Letter from the Chair

Dear Alumni and Friends,

It gives me great pleasure to introduce the Department of Biological Sciences newsletter for 2015. 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 a good one for our department. We were able to hire a new faculty member, Dr. Devin Bloom, whose research and teaching interests are in the area of ecology and evolution of marine and freshwater fishes.

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
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Editor: Cindy Linn, Ph.D.
Dr. Devin Bloom joined the Department of Biological Sciences in June of 2015. Dr. Bloom got his start as a researcher during his B.A. at Saint Mary’s University in Winona, Minnesota, where he studied reproductive behavior of spawning brook lamprey. He then moved from the bluffs of the driftless area to the bayous of Louisiana where he completed a master’s degree at Southeastern Louisiana University. At SELU he worked with Dr. Kyle Piller on the systematics and biogeography of silverside fishes from Central Mexico. After 2.5 years of crawfish, oyster po’boys, six expeditions to Mexico and humid weather, Devin moved to Toronto, Canada for his Ph.D. at the University of Toronto. At U of T, Devin worked with Dr. Nathan Lovejoy on the evolution of transitions between marine and freshwaters in fishes. During this time, he developed a deep fondness for anchovies – not for eating, but rather as a study system.

Over the course of five years at U of T Dr. Bloom investigated the biogeographic events that facilitated transitions between marine and freshwaters in numerous fishes, including anchovies. This work led to asking how these habitat shifts impact diversification rates and create opportunity for ecological diversification via adaptive radiation. During this time, Dr. Bloom repeatedly explained in public talks that he does not work on fishes that migrate between marine and freshwaters within a single lifetime (e.g. salmon), a life history strategy called diadromy. Naturally, near the end of his Ph.D. he became interested in and investigated the evolutionary origins of diadromy. These research topics in addition to new areas such as exploring the mechanisms that cause disparity in morphological diversity among groups of organisms continue to fascinate and motivate questions in the Bloom lab.

The many hours of molecular lab work and fish dissections in the Bloom lab are punctuated by field expeditions to tropical countries including Guyana, Panama, Barbados, Trinidad, Suriname and Colombia. These trips usually occur sometime between January and May, when Dr. Bloom senses his vitamin D levels are low and starts to miss the humidity and warm temperatures of southern latitudes.

Dr. Bloom lives in Kalamazoo with his wife, Tiffany Schriever (Bloom) and their adorable lab-springer spaniel, Tiktaalik (Teek), the latter of whom lives for chasing pheasants with Devin, but usually keeps the birds safely out of range. Dr. Bloom spends his free time either outside running, biking, fishing, and hunting, or inside an ice arena watching and playing hockey.
Faculty Focus: Yan Lu

Dr. Lu joined the Department of Biological Sciences at WMU in August 2011. She received her Ph.D. in Botany from the University of Wisconsin-Madison in 2005. During her Ph.D. research with Tom Sharkey, Yan Lu discovered that starch degradation is regulated by day length and circadian rhythm. She also found that two cytosolic enzymes that are critical to starch breakdown at night. In 2005, Dr. Lu moved to Michigan State University for a research associate position in the laboratory of Dr. Robert L. Last. At MSU, she worked on a chloroplast functional genomics project which involves parallel phenotypic analyses of several thousand Arabidopsis mutants of nuclear-encoded, plastid-targeted genes.

Dr. Lu’s current laboratory research at WMU is focused on understanding the regulation of photosynthesis and the accumulation of photoassimilates in plants. The Lu Lab is currently comprised of one postdoc (Krishna Nath), one Ph.D. student (James P. O’Donnell), two M.S. students (Justin B. Hackett and Ryan L. Wessendorf), and three undergraduate students (Meriah K. Lucas, Kaley A. Walker, and Kelsey L. Walker). Dr. Nath works on the function of a NFU protein in the assembly of iron-sulfur clusters. Jim studies the roles of thylakoid zinc-finger proteins in biogenesis of thylakoid membranes and assembly and repair of photosynthetic apparatus. Ryan examines how LQY1 homologs aid in light tolerance and repair of photosynthetic apparatus in land plants and terrestrial algae. Justin investigates the function of a RNA-binding protein in photosynthesis and RNA editing.

Dr. Lu has received three internal research grants, the Support for Faculty Scholars Award (SFSA), the Research Development Award (RDA), and the Faculty Research and Creative Activities Award (FRACAA), and one NSF grant (MCB 1244008) to help support her students’ and postdoc’s research. Since August 2011, their efforts have led to ten abstracts/posters at institutional, regional, national, or international meetings and five peer-reviewed journal articles. Dr. Lu is a member of the International Society of Photosynthesis Research and the American Society of Plant Biologists. She has been an ad hoc reviewer for journals such as BMC Systems Biology, Cell Research, Frontiers in Plant Sciences, International Journal of High Throughput Screening, Plant Cell and Environment, Plant Journal, Plant Physiology, Plant Science, PLoS One. She is currently an editor in Frontiers in Plant Science. Dr. Lu’s teaching includes an undergraduate-level Plant Physiology course (BIOS 3190), a capstone/graduate-level Plant Biotechnology and Metabolic Engineering course (BIOS 5970), and a graduate-level Plant Physiology course (BIOS 6140).

Dr. Lu lives in Portage, Michigan. Her husband, Dr. Jian Yao, is also a tenure-track assistant professor in the Department of Biological Sciences at WMU. They have a lovely daughter Janelle. During her leisure time, Dr. Lu enjoys gardening. She loves being part of the WMU community, because WMU is a unique place that emphasizes the importance of both teaching and research.
Our Biological Sciences Alumni Achievement Award Recipient in 2015 was Dr. Jim Olson. Dr. Olson gave an inspiring seminar in October at WMU on his work to develop a collaborative drug discovery network for scientists to utilize for decades to come.

Dr. Jim Olson earned his BS in Biomedical Sciences from Western Michigan University and the Lee Honors College in 1984. He went on to earn a Ph.D. in Pharmacology in 1989 and an M.D. in 1991, both from the University of Michigan. He completed his residency in pediatrics in 1994 and completed his fellowship in pediatric oncology in 1997, both at the University of Washington. He is currently professor of Pediatric Hematology-Oncology at the University of Washington School of Medicine, is an Attending Physician at Seattle Children’s Hospital and a full member at the Fred Hutchinson Cancer Research Center.

Olson is a physician scientist who cares for children with brain tumors and discovers/develops new cancer therapies. His lab’s work led to 5 national clinical trials, of which he leads a Phase III trial through the Children’s Oncology Group. His team invented chlorotoxin-based Tumor Paint, which led to the clinical candidate BLZ-100, developed by Blaze Bioscience and currently in human trials. Dr. Olson is the founder of Presage Biosciences and Blaze Bioscience: The Tumor Paint Company. He authored “Clinical Pharmacology Made Ridiculously Simple”, which has been the most used pharmacology board review book for 23 years. In August, 2013, Olson and colleagues at Fred Hutchinson Cancer Center launched Project Violet, a citizen science initiative that is using crowd funding to enlist the help of the community to develop a fundamentally new class of anti-cancer compounds derived from organisms such as violets, scorpions and sunflowers, to attack cancer cells while leaving healthy cells untouched.
In November, Dr. Linda Mansfield gave a thought provoking lecture in Biological Sciences entitled, “We are what we eat; Exploring mechanisms underlying how the foodborne pathogen, *Campylobacter jejuni*, can trigger acute and autoimmune disease.”

Dr. Mansfield is a University Distinguished Professor in Large Animal Clinical Sciences in the Department of Microbiology and Molecular Genetics at Michigan State University. Her research interests are involved with the Comparative Enteric Diseases Laboratory (CEDL) at MSU. Her specific research objective is to understand the mechanisms that initiate autoimmunity secondary to *Campylobacter jejuni* infection.

The incidence of foodborne disease due to *C. jejuni* remain very high worldwide and many autoimmune conditions have been found to be associated with recent *Campylobacter* infection, including acute neuropathies in Guillain Barre Syndrome, Miller Fisher Syndrome and Reactive Arthritis. Dr. Mansfield’s research is designed to explore whether acute exposure to enteric pathogens can cause persistent disease. Towards this end, the CEDL has developed murine models of Miller Fisher Syndrome and Guillain Barre Syndrome to understand how infection with particular *C. jejuni* strains leads to initiation of autoimmunity. Dr. Mansfield has developed a murine model with a mutation in interleukin 10 that makes it difficult to battle enteric infections and results in rapid disease progression when infected with *C. jejuni*.

From her results to date, it is clear that *C. jejuni* carriage or colonization is sometimes sufficient to trigger Guillain Barre Syndrome. Dr. Mansfield expects that these models can be used to dissect mechanisms of autoimmunity and to serve as treatment and prevention surrogates for patients with Guillain Barre Syndrome or Miller Fisher Syndrome.

WMU’s Bach Lecturer is sponsored each year by the Michael K. Bach Distinguished Visiting Lectureship Endowment Fund and the Department of Biological Sciences.

2015 Biological Sciences Bach Lecturer

Linda Mansfield V.M.D., Ph.D.

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Faculty Activities

A. External Funding

The majority of faculty members in our department have active funding for their research programs. Included below is a list of current external grants that faculty have. Even in an environment where funding is increasingly difficult to obtain, our faculty have been successful in obtaining funds to continue their research at WMU. 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.

**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. Christine Byrd-Jacobs**
Title: Olfactory Bulb Cell Genesis and Survival in a Model of reversible Deafferentation.
Source: National Institutes of Health

**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. 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. Renee Schwartz co-PI and 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 Vonhof, 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. John Spitsbergen (co-PI)
Title: Environmental signal transduction: An interdisciplinary research experience for undergraduates (REU).
Source: National Science Foundation

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
B. Papers Published in 2015

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 2015. 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)

Elizabeth Skippington, Todd J. Barkman, Danny W. Rice, and Jeffrey D. Palmer. Miniaturized mitogenome of the parasitic plant Viscum scurruloideum is extremely divergent and dynamic and has lost all nad genes. PNAS 2015; published ahead of print June 22, 2015, doi:10.1073/pnas.1504491112

Schatzberg D, Lawton M, Hadyniak SE, Ross EJ, Carney T, Beane WS, Levin M, Bradham CA. H+/K+ ATPase activity is required for bio mineralization in sea urchin embryos. Dev Biol. 2015 Aug 15:DBIO15157

Van Nynatten, A.D., Bloom, D.D., Chang, B.S.W., and Lovejoy, N.R. 2015. Out of the blue: adaptive visual pigment evolution accompanies Amazon invasion. Biology Letters.11: 20150349.

White, E.J., S.K. Kounelis (REU undergrad), and C.A. Byrd-Jacobs. 2015. Plasticity of glomeruli and olfactory-mediated behavior in zebrafish following detergent lesioning of the olfactory epithelium. Neuroscience 284:622-631.

Docherty, K.M., Aiello, S.W., Buehler, B.K., Jones, S.E., Szymczyna, B.R., Walker, K.A. (2015) Ionic Liquid Biodegradability Depends on Specific Wastewater Microbial Consortia. Chemosphere. 136: 160-166 (Aiello, Buehler and Walker are UG co-authors)

Docherty, KM, Borton, H, Espinosa, N, Gebhardt, M, Gil-Loaiza, J, Gutknecht, JLM, Maes, PW, Mott, BM, Parnell, J, Purdy, G, Rodrigues, PA, Stanish, L, Walser, O, Gallery, RE. Key edaphic properties largely explain temporal and geographic variation in soil microbial communities across four biomes. PLoS One. DOI: 10.1371/journal.pone.0135352

Morlon H, O'Connor, TK, Bryant, JA, Charkoudian, LK, Docherty KM, Jones, E, Kembel SW, Green JL, Bohannan, BJM. 2015. The biogeography of putative microbial antibiotic production. PLoS One. DOI: 10.1371/journal.pone.0130659

Conrad, S.J., El-Aswad, M., Kurban, E., Jeng, D., Tripp, B.C., Nutting, C., Eversole, R., Mackenzie, C. and Essani, K. Oncolytic tanapoxvirus expressing FliC causes regression of human colorectal cancer xenografts in nude mice. J. Exp. & Clin. Cancer Res., 34: 19, 2015.

David Mata, David Linn, Cindy Linn. Retinal ganglion cell neuroprotection induced by activation of alpha7 nicotinic acetylcholine receptors. Neuropharmacology (2015) 99: 337-346.

Cynthia A. Gossman, David Linn, Cindy Linn. Glaucoma-inducing procedure in in vivo rat model and whole-mount retina preparation. JOVE (2015).
Bolivia and Argentina. Biotropica 47(3): 355-362.

Malcolm, S.B., and B.H. Slager. 2015. Migration and host plant use by the southern monarch, Danaus erippus. Pages 225-235, in, K.A. Oberhauser, K.R. Nail and S. Altizer (editors), Monarchs in a changing world: Biology and conservation of an iconic butterfly. Cornell University Press, Ithaca, N.Y., USA.

Zalucki, M.P., L.P. Brower, S.B. Malcolm and B.H. Slager. 2015. Estimating the climate signal in monarch population decline: no direct evidence for an impact of climate change? Pages 130-141, in, K.A. Oberhauser, K.R. Nail and S. Altizer (editors), Monarchs in a changing world: Biology and conservation of an iconic butterfly. Cornell University Press, Ithaca, N.Y., USA.

Martinez Traverso, Griselle (REU undergrad) and Pearl, Christopher A. Immunolocalization of G protein-coupled receptor in the rat epididymis. Accepted for publication in Reproductive Biology and Endocrinology 2014.

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 Sediments. Geomicrobiology Journal, 2015. DOI:10.1080/01490451.2015.1049676

Jason R. Keeler, Edward A. Roth, Brittany L. Neuser, John M. Spitsbergen, Daniel J. Waters, John-Mary Vianney. The Neurochemistry of social flow of singing: Bonding and Oxytocin. Frontiers in Human Neuroscience (2015).

Brierley, L., M. J. Vonhof, K. J. Olival, P. Daszak, and K. E. Jones. In press. Quantifying global drivers of zoonotic bat viruses: A process-based perspective. American Naturalist

Warburton, E. M., S. L. Kohler, and M. J. Vonhof. In press. Patterns of parasite community dissimilarity: the significant role of land use and lack of distance-decay in a bat—helminth system. Oikos.

Vonhof, M. J., A. L. Russell, and C. M. Miller-Butterworth. 2015. Range-wide genetic analysis of little brown bat (Myotis lucifugus) populations: estimating the risk of spread of white-nose syndrome. PLoS One 10:e0128713.

Russell, A., C. Pinzari, M. Vonhof, K. Olival, and F. Bonaccorso. 2015. Two tickets to paradise: multiple dispersal events in the founding of hoary bat populations in Hawai’i. PLoS One 10:e0127912.

Vonhof, M. J., and A. L. Russell. 2015. Genetic approaches to the conservation of migratory bats: a study of the eastern red bat (Lasiurus borealis). PeerJ 3:e983

Gill, S. A., J. R. Job, K. Myers, K. Naghshineh, and M. J. Vonhof. 2015. Toward a broader characterization of anthropogenic noise and its effects on wildlife. Behavioral Ecology 26:328-333.

Zhang, L., J. Yao, J. Withers, X. Xin, R. Banerjee, Q. Fariduddin, Y. Nakamura, K. Nomura, G. A. Howe, W. Boland, H. Yan and S. Y. He. Host target modification as a strategy to counter pathogen hijacking of the jasmonate hormone receptor. (2015) Proceedings of National Academy of Sciences of the United States of America 112: 14354-14359.

Zhang, F., J. Yao*, J. Ke, L. Zhang, V. Q. Lam, X. Xin, X. E. Zhou, J. Chen, J. Brunzelle, P. R. Griffin, M. Zhou, H. E. Xu, K. Melcher and S. Y. He. Structural basis of JAZ repression of MYC transcription factors in jasmonate signaling. (2015) Nature 525: 269-273. (*Co-first author)

Xin, X., K. Nomura, X. Ding, X. Chen, K. Wang, K. Aung, F. Uribe, B. Rosa, J. Yao, J. Chen, and S. Y. He. Pseudomonas syringae effector AvrE localizes to the host plasma membrane and down-regulates the expression of the NDR/HIN1-like 13 gene required for antibacterial immunity in Arabidopsis. (2015) Plant Physiology 169: 793-802.
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, Deochand ME, Bacher J. Calcium Signaling and Regenerative Shape. 3rd North American Planarian Meeting, Chicago, IL, September 2015.

Paskin TR, Bacher J, Beane WS. Planarian “Vision”: A Combination of Ocular and Dermal Phototransduction. 3rd North American Planarian Meeting, Chicago, IL, September 2015.

Deochand ME, Duong KN, and Beane WS. Novel Ablation Assay Reveals Eye Regeneration Program. Annual meeting of the Michigan Chapter of the Society for Neuroscience, Mt. Pleasant, MI, May, 2015.

Dickens, J.M. and C.A. Byrd-Jacobs. Plasticity of mitral cell dendritic morphology in the adult zebrafish olfactory bulb following chemical deafferentation. Society for Neuroscience, 2015.

Trimpe, D.M. and C.A. Byrd-Jacobs. Patterns of olfactory bulb cell genesis are altered with long-term, partial deafferentation in adult zebrafish. Michigan Chapter of Society for Neuroscience, 2015.

Trimpe, D.M. and C.A. Byrd-Jacobs. Zinc sulfate affects ciliated olfactory sensory neurons more than microvillous olfactory sensory neurons in the adult zebrafish. Michigan Chapter of Society for Neuroscience, 2015.

Hentig, J. T. and C.A. Byrd-Jacobs. Zinc sulfate affects ciliated olfactory sensory neurons more than microvillous olfactory sensory neurons in the adult zebrafish. Michigan Chapter of Society for Neuroscience, 2015.

Hentig, J. T. and C.A. Byrd-Jacobs. Zinc sulfate affects ciliated olfactory sensory neurons more than microvillous olfactory sensory neurons in the adult zebrafish. Michigan Chapter of Society for Neuroscience, 2015.

Hentig, J. T. and C.A. Byrd-Jacobs. Zinc sulfate affects ciliated olfactory sensory neurons more than microvillous olfactory sensory neurons in the adult zebrafish. Michigan Chapter of Society for Neuroscience, 2015.

K.M. Docherty. Toward belowground restoration: understanding the effects of land management on soil microbial communities in a tallgrass prairie. Ecological Society of America (ESA), Baltimore, MD, August 2015.

D.S. Pearce, B. Hoover, G.A. Nevitt, K.M. Docherty. The role of environmental and genetic factors in shaping the microbiome of a highly olfactory bird species. Ecological Society of America (ESA), Baltimore, MD, August 2015.

D.S. Pearce, B. Hoover, G.A. Nevitt, K.M. Docherty. The role of environmental and genetic factors in shaping the microbiome of highly olfactory bird species. 7th Annual Argonne Soil Metagenomics Meeting, Lisle, IL, October 2015.

K.M. Docherty, K.M. Lemmer, R.L. Hale. Terrestrial Influences on Airborne Microbial Communities. 7th Annual Argonne
Valenti, A.B., Boothby-Shoemaker, W.T., Katbamna, B., Ide, C.F. (2015) Increased presence of inflammatory proteins within the pontocerebellar tracts in Multiple System Atrophy. Society for Neuroscience Abstracts, Chicago, Illinois

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

Charles Ide. (2015) Understanding MSA at the Molecular Level: Setting the Basis for New Therapeutics. Keynote address, May 28, 2015, to Hope for MSA, and Dayton Barefoot Runners MSA fundraiser, Dayton, Ohio.

Jellies, J. and T.K.H. Groves. (2015). In which the eyes of the beholder are a worm's: Mapping of multiplexed visual cues across the array of cephalic eyes in a leech. Society for Neuroscience, Chicago (330.11).

Slaters, T.K.H. and J. Jellies. (2015). Responses across ocular and presumptive non-ocular cephalic visual inputs in the leech. MI SFN 46:

Miller, D.A., M.Ellinger, J. Jellies, A. Ferguson, C. L. Linn, and M. E. Koelling (2015). Pre-computed optimal current stimuli evoke similar neuron membrane voltages as non-optimal stimuli. MI SFN 46:

Webster M, Gossman C, Linn CL. 2015. Proliferation of retinal ganglion cells in a mammalian model. ARVO abstract. # 2173435.

Miller DA, Ellinger M, Jellies J, Ferguson A, Linn CL, Koelling ME. 2015. Generating Neuron Membrane Action Potentials Using Optimal Input Current Stimuli in the Medicinal Leech. Soc. Neurosci Abstract Chicago, Ill.

S.B. Malcolm “Host plants and migration success: A holistic approach” Invited seminar at Monsanto Corporation, St. Louis, Missouri, 19 May 2015

S. Malcolm and B. Slager. Migration, host plant use and chemical defence in the southern monarch butterfly, Danaus erippus. Invited symposium speaker at V Encuentro de Lepidoptera Neotropicales in Tucumán, Argentina, 16-20 November 2015

Rossbach, S., C. Beaver, A. Williams, E. Atekwana, L. Slater, D. Ntarlagiannis, A. Lund. Field Evidence for Magnetite Formation by a Methanogenic Microbial Community AGU Fall Meeting, San Francisco, CA, December 14-18, 2015.

Rossbach, S., C. Beaver, A. Williams, E. Atekwana, L. Slater, D. Ntarlagiannis, A. Lund. Indications of Coupled Carbon and Iron Cycling at a Hydrocarbon-Contaminated Site from Time-Lapse Magnetic Susceptibility (MS) Profiles. AGU Fall Meeting, San Francisco, CA, December 14-18, 2015.

Rossbach, S., C. Beaver, A. Williams, E. Atekwana, L. Slater, D. Ntarlagiannis, A. Lund. Use of the Complex Conductivity Method to Monitor Hydrocarbon Degradation in Brackish Environments. AGU Fall Meeting, San Francisco, CA, December 14-18, 2015.

Rossbach, S., C. Beaver, A. Williams, E. Atekwana, L. Slater, D. Ntarlagiannis, A. Lund. Biogeophysics as a tool for “smart sampling” during the microbial degradation of hydrocarbons. 13th Symposium on Bacterial Genetics and Ecology (BAGECO 13) The Microbial Continuity Across Changing Ecosystems, Milano, Italy, 14-18 June 2015.

Rossbach, S., C. Beaver, A. Williams, E. Atekwana, L. Slater, D. Ntarlagiannis, A. Lund. Integrating microbial and geophysical methods for determining biodegradation pathways. 2015 Bioremediation Symposium, Miami, Florida, May 18-21, 2015.
Ntarlagiannis, D., L. D. Slater, C. Kimak, P. Argyrakis, E. A. Atekwana and S. Rossbach. Geoelectrical characterization and monitoring of hydrocarbon degradation. 2015 Bioremediation Symposium, Miami, Florida, May 18-21, 2015.

Atekwana, E., L. Slater, D. Ntarlagiannis, C. Beaver, A. Williams, and S. Rossbach. Magnetic susceptibility as a tool for assessing bioremediation of hydrocarbon contaminated sites. 2015 Bioremediation Symposium, Miami, Florida, May 18-21, 2015.

Williams, A., C. Beaver, E. Atekwana, L. Slater and S. Rossbach. Microbial Community Analysis in Petroleum-Contaminated Sediments Displaying High Magnetic Susceptibility. Michigan Branch of the American Society for Microbiology Spring Meeting, Ypsilanti, MI, April 10-11, 2015.

S.R. Joseph (REU undergrad), J.M. Vianney and J.M. Spitsbergen. The Effect of Rk35 Anti-Myostatin on Muscle Growth and Neurotrophic Factor Expression in Heart Tissue and Cardiac Muscle Cells in Culture. Annual Biomedical Research Conference for Minority Students (ABRCMS), 2015.

M.J. Vonhof. A review of North American bat population genetic research and implications for treatment. White Nose Syndrome Treatment Workshop, Grand Rapids, MI, 2015.

M.J. Vonhof, T. Carter, R. Eversole, and M.K. Keel. Does chitosan combat growth of Pseudogymnoascus destructans and prevent White Nose Syndrome? An experimental test. White Nose Syndrome Treatment Workshop, Grand Rapids, MI, 2015.

M.J. Vonhof. Wind energy technologies: Opportunities and challenges. WMU Lee Honors College Lyceum Lecture Series on Sustainable Energy Future, 2015.

J.D. Smith, S.A. Gill, K.M. Baker, and M.J. Vonhof. The effect of urbanization on prevalence and diversity of avian blood parasites. Michigan Bird Conservation Initiative, Tustin, MI, 2015.

D.C. Carter, K. Docherty, S. Gill, K. Baker, M.J. Vonhof. Avian antibiotic resistant bacteria: An investigation across bird species and land use in southwest Michigan. Michigan Bird Conservation Initiative, Tustin, MI, 2015.

J.B. Hackett, M.K. Lucas, R.L. Wessendorf, Y. Lu. The role of an RNA-binding protein in photosynthesis and RNA editing. The WMU 9th Annual Research and Creative Activities Poster and Performance Day in Kalamazoo MI, April 2015, Poster.
Graduate Student Activities.

The past year has been an outstanding one for our graduate students in Biological Sciences. Graduate students were included 20 times as co-authors on papers published in peer-reviewed scientific journals (see above), gave 27 presentations at scientific conferences (see above) and received numerous grants and awards (see below).

Graduate Student Awards Presented to Students in the Spring

Distinguished Biological Sciences Graduate Student – NaTasha Schiller

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

Masters – Teaching – Nicholas Martin
Masters - Research – Anja Williams
Ph.D. – Teaching – Charles Nutting
Ph.D. – Research – Jacob Job (All-University Award!)

Leo C. Vander Beek Graduate Student Plant Biology Award – Ryan Wessendorf

Hazel Wirick Scholarship – Awarded through Kalamazoo Garden Club – Justin Hackett

MPI Outstanding Graduate Research Award – Master’s level – Justin Hackett and Tetiana Petrachkova

MPI Outstanding Graduate Research Award – Doctoral level – Jacob Job and Chuck Nutting

Department of Biological Sciences Graduate Travel Awards – Andrew O’Donnell, Douglas Pearce, Joanna Dickens, Darcy Trimpe and Annie Valenti

Graduate College – Graduate Student Research Grant – Nicholas Martin, Hannah Borton and Matthew Deighton
I began my journey at Western Michigan University two years ago when I was awarded a Fulbright Graduate Scholarship. At that point, I was a graduate student in Ukraine, and could not have been happier to find out that I was given such an amazing opportunity to study abroad at Western Michigan University.

The Fulbright Foreign Student Program is sponsored by the United States Department of State, Bureau of Education and Cultural Affairs. It provides funding to conduct graduate study and research in one of the Universities in the United States. The grant processing took about a year and it was all kind of fun: applications, proposals, interviews, exams, more interviews, and, of course, a lot of waiting. Nonetheless, by the summer of 2012, I was leaving for Western Michigan University.

I was studying General and Molecular Genetics in Ukraine, and was looking forward to a new project in the Department of Biological Sciences at Western Michigan University. I consider myself pretty fortunate for meeting Drs. Kane and Warga, and am grateful they have allowed me to join their Developmental Genetics laboratory. Everything in the beginning, except for a few things, was new to me. Wouldn’t you agree, that after working in a yeast Genetics laboratory for four years, it would be a “little bit” overwhelming to master a brand new system – zebrafish. For two years, I worked on my Master’s research in Dr. Kane’s lab, studying a zebrafish cell cycle mutant. Why was it important and interesting to me, one might wonder? The answer to that is pretty simple: I have been curious to understand how and why conservative cell cycle pathways are important in the early vertebrate development.

One of the most exciting parts of the research was actually confirming a hypothesis. I could not have been happier when our hypothesis was confirmed using a novel gene editing technique called CRISPR/Cas9 system. It definitely took some time and effort to learn the procedure and see a result, but it worked. The CRISPR/Cas9 system originates from a bacteria vs. virus defense strategy, and has been successfully adopted in
eukaryotic system. What we created was a construct that was placed in zebrafish embryos to recognize and change particular sequences in their genome. Our goal was to create a mutant using CRISPR that would resemble our original cell cycle mutant and confirm the origin of the mutant phenotype we worked with.

In two years, I have answered some questions regarding my project, and I was proud to present them at my Master’s thesis defense. I could not be more grateful for the Fulbright Grant that has allowed me to continue my graduate studies as a Ph.D. student in Dr. Kane’s lab, for allowing me to meet groundbreaking scientists in my field and for having the greatest experience of my life.

Elizabeth Warburton recently graduated with her Ph.D. from the Department of Biological Sciences at Western Michigan University in 2014. Her Ph.D. research was performed in the lab of Dr. Maarten Vonhof, Associate Professor of Biological Sciences, and focused on how and why parasites are distributed in the manner that they are around the world and why certain hosts are more likely to be infected than others.

After receiving her Ph.D. degree, Dr. Warburton received a Fulbright Postdoctoral Fellow to work at Ben Gurion University of the Negev in Israel with Dr. Boris Krasnov, a leading international expert in parasitology. “This is an amazing opportunity to work with Professor Krasnov,” says Dr. Warburton. “I’m also excited to explore a new part of the world with its different landscape and culture. I like new experiences.” Dr. Warburton left in November for the 20-month fellowship. Go Broncos!!!
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 6 peer-reviewed journal articles and 8 undergraduate students gave presentations at scientific conferences (see above) and received numerous awards (see below) in 2015.

**Student Grants and Awards.**

**Undergraduate Students**

- **Presidential Scholar in Biological Sciences** – Nicole Carpp
- **Distinguished Senior in Biomedical Sciences** – Emily Manzon
- **Distinguished Senior in Biology** – Jamie Hentig
- **Distinguished Pre-Professional in Biological Sciences** – Joseph Barnett
- **Margaret Thomas Du Mond Award** – Matt Gibson
- **Hazel Wirick Scholarship** – Awarded through Kalamazoo Garden Club - Alexys K. Nolan
Joseph Barnett is a biomedical science senior in the Department of Biological Sciences at Western Michigan University and an Honors student through Lee Honors College. As an undergraduate student, Joseph and an alumnus of Western Michigan University developed and submitted a patent through Western Michigan University for an inexpensive NeoVent respiratory life support system to be used in underserved parts of the world. NeoVent has won the nationally prestigious Lemelson-MIT ‘Cure-it!’ prize, the Brian Thomas Entrepreneurial Spirit Award through Haworth College of Business at Western Michigan University, the James Dyson National Award and Top 20 International Award, won first place in the Venture Well BME Start competition for biomedical devices, and won first place in the Collegiate Inventors Competition, as well as many internal awards through the Department of Biological Sciences at Western Michigan University.

In October, Joseph attending the 2015 Grand Challenges Global Health Summit in Beijing China that focused on healthy birth, growth and development. In November, Joseph traveled to Alexandria, Virginia to compete in a multiday competition sponsored by the United States Patent and Trademark Office and the AbbVie Foundation. Joseph and his Western alumnus won the competition and were awarded the undergraduate Gold medal.

Besides Joseph’s business and development of new technology, he has been involved in glaucoma research in the lab of Dr. Cindy Linn in the Department of Biological Sciences. Joseph has been using an in vivo rat model to examine proliferation of adult retinal ganglion cells after treatment with an alpha7 nicotinic acetylcholine receptor agonist. As adult mammalian neurons do not typically proliferate, the results of these studies have tremendous implications. Joseph will be a co-author on the characterization of the proliferative effect paper that is in progress.

After graduating in December from Western Michigan University, Joseph will be moving to Honduras where he has accepted a volunteer teaching position in a bilingual school. He will be teaching and volunteering in the hospital clinic. In March, he will present his NeoVent at Open Minds 2016, a conference on technology entrepreneurship for higher education. Ultimately, Joseph will be heading to medical school. My guess is that he will have his pick of programs to attend.

By Cindy Linn
James (Jamie) Hentig is one of our exceptional Lee Honors College students majoring in Biology. But Jamie is not typical: he is a disabled combat veteran who served as a senior medic in the US Army. While deployed to Afghanistan in 2009-2010 in support of Operation Enduring Freedom, Jamie suffered a traumatic brain and spinal cord injury. He was medically retired from the military in 2012. Jamie has continued his recovery and has managed to succeed as a student and researcher. Jamie is performing an investigation of the effects of a heavy metal on the olfactory system in zebrafish, using a number of histological, microscopic, and behavioral techniques. He has found that the toxin has selective effects on specific cell types in the olfactory organ and that treated fish cannot respond to particular odors. He has presented his results at an international conference of the Association for Chemoreception Sciences and at several national and regional conferences including the Argonne National Laboratory Undergraduate Symposium, the Michigan Chapter of the Society for Neuroscience, and the West Michigan Regional Undergraduate Science Research Conference. His accomplishments as an undergraduate researcher have won him several research awards and internships. Jamie is graduating in April and has had several interviews for neuroscience graduate programs. He plans to enter a doctoral program this fall and study regeneration of the brain after injury, so he can help other disabled combat veterans.

By Christine Byrd-Jacobs

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. Sharon Gill. We congratulate Dr. Gill on her research and teaching success!
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.

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