Egan, J.P., **Bloom, D.D.,** and Simons, A.M. 2019. Phylogenetic Analysis of Trophic Niche Evolution and Spatial Patterns of Herbivory in Clupeoidei (Herrings, Anchovies, and Allies). *The Society for Integrative and Comparative Biology.* Tampa, FL.



Var SR, **Byrd-Jacobs CA**. 2019. *Ex Vivo* Examination of Microglial Proliferation Patterns Following a Direct Lesion to the Olfactory Bulb of the Adult Zebrafish Brain. *Zebrafish Neural Circuits and Behavior Meeting abstract.* Cold Spring Harbor, NY.

Var SR, **Byrd-Jacobs CA.** 2019. An examination of Microglial Involvement in Neuroregeneration and Functional Recovery Following Damage to the Olfactory Bulb. *Comprehensive Cancer Center of the University of Puerto Rico seminar.* San Juan, PR.

Var SR, **Byrd-Jacobs CA**. 2019. *Ex Vivo* Examination of Microglial Proliferation Patterns Following a Direct Lesion to the Olfactory Bulb of the Adult Zebrafish Brain. *Society of Neuroscience abstract.* Chicago, IL.

Ali, M.M. and **C.A. Byrd-Jacobs**. 2019. Examination of the injury response to chemical ablation in the zebrafish olfactory epithelium. Society for Neuroscience Annual Meeting. Chicago, IL.

Ali, M.M. and **C.A. Byrd-Jacobs**. 2019. Recovery of olfactory sensory neurons after damage involves changes in proliferation patterns. Kalamazoo Community Medical and Health Sciences Research Day, Kalamazoo, MI. Selected for oral presentation.

Ali, M.M. and **C.A. Byrd-Jacobs**. 2019. Recovery of olfactory sensory neurons after damage involves changes in proliferation patterns. Michigan Chapter of the Society for Neuroscience Annual Meeting. Kalamazoo, MI.

Calvo-Ochoa, E., N. Miyasaka, Y. Yoshihara, **C. Byrd-Jacobs**. 2019. Zebrafish olfactory system degeneration and regeneration following a focal lesion of the olfactory bulb. Zebrafish Neural Circuits and Behavior meeting, Cold Spring Harbor Laboratory, NY, USA.

Calvo-Ochoa, E., **C.A. Byrd-Jacobs**. 2019. The olfactory bulb of zebrafish regenerates and recovers by 21 days after an excitotoxic focal lesion. Society for Neuroscience Annual Meeting. Chicago, IL.

Calvo-Ochoa, E., **C.A. Byrd-Jacobs**. 2019. Recovery and morphological remodeling of the zebrafish olfactory bulb following a focal excitotoxic lesion. Association for Chemoreception Sciences Annual Meeting. Ft. Myers, FL.

Scheib, J.J. and **C.A. Byrd-Jacobs**. 2019. Adult zebrafish astroglial response to olfactory organ damage in the olfactory bulb. Society for Neuroscience Annual Meeting. Chicago, IL.

Var S.R. and **C.A. Byrd-Jacobs.** 2019. *Ex Vivo* Examination of Microglial Proliferation Patterns Following a Direct Lesion to the Olfactory Bulb of the Adult Zebrafish Brain. Michigan Chapter of the Society for Neuroscience Annual Meeting. Kalamazoo, MI.

**Docherty, K.M.,** Hale, R.L., Spring, A.M. Urban Homogenization of Soil Bacterial Communities Across Four North American Ecoregions. April 2019, Oral Presentation. Soil Ecology Society Meeting, Toledo, OH.

Whitacre, Z., *Evans, J., Patalon, M.*, **Docherty, K.M**. Differences in microbial community structure across a wildfire severity gradient are driven by soil pH and inorganic nitrogen three years post-fire. April 2019, Poster Presentation. Soil Ecology Society Meeting, Toledo, OH.

**Docherty, K.M.**, Domingue, K.D., Hale, R.L., Kerber, T.V., Lemmer, K.M., Mooney, M.M., Spring, A.M. Let's go fly a kite! Near-surface airborne bacteria reach higher altitudes and are homogenized by urbanization. August 2019, Oral Presentation. Ecological Society of America Meeting, Louisville, KY.

Whitacre, Z., **Docherty, K.M.,** *Evans, J., Patalon, M.* Restoration of soil microbial communities in prairie conservation corridors. August 2019, Oral Presentation. Ecological Society of America Meeting, Louisville, KY.

Sheltz-Kempf S, **Duncan JS**. 2019. Establishing the Role of Gata3 Over-Expression in Differentiating Cells. Midwest Auditory Conference Poster. Springfield, IL.

Sheltz-Kempf S, **Duncan JS**. 2019. Characterizing the Over-Expression of Gata3 in Differentiating Hair Cells. SFN Michigan Chapter Poster. Kalamazoo, MI.

*Dominguez K,* **Eng JT.** Squatting facets and osteoarthritis in an agricultural sample in ancient China: A biocultural perspective on ancient gendered activity. "Undergraduate Research Symposium" at the 88th Annual Meeting of the American Association of Physical Anthropologists, Mar 2019. Cleveland, OH

*Renda D, Verbrugge P*, **Eng JT.** Determining best practice in the application of 3D laser scan technology to characterize vertebral conditions. Bioarchaeology and Forensic Anthropology Association, Oct 2019, Grand Valley, MI.

**Eng JT**, Machicek M. Oral health and osteoarthritis: impacts from social and environmental variation among Iron Age steppe groups of

southern Siberia and Inner Asia. American Association of Physical Anthropologists, Mar 2019, Cleveland, OH.

Machicek M, **Eng JT.** Dental Pathology and Dietary Intake of Inner Asian Steppe Inhabitants during the Historic Mongol Period- Yuan Dynasty (ca. CE 1200-1400). American Association of Physical Anthropologists, Mar 2019, Cleveland, OH.

**Eng JT**, Aldenderfer M. Moving on up: The promise of multiple data sources in reconstructing early population history of high altitude sites in Nepal. Society for American Archaeology, Apr 2019, Albuquerque, NM.

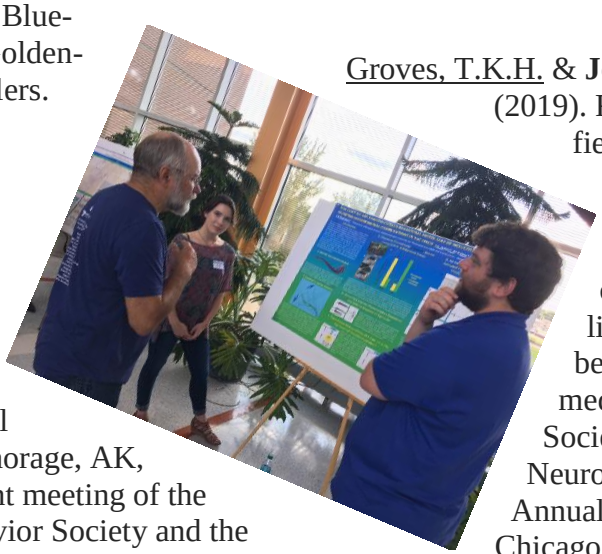
Sblendorio, J.M.*, **Vonhof, M.J**, and **Gill, S.A.** Partitioning of signal space in a breeding warbler community. Oral Presentation at 1.) Indiana University Animal Behavior Conference, Bloomington, IN (March 2019), 2.) American Ornithological Society, Anchorage, AK (June 2019), and 3.) Ecological Society of America, Louisville, KY (August 2019).

Foli, E., **M.J. Vonhof** & **S.A. Gill**. The meaning of song structure: exploring behavioral responses of field sparrows to three simple song types. Animal Behavior Conference, Indiana University; American Ornithological Society, Anchorage, AK, June.

**Gill, S.A.,** N. Fuller, K.M. Baker & **M.J. Vonhof**. Exploring the influences of land-use change and anthropogenic noise on acoustic diversity during the avian dawn chorus. Ecological Society of America, Louisville, KY, August.

Grabarczyk, E.E., **M.J. Vonhof** & **S.A. Gill**. What drives flexible signaling? Anthropogenic noise and social context affect male house wren vocal behavior. Presented at American Ornithological Society, Anchorage, AK, June; Joint meeting of the Animal Behavior Society and the International Ethological Congress, Chicago, IL, July; and Ecological Society of America, Louisville, KY, August.

Janik, A.E., **M.J. Vonhof** & **S.A. Gill**. Using playback experiments to investigate species discrimination in a hybridizing population of Blue-winged and Golden-winged Warblers. Presented at Animal Behavior Conference, Indiana University, April; American Ornithological Society, Anchorage, AK, June; and Joint meeting of the Animal Behavior Society and the International Ethological Congress, Chicago, IL, July.



NaTasha R. Schiller, Sarah A. Almuhanna and **Pamela E. Hoppe**. A myosin-isoform-specific requirement for the AMPK-related kinase UNC-82 in thick filament elongation in *C. elegans* striated muscle. The Myogenesis Gordon Research Conference, held in Lucca, Italy from June 9 - 14, 2019.

NaTasha R. Schiller, Sarah A. Almuhanna and **Pamela E. Hoppe**. A myosin-isoform-specific requirement for the AMPK-related kinase UNC-82 in thick filament elongation in *C. elegans* striated muscle. Platform presentation, Midwest C. elegans Meeting, University of Michigan on April 20, 2019.

Sarah A. Almuhanna, Albert B. Lam, NaTasha R. Schiller and **Pamela E. Hoppe**. The AMPK-related kinase UNC-82 mediates interaction of myosin A with paramyosin in striated muscle. Poster presentation, Midwest C. elegans Meeting, University of Michigan on April 20, 2019.

Groves, T.K.H. & **Jellies, J.A.** (2019). Receptive field properties of visually sensitive interneurons coordinating light-guided behavior in the medicinal leech. Society for Neuroscience Annual Meeting. Chicago, IL.

Groves, T.K.H. & **Jellies, J.A.** (2019). Shedding light on behavior: The neuronal circuitry of light-guided behavioral responses in the medicinal leech. The 50th Annual Meeting of the Michigan Chapter of the Society for Neuroscience. Western

Michigan University, Kalamazoo, MI.

**Dave Karowe** Martin Luther King Day Celebration (January 2019, ca. 150 people), Kalamazoo, "Climate Justice"

**Dave Karowe** Stand Up Science (January 2019, ca. 200 people), Kalamazoo, "Effects of Climate Change on Southwest Michigan"

**Dave Karowe** Cost of Carbon Panel (WMU special presentation) (February 2019, ca. 80 people), WMU, "The True Cost of Climate Change"

**Dave Karowe** Battle Creek Voices of Peace (March 2019, ca. 50 people), Battle Creek, "Effects of Climate Change on the Midwest: Would the Paris Agreement Matter?"

**Dave Karowe** Northern Lights (March 2019, ca. 30 people), Ann Arbor, "Effects of Climate Change on Northern Michigan"

**Dave Karowe** Kalamazoo Club of Little Gardens (March 2019, ca. 20 people), Kalamazoo, "Why Should We Care about Our Carbon Footprint?"

**Dave Karowe** WMU Biology Club (March 2019, ca. 15 people), WMU, "What Should Biologists Know about Climate Change?"

**Dave Karowe** Calvin College Plaster Creek Stewards (April 2019, ca. 70 people), Grand Rapids, "Effects of Climate Change on Aquatic Ecosystems of the Great Lakes Region"

**Dave Karowe** Kalamazoo Nature Center Earth Day (April 2019, ca. 20 people), Kalamazoo, "How Will Climate Change Affect Southwest Michigan?"

**One of Dr. David Karowe's many presentations this year!**

**Dave Karowe** Bell's Brewery, Comstock (April 2019, ca. 150 people) "Effects of Climate Change on the Great Lakes Region"

**Dave Karowe** Michigan Snowsports Industry Association (Keynote Speaker) (June 2019, ca. 100 people), Gaylord, "Effects of Climate Change on Michigan Winters"

**Dave Karowe** Climate Change Education Solutions Summit (June 2019, ca. 30 people), Grand Rapids, "Bringing Climate Change Ecological Consequences into the Classroom"

**Dave Karowe** Friendship Village of Kalamazoo (June 2019, ca. 50 people), Kalamazoo, "Effects of Climate Change on the Great Lakes Region"

**Dave Karowe** University of Michigan Biological Station (June 2019, ca. 120 people), Pellston, "Two Possible Climate Futures for the Great Lakes Region"

**Dave Karowe** Cheboygan City Council (August 2019, ca. 25 people), Cheboygan, "How Will Climate Change Affect Birds and Trees?"

**Dave Karowe** Kalamazoo Nature Center Zugunruhe (September 2019, ca. 2 people), Kalamazoo, "How Will Climate Change Affect Birds and Trees?"

**Dave Karowe** Loy Norrix High School (September 2019, ca. 60 people) "Effects of Climate Change on Southwest Michigan"

**Dave Karowe** Bell's Brewery, Comstock (September 2019, ca.150 people) "Two Possible Climate Futures for the Great Lakes Region (One Much Better than the Other)"

**Dave Karowe** Fridays for the Future, Office for Sustainability (September 2019, ca. 50 people) "The Scientific Case for Urgent Action on Climate Change"

**Dave Karowe** First Presbyterian Church of Kalamazoo (September 2019, ca. 30 people) "Two Possible Climate Futures for the Great Lakes Region (One Much Better than the Other)"

**Dave Karowe** Hope College Academy of Senior Professionals (October 2019, ca. 60 people) "Two Possible Climate Futures for

the Great Lakes Region (One Much Better than the Other)"

**Dave Karowe** Kalamazoo Nature Center Members' Night (November 2019, ca.100 people), Kalamazoo, "How Will Climate Change Affect Birds and Trees?"

Webster SE, Webster MK, Linn DM, **Linn CL**. 2019. Neurogenesis in the adult mammalian retina after application of an alpha7 nicotinic acetylcholine receptor agonist. WMU Research Day abstract, Kalamazoo, MI.

Webster SE, Sklar NC, Webster MK, Linn DM, **Linn CL.** 2019. The alpha7 nicotinic acetylcholine receptor agonist, PNU-282987, activates retinal pigment epithelium to induce neurogenesis and regeneration in adult mammals. Michigan Chapter Society for Neuroscience Annual Meeting. Kalamazoo, MI. Abstract

Webster SE, Sklar NC, Webster MK, Linn DM, **Linn CL**. 2019. Application of an alpha7 nicotinic acetylcholine receptor agonist in the adult mammalian retina causes RPE mediated neurogenesis and regeneration in a glaucoma model. Soc. Neurosci. Abstract Chicago, ILL.

Paris JR, Sklar NC, **Linn CL**. 2019. Regeneration induced in a genetic mouse model of glaucoma using an alpha7 nicotinic ACh receptor agonist. Michigan Chapter Society for Neuroscience Annual Meeting. Kalamazoo, MI. Abstract.

Stanchfield ML, Webster SE, Webster MK, **Linn CL**. 2019. De-differentiation of Muller glia in adult mice resulting from stimulation of RPE cells with PNU-282987. Michigan Chapter Society for Neuroscience Annual Meeting. Kalamazoo, MI. Abstract.

Paris JR, Sklar NC, **Linn CL**. 2019. Characterizing retinal regeneration in a genetic mouse model of glaucoma. Soc. Neurosci. Abstract Chicago, ILL.

Stanchfield ML, Webster SE, Webster MK, **Linn CL**. 2019. Changes in gene expression associated with de-differentiation of Muller glia in response to PNU-282987. Soc. Neurosci. Abstract Chicago, ILL.

Quakenbush JP. 2019. Where are the Knowledge Gaps in the Flora of Luzon? *Flora Malesiana Symposium 11*, Universiti Brunei Darussalam, Brunei.

Quakenbush JP. 2019. Biogeography and Systematics in the Paleotropics: Adventures with *Medinilla*. *Biology Seminar*, Calvin University, MI.

Nienhaus, H., **D.D. Bloom, T.A. Schriever.** 2019. Population and Landscape Genetics of Insect Species from Interdunal Wetlands along Lake Michigan's Shoreline. International Association for Great Lakes Research (IAGLR)

**Schriever, T.** 2019 Shoring up the Great Lakes coastline: the importance of coastal wetlands in generating unique biodiversity, recreational experiences, and conservation opportunities. WMU Discovery Symposium, spring Convocation

Stewart, N., **T.A. Schriever**. 2019. Spatiotemporal patterns of aquatic macroinvertebrate community assemblages in interdunal wetlands. IAGLR

Frazier, C.F. and **T.A. Schriever.** 2019. Patterns of functional community structure in Great Lakes interdunal wetlands. IAGLR

Gabriel Almeida Alves and **John M. Spitsbergen**. The Effects of Aging and Exercise on Glial Cell Line-Derived Neurotrophic Factor Content in Rat Hearts. Experimental Biology, 2019 (Selected for Oral Presentation in "Aging, Exercise, and Heart Failure: Common Connections and New Targets" session).

Gabriel Almeida Alves and **John M. Spitsbergen**. The Effects of Aging and Exercise on Glial Cell Line-Derived Neurotrophic Factor Content in Rat Hearts. Gull Lake Hypertension Workshop, Michigan State University Kellogg Biological Station, May 2019 – Oral Presentation.

Alberto Cintrón-Colón and **John M. Spitsbergen**. Effect of long-term exercise on GDNF expression and innervation in rat skeletal muscle. Experimental Biology, 2019.

Alberto Cintrón-Colón and **John M. Spitsbergen**. Effect of long-term exercise on GDNF expression and innervation in rat skeletal muscle. 37th Annual Kalamazoo Community Medical and Health Sciences Research Day (Oral Presentation).

*Kori Mecklenburg*, Gabriel Almeida Alves, Alberto Cintron-Colon and **John M. Spitsbergen**. Effects of Age and Exercise on Density of Sympathetic Innervation in Rat Vasculature. Annual Meeting of the Michigan Chapter of the Society for Neuroscience, 2019.

Gabriel Almeida Alves and **John M. Spitsbergen**. Effect of Voluntary Exercise on Neurotrophic Factor Protein Content in Cardiac Muscle of Young Rats. Annual Meeting of the Michigan Chapter of the Society for Neuroscience, 2019.

Alberto Cintrón-Colón and **John M. Spitsbergen**. Effect of long-term exercise on GDNF expression and innervation in rat skeletal muscle. Annual Meeting of the Michigan Chapter of the Society for Neuroscience, 2019.

Alberto Cintrón-Colón and **John M. Spitsbergen**. Exercise to the Rescue: Effects of Aging and Long-Term Exercise on Structural Plasticity of Motor Neurons and GDNF Expression in Spinal Cord. Annual Meeting of the Society for Neuroscience, 2019.

Alberto Cintrón-Colón and **John M. Spitsbergen**. Exercise to the Rescue: From Post-Weaning to Adulthood: Effects of Aging and Long Term Exercise on GDNF Expression, Structural Plasticity and Innervation in Skeletal Muscle. SACNAS: The National Diversity in STEM Conference, 2019.

Julie VanGyseghem, Alberto Cintrón-Colón, Gabriel Almeida Alves and **John M. Spitsbergen**. Keep moving! A discussion of the health benefits of physical activity. Saturday Morning Science Public Lecture Series, fall 2019.

Alberto Cintrón-Colón, Gabriel Almeida Alves and **John M. Spitsbergen**. Keep moving! A discussion of the health benefits of physical activity. Invited Lecture, Southwest Michigan College, fall 2019.


WMU Faculty and students attending the Society for Neuroscience Meeting in Chicago

The past year has been an outstanding one for our graduate students in Biological Sciences. Graduate students were included 23 times as co-authors on papers published in peer-reviewed scientific journals (see above), gave 74 presentations at scientific conferences (see above) and received numerous grants and awards (see below).

**Graduate Student Activities.**

**Graduate Student Awards Presented to Students in the Spring 2019**

Distinguished Biological Sciences Graduate Student – Allie Spring

Leo C. Vander Beek Graduate Student Plant Biology Award – Peter Quakenbush

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

Masters – Teaching – Christopher Frazier

Masters - Research – Allie Spring

Ph.D. – Teaching – Tanya Petrachkova

Ph.D. – Research – Alanna Van Huizen

Ph.D. Student All-University Research – Erin Grabarczyk

MPI Outstanding Graduate Research Award – Master's level – Joanna Sblendorio

MPI Outstanding Graduate Research Award – Doctoral level – Gabriel Alves

Department of Biological Sciences Student Travel Awards -- Sarah Webster, Joanna Sblendorio

Travel award for the meeting of the American Ornithological Society -- Eliza Foli, Amy Janik, Joanna Sblendorio and Erin Grabarczyk

Honorable mention student presentation awards, meeting of the American Ornithological Society – Erin Grabarczyk

Student Sustainability Grant, Evaluating Microbial Communities in Compost – Aurora Mokris

Student Endowment Awards Society for Freshwater Science – Halle Nienhaus

WMU Graduate Student Research Grant – Peter Quakenbush

Graduate student teaching intensive year-long mentoring program - - Peter Quakenbush

Graduate certificate in college Science Teaching, Mallinson Institute for Science Education – Peter Quakenbush

Society of Wetland Scientists International Student Research Grant – Nicole Stewart

Society of Wetland Scientists North Central Chapter student research grant – Nicole Stewart

WMU Dissertation Completion Fellowship – Susanne Var

Graduate Student Association Conference Grant – Susanne Var

College of Arts and Sciences Climate Change Research Graduate Scholarship -- Zach Whitacre

# Graduate Student Focus

## Kimberly Foster

I am a PhD Candidate at Western Michigan University. I was born as a fraternal twin in Shreveport LA (his name is Evans and is a software engineer who moved from Louisiana to Kalamazoo to live with me). I am also a part of the LGBTQ community which was difficult growing up in Louisiana, but I overcame adversity. I went to Southeastern Louisiana University to obtain my undergraduate and master's degrees, where I published my first authored paper as an undergraduate. I was fortunate enough to work under Kyle Piller where I met Devin Bloom who is now my advisor at Western. Another interesting fact is Devin was Kyle's first master's student and now I am Devin's first PhD student. I study the macroevolution of a family of neotropical fishes named Crenuchidae (South American Darters). They're called South American darters due to their superficial phenotypes of North American darters although they are very distantly related. Because of this it is an excellent example of convergent evolution. These fishes occur from Argentina all the way to Peru, spanning the entire South American continent. There are about 97 species of crenucids and most of them are benthic (meaning they dwell at the bottom of streams and rivers the other are pelagic meaning they occur in the mid-water column). Their highest diversity is in Southeastern Brazil, and the Guiana shield. My first year at Western I sequenced four genes (loci) important for the first molecular tree of the family. This chapter will soon be published in an impactful Journal within the next month, (if all goes to plan). I am particularly interested in their functional traits including locomotor (posterior of the fish) and trophic (anterior of the fish) traits. I'm also building the first-time calibrated phylogeny to use as a backbone to test if they are in fact an example of an adaptive radiation. I have taken about 700 photos of

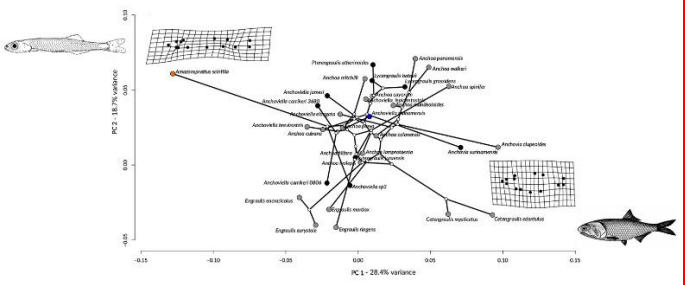


**Figure from a recently published 2019 paper with Kimberly Foster listed as a co-author.**

***Bloom D, Kolmann M, Foster K, Watrous H. Model of miniaturization influences body shape evolution in New World anchovies (Engraulidae) J. Fish Biol, 2019: 1-8.***

fish to use for geometric morphometrics which will allow me to view changes in body shape between the benthic and pelagic forms. I have given around five talks at a conference called the American Society of Ichthyologists and Herpetologists. I have recently been inducted into one of the most prestigious honor societies Phi Kappa Phi. I have received two grants from Western one for travel and one for research totaling $1700. I recently applied to the Society of Systematic Biologist grant for $3000 and am waiting to hear back. Outside of the lab I enjoy working out especially using the elliptical and weight room. I also enjoy cooking and spending time with my girlfriend, Jacy. I have a weekly scary movie night with my best friend Shelby Smith who just graduated from Western with a master's degree. I enjoy cleaning the house, cuddling with my cat Jasper and doting on him. I also like to binge watch my two favorite shows Outlander and Downton Abbey. Thank you for reading,

Kimberly Foster

# 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 7 peer-reviewed journal articles and 9 undergraduate students gave presentations at scientific conferences (see above) and received numerous awards (see below) in 2019.

**Student Grants and Awards.**

**Undergraduate Students**

Distinguished Senior in Biomedical Sciences – Ahmad Faryami and Kori Mecklenburg

Distinguished Senior in Biology – Eliza Foli

**Matthew Kornas (middle) with his mentor, Dr. Pamela Hoppe and lab mates**

Distinguished Pre-Professional in Biological Sciences – Kendall Jablonski and Matthew Kornas

Hazel Wirick Scholarship—Louis Mitchell

Margaret Thomas Du Mond Award – Hannah Mitchell

Colin J. Gould Memorial Scholarship—Hannah Mitchell

Frank Hinds Zoology Award—Yarielis Rosario

MPI Outstanding Undergraduate Research Award – Katelyn Kurrie

Presidential Scholar in Biological Sciences – Marwa Ahmed Saad

Best Honor's Thesis Award – Paige Blinkewicz

# Undergraduate Student Focus: Megan Alderman

My journey into science is a roundabout one, but for as long as I can remember, I have been interested in the world around me. I grew up in Portage, Michigan, was homeschooled in high school, and didn't have much interest in science at that time. I really enjoyed theatre, soccer, and cooking, which lead me to attend culinary school after graduating high school. I attended the Culinary Institute of Michigan of Baker College and graduated Cum Laude with my Associates degree in Culinary Arts in 2015. My degree allowed me to gain experience cooking at a restaurant in Orvieto, Italy, as well as in a few restaurants in Kalamazoo.

A scuba diving trip a few years ago had a huge impact on my life and changed how I thought about the world. I became passionate about conservation, environmental awareness, and the incredible world we live in. I always had a feeling I would return to school, and this experience led me to enroll at WMU as a biology major with a minor in environmental and sustainability studies. Since becoming a student at WMU, I have learned so much, and met so many wonderful people, and I am 100% confident in my choice of career change.

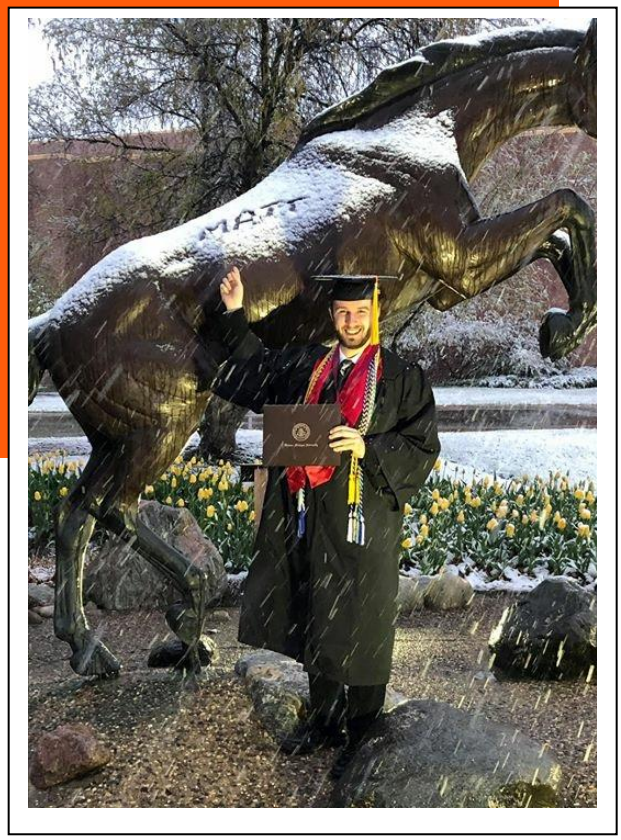
Since I have been at Western, I have worked as a peer academic success coach with Student Success Services, successfully achieved Deans list status for all semesters attended, and have maintained a 3.8+ GPA. I have been fortunate to receive the WMU academic achievement award, be a member of the Tau Sigma National Honors Society, and assist in research in Dr. Sharon Gill's sound ecology lab.

I became involved in Dr. Gill's lab after taking her class, Ecology and Evolution in the Fall semester of my second year. In this class, part of the lab objective was to complete a project about bird-window collisions on campus. We were all required to do some part in the project but had the option to volunteer to present the research at the end of the semester. I volunteered to present, because I enjoyed being a part of the project so much. After the semester was over, Sharon invited me to be a part of her lab. Since joining the lab, I have assisted with a project a previous grad student began, and have also assisted Ph.D student Joanna Sblendorio in her current project, which examines the effects of anthropogenic noise on vocal communication in bird communities. Dr. Gill and I are currently working on plans for a project of my own this coming year, which will focus on avian communication.

I really enjoy doing research in Dr. Gill's lab, because it combines some of my personal interests: effects of environmental change and animals. I have to say, my love for birds has rapidly increased since studying with Sharon, her passion is infectious.

Outside of classes and working in the lab, I decorate wedding cakes for a living at my family's business, Boonzaaijer Bakery. For fun, I enjoy reading, listening to podcasts, scuba diving and traveling (when I can), and playing live music around Kalamazoo with my husband.

My love for science and learning has only increased since attending Western, and I continue to be amazed at how much my passion grows for this field. I am grateful to WMU, the professors, and staff at Western who have not only opened doors of opportunity to me but have also opened my eyes to how amazing the world of science is. After graduation, I hope to find a position doing work in conservation biology, and eventually return to school to achieve a master's degree. I am excited to go wherever this career leads. Megan Alderman




# Alumni Quote

**My time at Western influenced my career/life by:** "providing opportunities for me to explore my passions for research and public service. I had the pleasure of working in a molecular biology research lab during undergrad, where I collaborated with both my lab advisor and graduate students on a project that I wrote and published my thesis on. I'm confident that my experiences and skill-building in the lab helped me successfully become a medical student at WMed. I'm incredibly thankful for the time I had in conducting research and that I can continue to pursue my medical and research goals right here in the Bronco community!"

***Matthew Kornas***

Medical Student – Class of 2023
Western Michigan University
Homer Stryker M.D. School of Medicine

# Outreach Activities

Besides active interest in research, teaching and service to the University, many faculty members are dedicated to outreach activities that bring their research interests and knowledge to the community. Below are just a few of the many outreach activities that faculty and students were involved in for 2019:

**Kathryn Docherty** was invited to speak about restoration ecology at the Oak Openings Green Ribbon Initiative Science Summit at the Toledo Botanical Garden's Crosby Center (November 2019)

**Kathryn Docherty** served as a SEEDS mentor for an under-represented minority student at the Ecological Society of America annual meeting in August 2019

**Kathryn Docherty** was named a Lee Honors College Fellow in April 2019, for her service mentoring LHC students in her research group and outreach activities with LHC. These include: providing mentor-matching information sessions to LHC freshmen, serving on information panels with other WMU faculty and serving as a Medallion Competition and Thesis Celebration Week judge.

**Sharon Gill and Maarten Vonhof** The Science of Birdsong. Sarett Nature Center, December 14, 2019

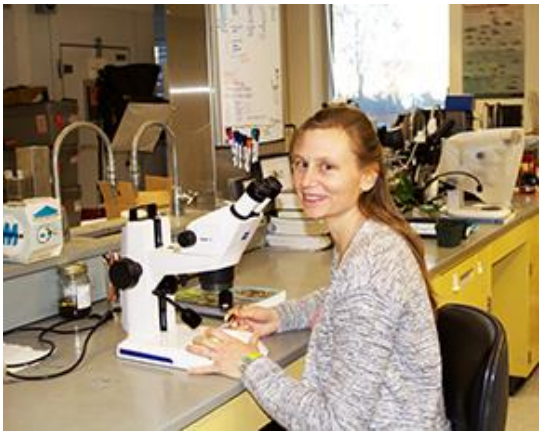
**Sharon Gill** Staff Enrichment: Bird and bat research in the Gill and Vonhof labs. Sarett Nature Center, Nov 14, 2019

**Sharon Gill** When birds fly: the scope and causes of bird-window collisions, with Dr. Denise Keele, Mary-Claire Griffith, and Dr. Gail Walter. Zugunruhe Celebration, Kalamazoo Nature Center, September 7, 2019

**Sharon Gill** On birds and soundscapes: Listening to stories of the environment. Capital Area Audubon Society, April 4, 2019. Barry County Bird Club, April 16, 2019, with M. Vonhof.

**Sharon Gill** Stand-up Science with comedian Shane Mauss, Shakespeares' Pub, Kalamazoo, January 26, 2019

**Tiffany Schriever** Interview with Gordon Evans. "How The Climate And Human Activity Can Change Wetlands". WMUK 102.1, Kalamazoo, MI, 21 March 2019. Radio.



**Sydney Sheltz-Kempf.** Podcast Interview with Dr. Hannah Maeda from PHD-SOS (APA citation below): PhD-SOS. "PhD Student, Sydney Sheltz-Kempf, talks about balancing a PhD and her passion for poetry." *PHD SOS: The Podcast*, Hannah Maeda, Aug 9, 2019, https://phdsosthepodcast.podbean.com/e/phd-student-sydney-sheltz-kempf-talks-about-balancing-a-phd-and-her-passion-for-poetry/

**Gobles High School STEM Outreach event:** A STEM outreach practicum was attended by 48 students to a freshman class and a junior/senior class in collaboration with Bob Lisowski, the Gobles STEM Instructor. Two graduate students (Alanna Van Huizen and Luke Kinsey), one undergraduate (Emily Bolhuis), WMU Assistant Director of Academic Advising (Diana Blouin), and WMU Manager of Undergraduate Recruitment (Gabriela Saliwanchik) was involved in the event. Each session consisted of a 25 minute basic science lecture, a 10 minute biological sciences career information session including handouts, and a hands-on practical lab experience. The lab focused on stem cell and regeneration experiments, which for the upper class students examined planarian flatworm regrowth following micro-surgeries performed by the students. In addition, students were able to manipulate the regeneration process and then follow regeneration (post-visit) over the next two weeks.

**Portage Northern Middle School STEM Outreach event:** This event was sponsored at Western Michigan University and organized with help from our Chair, Dr. John Spitsbergen.


# *Climate Change Outreach*

Over the last year, Dr. David Karowe has reached out to the community to discuss climate change. Below is the list of talks and presentations he has given to get this important information out.

Two Rivers Coalition, Lawton, “Effects of Climate Change on the Great Lakes Region”
Calvin College Plaster Creek Stewards, Grand Rapids, “Effects of Climate Change on Aquatic Ecosystems of the Great Lakes Region”
Kalamazoo Wild Ones, Kalamazoo, “Effects of Climate Change on Plants”
Cost of Carbon Panel, WMU, “The True Cost of Climate Change”
Episcopal Diocese of Northern Michigan Annual Conference, Marquette, “Effects of Climate Change on the Great Lakes”
Battle Creek Voices of Peace, Battle Creek, “Effects of Climate Change on the Midwest: Would the Paris Agreement Matter?”
Sierra Club of Kalamazoo, Kalamazoo, “Effects of Climate Change on the Great Lakes Region”
Kellogg Biological Station Field Ornithology Outreach, Hickory Corners, “Effects of Climate Change on Birds”
WMU Emeriti, WMU, “Effects of Climate Change on the Great Lakes Region”
Michigan State University Observatory, East Lansing, “Effects of Past and Future Climate Change on Michigan”
Northern Lights, Ann Arbor, “Effects of Climate Change on Northern Michigan”
Kalamazoo Club of Little Gardens, Kalamazoo, “Why Should We Care about Our Carbon Footprint?”
WMU Biology Club, WMU, “What Should Biologists Know about Climate Change?”
Stand Up Science, Kalamazoo, “Effects of Climate Change on Southwest Michigan”
Kalamazoo Nature Center Earth Day, Kalamazoo, “How Will Climate Change Affect Southwest Michigan?”
Friendship Village of Kalamazoo, Kalamazoo, "Effects of Climate Change on the Great Lakes Region”
University of Michigan Biological Station, Pellston, “Two Possible Climate Futures for the Great Lakes Region”
Michigan Snowsports Industry Association, “Effects of Climate Change on Michigan Winters”
Kalamazoo Nature Center Zugunruhe, Kalamazoo, “How Will Climate Change Affect Birds and Trees?”
Loy Norrix High School, “Effects of Climate Change on Southwest Michigan”
Bell’s Brewery, Comstock ““Two Possible Climate Futures for the Great Lakes Region (One Much Better than the Other)”
Fridays for the Future, Office for Sustainability “The Scientific Case for Urgent Action on Climate Change”
First Presbyterian Church of Kalamazoo “Two Possible Climate Futures for the Great Lakes Region (One Much Better than the Other)”
Hope College Academy of Senior Professionals “Two Possible Climate Futures for the Great Lakes Region (One Much Better than the Other)”

**Special Award:** 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. Kathryn Docherty. We congratulate Dr. Docherty on her 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 using the following link.

https://wmich.edu/biology/giving Please select "Make a Donation" at the bottom of the page. Donations should be made directly to the Department of Biological Sciences.

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The Department of Biological Sciences

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Thank you for considering a gift to the WMU Department of Biological Sciences. Have a happy holiday season! Go Broncos!!!!!