Biological Sciences

Annual Report 2016

Presented by: biosci.mst.edu
Department Summary

2016 was a successful year in the Biological Sciences department. With 234 undergraduates and 8 graduate students, our numbers have grown 7% from the previous year. 32 students graduated in the spring and another 19 in the fall.

A large part of our success is due to our committed faculty, who have a combined 16 published works, 14 conference presentations, 10 research grants, all while teaching roughly 30 courses per semester and serving on various committees.

We greatly appreciate your continued support. Thank you for taking the time to catch up with our department!
ANNUAL REPORT 2016

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

PRESENTATIONS
Biology Seminar Series; Missouri S&T; October 17, 2016; “Survey of Insertion Sequences in the Genome of Halanaerobium hydrogeniformans”

TEACHING
SP16: Plant Biology (BioSci 2383); General Genetics (2223); Free Radicals in Biochemistry (CHEM 6650)
FS16: Molecular Genetics (BioSci 4323); Evolution (2233)

ADVISING
33 academic advisees
Undergraduate researchers: Brandon Lile (CompSci), Kody Bassett, Brynn Shrom, Ivana Grimm
Masters students: Mike Sadler
Ph.D. committee: Jay Muchala (EE), Mohamed Milad (Math)

ACTIVITIES
Freshmen advisor
Primary Secondary Education advisor
Teacher Education Program Advisory Committee
Phi Sigma National Honor Society advisor and council representative to National Office
Departmental Graduate Committee
Departmental Undergraduate Committee
CSCMBC Director
Departmental Bylaws Drafting Committee Coordinator
Campus Tenure Policy Committee
OU RE Departmental Coordinator
Pre-Med Committee
Transfer Advising
Institutional Biosafety Committee
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.

PRESENTATIONS
Testing a general model of life history tradeoff between growth and longevity. Invited seminar talk at Department of Biology at Missouri State University, April, 2016.

TEACHING
Spring: Human Anatomy and Physiology II (Bio 3343), Biology of Aging (Bio 3001); Evolutionary Medicine (Bio 3000)
Summer: Evolution (Bio2233)

ADVISING
30+ Undergradute academic advisees
7 undergraduate researchers: Nolan Ferral; Kyara Holloway; Haley Neeter; Darius Mann; Megan Fairfield; James Whittingham; Kent Gorday.
Graduate advisee: Nikki Gomez

PUBLICATIONS
  (The first two authors are undergraduate students in Hou lab.)
  (The 1st and 3rd authors are a visiting scholar and an undergraduate student respectively in Hou lab.)
  (The first two authors are graduate students in Hou lab.)

ACTIVITIES
Reviewer of peer-reviewed international journals: Proceeding of National Academy of Science; Nature Ecology and Evolution; Scientific Reports; Biology Letters; American Naturalist; Proceeding of Royal Society B-London; Oikos; PLoS One;

FUNDING
University of Missouri System Research Board Grant 2016-2017 (PI, $51,463): Oxidative damage is more sensitive to growth than to metabolism
Yue-Wern Huang, Ph.D.
Professor
Laboratory of Nanomedicine & Molecular Toxicology

RESEARCH INTERESTS
Nanomedicine: using nanomaterials for targeted delivery to treat diseases
Nanomaterial toxicity: molecular mechanisms of cytotoxicity induced by exposure to nanomaterials
Pollutants and environmental health

PRESENTATIONS AND CONFERENCES
Invited Speeches:

Conference Presentations:

TEACHING
SS16: Toxicology (CET score = 3.4)
FS16: Ecology (CET score = 3.4)

ADVISING
30+ Undergraduate academic advisees
Graduate students: Melissa Cambre & Sahitya Injamuri
Undergraduate students: Ganan Hahn; Kaitlyn Oberkirsch; Brynn Shrom; Bolin Wang; Andrew Murphew; Lucas Harper

PUBLICATIONS
2016 Peer-reviewed Journal Publications
ANNUAL REPORT 2016

Yue-Wern Huang, Ph.D.
Professor
Laboratory of Nanomedicine & Molecular Toxicology

PUBLICATIONS

2016 Book Chapters

ACTIVITIES
Interim Chair (till August 31, 2016)
Chair, S&T Institutional Animal Care and Use Committee
Chair, Department Promotion and Tenure Committee
Chair, S&T Science Area Promotion and Tenure Committee
Committee member, S&T Campus Promotion and Tenure Committee
Panelist, Missouri S&T NIH Proposal Development Workshop (2016)
S&T Schrenk Hall Renovation Steering Committee (2015 – 2016)
S&T Interdisciplinary PhD Program in Bioscience Development Committee (2015 – 2016)
S&T Radiation Safety Committee (2015 – present)
Editorial Board: Frontiers in Environmental Health (Review Editor); Austin Environmental Sciences
Reviewer of peer-reviewed international journals:
- Expert Opinion on Drug Delivery
- Biomaterials
- Langmuir
- Advanced Materials Letters
- Cell Biology and Toxicology
- Toxicology
- Journal of Applied Toxicology
- Journal of Membrane Biology (BioMed Central)
- Journal of Agricultural and Food Chemistry

FUNDING
- 2016 – 2017. Damage is more sensitive to growth than to metabolism. PI: Chen Hou; Co-PI: Yue-Wern Huang. The University of Missouri System Research Board. $51,463.
- 2016. Combination of Relaxin and Bone Morphogenetic Protein-2 to Induce Osteogenesis. PI: Yue-Wern Huang; Co-PI: Mohamed Rahaman. Missouri S&T Center for Biomedical Science and Engineering (CBSE). $12,550.
ANNUAL REPORT 2016

Melanie R. Mormile, Ph.D.
Professor
Associate Provost of Faculty Affairs

RESEARCH INTERESTS
Extremophilic Bacteria, Astrobiology, Industrial Microbiology

PRESENTATIONS AND CONFERENCES

TEACHING
Spring 2016 - Experimental Course-Geomicrobiology-interdisciplinary upper level undergraduate and graduate course
Fall 2016 - Environmental Microbiology-interdisciplinary upper level undergraduate and graduate course

ADVISING
Graduate Students: Shivani Kalia
Undergraduate Research Students: Erica Blumhorst, Abagail Campbell, Ava Hughes, Katlyn Lonergan, Ashley Segobiano, Jordan Trager, Emma (Emy) Young
Melanie R. Mormile, Ph.D.
Professor
Associate Provost of Faculty Affairs

PUBLICATIONS AND PATENTS


ACTIVITIES

- Review member for the NASA’s Exobiology Peer Review Panel, Phoenix, Arizona
- Associate Editor for SIMB News
- Active member the Subcommittee on the Taxonomy of the Halomonadaceae of the International Committee on Systematics of Prokaryotes
- Active member of the American Society for Microbiology’s Committee on the Status of Women in Microbiology of the Public and Scientific Affairs Board
- Active member of the EMD Millipore Alice C. Evans Award Selection Committee
- Main Faculty Advisor for the Missouri University of Science and Technology Mars Rover Design Team
- Featured on an episode of BBC’s Horizon (Horizon: Oceans of the Solar System), aired on April 6, 2016 on BBC2 in the United Kingdom. Trailer: http://www.bbc.co.uk/programmes/p03q60nthttp://www.bbc.co.uk/programmes/p03q60nt

AWARDS

- Waksman Foundation Lecturer in the American Society for Microbiology Distinguished Lecturer Program. Will serve a two-year term (July 1, 2016-June 20, 2018).
Dev Niyogi, Ph.D
Associate Professor
Laboratory of Freshwater Ecology

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

TEACHING
Spring: Ecology (BioSci 2263), Advanced Fish Ecology (BioSci 3000, 6202)
Summer: Field Ecology (BioSci 2264), 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)

ADVISING
30+ Undergraduate academic advisees
Graduate research advisees: 1
Undergraduate research advisees: 8

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. Ron Metts, Jonah Heitman, and Veronica Lee are examining the survival and transport of E. coli in streams. Kaleb Bassett is a M.S. student in my lab studying the dynamics and sources of E. coli in Mill Creek.

PUBLICATIONS
ANNUAL REPORT 2016

Julie Semon, Ph.D
Assistant Professor
Laboratory of Regenerative Medicine

RESEARCH INTERESTS
Adult stem cells

TEACHING
Tissue Engineering (BioSci 5240, 6240), Biomedical Engineering (CerEng 3110)

ADVISING
Masters student: Caroline Murphy
OURE researchers: Lisa Gutgesell, Bonnie Koestal, Jakeb Baldridge, Daniel Park
Undergraduate researchers: Gorgina Barsoum, Lauren Flowers
High School researcher: Codi Wilson, Eldon High School, Eldon, MO
Graduate committee: Sahitya Injamuri, Master’s student, Department of Biological Sciences
Casey Burton, PhD student, Department of Chemistry
Yuan Gao, PhD student, Department of Electrical Engineering

ACTIVITIES
Chair of Institutional Biosafety Committee
Chair of Graduate Studies Committee
Career Opportunities & Employer Relations Advisory Council member
Research Support Task Force member
Institutional Animal Care and Use Committee member
Academic Advisor of Missouri S&T Optimist International

PUBLICATIONS

PRESENTATIONS AND CONFERENCES
- “Characterization of Mesenchymal Stem Cells” Ozark Biomedical Initiative Symposium, PCRMC, Rolla, MO
- “Mesenchymal Stem Cells: Engineered for Fun” Biological Sciences Seminar Series, Missouri S&T, Rolla, MO
- “3D Printing of a Cellularized Composite for Bone Repair” Biomedical Engineering Society (BMES) Annual Meeting, Oct 5-8, Minneapolis, MN
- “3D Printing of a Cellularized Polymer-Bioglass Composite for Bone Repair” Annual International Solid Freeform Fabrication Symposium, Austin, TX

FUNDING
- “Borate Bioglass and Mesenchymal Stem Cells” Missouri S&T Innovation Shark Tank Program, Rolla, MO (P.I.)
- “Bioactive Glass and Adipose Stem Cells in Wound Healing” University of Missouri Research Board, Columbia, MO (P.I.)
Katie Shannon, Ph.D
Associate Teaching Professor, Chair of Pre-Med Committee
Laboratory of Cytokinesis & Director of 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.

TEACHING
SS16: Cell Biology (Bio2213), Developmental Biology (Bio5353), Research Proposal Writing (Bio6223)
FS16: Senior Seminar (Bio4010), Cancer Cell Biology (Bio4353/6353), Cell Biology (Bio2213), Introduction to Biological Sciences (Bio1201)

ADVISING
OURE students: Madison Mara, Caitlin Siehr, Alex Ayers, Mason Donnell
Undergraduate Research Conference Mason Donnell 1st place, Research Proposal Poster, Madison Mara, 1st place Oral Presentation Natural Sciences
30+ Undergraduate Academic Advisees

ACTIVITIES
Co-advisor, iGEM student synthetic biology team
Reviewer, Journal of Microbiology & Biology Education
Reviewer, FEMS Yeast Research
Advisory Board member, Student Design and Experiential Learning Center (SDELC)

PRESENTATIONS AND CONFERENCES
- Shannon, K. Measuring student course preparation and the effect on exam performance in a partially flipped class, American Society for Cell Biology (ASCB) mini symposium - Evidence-Based Education: Innovations in Cell Biology December 4, San Francisco, CA
- Shannon, K. Regulation of budding yeast cytokinesis by IQG1 phosphorylation, Midwest Yeast Meeting, October 8, Northwestern University, Evanston IL
- Shannon, K. How do Online Videos and Textbook Reading Engage Students and Affect Exam Performance? Teaching and Learning Technology Conference, March 17-18, Missouri S&T, Rolla, MO
- Poster: Shannon, K.B. What is the impact of student reading and video watching on exam performance? July 15, 2015 Society for the Advancement of Biology Education Research (SABER) Annual Meeting, Minneapolis, MN
RESEARCH INTERESTS
Plant hormone Gibberellins (GAs) regulate various processes in plant growth and development, from seed germination to fruit development. The key repressors in the GA signaling pathway, DELLA proteins, serve as the central coordinator of multiple signaling networks through protein-protein interaction. SPINDLY (SPY), another negative regulator in the GA pathway, is a putative O-GlcNAc transferase (OGT) identified 20 years ago.

I am interested in the structure and function of DELLA and SPY proteins. Our recent study revealed SPY to be an O-fucosyltransferase rather than an OGT, and it O-fucosylates DELLA to activate it through promoting its interaction with binding partners. This is the first work to identify O-fucosylation of nuclear proteins in any organism.

TEACHING
SP17: General Biology lab (Bio Sci 1219)
Plant Biology (Bio Sci 2383)

ADVISING
10 academic advisees

PUBLICATIONS
ANNUAL REPORT 2016

Matthew S. Thimgan, Ph.D
Assistant Professor
Laboratory of Genetic & Behavioral Sleep Research

RESEARCH INTERESTS
Genes and metabolic pathways that regulate sleep and wakefulness
Relating sleep and wake transitions to aging and lifespan using mathematical modeling
Physiologic and molecular biomarkers of sleepiness

TEACHING
FS 2015: Bio 3333: Anatomy & Physiology I
SS 2016: Bio 2001: Sleep: Function and Dysfunction
SS 2016: Bio 2344: Neurobiology

ADVISING
30+ Academic Advisees
Graduate researchers: Joshua Lisse
Undergraduate researchers: Robert Block (OURE, OURE Fellows), Sarah Buckley (OURE), Rachel Craft, Isaac Digennaro, Gregory Evans, Sami Friederich, Colleen Hatley, Andrea Huber, James Betz, Kelsi James, Dani Jones, Lisa Kinder, Maddie Kruper, Aaron Latal, Harriet Lumila, Molly Maloney, Madi Morris, Zachary Paul, Torria Slagle (OURE), Nicholas Statesel, Neil Vessely, Leah Whelan
Junior High: Kathleen Beetner

PUBLICATIONS

ACTIVITIES
Missouri University of Science and Technology College of Arts, Science and Business Pilot Study Program “Objective Detection of Sleepiness Using Physiologic Measures”

National Institute of General Medical Sciences “Mathematical modeling sleep in a model system”

PRESENTATIONS AND CONFERENCES
• ESPCI Paris Tech (Paris, France) “Correlating lifespan with sleep architecture in Drosophila”
• Université Claude Bernard Lyon 1 (Lyon, France) “Correlating lifespan with sleep architecture in Drosophila”
• Ignite Rolla Missouri, S&T (Rolla, MO) “Why “Hitting the Hay” is so important”
• CASB Dean’s Leadership Council
• Gordon Conference on Sleep Regulation and Function (Poster presentation) “Sleep-wake transitions predicts lifespan and biological differences in Drosophila”
• American Professional Sleep Societies – Oral presentation “Correlating lifespan with sleep architecture in Drosophila”
• American Professional Sleep Societies – Poster presentation “Sleep-wake transitions predicts lifespan and biological differences in Drosophila”
David J. Westenberg, Ph.D
Associate Professor, Interim Department Chair
Faculty Athletics Representative & Pre-Medicine Advisory Committee

RESEARCH INTERESTS
Rhizosphere microbiology, legume symbiosis, quorum sensing, antibacterial materials, microbiology education.

TEACHING
SP16: Microbiology (BioSci 3313); Microbiology Lab (BioSci 3319); Communication Workshop for Pre-Health Professions (Pre-Med 3010), Biological Design and Innovation (BioSci 3783)
FS16: Microbiology (BioSci 3313), Microbiology Lab (BioSci 3319)

ADVISING
40+ Undergraduate academic advisees
Graduate Students: Matt Liberson
Undergraduate Students: Claire Brewer, Elsie Greenwood, Abigail Haler, Natalie Holste, Kim Huskey, Dane Meyer, Mark McFerren
High School Students: Emelia Gautier, Grace Hall, Olivia Kline, Emily Zaretzky,

ACTIVITIES
HHMI Teaching Ambassador
Chair, ASM Committee on K-12 Education
Faculty Athletics Representative
DAAD Research Ambassador
Missouri S&T Faculty Teaching Partner
Advisor for Scrubs and Humans vs. Zombies student organizations and Co-Advisor for the Missouri S&T iGEM team
Summer SEQL Workshop for K-12 teachers and BioBuilder Workshop
Hosted iGEM Meet-up
Building with Biology Forums at Missouri S&T,

Missouri State and Lincoln University
Hosted Science Olympiad event - Disease Detective Presentations to visiting students through SHPE, MITE and Expanding Your Horizons programs, presentations to visiting school groups and visits to school classrooms.
Member of the Missouri S&T Performing Arts Series, Conflict of Interest, CERTI, Title IX equity hearing panel and Athletics Advisory Committees

FUNDING
- Missouri Dept. of Higher Ed. Grant, $215,867.72 Science Ed. & Quantitative Literacy: An Inquiry-based Approach (10%)
- Teaching Innovation award. $5,000. S&T Innovation committee (100%)

AWARDS
Outstanding Teaching Award
Natalie Holste earned S&T OURE Fellows Award, Elsie Greenwood, Abigail Haler, Dane Meyer and Mark McFerren earned S&T OURE awards
David J. Westenberg, Ph.D
Associate Professor, Interim Department Chair
Faculty Athletics Representative & Pre-Medicine Advisory Committee

PRESENTATIONS AND CONFERENCES

• You’re not alone, Missouri S&T Trailblazers program, Rolla, MO November 9, 2016
• Me and My’Crobes. Missouri S&T Honors Academy, Rolla, MO November 8, 2016
• Me and My’Crobes. Missouri S&T Kappa Mu Epsilon Rolla, MO October 26, 2016
• Me and My’Crobes. Missouri S&T W. T. Schrenk Society Rolla, MO September 12, 2016
• Human Electron Transport Chain Activity. American Society for Microbiology Conference for Undergraduate Educators, Bethesda, MD July 23, 2016
• Wildcam Gorongosa (HHMI BioInteractive): A Citizen Science Project and Online Data Lab. American Society for Microbiology Conference for Undergraduate Educators, Bethesda, MD July 22, 2016
• Teaching Innovation at Missouri S&T. Missouri College of Arts and Sciences Deans Association Annual Conference, Rolla, MO April 8, 2016 (Along with Katie Shannon)
• Zombies All Aglow. Missouri S&T ZED Talks. Rolla, MO April 8, 2016
• Symposia Organized: The American Society for Microbiology Presents: Vectors of Disease. 2016 National Association of Biology Teachers Annual meeting, Denver, CO

PUBLICATIONS AND ABSTRACTS

• Gheni, N. and D.J. Westenberg. Quantitative Real-Time PCR Assay with Immunohistochemical evaluation of HER2/neu Oncogene in Breast Cancer Patients and Correlation to Clinicopathological Findings. (submitted)
• Abstracts:
  • Westenberg, D.J. 2016 Teaching Partners. American Society for Microbiology Conference for Undergraduate Educators, Bethesda, MD July 23, 2016
  • Westenberg, D.J. 2016. Using Available Online Resources to Facilitate the Flipped Classroom and Increase Student Engagement. Teaching and Learning Technology Conf., Rolla, MO
Terry Wilson, M.S.
Associate Teaching Professor
Assistant Affiliate Director, PLTW Biomedical

TEACHING
SP16: Biodiversity lecture (Bio 1223)
SP16: Biodiversity lab (Bio 1229, 3 sections)
SP16: Cellular Biology Lab (Bio 2219, 2 sections)
FS16: Principles of Biology lecture (Bio 1213)
FS16: General Biology Lab (Bio 1219, 3 sections)
FS16: Cellular Biology Lab (Bio 2219, 3 sections)

ADVISING
30+ freshman advisees (PRO advisor)

ACTIVITIES
Member, Committee for Effective Teaching (CET)
Member, Graduate Committee
Member, Undergraduate Committee
Member, National Association of Biology Teachers (NABT)
Campus GTA Assessor
Hosted Project Lead the Way summer training institute for secondary science teachers
  8 sessions
  96 teachers trained
  Session I & III: Principles of Biomedical Sciences - 27
  Session I & III: Human Body Systems - 14
  Session II: Medical Interventions-18
  Session II: Biomedical Innovations -9
  Session II: Environmental Sustainability - 4
  Session III: Medical Detectives- 24

AWARDS
Faculty Achievement Award