

**2015
Annual Report
Department of Biological Sciences**

**Missouri University of Science &
Technology**

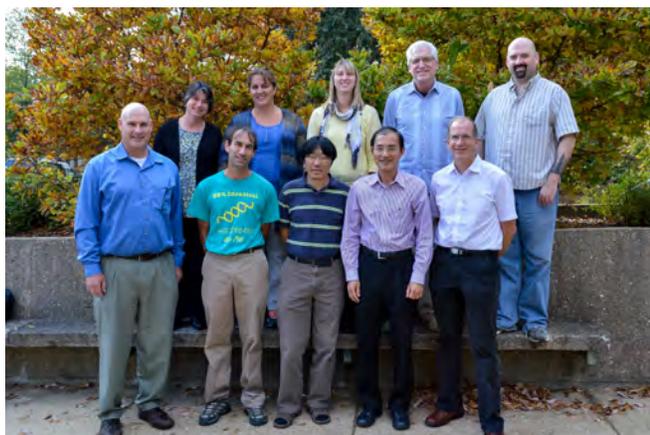
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Note: This Annual Report is prepared to improve communications with the S&T Biological Sciences community. To reduce the environmental impact of our activities, the report is published online; printed copies are available upon request. We publish the calendar annual report in February of the following year. We hope you find this information useful and the format accessible. Your feedback and ideas are welcome.

Useful BioSci Links

- Department biosci.mst.edu
Missouri S&T www.mst.edu
BioSci Donations givingtomst.missouri.edu
S&T Biology FaceBook [Missouri S&T Biology](#)

BioSci Mission Statement: The Missouri S & T Department of Biological Sciences is an academic community focused on learning and discovery. The S&T BioSci community provides a supportive, collegial, challenging and rewarding environment for its faculty, students, and staff.

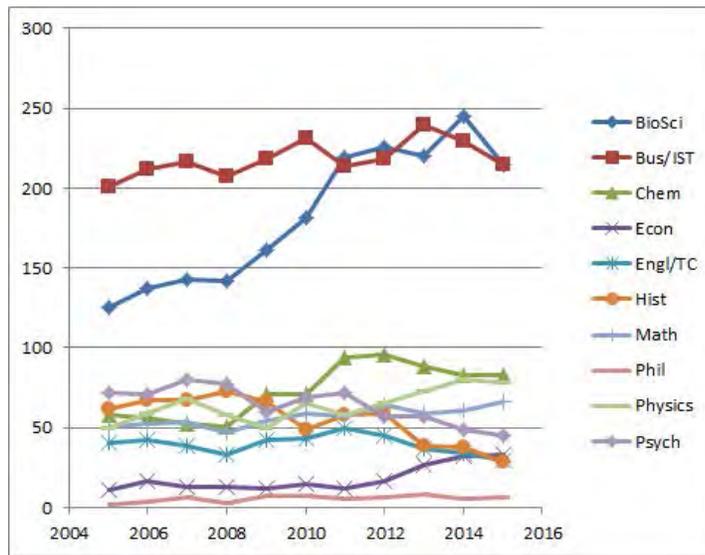
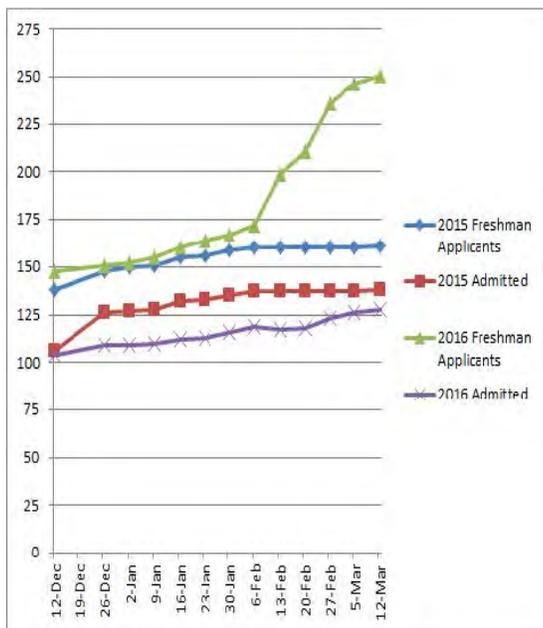


Faculty: After 11 years serving as department head, Dr. Robert S. Aronstam retired in June 2015. He has accepted the position of the dean of College of Science and Technology at Bloomsberg University in Pennsylvania. Under Dr. Aronstam's leadership and support from faculty and staff, BioSci undergoes tremendous growth and becomes the sixth largest department on campus. His status of professor emeritus has been approved by the university.

Faculty members continue to actively engage in research activities. Dr. Yue-Wern Huang is supported by NIH to study bone repair and regeneration. Dr. Dev Niyogi's Mill Creek Watershed Assessment with the US Forest Service has been extended for another year. Dr. Westenberg and three faculty members in mathematics successfully renewed their grant from the Missouri Department of Higher Education to train elementary and middle school teachers in integrated math and science education. Dr. Melanie Mormile received a UM Fast Track grant to study the ability of a bacteria strain to transform glycerol to a polymeric precursor that can be used to product textiles and carpeting. Dr. Katie Shannon received an S&T educational mini-grant for her proposal, "Do flipped lectures increase student engagement with course material?" Dr. Westenberg was selected as a German Academic Exchange Service (DAAD) Research Ambassador. Dr. Chen Hou was interviewed live by superhumanradio.com to discuss about mechanisms of aging and development. Dr. Yue-Wern Huang and Dr. Dave Westenberg each received a grant from the S&T Miner Tank. Several external grant proposals from faculty members are pending for review by state and federal agencies.

Students: Chance Walker, Amanda Bloom, and Anthony Bitar received Gale-Hufham Scholarship. Anthony Bitar and Caleb Trecuzzi earned second place in the CBSE poster competition. Natalie Holste and Anthony Bitar earned OURE Fellows awards. Kailea Tildon received the first Renaissance Student Award in the college which highlights student's excellence in multiple unrelated fields. Andrew Lott was named outstanding Beginning Teachers during MACTE conference. Seventy-eight BioSci Majors were honored on Dean's List.

Enrollment: Enrollment has more than doubled in the past decade. With 211 biology majors, the department is now the 5th largest department on campus. The number of first time freshman applicants for fall 2016 grew more than 53% by the end of February 2016.



Development: Several exciting events are happening! A two-page white paper to establish an interdisciplinary PhD in bioscience has received approval from the university. A campus-wide committee has started to develop a full proposal and submit to the UM-System for approval. A PhD program in bioscience would significantly advance the mission of our department as well as academic stature of the department. The Bohigian Field Station is under development. This facility will benefit biosci education and research. The second and third floors of Schrenk Hall will undergo a phase II renovation in June 2016 to address infrastructure issues and increase the building’s capacity for laboratory space. The renovation is expected to be completed in June 2017.

Many details and activities are available on our website (biosci.mst.edu). You may also find us on our FaceBook page (Missouri Biology). Your comments, suggestions, and financial support are welcome. We also invite you to visit the department for a tour and update.

Sincerely,

Yue-Wern Huang, Ph.D.
Professor and Chair, Biological Sciences



Ronald L. Frank, Ph.D.

Associate Professor

Laboratory of Plant Molecular Genetics

Research Interests

Identification of gene families and other functional sequences using computer algorithms
Evolution and expression of gene families in legumes
Characterization of insertion sequence families in bacteria

Education

Houghton College, Houghton, NY, B.S. General Biology, 1978
The Ohio State University, Columbus, OH, M.Sc., Genetics, 1981
The Ohio State University, Columbus, OH, Ph.D., Genetics, 1985
USDA Agricultural Research Service, Beltsville, Postdoctoral Fellow, 1985-88

2015 Teaching

SP15: Plant Biology (BioSci 2383)
SP15: Genomics (BioSci 5333)
SS15: General Genetics (BioSci 2223)
FS15: Molecular Genetics (BioSci 4323)
FS15: Evolution (BioSci 2233)
Undergraduate advisees: 28 majors
Undergraduate researchers: Sharon Lee, Kirsten Kelley
(BioSci 4099), Brandon Lile

Graduate Students:
Michael Sadler M.S., National Biological
Honor Society Council Representative
and Faculty Advisor: Phi Sigma

OURE student for 2015-2016

Brandon Lile, Computer Science
Project Title: Development of a Bioinformatics Tool to Identify
Terminal Imperfect Inverted Repeats of Transposable Elements



Dr. Frank with talks with students interested in genomics research at the Helix-sponsored Open Lab.



Chen Hou, Ph.D.

Assistant Professor
Laboratory of Animal Physiology

Research Interests

Metabolic basis of aging; Eusocial insect physiology and social network; Energetic basis of animal growth and reproduction; Mammalian respiratory physiology.

2015 Peer-reviewed Journal Publications

C. Hou. The similarity and difference between ant and human ultrasocieties: from the viewpoint of scaling laws. (Commentary article) *Behavioral and Brain Sciences*. In press.

C. Hou*, K. Amunugama. On the Complex Relationship between Energy Expenditure and Longevity: Reconciling the Contradictory Empirical Results with a Simple Theoretical Model. *Mechanisms of Ageing and Development*, 149:50-64.
(The co-author is a graduate student in Hou lab.)

L. Jiao, K. Amunugama, M. Hayes, M. Jennings, A. Domingo, and **C. Hou***. Food restriction-induced alteration of energy allocation strategy in hornworms (*Manduca sexta* larvae). *The Science of Nature* (former *Naturwissenschaften*), 102:40-50.
(All the co-authors are students in Hou lab.)

2015 Invited Speech

Hou, C., Why do smaller dogs live longer than larger ones? A universal theory to answer long-standing puzzles in aging study. Invited seminar talk at Santa Fe Institute, Santa Fe, New Mexico, December, 2015.

2015 Teaching

Spring: Human Anatomy and Physiology II (Bio 3343)

Summer: Evolution (Bio2233)

Fall: Mathematical modeling in biology (Math 4097) (Co-taught with Dr. John Singler, 50%)

2015 Advising

Undergraduate researchers (8): Nolan Ferral; Kyara Holloway; Haley Neeter; Darius Mann; Chance Walker; Xavier Baker, Tim Butz; and Hannah Goodman

Graduate advisee: Kaushalya Amunugama

2015 Activities

Panelist for NSF, Integrative Organismal Systems (April, 2015)

Member of Ph.D. Committee of James Maino at University of Melbourne and Vrije Universiteit, Melbourne, Australia (2015).

Reviewer of peer-reviewed international journals: *Functional Ecology*; *Natural Resource Modeling*



Yue-Wern Huang, Ph.D.

Professor & Interim Chair

Director, Laboratory of Molecular Toxicology and Nanomedicine

Research Interests

- Nanomaterial toxicity in the aspect: how physicochemical properties of nanoparticles contribute to molecular toxicity mechanisms
- Using nanomaterials and cell-penetrating peptides (CPPs) to deliver biologically active molecules into the cell for biomedical applications
- Pollutants and environmental health

2015 Peer-reviewed Journal Publications

2015. Betty R. Liu, Yue-Wern Huang, Robert S. Aronstam, and Han-Jung Lee. Comparative mechanisms of protein transduction mediated by cell-penetrating peptides in prokaryotes. *International Journal of Molecular Sciences. Journal of Membrane Biology*, 248(2):355-368. doi:10.1007/s00232-015-9777-x.

2015. Yue-Wern Huang, Han-Jung Lee, Larry M. Tolliver, and Robert Aronstam. Delivery of nucleic acids and nanomaterials by cell-penetrating peptides: opportunities and challenges. *BioMed Research International. Special Issue "Advances in Gene Delivery Systems"*, volume 2015, article ID 834079, 16 pages. doi:10.1155/2015/834079.

2015. Betty R. Liu, Hwei-Hsien Chen, Ming-Huan Chan, Yue-Wern Huang, Robert S. Aronstam, and Han-Jung Lee. Three arginine-rich cell-penetrating peptides facilitate cellular internalization of red-emitting quantum dots. *Journal of Nanoscience and Nanotechnology* 15:2067-2078.

2016. Betty R. Liu, Yue-Wern Huang, Robert S. Aronstam, and Han-Jung Lee. Identification of a short cell-penetrating peptide from bovine lactoferricin for intracellular delivery of DNA in human cells. *PLOS ONE*, submitted.

2015 Book Chapters

2015. Charles C. Chusuei, Chi-Heng Wu, Shravan Mallavarapu, Fang Yao Stephen Hou, Chen-Ming Hsu, Robert S. Aronstam and Yue-wern Huang. Chapter 8: Review: Physicochemical Structure Effects on Metal Oxide Nanoparticulate Cytotoxicity. In: *Recent Progress in Surface and Colloids Chemistry with Biological Applications*. Editors Wang, C; Hauserman, B. ACS Symposium Series, Vol.1215. American Chemistry Society, Washington DC, pp 137-155.

2015. Yue-Wern Huang and Sutapa Barua. *Oral Drug Delivery Systems for Gastrointestinal Cancer Therapy*. Kaushal Rege (ed.); World Scientific Publishing. (Submitted)

2015 Presentations

Invited Speech

2015, Sept. 28. University of Missouri-Columbia. Title: Properties of Engineered Nanoparticles Influence Nanodelivery and Nanotoxicity. Columbia, MO, USA.

Conference Presentation

2015, March 22-26. 54th Annual Meeting of the Society of Toxicology. Distinct patterns of cell death in A549 cells by fourth-period transition metal oxide nanoparticles. Yue-Wern Huang, Larry M. Tolliver, Fang Yao Stephan Hou, Robert S. Aronstam, and Han-Jung Lee. San Diego, CA, USA.



2015 External Funding

2014 – 2016. Reduction of the BMP2 Dose Required for Bone Regeneration through the Use of a New Intrinsically Osteoinductive Hydroxyapatite Carrier. PI: Mohamed N. Rahaman; Co-PI: Yue-Wern Huang (25%). NIH. R15DE023987. \$365,420.

2015 Internal Funding

2015. Delivering the Right Dose to the Tumor. PIs: Yue-Wern Huang & Sutapa Barua. Missouri S&T Miner Tank Innovation Grant. \$23,000.

2015 Pending Proposals

2016 – 2019. Engineering Bioresponsive Nanoparticles for Delivery of Biologically Active Molecules to Treat Cancers. Multiple PIs: Yue-Wern Huang (55%); Sutapa Barua (45%). NIH R15. \$446,704.

2015 Teaching and Advising

- SS15: Toxicology; Tissue Engineering (co-taught); Techniques in Appl & Env Bio
- FS15: Ecology
- Undergraduate advisees: 20 bio majors
- 3 Graduate students: Larry M. Tolliver; Melissa Cambre; Sahitya Injamuri
- 8 undergraduate students: Logan Featherston; Kent Lin; Kwther Albash; Anthony Bitar; Rosamond Hoyle; Grace Dieztler; Lucas Harper; Bolin Wang
- 20 undergraduate advisees

2015 OURE Projects Supervision

- 2015 – 2106. Anthony Bitar. Project title “Evaluation of Bioactive Glass Implants as Devices for Local Delivery of Pain Killers”. \$1,200. Missouri S&T. OURE Fellow
- 2015 – 2016. Kwther Albash. Project title “Therapeutic Effects of Tamoxifen on Chemically Induced Breast Cancer Rats. \$1,200. Missouri S&T.
- 2015 – 2016. Grace Deitzler. Project title “Chemically induced carcinogenesis via DMBA in Sprague-Dawley rats”. \$1,200. Missouri S&T.
- 2015 – 2016. Rosamond Hoyle. Project title “Developing a Chemically-Induced Breast Cancer Rat Model”. \$1,200. Missouri S&T.

2015 Activities

- Interim Department Chair (Starting Summer 2015)
- Chair, S& T Institutional Animal Care and Use Committee
- Chair, Departmental Graduate Program (Spring 2015)
- S&T Schrenk Hall Renovation Steering Committee (2015 – current)
- S&T Interdisciplinary PhD Program in Bioscience Development Committee (2015 – current)
- S&T Radiation Safety Committee (2015 – present)
- Proposal Reviewer. United Kingdom Medical Research Council
- Proposal Reviewer. Oak Ridge Associated Universities; NIOSH
- Editorial Board: Frontiers in Environmental Health (Review Editor)
- Reviewer of Peer-reviewed International Journals: Expert Opinion on Drug Delivery; Biomaterials, BBA Biomembranes; Advanced Materials Letters; Cell Biology and Toxicology; Toxicology; Journal of Applied Toxicology; Journal of Membrane Biology (BioMed Central)



Adam Martin, Ph.D.
Lecturer, Department of Biological Sciences

Research Interests

Detection of constitutive signaling in orphan G protein coupled receptors

G protein coupled receptors are an important class of over 400 communication proteins on the cell surface. Some estimates have put them as targets for as much as 60% of the pharmaceuticals currently in use worldwide. The primary mechanism for study of this class of enzymes is through the use of drugs that bind and activate them. But a small group of these receptors do not have generally agreed upon drugs that can accomplish this task. Collectively, those receptors are considered “orphans”. But study of these receptors does not require an agonist if they are capable of signaling independently; a behavior called constitutive activity. By looking for this constitutive activity among these orphans, there is the potential to explain their impact on cell behavior and help to identify which pathways to focus on for drug development in the future.

2015 Peer-reviewed Journal Publications

Martin AL, Steurer MA, Aronstam RS (2015) Constitutive Activity among Orphan Class-A G Protein Coupled Receptors. PLoS ONE 10(9): e0138463. doi:10.1371/journal.pone.0138463

2015 Teaching

SP15: General Biology (Bio 1113/1A), General Biology Online (Bio 1113/1B), Biotech & Film (Bio 1163)

SS15: General Biology (Bio 1113)

FS15: General Biology (Bio 1113/1A), General Biology Online (Bio 1113/1B), General Genetics (Bio 2223), Molecular Genetics Lab (Bio 4329)

2015 Advising

Twenty Six Undergraduate and Transfer Advisees

2015 Activities

- Member, Student Recruitment Committee



Melanie R. Mormile, Ph.D.

Professor
Environmental Microbiology

Research Interests

Microbial populations in hypersaline environments
Bio-energy production by halophilic/halotolerant bacteria
Retrieval of enzymes for industrial use from extremophilic bacteria

2015 Active Members of Laboratory

Tiffany Edwards-Master's Thesis Candidate
Shivani Kalia-Master's Thesis Candidate
Abigail Campbell-Undergraduate Student in Biological Sciences
Ethan Hamilton-Undergraduate Student in Biological Sciences
Ava Hughes-Undergraduate Student in Biological Sciences
Katlyn Lonergan-Undergraduate Student in Geological Sciences
Matthew Russell-Undergraduate Student in Biological Sciences
Jordan Trager-Undergraduate Student in Biological Sciences
Jenn Parks-Technician
Yi Cui – Post-Doc

2015 Completed Master's Thesis

Tiffany Edwards-M.S. student (2013-2015), successfully defended her thesis April 27, 2015. Thesis title: pH Dependent Antibiotic Resistance of an Alkaliphilic, Halotolerant Bacterium Isolated from Soap Lake, Washington

2015 Grants Obtained

Melanie R. Mormile and Oliver C. Sitton. Commercialization of 1,3-Propanediol Production from Glycerol under Haloalkaline Conditions. University of Missouri FastTrack Initiative. (Mormile-Lead PI).

2015 Abstracted Presentations

Edwards, T., E. Hamilton, G. Olbricht, and M.R. Mormile. pH Dependent Antibiotic Resistance of an Alkaliphilic Halotolerant Bacterium from Isolated Soap Lake, Washington. (Poster) *Annual Meeting of the American Society for Microbiology*, May 30-June 2, New Orleans, LA. (National level). *Tiffany Edwards received a Student Travel Grant from ASM for her presentation.*

Marshall, F.E., M.A. Pride, M. Rojo, K.R. Brinker, Z. Walker, M. Storie-Lombardi, M.R. Mormile, G.S. Grubbs II. A simple, cost effective Raman-fluorescence spectrometer for use in laboratory and field experiments. (Platform) International Symposium on Molecular Spectroscopy, June 22-26, Champaign-Urbana, IL. (International level). *Frank Marshall was an undergraduate when he performed the research he presented.*

Benison, K.C., M.R. Mormile, S.S. Johnson. Using petrography and spectroscopy to detect life in evaporites and iron oxide concretions: Suggestions for the search for modern and ancient life on

Mars. (Platform) Geological Society of America Annual Meeting, November 1-4, Baltimore, MD.
(*National level*).

2015 Teaching

SP15: Introduction to Astrobiology
SP15: Astrobiology
SP15: Proposal Writing
FA15: Bioremediation

2015 Activities

- Academic Editor for PLoS ONE
- Member of the Editorial Boards for: Environmental Technology; Frontiers in MicroBio Technology; Frontiers in Extreme Microbiology
- Served as peer-reviewer for the following journals: Astrobiology; Environmental Microbiology and Environmental Microbiology Reports; Extremophiles; F1000Research; Systematic and Applied Microbiology
- Associate Editor for SIMB News
- Actively served on the following national committees: The American Society for Microbiology's Committee on the Status of Women in Microbiology of the Public and Scientific Affairs Board; The EMD Millipore Alice C. Evans Award Selection Committee
- Academic Faculty Advisor for the Mars Rover Design Team
- Academic Faculty Advisor for Helix, the Undergraduate Student Organization of the Department of Biological Sciences

2015 Advising

OURE students:

Abigail Campbell - Characterization of Acidophilic Microorganisms in Red Lake
Ava Hughes - Isolation and Characterization of Novel Halo-Acidophilic Microorganisms found in Hypersaline Lakes in Western Australia

Katlyn Lonergan - Isolation & Characterization of Novel Halo-Acidophilic Microorganisms from Evaporites in Western Australia

Jordan Trager - Media optimization for Halanaerobium hydrogeniformans

Ava and Katlyn presented at the Missouri Valley and Missouri Branches of the American Society for Microbiology and won first place recognition for their presentation.



Dev Niyogi, Ph.D.

Associate Professor

Director, Laboratory of Freshwater Ecology

Research Interests

Freshwater ecology, aquatic biogeochemistry, microbial ecology of streams and lakes

2015 Peer-Reviewed Journal Publications

Kitto, J.A.J, D.P. Gray, H.S. Greig, **D.K. Niyogi**, and J.S. Harding,. 2015. Metacommunity theory and stream restoration: evidence for mass effects on stream invertebrate communities in a mine impacted landscape. *Restoration Ecology*. DOI: 10.1111/rec.12179.

Piggott, J.J., **D.K. Niyogi**, C.R. Townsend, and C.D. Matthaei. 2015. Multiple stressors and stream ecosystem functioning: climate warming and agricultural stressors interact to affect processing of organic matter. *Journal of Applied Ecology*. 52:1126-1134.

Ferreira, V., J. Koricheva, S. Duarte, **D.K. Niyogi**, and F. Guérol. *In press*. Effects of heavy metal contamination on litter decomposition in streams – a meta-analysis. *Environmental Pollution*.

Wood, J.K., W.G. Gold, **D.K. Niyogi**, K. Ewing, J.L. Fridley. *In review*. Restoring urban green spaces with university – community partnerships: monitoring for patterns in success.

2015 Teaching

Spring: Biodiversity (BioSci 1223), Global Ecology (BioSci 4463)

Summer: Field Ecology (BioSci 2264), Ecology (BioSci 2263), Field class in freshwater ecology (through University of Colorado)

Fall: Introduction to Environmental Science (BioSci 1173), Freshwater Ecology (BioSci 4363), Advanced Freshwater Ecology (BioSci 6363)

Graduate research advisees: 0

Undergraduate research advisees: 10

OURE Students:

Ron Metts, Marlene Malmborg

2015 Activities

At Missouri S&T, I am continuing my research on ecosystem processes in streams, and the use of molecular tools to describe microbial communities of streams. One main focus is on the effects of stream drying on communities of microbes, algae, and animals. I am also collaborating with local scientists and conservationists with the Mill Creek Watershed Coalition and their efforts to study and conserve a unique watershed near Rolla. Several undergraduate students are examining water quality in the Mill Creek watershed as part of the OURE program on campus. Edna Armstrong and Morgann Kleeschulte measured concentrations of *E. coli* in waters across the area, and Marlene Malmberg and Ron Metts are continuing this research.





Julie Semon, Ph.D.

**Assistant Professor
Laboratory of Regenerative Medicine**

Research Interests

Identifying molecular and therapeutic differences of mesenchymal stem cell subpopulations
Interactions of mesenchymal stem cells with extracellular matrix and endogenous cell populations
Trafficking and fate determination of mesenchymal stem cells

2015 Grants

College of Arts, Sciences, and Business Best In Class Program, Missouri S&T (P.I.)
“3D Printing of Bone Using Bioactive Glass and Mesenchymal Stem Cells”

2015 Presentations

Invited Speaker: Biology Seminar Series, Morehouse College, Atlanta, GA
“Mesenchymal Stem/Progenitor Cells in the Treatment of a Mouse Model of Multiple Sclerosis”
Poster presentation: Biomedical Sciences and Engineering Research Symposium, Missouri S&T, Rolla, MO
“Adult Stem Cells in the Treatment of a Mouse Model of Multiple Sclerosis”

2015 Teaching

SP15: Tissue Engineering (BioSci 5240, 6240)
SU15: Research Design (BioSci)
FS15: Stem Cell Biology (BioSci 5001), Undergraduate Research Topics (BioSci 4099)

2015 Advising

21 academic advisees
OURE researchers: Daniel Park, Lisa Gutgesell, Cassandra Hurley
Undergraduate researchers: Tony Ragusa, Michelle Rojo, Dana Lawson, Emily Mulawa, Deanne Lyons
Masters student: Thomas Congdon, Caroline Murphy
Ph.D. committee: Casey Burton, Department of Chemistry
High School researcher: Codi Wilson, Eldon High School, Eldon, MO

2015 Activities

Reviewer for international journals: *Regenerative Medicine*, *Stem Cells Translational Medicine*
Judge for Missouri S&T Undergraduate Research Symposium
Judge for Biomedical Sciences and Engineering Research Symposium at Missouri S&T
Summer Camps:
 It's a Girl Thing, 7-8th grade
 Summer Solutions, 9-10th grade
Member of the Missouri S&T's Institutional Animal Care and Use Committee (IACUC)
Chair of Graduate Studies for the Department of Biological Sciences



Katie Shannon, Ph.D.

Associate Teaching Professor
Director, Cytokinesis Laboratory
Director, Cellular Imaging Facility

Research Interests

Regulation of actomyosin ring assembly and contraction

Cytokinesis is the physical separation of cells, accomplished by contraction of a ring containing actin and the molecular motor myosin. Regulation of cytokinesis is essential to ensure that cell division occurs between chromosomes segregated by mitosis. If cytokinesis fails, aneuploidy results, leading to cell death or initiation of tumors. The current focus is on a protein essential for cytokinesis in the budding yeast *Saccharomyces cerevisiae* called IQG1. This protein interacts with many other proteins, including actin, a small GTPase, a kinase, a phosphatase, and formins, a class of actin nucleating proteins. Regulation of these interactions during the cell cycle is an area of active research.

2015 Peer-reviewed Journal Publications

Miller, D.P., Hall, H., Chaparian, R., Mara, M., Mueller, A., Hall, M.C., and Shannon, K.B.* (2015) Dephosphorylation of Iqg1 by Cdc14 regulates cytokinesis in budding yeast *Molecular Biology of the Cell* vol. 26 no. 16 2913-2926 mbc.E14-12-1637; First Published on June 17, 2015;doi:10.1091/mbc.E14-12-1637

2015 Poster Presentations

Shannon, K.B. (2015) Using flipped Friday video viewing data and student surveys to evaluate student engagement July 31, 2015 Society for the Advancement of Biology Education Research (SABER) Annual Meeting, Minneapolis, MN

Miller, D, and **Shannon, K.B. (2015)** Regulation of budding yeast cytokinesis by dephosphorylation Midwest Yeast Meeting, Northwestern University, Evanston, IL

2015 Talks

Shannon, K. (2015) Does watching online videos increase student engagement and performance? Association of Colleges and Universities for Biology Education, annual meeting, Missouri Western State University, October 23-25, St. Joseph, MO

2015 Grants

The Center for Statistical and Computational Modeling of Biological Complexity (CSCMBC) collaborative research project entitled, "Integrative investigation autophagy-apoptosis crosstalk," 2015, co-PI with Dipak Barua, \$1000

Educational Research Mini-Grant, 2015, "Do flipped lectures increase student engagement with course material?" (P.I.), \$3,500

2015 Teaching

WS15: Cell Biology (Bio2213), Molecular Genetics Lab (Bio4329), Developmental Biology (Bio5353)

FS15: Senior Seminar (Bio4010), Cancer Cell Biology (Bio4353/6353), Cell Biology (Bio2213), Introduction to Biological Sciences (Bio1201)

2015 Advising

OURE students: Kayln Jones, Madison Mara, Caitlin Siehr, Kristen Kelly, Lindsey Pratt

Undergraduate lab researchers: Alex Ayers, Matt Liberson, Daniel Sloan

Twenty Undergraduate Advisees

2015 Activities

- Co-advisor, iGEM student synthetic biology team
- Reviewer, Journal of Microbiology & Biology Education (JMBE)
- Reviewer, *PLOS One*
- Reviewer, *Cell Cycle*
- Advisory Board member, Student Design and Experiential Learning Center (SDELC)
- Member, Experiential Learning Committee
- Member, Discipline Specific Curriculum Committee
- Reviewer, College of Arts, Science, and Business BIC grants
- Panelist, Sue Shear Women's panel event
- Mentor, Mentoring in Active Learning and Teaching, ASCB program
- Session Chair, Midwest Yeast Meeting at Northwestern University



Matthew S. Thimgan, Ph.D.

**Assistant Professor
Laboratory of Genetic & Behavioral Sleep
Research**

Research Interests

Genes and metabolic pathways that regulate both the sleep and wake cycles
Pathways that mitigate the negative consequences of sleep deprivation, with a focus on lipid metabolism pathways
Salivary biomarkers of sleep deprivation

White Paper

Arble, Deanna M., Joseph Bass, Cecilia Diniz-Behn, Matthew P. Butler, Etienne Challet, Charles Czeisler, Christopher M. Depner, Joel Elmquist, Paul Franken, Michael G. Grandner, Alex C. Keene, Michael J. Joyner, Iliia Karatsoreos, Philip A. Kern, Samuel Klein, Christopher J. Morris, Allan I. Pack, Satchidananda Panda, Louis Ptacek, Naresh M. Punjabi, Paolo Sassone-Corsi, Frank A. Scheer, Elizabeth R. Seaquest, Richa Saxena, **Matthew S. Thimgan**, Eve Van Cauter, Kenneth P. Wright (2015). Impact of sleep and circadian disruption on energy balance and diabetes workshop. *SLEEP* 38(12):1849-60.

Invited presentations

Washington University, School of Medicine
“The role of lipid metabolism in sleep regulation”
Washington University, School of Medicine
“How Neo sees sleep in *Drosophila*”

National Presentations

American Professional Sleep Societies
“Robust waking in response to food deprivation in a metabolic mutant”

Teaching

SS2015: Bio 2001: Sleep: Function and Dysfunction
FS 2015: Bio 3333: Anatomy & Physiology I

Graduate researchers: Carlos Rivera, Courtney Fiebelman

Undergraduate researchers: Dillon Barton, Thomas Congdon, Sahitya Injamuri, Jack Colaric, Elizabeth Theonen, Julie Nguyen, Ali Mueller, Lisa Kinder, Caron Harada, Aaron Latal, Meagan Windsor, Amanda Martin-Erb, Harriet Lumula, Chauncey Depew

Other activities

UM Research Board Grant Reviewer
Abstract reviewer SLEEP Meeting 2015



David J. Westenberg, Ph.D.

**Associate Professor,
Chair, Pre-Medicine Advisory Committee
Faculty Athletics Representative**



Research Interests

Rhizosphere microbiology, legume symbiosis, quorum sensing, antibacterial materials

Research Lab Members: Graduate Students: Crystal Meeks; **Undergraduate Students:** Fatimah Alqarius, Adrian Black, Kira Buckowing, Rachel Connell, Elsie Greenwood, Victoria Grill, Austin Hall, Natalie Holste, Samantha Huckontod, Hannah Kim, Margaret Pitzer, Sonya Roberts, Elizabeth Thoenen, Claire Wilmore **High School Students:** Vasanth Balakrishnan

Peer-Reviewed Journal Publications

Yucelen, G. I., *Connell, R. E., Terbush, J. R., Westenberg, D. J. and F. Dogan. 2015 Synthesis and immobilization of silver nanoparticles on aluminosilicate nanotubes and their antibacterial properties. *J Applied Nanoscience*, 2015-06-17.

Editorial and Book Review

Westenberg, D.J. and Chang, A.L. 2015 “The Unseen Microbial World as a Tool for Learning Biology. *The American Biology Teacher*, 77:320-321.

Westenberg, D.J. 2015 “Microbial Diversity: A Journey Through Woese's Tree of Life.” *Journal of Microbiology and Biology Education*. 16:98-99

Abstracts

Westenberg, D.J. 2015 Hands-on synthetic biology in the classroom. ASM Conference on Undergraduate Education, Austin, TX

Westenberg, D.J. 2015. **BioBuilder - Bringing Science and Technology problem solving into the K-12 and undergraduate classroom.** Teaching and Learning Technology Conference, Rolla, MO

Presentations

Biointeractive - Winogradsky Columns. National Association of Biology Teachers, Providence, RI November 12 and 13, 2015

Hot Stuff at Missouri S&T: The Aesthetics and Technical Appeal of Glass. 2015. University of Missouri Board of Curators. April 10, 2015 (along with Richard Brow, Erica Ronchetto, *Rachel Connell, Mary Reidmeyer and *Taylor Davis). *undergraduate students

Symposia Organized

The American Society for Microbiology Presents: A Constructive Approach to Biology. 2015. National Association of Biology Teachers Annual meeting, Providence, RI

The American Society for Microbiology Presents: Biosafety in the classroom. 2015. National Association of Biology Teachers Annual meeting, Providence, RI

Teaching

SP15: Microbiology (BioSci 3313); Microbiology Lab (BioSci 3319); Communication Workshop for Pre-Health Professions (Pre-Med 3010), Biological Design and Innovation (BioSci 3783)

FS15: Microbiology (BioSci 3313), Microbiology Lab (BioSci 3319), Pathogenic Microbiology (BioSci 5313)

Extramural Funding

Missouri Dept. of Higher Ed. Grant, \$276,125.40 Science Ed. & Quantitative Literacy: An Inquiry-based Approach (20%)

Miner Tank award. \$15,000. Heartland Synthetic Biology Consortium (100%)

2015 Activities

Chair, ASM Committee on K-12 Education

Chair, ASM Task Force on Public Engagement

Faculty Athletics Representative

DAAD Research Ambassador

Chair, Missouri S&T Pre-Medicine Advisory Committee

Advisor for Scrubs, the Missouri S&T Pre-Health student organization

Advisor for Humans vs. Zombies student organization

Co-Advisor for the Missouri S&T iGEM team

Judge for S&T Annual Undergraduate Research Conference

Summer SEQL Workshop for K-12 teachers

Member of the Missouri S&T Performing Arts Series, Conflict of Interest, Service Learning Advisory, CERTI, Woman of the Year Selection and Athletics Advisory Committees

Faculty Teaching Partner

Hosted Science Olympiad event - Disease Detective

Chair, Faculty Service Award committee

Presentations to visiting students through SHPE, MITE and Expanding Your Horizons programs, presentations to visiting school groups and visits to school classrooms.

NSF Graduate Research Fellowship Grant review panelist

2015 Awards, Honors

Kappa Delta Professor of the Semester - FS 2015

Natalie Holste earned S&T OURE Fellows Award, Fatimah Alqarius, Kira Buckowing, Elsie Greenwood, Victoria Grill, Austin Hall, Samantha Huckontod, Hannah Kim, Margaret Pitzer, Sonya Roberts, Elizabeth Thoenen and Claire Wilmore earned S&T OURE awards





Terry Wilson, M.S.
Associate Teaching Professor
Assistant Affiliate Director, PLTW Biomedical

2015 Teaching

- SP15: Biodiversity lab (Bio 1229, 3 sections)
- SP15: Cellular Biology Lab (Bio 2219, 2 sections)
- SP15: Online General Biology Lab (BIO 1219, 1 section)
- FS15: Principles of Biology lecture (Bio 1213)
- FS15: General Biology Lab (Bio 1219, 3 sections)
- FS15: Cellular Biology Lab (Bio 2219, 3 sections)
- FS15: Online General Biology Lab (Bio 1219, 1 section)

2015 Activities

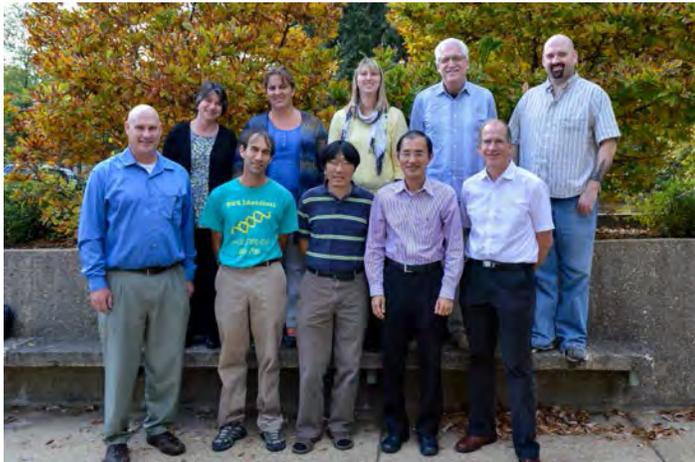
- PRO advisor for first year students
- Hosted Project Lead the Way summer training institute for secondary science teachers



Project Lead the Way Training – 2015

- 7 sessions
- 78 teachers
- Session I: BI - 9
- Session I: MI - 13
- Session II: PBS-10
- Session II: HBS -8
- Session III: HBS - 12
- Session III: PBS - 16
- Session III: GTTMD - 10





BioSci Faculty (left to right back row): Melanie Mormile, Julie Semon, Katie Shannon, Ronald Frank, Adam Martin, (front row) Matt Thimgan, Dev Niyogi, Chen Hou, Yue-Wern Huang and Dave Westenberg
Missing: Terry Wilson

Faculty Scientific Communications

Published Research Articles:

- C. Hou**, K. Amunugama 2015. On the Complex Relationship between Energy Expenditure and Longevity: Reconciling the Contradictory Empirical Results with a Simple Theoretical Model. *Mechanisms of Ageing and Development*, 149:50-64. (The co-author is a graduate student in Hou lab.)
- L. Jiao, K. Amunugama, M. Hayes, M. Jennings, A. Domingo, and **C. Hou** 2015. Food restriction-induced alteration of energy allocation strategy in hornworms (*Manduca sexta* larvae). *The Science of Nature* (former *Naturwissenschaften*), 102:40-50. (All the co-authors are students in Hou lab.)
- Betty R. Liu, **Yue-Wern Huang**, Robert S. Aronstam, and Han-Jung Lee 2015. Comparative mechanisms of protein transduction mediated by cell-penetrating peptides in prokaryotes. *International Journal of Molecular Sciences. Journal of Membrane Biology*, 248(2):355-368. doi:10.1007/s00232-015-9777-x.
- Yue-Wern Huang**, Han-Jung Lee, Larry M. Tolliver, and Robert Aronstam 2015. Delivery of nucleic acids and nanomaterials by cell-penetrating peptides: opportunities and challenges. *BioMed Research International*. Special Issue "Advances in Gene Delivery Systems", volume 2015, article ID 834079, 16 pages. doi:10.1155/2015/834079.
- Betty R. Liu, Hwei-Hsien Chen, Ming-Huan Chan, **Yue-Wern Huang** 2015, Robert S. Aronstam, and Han-Jung Lee. Three arginine-rich cell-penetrating peptides facilitate cellular internalization of red-emitting quantum dots. *Journal of Nanoscience and Nanotechnology* 15:2067-2078.
- Martin AL**, Steurer MA, Aronstam RS (2015) Constitutive Activity among Orphan Class-A G Protein Coupled Receptors. *PLoS ONE* 10(9): e0138463. doi:10.1371/journal.pone.0138463.
- Kitto, J.A.J, D.P. Gray, H.S. Greig, **D.K. Niyogi**, and J.S. Harding, 2015. Metacommunity theory and stream restoration: evidence for mass effects on stream invertebrate communities in a mine impacted landscape. *Restoration Ecology*. DOI: 10.1111/rec.12179.
- Piggott, J.J., **D.K. Niyogi**, C.R. Townsend, and C.D. Matthaei. 2015. Multiple stressors and stream ecosystem functioning: climate warming and agricultural stressors interact to affect processing of organic matter. *Journal of Applied Ecology*. 52:1126-1134.
- Miller, D.P., Hall, H., Chaparian, R., Mara, M., Mueller, A., Hall, M.C., and **Shannon, K.B.** 2015. Dephosphorylation of Iqg1 by Cdc14 regulates cytokinesis in budding yeast *Molecular Biology of the Cell* vol. 26 no. 16 2913-2926 mbc.E14-12-1637; First Published on June 17, 2015;doi:10.1091/mbc.E14-12-1637.

Arble, Deanna M., Joseph Bass, Cecilia Diniz-Behn, Matthew P. Butler, Etienne Challet, Charles Czeisler, Christopher M. Depner, Joel Elmquist, Paul Franken, Michael G. Grandner, Alex C. Keene, Michael J. Joyner, Iliia Karatsoreos, Philip A. Kern, Samuel Klein, Christopher J. Morris, Allan I. Pack, Satchidananda Panda, Louis Ptacek, Naresh M. Punjabi, Paolo Sassone-Corsi, Frank A. Scheer, Elizabeth R. Sequest, Richa Saxena, **Matthew S. Thimgan**, Eve Van Cauter, Kenneth P. Wright (2015). Impact of sleep and circadian disruption on energy balance and diabetes workshop. *SLEEP* 38(12):1849-60.

Yucelen, G. I., *Connell, R. E., Terbush, J. R., **Westenberg, D. J.** and F. Dogan. 2015 Synthesis and immobilization of silver nanoparticles on aluminosilicate nanotubes and their antibacterial properties. *J Applied Nanoscience*, 2015-06-17.

Published Book Chapters

Charles C. Chusuei, Chi-Heng Wu, Shraavan Mallavarapu, Fang Yao Stephen Hou, Chen-Ming Hsu, Robert S. Aronstam and **Yue-wern Huang**. Chapter 8: Review: Physicochemical Structure Effects on Metal Oxide Nanoparticulate Cytotoxicity. In: *Recent Progress in Surface and Colloids Chemistry with Biological Applications*. Editors Wang, C; Hauserman, B. ACS Symposium Series, Vol.1215. American Chemistry Society, Washington DC, pp 137-155.

Invited Talks and Seminars

Hou, C. Why do smaller dogs live longer than larger ones? A universal theory to answer long-standing puzzles in aging study. Invited seminar talk at Santa Fe Institute, Santa Fe, New Mexico, December, 2015.

Huang, Y.-W. Properties of Engineered Nanoparticles Influence Nanodelivery and Nanotoxicity. University of Missouri-Columbia Department of Pathology, Columbia, MO, USA. September 2015.

Semon, J. Biology Seminar Series, Morehouse College, Atlanta, GA. "Mesenchymal Stem/Progenitor Cells in the Treatment of a Mouse Model of Multiple Sclerosis".

Shannon, K. (2015) Does watching online videos increase student engagement and performance? Association of Colleges and Universities for Biology Education, annual meeting, Missouri Western State University, October 23- 25, St. Joseph, MO.

Thimgan, M. S. "The role of lipid metabolism in sleep regulation". Washington University, School of Medicine.

Thimgan, M. S. "How Neo sees sleep in *Drosophila*". Washington University, School of Medicine.

Westenberg, D. J. Biointeractive - Winogradsky Columns. National Association of Biology Teachers, Providence, RI November 12 and 13, 2015

Westenberg, D. J. Hot Stuff at Missouri S&T: The Aesthetics and Technical Appeal of Glass. 2015. University of Missouri Board of Curators. April 10, 2015 (along with Richard Brow, Erica Ronchetto, *Rachel Connell, Mary Reidmeyer and *Taylor Davis). *undergraduate students.

Conference Presentations/Abstracts

Huang, Y.-W. 54th Annual Meeting of the Society of Toxicology. Distinct patterns of cell death in A549 cells by fourth-period transition metal oxide nanoparticles. Yue-Wern Huang, Larry M. Tolliver, Fang Yao Stephan Hou, Robert S. Aronstam, and Han-Jung Lee. San Diego, CA, USA. 2015, March 22-26.

Edwards, T., E. Hamilton, G. Olbricht, and M.R. Mormile. pH Dependent Antibiotic Resistance of an Alkaliphilic Halotolerant Bacterium from Isolated Soap Lake, Washington. (Poster) *Annual Meeting of the American Society for Microbiology*, May 30-June 2, New Orleans, LA. (National level). *Tiffany Edwards received a Student Travel Grant from ASM for her presentation.*

Marshall, F.E., M.A. Pride, M. Rojo, K.R. Brinker, Z. Walker, M. Storie-Lombardi, M.R. Mormile, G.S. Grubbs II. A simple, cost effective Raman-fluorescence spectrometer for use in laboratory and field experiments. (Platform) International Symposium on Molecular Spectroscopy, June 22-26, Champaign-Urbana, IL. (International level). *Frank Marshall was an undergraduate when he performed the research he presented on.*

Benison, K.C., M.R. Mormile, S.S. Johnson. Using petrography and spectroscopy to detect life in evaporites and iron oxide concretions: Suggestions for the search for modern and ancient life on Mars. (Platform) Geological Society of America Annual Meeting, November 1-4, Baltimore, MD. (National level).

Semon, J. Adult Stem Cells in the Treatment of a Mouse Model of Multiple Sclerosis. Biomedical Sciences and Engineering Research Symposium, Missouri S&T, Rolla, MO.

Shannon, K.B. Using flipped Friday video viewing data and student surveys to evaluate student engagement July 31, 2015 Society for the Advancement of Biology Education Research (SABER) Annual Meeting, Minneapolis, MN

Miller, D, and Shannon, K.B. (2015) Regulation of budding yeast cytokinesis by dephosphorylation Midwest Yeast Meeting, Northwestern University, Evanston, IL.

Thimman, M. Robust waking in response to food deprivation in a metabolic mutant. American

Professional Sleep Societies. Westenberg, D.J. 2015 Hands-on synthetic biology in the classroom. ASM Conference on Undergraduate Education, Austin, TX.

Westenberg, D.J. 2015. BioBuilder - Bringing Science and Technology problem solving into the K-12 and undergraduate classroom. Teaching and Learning Technology Conference, Rolla, MO.

Faculty External Grants

NAME	SHARED CREDIT(%)	DIRECT COST	INDIRECT COST	TOTAL COST	SPONSOR NAME	PROJECT NAME
Huang, Yue-Wern	25	\$20,201	\$10,388	\$30,589	NIH	BMP-2 & bone repair...
Mormile, Melanie R.	100	\$6,973	0	\$6,973	NASA	Extremophiles in Lake Magic...
Niyogi, Dev K.	100	\$7,404	\$1,925	\$9,329	US Forest Service	Mill Creek Watershed...
Westenberg, David J.	20	\$46,216	\$1,040	\$47,256	MO Higher Education	Science Education & Quantitation...
		\$80,794	\$13,353	\$94,147		

**Seminar Program
2015 Annual Report**

Seminar director: Dr. Matt Thimgan (Spring)
Dr. Chen Hou (Fall)

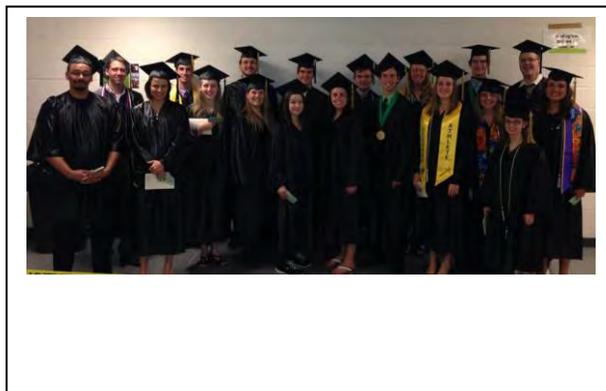


Date	Speaker	Institution	Topic
Jan 26	Courtney Fielbelman, Larry Tolliver	Missouri S&T	Progress Reports
Feb 2	Allison Meyer	UM Columbia	Ruminant Nutrition/Nutritional Physiology
Feb 9	EJ Brace	Washington University	Synaptic structure and function
Feb 16	Troy Zars	UM Columbia	Genes and neural systems that support learned behavior
Feb 26	Steve Roberts	Missouri S&T	Integrative biology of insects
Mar 2	Amy Dunlap	UMSL	The Evolution and Ecological Function of Cognition
Mar 9	Amy Harkins	SLU	Neural connections and regeneration
Mar 16	Chen Hou	Missouri S&T	Energy allocation under environmental pressures
Mar 30	Matt Wyc	Washington University	Computational Biology
Apr 6	Wendi Neckameyer	SLU	Development and function of neural circuits
Apr 13	Yue-wern Huang	Missouri S&T	Nanotoxicity and modulation of cells
Apr 20	Bing Zhang	UM-Columbia	Dissection of neural and glial circuits
Apr 27	Eric Schmidt	Washington University	Computational analysis determining genetic influence of phenotypes
May	Adam Martin	Missouri S&T	Final dissertation talk

Date	Speaker	Institution	Topic
Aug 31	Laura Schulz	MU	Maternal physiology and development of placenta.
Sept. 14	Lori Eggert	MU	Ecological pressures that shape animal populations
Sept. 21	Qisheng Song	MU University	Entomology
Sept. 28	Nathan Muchhala	UMSL	Pollination Systems
Oct. 5	Maoyin Li	Danforth/UMSL	Plant Cell
Oct. 12	Leah	Missouri S&T	Mammal Ecology
Oct. 19	Rex Cocroft	MU	Insect Communication
Oct. 26	Yi Cui	Missouri S&T	Microbiology from Dr. Mormile's lab
Nov. 2	Gavin King	MU	Biophysics
Nov. 9	Troy Zars	MU	Fruit Flies
Nov. 16	Manuel Leal	MU	Animal communication, behavioral drive, and axes of divergence
Nov. 30	Our own graduate students	Missouri S&T	from Dr. Frank's lab and Dr. Westenberg's lab

Undergraduate Education 2015 Annual Report

Missouri S&T's thriving Biological Sciences community included 211 undergraduate majors in 2015 (4th week fall semester enrollment reports). Dr. Katie Shannon chaired the Undergraduate Education Committee in 2015.



2015 Highlights

- Service learning courses engaged in by all seniors
- 66 BioSci majors graduated in 2015; 34 graduated with honors: 5 GPA 4.0; 8 Summa Cum Laude, 11 Magna Cum Laude, 10 Cum Laude
- 1 Biology student earned OURE Fellows awards – Natalie Holste

Courses Offered Spring 2015

Bio 1113 General Biology
Bio 1219 General Biology Lab
Bio 1223 Biodiversity
Bio 1229 Biodiversity Lab
Bio 1163 Biotechnology in Fil
Bio 2213 Cell Biology
Bio 2219 Cell Biology Laboratory
Bio 3313 Microbiology
Bio 3319 Microbiology Lab
Bio 4329 Molecular Genetics Lab
Bio 3343 Human Anatomy and Physiology II
Bio 3349 Human Anatomy and Physiology II Laboratory
Bio 2372 Issues in Public Health
Bio 3000 Special Problems
Bio 3001 Special Topics
Bio 5353 Developmental Biology
Bio 5333 Genomics
Bio 5240 Tissue Engineering I
Bio 4383 Toxicology
Bio 3783 Biological Design and Innovation I
Bio 4463 Global Ecology
Bio 3483 Biomedical Problems
Bio 4099 Undergraduate Research
Bio 5000 Special Problems
Bio 5010 Graduate Seminar
Bio 5040 Oral Examination
Bio 5099 Graduate Research
Bio 5423 Advanced Biodiversity
Bio 5433 Neurobiology
Bio Techniques In Applied And Environmental Bio



Bio 2383 Plant Biology
Bio 6240 Tissue Engineering II
Bio 6383 Advanced Toxicology
Bio 6423 Astrobiology
Bio 3010 Communication Workshop

Summer 2015

Bio 1113 General Biology
Bio 2001 Special Topics
Bio 2213 Cell Biology
Bio 2223 General Genetics
Bio 2233 Evolution
Bio 2263 Ecology
Bio 2264 Field Ecology
Bio 3000 Sepcial Problems
Bio 4099 Undergraduate Research
Bio 5040 Oral Examination
Bio 5099 Graduate Research

Fall 2015

Bio 1113 General Biology
Bio 1173 Introduction to Environmental Sciences
Bio 1201 Introduction to Biological Sciences
Bio 1213 Principles of Biology
Bio 1219 General Biology Lab
Bio 1223 Biodiversity
Bio 1229 Biodiversity Lab
Bio 2213 Cell Biology
Bio 2219 Cell Biology Laboratory
Bio 2223 General Genetics
Bio 2233 Evolution
Bio 2263 Ecology
Bio 2333 Nutrition
Bio 3000 Special Problems
Bio 3001 Special Topics
Bio 3313 Microbiology
Bio 3319 Microbiology Lab
Bio 3333 Human Anatomy Physiology I
Bio 3339 Human Anatomy Physiology I Lab
Bio 4010 Seminar
Bio 4099 Undergraduate Research
Bio 4323 Molecular Genetics
Bio 4329 Molecular Genetics Laboratory
Bio 4353 Cancer Cell Biology
Bio 4363 Freshwater Ecology
Bio 5000 Special Problems
Bio 5001 Special Topics
Bio 5010 Graduate Seminar
Bio 5040 Oral Examination
Bio 5099 Graduate Research
Bio 5210 Biomaterials I
Bio 5513 Pathogenic Microbiology
Bio 5323 Bioinformatics
Bio 5533 Pharmacology
Bio 6210 Biomaterials II
Bio 6273 Techniques In Applied and Environmental Biology

Bio-Star Awards

BioStar award winners for AY15 were announced in April. These awards recognize outstanding achievements by BioSci students. A faculty committee selected the winners; the winners received a certificate and flash drive.

- Graduating Senior: Kelsey Crossen
- Student Leader: Kiran Patel
- Undergraduate Research: Elizabeth Thoenen
- Graduate Teaching Assistant: Larry Tolliver
- Graduate Research: Courtney Fiebelman

Troutbusters Scholarship Winners:

Sierra Comer, Ronald Metts, and
Marlene Malmborg

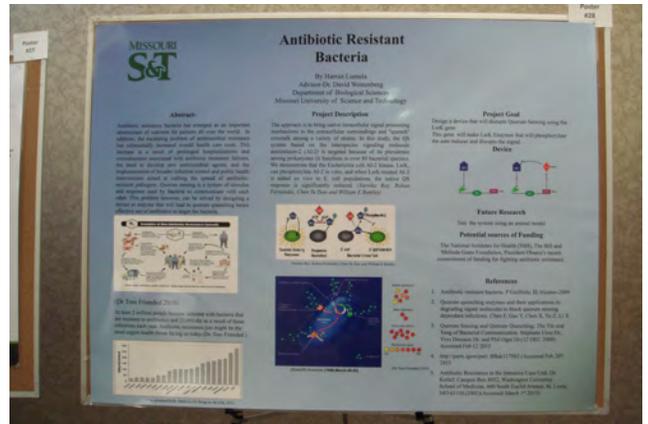


S&T Undergraduate Research Day

BioSci students participated in the **Annual Undergraduate Research Conference** (April 2015)

BioSci Students receiving awards included
Research proposal poster session:

Third place – Harriet Lumula, a senior in biological sciences from Rolla, Missouri, for research titled “Antibiotic Resistant Bacteria.” The research advisor is Dr. David Westenberg, an associate professor of biological sciences



The 2015-2016 OURE Fellows recipient is:
Natalie Holste, a sophomore in biological sciences from Romeoville, Illinois, for research titled "Synthetic Biology Approach to Making Drought Tolerant *Bradyrhizobium japonicum*." The research advisor is Dr. David Westenberg, an associate professor of biological sciences.



Gale Huffman Scholarship Awards:

Chance	Walker
Amanda	Bloom
Anthony	Bitar

Field Courses 2015 Annual Report

BioSci has been offering an increasing number of field courses and incorporating field exercises in their regular courses.



Cave Biology



Field Ecology



Freshwater Ecology Field Test



Freshwater Ecology Field Trips

Graduate Education

2015 Annual Report

Since the inception of the graduate program in Environmental and Applied Biology, many graduates have gone on to doctoral programs at other national institutions. Other graduates have found employment in medical, pharmaceutical, and biotech industries.

It was a productive year for graduate students in the department resulting in many publications, submitted abstracts, and presentations. Drs. Yue-wern Huang and Julie Semon chaired the department's Graduate Studies Committee in 2015.

2015 Highlights

- A white paper outlining a proposal for a doctoral training program was submitted
- Five thesis students and one non-thesis student earned an M.S. in Environmental and Applied Biology in 2015

2015 Graduate Students

Tiffany Edwards
Courtney Fiebleman
Crystal Meeks
Amunugama Palihawadana
Carlos Riveria
Michael Sadler
Larry Tolliver
Shivani Kalia
Sahitya Injamuri
Melissa Cambre
Thomas Congdon

Thesis Defense

Tiffany Edwards
Advisor: Dr. Melanie Mormile
Thesis: pH Dependent Antibiotic Resistance of an Alkaliphilic, Halotolerant Bacterium Isolated from Soap Lake, Wahsington

Courtney Fiebleman
Advisor: Dr. Matt Thimgan
Thesis: Correlation Between Sleep and Lifespan in *Drosophila Melanogaster*

Amunugama Palihawadana
Advisor: Dr. Chen Hou
Thesis: Sensitivity of Cellular Oxidative Damage to Biosynthetic Rate and Metabolic Rate

Carlos Riveria
Advisor: Dr. Matt Thimgan
Thesis: The Involvement of Energy and Metabolism in Sleep

Larry Tolliver
Advisor: Dr. Yue-Wern Huang
Thesis: Cytotoxic Effect of Fourth-period Transition Metal Oxide Nanoparticles in Human Lung

Senior Seminar Service Learning Class

2015 Annual Report

Biological Sciences Department incorporates a service-learning experience as part of its required senior capstone course.

Students work in groups to propose, research, develop, complete, and present service-learning projects that are related to the biological sciences. There are multiple objectives of the service learning activity: 1) to address a need in the community that is broadly related to core concerns of a biology curriculum, 2) to develop students' skills in organizing group endeavors and formalizing, justifying, proposing and presenting their ideas (in oral and written form); 3) to enhance students' sense of community responsibility and accountability; and 4) to provide students with opportunities to participate in activities that will enhance their employability and academic maturity. Our corporate partners emphasize the importance of team dynamics in the workplace.

Dr. Katie Shannon has directed the department's service learning course for the last 6 years. The nature of our students' service learning projects is diverse and impressive. Students raised money for Make A Wish, raised awareness of the problem of antibiotic resistance, and collected food for local children. Several projects were designed to combat the problem of obesity by hosting a 5K, educating college students on healthy choices, and raising awareness of the link between poverty and obesity. Photos of some of the projects are posted on the BioSci Facebook page ("[Missouri S&T Biology](#)").



Figure 1 Students Carol Williams, Carol Pint, and Trevor Karbowski give a presentation about nature to the children at Greater Circle in St. James

Student Projects 2015

- **Be the Match Project** – Hosted a drive to register bone marrow donors for leukemia patients
- **Sole Hope** – Held a jean drive to collect material and had a shoe cutting party to produce materials to make shoes to combat the problem of jiggers in Uganda
- **Health and You** – Presented information on healthy diet, exercise, and the importance of sleep to students at four greek houses
- **Grant a Wish** – raised \$696.41 for the Make A Wish foundation
- **Combating Obesity Caused by Childhood Hunger and Poverty** – raised awareness and recruited volunteers to help serve 583 families through the Phelps County Faith Distribution Food Distribution
- **Antibiotic Resistance Awareness** – Had a booth to raise awareness of the problem of antibiotic resistance and collected and donated over 100 bars of soap
- **Student Survival Guide**– Produced a pamphlet to provide students with information on healthy living and stress management
- **Food Drive** – Collected and donated food for the Rolla Backpack Program to help hungry kids
- **Nature Days** – Built compost bins and provided nature conservation education to children at Greater Circle in St. James
- **Fighting Obesity**- Organized a 5K fun run to promote exercise, raised \$712.86 donated to The Backpack Program of Rolla
- **Safe Sex Education** – presented information about STDs and proper condom use to S&T students at Havener Center
- **TedEd Talk**-students produced an educational video about antibiotic resistance shown to local school children and created a pamphlet distributed at local pharmacies



Figure 2 Food Collected for donation to Rolla Backpack Program

Helix Life Sciences Club: Annual Report 2015

Helix: Missouri S&T's Life Sciences Club.

Helix strives to provide support, a welcoming environment, and a connection to the biology department for students studying biology and related subject. The club works to help students connect with their professors, participate in philanthropic events, and plan for their future careers.



Shamrock Face Painting: St. Pats Fundraiser

2015 Activities:

- Fundraiser: St. Pat's Shamrock Face Paint (March)
- Fundraiser: Taco Lunch (February)
- Trip to St. Louis City Museum (April)
- Volunteering at Rolla Animal Shelter (May)
- Ice-Cream Social (September)
- Onondaga Cave Tour (October)
- Sweets and Scheduling: to aid underclassmen in registering for classes (October)
- Presentation: How to Read a Scientific Paper with Dr. Thimgan (November)
- Student Presentation: Internship at the St. Louis Zoo (November)
- Philanthropy: Adopt-A-Family (December)

2015 Officers:

- President – Little Rosamond Hoyle
- Vice-President – Grace Deitzler
- Secretary – Delaney DeJanes
- Treasurer – Samantha Friederich
- Historian – Neil Vesely
- Promotions – Cailyn McKee
- Student Council Rep. – Lisa Gutgesell



Onondaga Cave Tour



Ice-Cream Social

Helix Faculty Advisors: Dr. Melanie Mormile & Dr. David Westenberg



Missouri S&T International Genetically Engineered Machines Team

The Missouri S&T iGEM team is a synthetic biology research and design team affiliated with the iGEM Foundation, which is dedicated to research and education as well as the advancement of open collaboration in the field of synthetic biology. The team participates in the iGEM yearly competition between teams from around the world.

The Missouri S&T iGEM team seeks to...

- Engineer synthetic biological systems to help advance the iGEM Registry of Standard Biological Parts and the field of synthetic biology
- Increase awareness of synthetic biology
- Provide experiential research opportunities to undergraduate students

2015 Highlights:

- Earned a Bronze medal at the 2015 Jamboree in Boston, MA
- Presented an overview of synthetic biology at East Central College in Rolla, MO
- Held an interactive "Bake-Cell" for students in the Havener Center
- Conducted a successful bottomless soup fundraiser
- Hosted the White Nose Symposium, wherein five researchers and bat experts provided a comprehensive survey of the threat posed by the disease

Project:

Bats consume enormous numbers of pests, saving agriculture millions of dollars and reducing pesticide use, while serving as the sole pollinators for many plants. However, since 2007, a fungal disease introduced from Europe has been quickly spreading among bat populations in North America. White-Nose Syndrome (WNS), caused by *Pseudogymnoascus destructans*, is responsible for mortality rates in excess of 90% in some caves. Included among the wide range of species affected by WNS are several already-endangered species. With current trends, entire bat species could become extinct within decades.

P. destructans digests the bat's skin and awakes bats during their crucial hibernation as their body temperature drops. Ultimately, most infected bats die from starvation or inflammatory shock, and estimates suggest more than 6 million bats have already perished.

Traditional approaches to fungal infections, specifically fungicides, indiscriminately kill beneficial and harmful fungi, while providing strong evolutionary pressure for resistance. We are instead exploring a volatile organic compound, ocimene, which has been shown to slow fungal growth. We are also investigating ways to sense *P. destructans* to impact the cave environment as little as possible, and compounds that may inhibit metabolism of the bats' skin. Our hope is that by slowing growth of the fungus, we can defend bats from the disease and give them a chance to recover after hibernation.

2015 Officers:

President: Levi Palmer

Vice President: Nocona Sanders

Treasurer: Edna Armstrong

Secretary: Stephanie Soendker

PR Manager: Austin Hall

Lab Manager: Kira Buckowing

Safety and Socials Chair: Jordan Sanders

Advisors: Drs. Westenberg and Shannon

Phi Sigma Biological Sciences Honor Society 2015 Annual Report

Phi Sigma: Missouri S&T's Biological Sciences Honor Society

2015-2016 Officers:

- **President:** Lauren Moore
- **Vice President:** Olivia Fleming
- **Treasurer:** Ivana Grimm
- **Secretary:** Grace Deitzler
- **Public Relations:** Anne Safron

Faculty Advisor: Dr. Ronald Frank

2015 Spring Semester Activities:

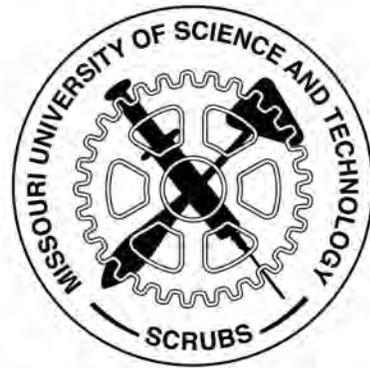
- Penny Wars raised money for the Outstanding Freshman Scholarship
- Cleaned up Phi Sigma-adopted stretch of 10th St. for Adopt-a-Highway
- Inducted 26 new members
- Outstanding Freshman Scholarship awarded to Kim Huskey



2015 Fall Semester Activities:

- First Annual Pancake Breakfast raised money for the Outstanding Freshman Scholarship
- Held meeting to keep members informed of activities
- Promoted and partnered with other Biological Sciences organizations' events
- Members volunteered at various organizations throughout campus and in conjunction with other Biological Sciences organizations

Scrubs 2015 Annual Report



Scrubs Pre-Medical Club



We are dedicated to aid any student of Missouri S&T Interested in perusing a career in the health sciences field as Well as promoting education and volunteerism on campus And within the community. Moreover, we strive to enrich our Members scholastically, socially, and through serving others.

Officers 2015:

President- Zach Woolsey
Vice President- Wyatt Eikermann
Secretary- Kaylen Jones
Treasurer- Chance Walker
Community Relations- Maddie Mara
Outreach Chair- Kayla Smith
Web Administrator- Nick Statesel

Events:

-Pizza Inn Fundraiser Event
-Barbeque Fundraising Event
-Old Iron Works Day Medicine Education

Scrubs Faculty Advisor: Dr. David Westenber

Donors

2014 Annual Report

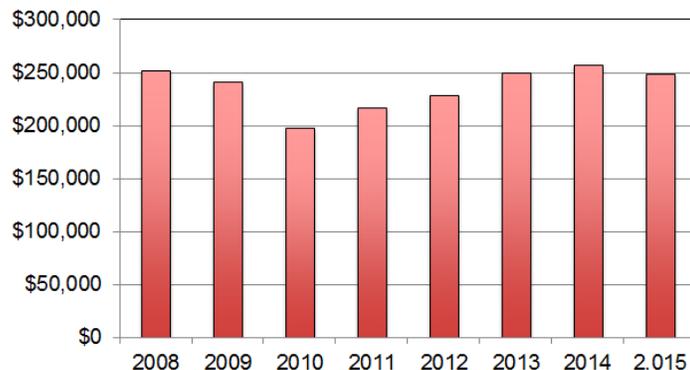
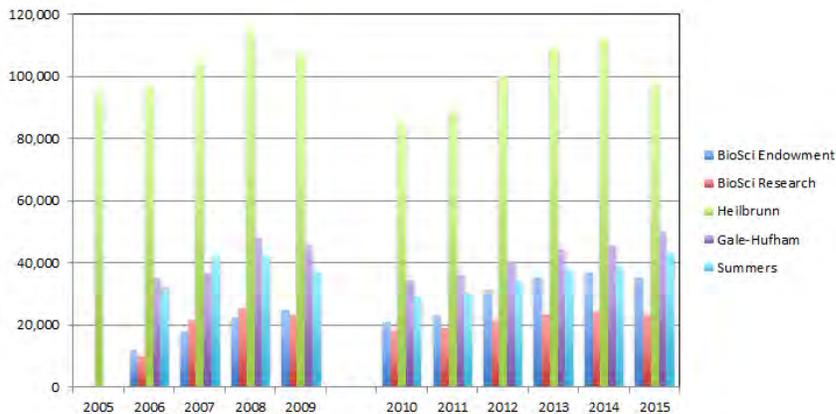
BioSci Partners 2015

We are pleased to recognize those who supported the department in 2015. Donations to the department were \$9,425.00. The consistent support we receive from our alumni and friends is vital for the further development of our academic programs. In particular, this support allows us to explore innovative ideas in both teaching and research.

Contributions are welcome at any time and can be made on the S&T web site (givingtomst.missouri.edu) (be sure to designate Biological Sciences as the recipient fund). The cadre of BioSci alumni continues to grow, although half have graduated in the decade, reflecting our recent growth.

Finally, **TroutBusters of Missouri** renewed their funding of scholarships for S&T Ecology students, and Mr. Fred Kielhorn continued his strong support of the iGEM student design team.

We appreciate all you do to support the department and its students and hope you will continue to be able to do so. We welcome your feedback on any of our activities or plans, and invite you to visit when you are in Rolla.



Value of BioSci endowment funds at the end of the indicated calendar years. The Gale-Hufham, Heilbrunn and Summers funds provide student scholarships; our other funds support faculty and student research.

Donations to the BioSci department in the indicated calendar year.

Donations of \$1000 and above

- ExxonMobil Foundation*
- Fred Kielhorn
- Stacy Story
- Joseph A. Safron
- Troutbusters of Missouri

Donations \$250 - \$499

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