2008
Annual Report
Department of Biological Sciences
Missouri University of Science & Technology

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Ozark Hellbender

Note: To improve communications with the S&T Biological Sciences community, as well as reduce the environmental impact of our activities, we are introducing this new format for our annual report. Reports from faculty members, student organizations and departmental functions are assembled and published on-line as a PDF document; printed copies are available upon request. Our goal is to publish the calendar annual report in February of the following year. We hope you find this format useful; your feedback and ideas are welcome.

BioSci Links

Department	biosci.mst.edu
cDNA Center	www.cdna.org
Missouri S&T	www.mst.edu
BioSci Donations	giving.mst.edu
iGEM Team wiki	2008.igem.org/Team:Missouri_Miners/Team
MorphologyNet	www.morphologynet.org
Amphibian Anatomical Ontology	www.amphibanat.org

Department of Biological Sciences

Chair's Summary

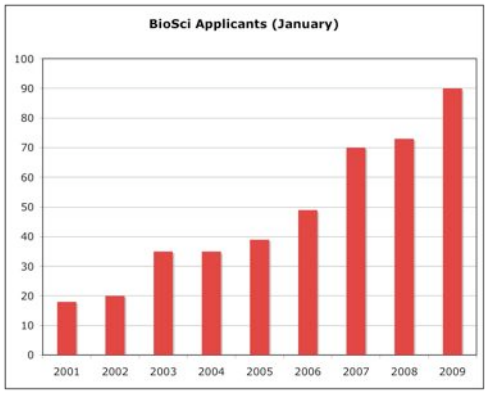
Robert S. Aronstam

Every year brings its accomplishments and unique challenges. Overall, there was a great deal for the BioSci community to celebrate in 2008:

Curriculum: Courses introduced in 2008 include Pharmacology, Epidemiology, Advanced Plant Biology and Cancer Biology. A plan to incorporate bioinformatics throughout the curriculum was adopted by the faculty.

BioSci Web Site: The site has been redesigned to increase its accessibility and timeliness. Your comments and suggestions are welcome (**biosci.mst.edu**).

Department Growth: We reached new highs in the number of majors, minors, student credit hours, applicants, graduates, and scholarships awarded. We remain one of the fastest growing departments on campus.



Teaching Quality. S&T students evaluate all courses in multiple dimensions on a 4-point scale. In the undergraduate BioSci courses offered in 2008, our average score was 3.4 (range 2.8 – 4.0); the S&T average is 2.85. This is a remarkable performance.

Faculty Awards: **Dr. Anne Maglia** was promoted to Associate Professor; **Dr. Melanie Mormile** was named S&T Woman of the Year; **Dr. David Westenberg** was a Scholar in Residence for the Society for Microbiology. **Dr. Yue-wern Huang** and **Dr. Melanie Mormile** received Faculty Excellence Awards.

Research: Publications have more than doubled in the past 4 years, a proposal for a Bioinformatics and Biological Imaging Center was submitted, grant applications are at an all time high, and extramural funding now accounts for 30% of departmental expenditures.

Design Team: Our iGEM team competed in a national event at MIT. A second team has been formed, corporate sponsors have been secured, and the team will soon be recognized as an official student organization.

Student Affairs: Each of our official student organizations (Helix, Scrubs, and Phi Sigma) had a very active year, with invited speakers, service projects, and field trips; the student study lounge was opened; the department hosted a homecoming picnic, 2 graduation receptions, and lunch with the faculty events; and our weekly student newsletter (BioConnection) completed its second year of publication.

Graduate Program: We graduated 4 Masters students, and our program continues to operate at full capacity. Our graduates are evenly split between PhD programs and employment in biology-related industries. A proposal for a doctoral level training program in interdisciplinary biology has been submitted.

Other Good Stuff: We initiated an exchange program with Dong Hwa National University and three students spent 8 weeks in Taiwan this past summer; we hosted visiting scholars from Tzu Chi University; S&T was chosen as the state training center for Project Lead the Way – Biomedical Sciences; Dev Niyogi returned from a year in New Zealand as a visiting scholar; the department was commended by the UM System for its performance in its comprehensive self-study.

Visiting scientists from Tzu-Chi University

In the "**Not So Good**" news category: Dr. Nathan Chen resigned from the University to assume a position at National Sun Yat Sen University. We will miss his good will, dedication and intense professional focus, in addition to his expertise in plant biology and biofuel development.

Challenges:

Facilities: Our physical facilities are substandard. Improvements are needed in both our research and teaching laboratories.

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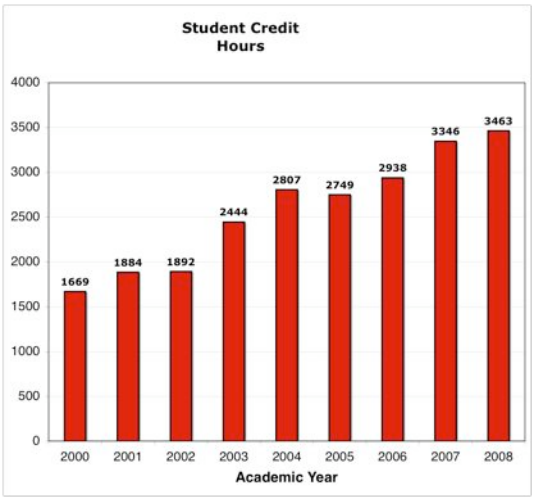
Graduate Program: While we have achieved all of our goals established for our masters program, including student enrollment and achievement, substantial investments are required to allow us to go to the next level, a doctoral training program. A preliminary plan for a doctoral training program has been submitted.

Growth Challenges: Our growth has placed strain on our resources in a number of areas, notably faculty teaching and advising efforts, student scholarships, and the availability of research training opportunities for undergraduates.



Financial Challenges. The economic challenges facing the nation and state will, of course, affect our operations. State revenues are down, and the state provides about $40 million to Missouri S&T, about one third of our general operating budget (and perhaps one fifth of our total budget). The challenge for BioSci (and S&T) is to weather the storm while preserving the critical elements of our programs. To do this we must increase our efficiency while broadening our resource base, including income grants, biotech ventures and alumni support.

Fortunately, we anticipate a number of good things happening. Perhaps two of the most important factors are 1) a $58 million building to house Biological Sciences, Chemistry and Chemical Engineering is presently the number 1 building priority on campus, and 2) our alumni support continues to grow in parallel with our alumni base (50% of all UMR/S&T BioSci majors have graduated within the last 5 years!) So there are good reasons for optimism. We appreciate your support, ideas and interest, and we look forward to continuing to report our progress and challenges to you.

Strategic Action Plan Summary (1/2009)
Biological Sciences

Goals:

The Biological Sciences Department will

1) provide outstanding undergraduate instruction in biology, preparing students for careers in research, health care, teaching, and applied biology;

2) prepare graduate students to make fundamental discoveries in the biological sciences;

2) make new discoveries of significant impact in the biological sciences, especially in the fields of cell/molecular biology, bioinformatics, microbiology and environmental sciences.

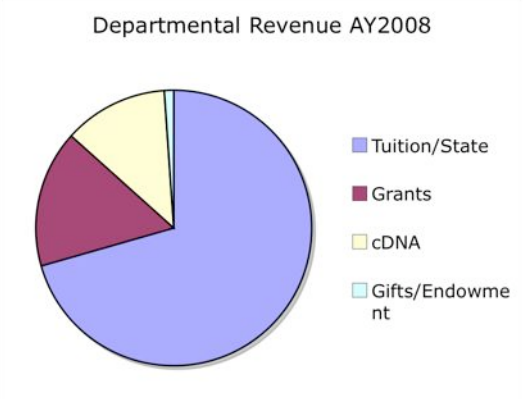
Tactical Plans:

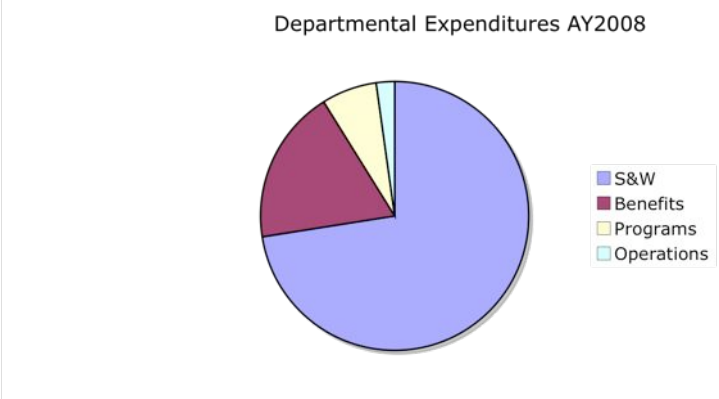
Increase the number of undergraduate students.

Institute a doctoral training program.

Increase research productivity.

Increase departmental resources to support teaching and research functions.





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Robert S. Aronstam, Ph.D.

Professor and Chair, Department of Biological Sciences
Director, Missouri S&T cDNA Resource Center
Director, Laboratory of Neurobiology

Research Interests

Neurochemical, pharmacological and toxicological characterization of muscarinic acetylcholine receptors

G Protein Coupled Receptors signaling pathways: second messenger production, calcium imaging, altered gene expression , posttranslational receptor processing

Research Staff: Adam Martin, M.S. (Senior Research Associate); Vanessa Kaighan (Research Technician); Student Research Assistants: Anna Growcock, Heather Lavezzi, Amanda Sutterer, Ajay Rao, Brian Pink, Anne Schumer

2008 Publication

Aronstam, R.S. and P. Patil, Receptors on Autonomic Neurons and Neuroeffector Cells: Muscarinic Receptors. acetylcholine receptors, In: *Encyclopedia of Neuroscience* (G. Adelman and B Smith, eds.), CD-ROM, Elsevier Press, Amsterdam, 2008 (Fourth Edition).

2008 Presentations

Aronstam, R.S. and P. Patil, Influence of S-nitrosylation of membrane proteins on muscarinic receptors in brainstem and CHO cells. J. Neurochem. 104S, 30-31, 2008.

Huang, C.-C., R.S. Aronstam, D.-R. Chen and Y.W. Huang, Intracellular calcium modulation and gene expression alteration in human lung epithelial cells exposed to ZnO nanoparticles, Gordon Conference presentation, 2008.

Wang, H., B.A. Wheelden, A.C. Growcock, A.L. Martin, Y. Huang and R.S. Aronstam, Nitric oxide and muscarinic receptor –mediated signaling: Influence on calcium oscillations, American Society for Cell Biology, December, 2008.

Huang, C., D. Chen, R.S. Aronstam and Y. Huang, Alterations in oxidative stress, apoptotic pathways, calcium metabolism and gene expression in human bronchial cells by zinc oxide nanoparticles, American Society for Cell Biology, December, 2008.

Huang, C.-C., R.S. Aronstam, D.-R. Chen and Y.-w. Huang, Intracellular calcium modulation and gene expression alteration in human lung epithelial cells exposed to ZnO nanoparticles, Society for Free Radical Biology and Medicine, 2008

2008 Teaching

SS08: Pharmacology (BioSci 301)
FS08: Cellular Biology (BioSci 211)
FS08: Senior Seminar (BioSci 310)
Undergraduate advisees: 46 majors; 8 minors
Graduate Student: Hsui-Jen Wang
OURE fellows: Casey Growcock, Caroline Drownen, Barbara Wheelden

2008 Activities

- Submitted sequences of 33 human signal transduction proteins to GenBank
- Instituted Taiwan undergraduate exchange program with Dong Hwa University
- Instituted graduate student exchange program with National Taiwan Normal University
- Directed the Missouri S&T cDNA Resource Center

Roger F. Brown, Ph.D.

Professor
Director, Missouri S&T Animal Research Facility
Director, Biomaterials Laboratory

Research Interests

Biomaterials for bone repair and therapeutic applications
Development of bioactive glass coatings on titanium implants for enhanced bonding at implant site
Porous bioactive glass scaffolds for in vitro engineering of new bone tissue
Bioabsorbable composite materials for bone fracture fixation
Neutron-activatable glass microspheres for radiotherapeutic applications

Education

Colorado State University, Ft. Collins, B.S. Zoology, 1964
Colorado State University, Ft. Collins, Ph.D., Physiology, 1968
University of Pittsburgh School of Medicine, Pittsburgh, Postdoctoral training, 1968-71

2008 Publications

Peddi, L., R.K. Brow, and R.F. Brown, 'Bioactive Borate Glass Coatings for Titanium Alloys,' *Journal of Materials Science Materials in Medicine.* (in press)

Brown, RF, M.N. Rahaman, A. Dwilewizc, W. Huang, D.E. Day, Y. Li, and B. Bal, 'Effect of borate glass composition on its conversion to hydroxyapatite and on the proliferation of MC3T3-E1 cells,' *Journal of Biomedical Materials Research* (published online Feb 27, 2008).

Fu, Q., M.N. Rahaman, R.F. Brown, B.S. Bal, D.E. Day, 'Macroporous Bioactive 13-93 Glass Scaffolds Fabricated by a Polymer Foam Replication Technique for Bone Tissue Engineering,' *Acta Biomaterialia* 4: 1854-1864, 2008.

Brown, R.F., D.E. Day, T. Day, M.N. Rahaman, S. Jung, and Q. Fu, 'Growth and Differentiation of Osteoblastic Cells on 13-93 Bioactive Glass Fibers and Scaffolds,' *Acta Biomaterialia* 4: 387-396, 2008.

2008 Teaching

SS08: Human Physiology (BioSci 242)
SS08: Tissue Engineering I / Tissue Engineering II (BioSci 341/BioSci 441)
FS08: Human Anatomy (BioSci 241)
FS08: Biomaterials I / Biomaterials II (BioSci 340/BioSci 440)

Mentoring of Mr. Vernon Modglin, graduate candidate for MS degree

2008 Extramural Funding

- 'Periodontal Engineering by Growth Factor Release from Hollow HA Microspheres,' National Institute of Arthritis and Musculoskeletal and Skin Diseases R-15 grant, Co-PI (with Dr. M. Rahaman (PI), Missouri S&T Ceramic Engr.), 7/01/08-6/30/10, $250,000.
- 'Consortium for Bone and Tissue Repair and Regeneration,' U.S. Army Med Res and Materiel Command, Investigator (with J. David Eick (PI), Univ of Missouri-Kansas City), 9/1/08 – 8/31/10, $850,000.

2008 Activities

Participated in the Center for Bone and Tissue Repair and Regeneration (CBTRR) which began January 2008 with a mission to develop advanced biomaterials and biosensors for repair of traumatized bones and tissue.

Ronald L. Frank, Ph.D.

Associate Professor

Director, Laboratory of Plant Molecular Genetics

Research Interests

Identification of gene families using computer algorithms

Evolution and expression of gene families in plants

Structure and expression of phenylalanine ammonia-lyase genes in soybean

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 training, 1968-71

2008 Publications

Frank RL, Kandoth C, and Ercal F. 2008. Validation of an NSP-based (negative selection pattern) gene family identification strategy. BMC Bioinformatics 9(Suppl 9):S2.

Kandoth C, Frank RL, and Ercal F. 2008. Automation of an NSP-based (negative selection pattern) gene family identification strategy. In: *Intelligent Engineering Systems Through Artificial Neural Networks*. Vol. 18. (CH Dagli, DL Enke. KM Bryden, H Ceylan, M Gen, eds). ASME Press, Three Park Ave., New York, NY. 319-326.

2008 Presentations

Kandoth C, Frank RL, and Ercal F. 2008. Automation of an NSP-based (negative selection pattern) gene family identification strategy. Artificial Neural Networks in Engineering Conference, November 2008, St. Louis, MO.

Frank RL, Schwent D, Kandoth C, Ercal F. 2008. Preliminary identification of ribosomal protein gene family members in *Glycine max*. Molecular and Cellular Biology of the Soybean Conference, Indianapolis, IN

Frank, RL, Kandoth, C, Ercal, F. 2008. Automated gene family identification using patterns of negative selection. Mid-South Computational Biology and Bioinformatics Society Conference, Oklahoma City, OK.

2008 Teaching

WS08: General Genetics (BioSci 231)

WS08: Evolution (BioSci 235)

FS08: Molecular Genetics (BioSci 331)

FS08: Molecular Genetics Lab (BioSci 332)

Undergraduate advisees: 39 majors

Graduate Students: Erin Pringle, M.Sc. 2008, Applied and Environmental Biology

Cyriac Kandoth, M.Sc. 2008, Computer Science

OURE fellow: Daniel Schwent

Yue-wern Huang, Ph.D.

Associate Professor

Director, Laboratory of Toxicology

Research Interests

Delineate nanoparticle toxicity in the aspect of how physiochemical properties of nanoparticles contribute to molecular toxicity mechanisms

Assessing biological responses to endocrine modulators in the environment

Using quantum dots (QDs) and protein transduction domains (PTDs) to deliver biologically active molecules into the cell

2008 Publications

2008. Weisheng Lin, Isaac Stayton, Yue-wern Huang, Xiao-Dong Zhou, and Yinfa Ma. Cytotoxicity and cell membrane depolarization induced by aluminum oxide nanoparticles in human lung epithelial cells A549. Toxicological and Environmental Chemistry 90:983-996. DOI: 10.1080/02772240701802559.

2008. Loretta Hunter, Gary Gadbury, and Yue-wern Huang. Atrazine exposure and breast cancer incidence: an ecologic study of Missouri counties. Toxicological and Environmental Chemistry 90:367-376.

2008 Presentations

2008, Dec. 13 – 17. 48th Annual Meeting of the American Society for Cell Biology. Hsiu-Jen Wang, Barbara Wheelden, Anna Growcock, Yue-wern Huang, Adam Martin, and Robert S. Aronstsam. Nitric oxide and muscarinic receptor mediated signaling: influence on calcium oscillations. San Francisco, CA, USA.

2008, Dec. 13 – 17. 48th Annual Meeting of the American Society for Cell Biology. Chuan-Chin Huang, Da-Ren Chen, Robert S. Aronstam, and Yue-wern Huang. Alterations in oxidative stress, apoptotic pathways, calcium metabolism and gene expression in human bronchial epithelial cells by zinc oxide nanoparticles. San Francisco, CA, USA.

2008, Nov. 19 – 23. 15th Annual Meeting of the Society of Free Radical Biology and Medicine. Chuan-Chin Huang, Robert S. Aronstam, Da-Ren Chen, and Yue-wern Huang. Zinc oxide nanoparticles induce oxidative stress and alter calcium homeostasis in human bronchial epithelial cells (BEAS-2B). Indianapolis, IN, USA.

2008, Jul. 27 – Aug. 1. Gordon Research Conference: Mechanisms of Toxicity. Yue-wern Huang, Chuan-Chin Huang, Robert S. Aronstam, and Da-Ren Chen. Intracellular calcium modulation and gene expression alteration in human lung epithelial cells exposed to ZnO nanoparticles. Bates College, Maine, USA.

2008 Teaching

SS08: Toxicology (BioSci 370/401); Graduate Seminar (BioSci 410); Environmental Science (BioSci 101)

FS08: Ecology (BioSci 251); Graduate Seiminar (BioSci 410); Techniques in Appl & Env Bio (BioSci 475)

Undergraduate advisees: 14 majors

Graduate Student: Xu, Yi; Huang, Chuan-Chin

OURE fellows: Jamie Statler

2008 Extramural Funding

2007-2009. Evaluation of Health Conditions, Reproductive Hormones, and Contaminants in Hellbenders (*Cryptobranchus alleganiensis*): juveniles. PIs: Yue-wern Huang, Jeff Briggler (MDC), and Mike McKee (MDC). Missouri Department of Conservation.

2008 Activities

2008 November. Help establish a student exchange program between my department and the Graduate Institute of Life Science at National Taiwan Normal University. Two to four of their students will spend three to six months for research activities with my colleagues and me in 2009.

2008 August. Facilitated and hosted short-term visitation of Professors Hwei-hsien Chen and Ming-huan Chan at Tzu Chi University, Taiwan. Organized research activities to explore potential collaborations among Toxicology Laboratory, Neuroscience Laboratory, and M S&T cDNA Resource Center.

2008 May – July. Brought M S&T three students to National Dong Hwa University, Taiwan, for research collaboration and a summer education program for eight weeks.

2008 Awards, Honors

Missouri S&T Faculty Excellence Award

Keynote Speaker. The 5th Life Science and Biotechnology Forum between Taiwan and China. Presentation title: "Nanotechnology: a Double-edged Sword". Oct. 2-4. Taipei, Taiwan.

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Anne Maglia, Ph.D.

Associate Professor
Director, Laboratory of Herpetology
Director, Bioimaging and Bioinformatics Laboratory

Research Interests:

The evolution of amphibians, including development and anatomical diversity. The development of computational methods for visualizing and analyzing biological data, including 3D visualizations of anatomy and the development of biological ontologies.

Research Staff: Analía Pugner, Ph.D. (Postdoctoral Research Associate)

2008 Publication

Pugener, L.A. and A. M. Maglia. Skeletal morphogenesis of the vertebral column of the miniature hylid frog *Acris crepitans,* with comments on anomalies. Journal of Morphology (early view. Oct 22), 2008.

2008 Presentations

Maglia, A.M.; Pugener, L.A.; Leopold, J.L. The MorphologyNet digital library of interactive, three-dimensional anatomical reconstructions. Integrative and Comparative Biology 47(1): e153, 2007. (presented Jan 2008)

Pugener, L.A.; Maglia, A.M. Skeletal development of the vertebral column of the miniature hylid frog *Acris crepitans,* with comments on vertebral anomalies. Integrative and Comparative Biology 47(1): e102, 2007. (presented Jan 2008)

Maglia, A.M. Developing an Ontology for Amphibians using NLP. Evolutionary Biology and Ontologies Workshop. Evolution Meetings. June, 2008.

2008 Teaching

SS08: Biotechnology in Film (BioSci 150)

SS08: Techniques in Applied and Environmental Biology (BioSci 475)

FS08: Bioinformatics (BioSci/CompsSci 311)

FS08: Senior Seminar (BioSci 310)

2008 Advising

Undergraduate advisees: 9 majors, 3 minors

Graduate Student: Sarah Havens, Bonnie Beasley, Barbara Fears, John Campbell

OURE fellows: Janelle Modglin

2008 Extramural Funding

- *MorphologyNet:* A Digital Library of Interactive, 3D Visualizations of Anatomy. National Science Foundation.
- Semi-Automated Construction of an Ontology for Amphibian Morphology. National Science Foundation.

2008 Awards, Honors

Missouri S&T Miner Alumni Association: Outstanding Advisor Award

Melanie R. Mormile, Ph.D.

Associate Professor

Director, Environmental Microbiology Laboratory

Research Interests

Microbial populations in hypersaline environments

Bio-energy production by halophilic/halotolerant bacteria

2008 Publications

VanEngelen, M.R., B.M. Peyton, M.R. Mormile, and H.C. Pinkart. Fe(III), Cr(VI), and Fe(III) mediated Cr(VI) reduction in alkaline media using a *Halomonas* isolate from Soap Lake, Washington. Biodegradation, 19: 841-850.

Dimitriu, P.A., B.M. Peyton, H.C. Pinkart, and M.R. Mormile. Microbial diversity of a meromictic soda lake in Washington, USA: Spatial and temporal patterns. Applied and Environmental Microbiology, 74: 4877-4888.

Bowen, B.B., K.C. Benison, F.E. Oboh-Ikuenobe, S.L. Story, and M.R. Mormile. Active hematite concretion formation in modern acid saline lake sediments: A model for early diagenetic hematite on Mars? Earth and Planetary Science Letters, 268: 52-63.

Benison, K.C., E.A. Jagniecki, T.B. Edwards, M.R. Mormile, M.C. Storrie-Lombardi. "Hairy blobs": Microbial suspects preserved in modern and ancient extremely acid lake evaporites. Astrobiology, 8: 489-503.

2008 Presentations

Invited Seminar

Microbial Diversity in Anaerobic Swine Lagoons. Soil and Land Resources Division. University of Idaho. Moscow, Idaho, May 12th.

Abstracted Talks and Poster Presentations

Begemann, M.B., M.R. Mormile, H.C. Pinkart, J.D. Wall, and D.A. Elias. A Novel Species of *Haloanerobium* Identified from a Halo-alkaline Lake has the Potential to Contribute to Biodiesel Production. (Poster) *Abst. Ann. Meet. Am. Soc. Microbiology*, June 1-5, Boston, MA (N-158).

Begemann, M.B., M.R. Mormile, J.D. Wall, and D.A. Elias. A Novel Haloalkaliphilic Bacterium that Produces H_2 and Ethanol for Bioenergy Production. (Platform) Joint Meeting of the Missouri and Missouri Valley Branches of ASM. March 14-15, 2008, Liberty, MO.

2008 Teaching

Spring 2008

A & S 111 Women as Global Leaders – co-taught with Mrs. Cecilia Elmore

Bio Sci 221 Microbiology – co-taught with Dr. Dave Westenberg

Bio Sci 402 Problems in Applied and Environmental Biology

Bio Sci 421 Advanced Microbial Metabolism – co-taught with Dr. Dave Westenberg

Fall 2008

Bio Sci 102 Introduction to Biological Sciences

Bio Sci 301 & 451 Environmental Microbiology

2008 Extramural Funding

Melanie R. Mormile, Oliver C. Sitton, and Thomas Schuman. Development of Novel Animal Feed Ingredients from Agricultural Feedstocks, MSC Company, Dundee, IL.

2008 Activities

- Served as Councilor for the Missouri Branch of the American Society for Microbiology
- Member of the Editorial Board for Applied and Environmental Microbiology
- Member of the Editorial Board for Environmental Technology
- Served as a peer-reviewer for the National Science Foundation
- Served as peer-reviewer for the University of Missouri Research Board
- Served as peer-reviewer for the following journals: Agricultural Engineering International-the CIGR Ejournal, Environmental Engineering Science, FEMS Microbiology Ecology, International Journal of Systematic and Evolutionary Microbiology, Microbial Ecology
- Worked with Drs. Francisca Oboh-Ikuenobe and Kathleen Benison as well as St. Louis Science Center people to develop a public display that will present our Australian research. The display will remain in place at the Science Center for at least three years.
- Participated in Mizzou NSF ADVANCE Building Academic Leadership Strengths Workshop. University of Missouri-Columbia, Missouri
- Served as major advisor for the following graduate students: Malavika Sinha (who successfully completed her thesis) and Varun Paul.

2008 Awards, Honors

- Named Missouri University of Science and Technology's Woman of the Year (April 7th)
- The Missouri University of Science and Technology Faculty Excellence Award and recognition for 5th Faculty Excellence Award (December 16th)

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Dev Niyogi, Ph.D.

Assistant Professor

Director, Laboratory of Freshwater Ecology

Research Interests

Freshwater ecology, aquatic biogeochemistry, microbial ecology of streams

2008 Publications

Bray, J.P., P.A. Broady, D.K. Niyogi, and J.S. Harding. 2008. Periphyton communities in New Zealand streams impacted by acid mine drainage. *Marine and Freshwater Research*. 59:1084-1091.

Lear, G., Niyogi, D., J. Harding, Y. Dong, and G. Lewis. *In review*. Effect of acidic drainage on stream bacterial communities. *Environmental Microbiology*.

Niyogi, D.K., C.A. Cheatham, W.H. Thomson, and J.M. Christiansen. *In review*. Litter breakdown and fungal diversity in a stream affected by mine drainage. *Fundamental and Applied Limnology*.

Niyogi, D.K., J.M. Bandeff, and C. Selman. *In review*. Nutrient flux, uptakex and transformation in a spring-fed stream in the Missouri Ozarks, USA. *Aquatic Sciences*.

Smith, L.K., and D.K. Niyogi. *In revision*. A field-based course that prepares students to develop student-centered research projects. *Journal of Geoscience Education*.

2008 Presentations

Niyogi, D.K., J.S. Harding, and K.S. Simon. 2008. Breakdown of leaves and wood in New Zealand streams affected by mine drainage. North American Benthological Society, Annual Meeting, Salt Lake City.

Kitto, J., J.S. Harding, and D.K. Niyogi. 2008. Investigating techniques to enhance benthic communities in streams post acid mine drainage. New Zealand Freshwater Sciences Society, Annual Meeting, New Plymouth.

2008 Teaching

While on research leave in New Zealand, I co-taught a Freshwater Ecology class and a Freshwater Ecology graduate seminar. Back at Missouri S&T, I helped teach the Ecology class with Dr. Yue-wern Huang and the Biofuels seminar with Dr. Nathan Chen.

2008 Extramural Funding

Missouri Water Resources Research Center, "Fungal Diversity and Functioning in Streams Affected by Climate Change," $38,522, PI - 100% effort, 2008 (*pending*).

University of Canterbury (New Zealand) Subcontract for FRST program "Delivering Pathways to Mineral Wealth and Environmental Sustainability," $17,000, PI – 100% effort, 2008-2009.

2008 Activities

During most of 2008, I was on a research leave to the University of Canterbury in Christchurch, New Zealand. I worked with several stream ecologists on projects related to the effects of humanity on streams. My main research focus was the effects of active and abandoned coal mines on streams. Back at Missouri S&T, I am continuing my research on nutrient dynamics in streams, and the use of molecular tools to describe microbial communities of streams.

Katie Shannon, Ph.D.

Assistant Professor , Department of Biological Sciences
Director, Cytokinesis Laboratory
Director, Cellular Imaging Facility

Research Interests

Dr. Shannon's research focuses on the temporal regulation of cytokinesis. Cytokinesis is the physical separation of cells, which is accomplished by the contractile action of actin and myosin filaments. The regulation of this process is essential to ensure that cell division occurs between chromosomes segregated by mitosis. If cytokinesis fails, aneuploidy results, leading to cell death or tumoriogenesis. The current focus of the lab is on a signaling pathway in the budding yeast *Saccharomyces cerevisiae* called the mitotic exit network (MEN). This pathway regulates exit from mitosis and may also control the timing of cytokinesis, temporally linking these two processes.

Dr. Shannon is also collaborating with Dr. Huang to investigate the mechanism of nanoparticle uptake and transport in cells.

2008 Publications

Lin, W., Xu, Y., Huang, C., Ma, Y., Shannon, K.B., Chen, D. and Huang, Y. (2008) *In Vitro* Oxidative Stress and DNA Damage Induced by Nano- and Micro-sized ZnO Particles in Human Lung Epithelial Cells. *Journal of Nanoparticle Research* Special Issue: Nanoparticles and Occupation Safety. DOI 10.1007/s11051-008-9419-7.

2008 Presentations

Poster, Su Young Park, Addie Cable, Katherine Stockstill, Katie B. Shannon, "Bub2 Regulation of Cytokinesis and Septation in Budding Yeast", American Society for Cell Biology, December, 2008.

Poster, Juliette Bell and Katie B. Shannon, "Using a Cell Model Project in a Cell Biology Course", American Society for Cell Biology, December, 2008.

2008 Teaching

BIO211 Cellular Biology, Spring

BIO301/401 Cancer Cell Biology (new course), Fall

2008 Advising

Graduate Student: Su Young Park graduated with thesis August 2008

OURE students: Katherine Stockstill, Joesph Karas

Fifteen Undergraduate Advisees

2008 Extramural Funding

University of Missouri Research Board, 2008 (P.I.) "Regulation of cytokinesis in budding yeast" $36,500

2008 Activities

iGEM student synthetic biology team, advised, supervised project, attended 2008 competition at MIT

Science Olympiad, supervised student volunteers for Cell Biology competition at regional Olympiad

David J. Westenberg, Ph.D.

Associate Professor
Director, Laboratory of Microbiology
Chair, Pre-Medicine Advisory Committee

Research Interests

Rhizosphere microbiology. legume symbiosis, quorum sensing, bioenergetics, nitrogen fixation, phytoremediation
Antimicrobial agents, disinfection, biofilm inhibition

Research Lab Members: Karissa Braaten, April Rocha, Kristen Hinton, Erin Sind, Kaitlyn Wong, Richard Campos, Cory Cheatham, Brian Pink, Rachel Klapper, Jackie Schneider

2008 Presentations

Westenberg, D.J. 2008. Teaching Microbial Diversity through Internet Diversity. ASM Conference on Undergraduate Education, Endicott College, Beverly, MA May 29-June1, 2008.

2008 Teaching

SP08: Microbiology (BioSci 221), Microbiology Lab (BioSc 222), Communication Workshop for Pre-Health Professions (Pre-Med 310), Advanced Microbial Metabolism (BioSc 421)

FS08: General Genetics (BioSci 231), General Virology (BioSc 391)

Undergraduate advisees: 20 majors; Approximately 150 Pre-Meds

Graduate Student: Karissa Braaten

OURE fellows: April Rocha, Erin Sind, Cory Cheatham, Brian Pink, Rachel Klapper, Jackie Schneider

2008 Extramural Funding

Subcontractor on Missouri Dept. of Higher Education Grant, $177,967 Science Education & Quantitative Literacy: An Inquiry-based Approach.

2008 Activities

- Co-Advisor for the Missouri S&T iGEM team
- Advisor for Scrubs, the Missouri S&T Pre-Health student organization
- Presented workshops for K-12 teachers on genetics and microbiology activities in the classroom
- Member of the American Society for Microbiology Committee on K-12 Education
- Chair of the Missouri S&T Public Occasions Committee
- Member of the Missouri S&T Performing Arts Series advisory Committee
-

2008 Awards, Honors

Extraordinary Faculty/Staff Award – Missouri S&T

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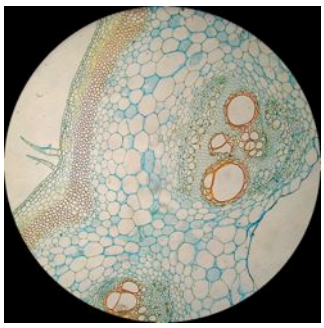
Terry Wilson, M.S.
Teaching Associate

2008 Teaching

SP08 – Biodiversity lecture (BIO113)
SP08 – Biodiversity lab (BIO 114, 3 sections)
SP08 – Cellular Biology Lab (BIO 212)
FS08 – Principles of Biology lecture (BIO 111)
FS08 – General Biology Lab (BIO 112, 2 sections)
FS08 – Cellular Biology Lab (BIO 212, 2 sections)



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Undergraduate Education

2008 Annual Report

Some of our May 2008 graduates

Missouri S&T's thriving **Biological Sciences** community included 153 undergraduate majors in 2008. Dr. David Westenberg chaired the Undergraduate Education Committee in 2008.

2008 Highlights

- record number of graduates (23)
- record number of student credit hours taught (3463)
- record number of majors (153, FS2008))
- average teaching evaluation = 3.4 (S&T average, 2.85)
- 80% of graduating seniors participated in research
- service learning courses introduced
- new courses offered: Pharmacology; Epidemiology; Cancer Cell Biology
- 51 BioSci students were named to the Provost's Academic Scholars List for the Spring 2008 semester (Fall semester scholars not yet named)
- 11 BioSci students participated in the 4th Annual Undergraduate Research Conference (April 9, 2008). BioSci Award winners were:
    - **Jenna Tune** (Field Analyses for the Detection and Enumeration of Coliform Bacteria in Drinking Water During a Public Health Assessment Study, 2nd place, oral presentation),
    - **Kevin Walker** (In Vitro Assessment of Porous Glass Scaffolds for Bone Tissue Engineering, 2nd place, poster presentation), and
    - **Stuart Brune** (Algae for Biodiesel: Investigation of Enhanced Lipid Biosynthesis During Nitrogen Starvation, OURE award).
- 21 students were awarded OURE scholarships to perform research in the BioSci department (Michele Brosnahan, Stuart Brune, Cory Cheatham, Isaac Deatherage, Carolyn Drownen, Anna Growcock, Benjamin Hale, Marcus Hayer, Joesph Karas, Rachel Klapper, Jennifer Kresse, Janelle Modglin, Andrew Moss, Brian Pink, April Rocha, Jackie Schneider, Daniel Schwent, Erin Sind, Jamie Statler, Katherine Stockstill and Barbara Wheelden,)

Courses Offered

Spring 2008

- Bio 101 Environmental Science
- Bio 110 General Biology
- Bio 112 General Biology Lab
- Bio 113 Biodiversity
- Bio 114 Biodiversity Lab
- Bio 211 Cell Biology
- Bio 212 Cell Biology Lab
- Bio 218 Plant Biology
- Bio 221 Microbiology
- Bio 222 Microbiology Lab
- Bio 231 General Genetics
- Bio 235 Evolution
- Bio 242 Human Physiology
- Bio 234 Human Physiology Lab
- Bio 300 Special Problems
- Bio 301 Pharmacology
- Bio 301 Epidemiology
- Bio 328 Nutr &Med Properties of Plants
- Bio 341 Tissue Engineering 1
- Bio 370 Toxicology
- Bio 390 Undergraduate Research

Fall 2008

- Bio 101 Special Topics
- Bio 102 Intro to Biological Sci
- Bio 110 General Biology
- Bio 111 Principles of Biology
- Bio 112 General Biology Lab
- Bio 201 Special Topics
- Bio 211 Cell Biology
- Bio 212 Cell Biology Lab
- Bio 231 General Genetics
- Bio 241 Human Anatomy
- Bio 251 Ecology
- Bio 300 Special Problems
- Bio 301 Cancer Cell Biology
- Bio 310 Seminar

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- Bio 311 Bioinformatics
- Bio 315 Developmental Biology
- Bio 331 Molecular Genetics
- Bio 332 Molecular Genetics Lab
- Bio 340 Biomaterials I
- Bio 390 Undergrad Res
- Bio 391 General Virology

May 2008

Herman Armstrong BS
Debra Cartagena BA
Nicole Cochran BA
Justin Grady BA
Tera Humphrey BA
Amanda Watson BA
Nicholas Adams BS
David Calcara BS
Loraine Destry BS
Agatha Dwilewicz BS
Mariann Fisher BS
Lisa Guntly BS
Karmen Proffitt BS
Jeffery Ross BS

December 2008

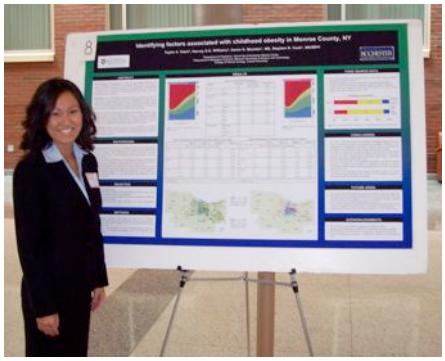
Michael Abernathy BA
Andrea Asselmeier BA
Emily Bahram-ahi BS
Cory Cheatham BS
Mariann Fisher BS
Amber Kirkpatrick BS
Amanda Lueckenhoff BS
Ajay Rao BS
Mudumala Samuel BS

2008 BioSci graduates

Halloween

S&T students in Taiwan

The Microbiology Lunch:
Catered by your friendly neighborhood microbes



Taylor Hahn presenting work from her summer internship at the University of Rochester

Helix-sponsored ice cream reception for new students.

Jen Kresse with Provost Wray – Female Student of the Year!

Service learning project – teaching elementary students about germs

Reception for May graduates

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Graduate Education

2008 Annual Report

The Department instituted a M.S. degree is Environmental and Applied Biology in 2002, and graduated its first students in 2004. Since its inception, the program has been fully subscribed. Many of our graduates have gone on to doctoral programs at institutions across the nation, most of the others are employed in the medical and biotech industries (see table, below). Dr. Melanie Mormile chairs the department's Graduate Studies Committee.

2008 Highlights

- A white paper outlining a proposal for a doctoral training program was submitted.
- BioSci has graduated 26 M.S. students in the last 5 years.
- Four thesis students earned their degrees in 2008:

Student	Thesis Title	Advisor
Pringle, Erin	The identification and Characterization of Phenylalanine Ammonia-Lyase Gene Family in *Glycine max*	Dr. Ronald Frank
Park, Su Young	Role of Microtubules in Budding Yeast Cytokinesis	Dr. Katie Shannon
Potter, Maria Louise	AFLP Fingerprint Analysis of Hybrid Salamanders in the Missouri Caverns Section of Onondaga Cave	Dr. Anne Maglia
Sinha, Malavika	Characterization of selected isolates from hypersaline lakes in Western Australia and Victoria, Australia.	Dr. Melanie Mormile

2008 Current Graduate Students

Jessica Blair	Kholoud Ghanem	Varun Paul
Karissa Braaten	Justin Grady	Hsiu-Jen Wang
Bonnie Beasley	Sarah Havens	Amanda Watson
John Campbell	Chuan-Chin Huang	Xu Yi
Barbara Fears	Vernon Modglin	

2008 Graduate Student Publications

Aronstam, R.S. and **P. Patil**, Receptors on Autonomic Neurons and Neuroeffector Cells: Muscarinic Receptors. acetylcholine receptors, In: *Encyclopedia of Neuroscience* (G. Adelman and B Smith, eds.), CD-ROM, Elsevier Press, Amsterdam, 2008 (Fourth Edition).

Lin, W., Xu, Y., **Huang, C**., Ma, Y**.,** Shannon, K.B**.**, Chen, D. and Huang, Y. (2008) *In Vitro* Oxidative Stress and DNA Damage Induced by Nano- and Micro-sized ZnO Particles in Human Lung Epithelial Cells. *Journal of Nanoparticle Research* Special Issue: Nanoparticles and Occupation Safety. DOI 10.1007/s11051-008-9419-7.

Hunter, Loretta, Gadbury, Gary, and Huang, Yue-wern. Atrazine exposure and breast cancer incidence: an ecologic study of Missouri counties. *Toxicological and Environmental Chemistry* 90:367-376.

Dimitriu, P.A., B.M. Peyton, H.C. Pinkart, and M.R. Mormile. Microbial diversity of a meromictic soda lake in Washington, USA: Spatial and temporal patterns. *Applied and Environmental Microbiology*, **74:** 4877-4888.

2008 Graduate Student Abstracts/Presentations

Aronstam, R.S. and **P. Patil**, Influence of S-nitrosylation of membrane proteins on muscarinic receptors in brainstem and CHO cells. J. Neurochem. 104S, 30-31, 2008.

Huang, C.-C., R.S. Aronstam, D.-R. Chen and Y.W. Huang, Intracellular calcium modulation and gene expression alteration in human lung epithelial cells exposed to ZnO nanoparticles, Gordon Conference presentation, 2008.

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Wang, H., **B.A. Wheelden, A.C. Growcock**, A.L. Martin, Y. Huang and R.S. Aronstam, Nitric oxide and muscarinic receptor –mediated signaling: Influence on calcium oscillations, Am. Soc. Cell Biol., December, 2008.

Huang, C., D. Chen, R.S. Aronstam and Y. Huang, Alterations in oxidative stress, apoptotic pathways, calcium metabolism and gene expression in human bronchial cells by zinc oxide nanoparticles, American Society for Cell Biology, December, 2008.

Huang, C.-C., R.S. Aronstam, D.-R. Chen and Y.-w. Huang, Intracellular calcium modulation and gene expression alteration in human lung epithelial cells exposed to ZnO nanoparticles, Society for Free Radical Biology and Medicine, 2008

Kandoth C, Frank RL, and Ercal F. 2008. Automation of an NSP-based (negative selection pattern) gene family identification strategy. Artificial Neural Networks in Engineering Conference, November 2008, St. Louis, MO.

Frank RL, Schwent D, **Kandoth C**, Ercal F. 2008. Preliminary identification of ribosomal protein gene family members in *Glycine max*. Molecular and Cellular Biology of the Soybean Conference, Indianapolis, IN

Frank, RL, **Kandoth, C**, Ercal, F. 2008. Automated gene family identification using patterns of negative selection. Mid-South Computational Biology and Bioinformatics Society Conference, Oklahoma City, OK.

Park, Su Young, Cable, Addie, Stockstill, Katherine, Shannon Katie B., "Bub2 Regulation of Cytokinesis and Septation in Budding Yeast", American Society for Cell Biology, December, 2008.

S&T Biology MS Graduates

Name	Grad Date	Current Position
Dimitriu, Pedro Alejandro	FS2004	University of British Columbia (PhD)
Elrod, Jason C	FS2004	Rolla Municipalities, Water Testing
Martin, Adam Lee	FS2004	Manager, S&T cDNA Resource Center
*Carter, Rachel Lee	WS2005	Manager Armstrong Environmental Testing
Macauley, John J	WS2005	Steris, St. Louis (sterilization company)
Morris, Kacey Elizabeth	WS2005	Nursing school in Kansas City
Banbury, Barb Lee	SS2005	Washington State University (PhD)
*Bryant, Evan Thomas	SS2005	
Liu, Chihchin	SS2005	University of Texas (PhD)
Park, Ji-Yeon	SS2005	University of Illinois (PhD)
Solis, Mauricio Eduardo	SS2005	Arkansas State University (PhD)
Alamillo, Hugo	FS2005	Washington State University (PhD)
Hunter, Loretta Dunn	SS2006	Monsanto
Patel, Shitalben	SS2006	University of Chicago
*Prewett, Aysheia D	SS2006	Walmart Pharmacy, Rolla, MO
*Gernapudi, Ramkishore	FS2006	Genetics lab, George Washington University
Ramamurthy, Sangeetha	FS2006	University of South Alabama
Patil, Pradnya	WS2007	Pfizer Inc.
*Harms, Scot	WS2007	Stowers Institute, Kansas City
Hong, Bo Young	FS2007	Binghamton University (PhD)
Park, Jung Eun	FS2007	Stowers Institute, Kansas City
Weimer, Amanda	FS2007	Missouri Dept. Natural Resources
Pringle, Erin	WS2008	
Park, Su Young	SS2008	MoSci Corp., Rolla
Potter, Maria Louise	SS2008	Superintendent, Onondaga Cave State Park
Sinha, Malavika	WS2008	Pacific Northwest National Laboratory

* denotes a non-thesis graduate

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Service Learning Classes

2008 Annual Report

Staff:

During the Fall 2008 semester, the Biological Sciences department implemented a service-learning practicum for their required capstone senior seminar course. Students worked in small teams to identify needs of the local, campus, or national community and worked to address those needs in a semester long project, often in conjunction with partnering organizations.

"Biology is inherently a service-related major," said Dr. Anne Maglia, Associate Professor of Biological Sciences and co-instructor of the course. "Most of our graduates go on to careers in healthcare, the environment, or biomedical research. As a department, we felt it was important to engage all of our students in service activities to encourage them to be proactive leaders in society and difference makers in the community."

Andy Moss and Chad Abernathy at Mark Twain Elementary School

The course also was added in response to suggestions by alumni and industry partners who identified teamwork and the ability to work successfully in groups as the most valuable skills graduating seniors could possess. Dr. Robert Aronstam, Chair of Biological Sciences and co-instructor of the course said, "A large aspect of service learning at Missouri S&T is the small work group structure. Our industrial partners tell us that the majority of their work is accomplished by small teams created to complete specific tasks, and they are interested in hiring employees with experience working in such an environment."

The BioSci course follows the industry model closely and helps students develop their leadership and teamwork skills. Students plan and implement all aspects of a biology-related service project in small teams, from identifying needs, outlining a solution, setting landmark goals and deliverables, proposing and working within an allotted budget and timeframe, conducting periodic self, group, and impact assessments, and developing a strategy for sustainability.

Said one student of the class, "I like learning to work better as a team while positively impacting the community. I felt like we all accomplished something with this course."

The Fall 2008 class comprised 31 BioSci students who completed eight service projects. Partnering organizations included the Russell House, the Tri-County Animal Shelter, Mark Twain National Forest, and Rolla Middle School. The students volunteered over 1000 hours to the community, gave lectures and presentations to more than 200 people, and raised over $1100 for local organizations.

Fund raising for Humane Society at Rolla street fair

2008 Projects

- Tri-County Humane Society
- Website development for Russell House shelter
- Halloween dance fundraiser for animal shelter
- Freshmen mentoring/tutoring sessions
- Mill Creek Area Trail Reconstruction
- On-Line Science Help Forum for high school students
- Cold & Flu awareness program
- Microbiology curriculum for elementary students

Brianna Blue at TriCounty Humane Society

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Adam Martin

cDNA Resource Center
2008 Annual Report

Staff:

Adam Martin, M.S., Manager
Vanessa Kaighin, Technician
Heather Lavezzi, Technical Assistant
Amanda Sutterer, Technical Assistant
Robert S. Aronstam, Ph.D., Director

Vanessa Kaighin

Robert Aronstam

The Missouri S&T cDNA Resource Center is a non-profit service providing full-length cDNA clones encoding signal transduction proteins to the research community. www.cDNA.org

The Center provides clones of human proteins that are:

- Full-length
- Sequence verified
- Expression verified by coupled in vitro transcription/ translation assays
- Propagated in a versatile mammalian expression vector
- Free of extraneous 3' and 5' untranslated regions
- Available in wild-type, epitope-tagged and useful mutant forms (e.g., constitutively-active, dominant negative, PTX-resistant)
- Shipped by courier delivery (Federal Express) within 24 hours of order
- Guaranteed for 6 months

In 2008, proceeds from the Center were used to support 1) faculty and student research; 2) faculty travel; 3) research in the Laboratory of Neurobiology; 4) departmental operations and initiatives.

2008 Highlights

- published a new clone catalog
- achieved sales of >$200,000
- introduced new packing method
- reanalyzed over 90% of the collection to ensure quality
- introduced >30 new clones, including representatives of 3 new gene families
- 3 graduate students performed research rotations in basic molecular biology

2008 GenBank Submissions (Full length coding sequences for human signal transduction proteins)

1. EU432129 Homo sapiens relaxin/insulin-like family receptor 4 (RXFP4) mRNA, complete cds
2. EU432128 Homo sapiens neuropeptide FF receptor 1 (NPFFR1) mRNA, complete cds
3. EU432127 Homo sapiens melatonin receptor 1A (MTNR1A) mRNA, complete cds
4. EU432126 Homo sapiens mas-related GPCR member X3 (MRGX3) mRNA, complete cds
5. EU432125 Homo sapiens glutamate metabotropic receptor 8 (GRM8) mRNA, complete cds
6. EU432124 Homo sapiens glutamate metabotropic receptor 4 (GRM4) mRNA, complete cds
7. EU432123 Homo sapiens glutamate metabotropic receptor 3 (GRM3) mRNA, complete cds
8. EU432122 Homo sapiens glutamate metabotropic receptor 2 (GRM2) mRNA, complete cds
9. EU432121 Homo sapiens G protein-coupled receptor 132 (GPR132) mRNA, complete cds
10. EU432120 Homo sapiens G protein-coupled receptor 83 (GPR83) mRNA, complete cds
11. EU432119 Homo sapiens G protein-coupled receptor 56 (GPR56) mRNA, complete cds

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12. EU432118 Homo sapiens G protein-coupled receptor 50 (GPR50) mRNA, complete cds
13. EU432117 Homo sapiens G protein-coupled receptor 31 (GPR31) gene, complete cds
14. EU432116 Homo sapiens G protein-coupled receptor 4 (GPR4) mRNA, complete cds
15. EU432115 Homo sapiens free fatty acid receptor 3 (FFAR3) mRNA, complete cds
16. EU432114 Homo sapiens free fatty acid receptor 2 (FFAR2) gene, complete cds
17. EU432113 Homo sapiens free fatty acid receptor 1 (FFAR1) gene, complete cds
18. EU432112 Homo sapiens dopamine receptor D4 (DRD4) mRNA, complete cds
19. EU432111 Homo sapiens arginine vasopressin receptor 1b (AVPR1B) mRNA, complete cds
20. EU432110 Homo sapiens succinate receptor 1 (SUCNR1) mRNA, complete cds
21. FJ348262 Homo sapiens arrestin beta 1 transcript variant 2 (ARRB1) mRNA, complete cds
22. FJ348261 Homo sapiens G protein-coupled receptor 84 (GPR84) mRNA, complete cds
23. FJ348260 Homo sapiens G protein-coupled receptor 63 (GPR63) mRNA, complete cds
24. FJ348259 Homo sapiens G protein-coupled receptor 55 (GPR55) mRNA, complete cds
25. FJ348258 Homo sapiens G protein-coupled receptor 39 (GPR39) mRNA, complete cds
26. EU883577 Homo sapiens KISS1 receptor (KISS1R) mRNA, complete cds
27. EU883576 Homo sapiens orphan GPCR 87 (GPR87) mRNA, complete cds
28. EU883575 Homo sapiens orphan GPCR 68 (GPR68) mRNA, complete cds
29. EU883574 Homo sapiens orphan GPCR 65 (GPR65) mRNA, complete cds
30. EU883573 Homo sapiens orphan GPCR 45 (GPR45) mRNA, complete cds
31. EU883572 Homo sapiens arrestin beta 2 transcript variant 1 (ARRB2) mRNA, complete cds
32. EU883571 Homo sapiens arrestin 3 (ARR3) mRNA, complete cds
33. EU883570 Homo sapiens opioid receptor delta 1 (OPRD1) mRNA, complete cds

www.cdn.org

Seminars

2008 Annual Report

Seminar directors: Dr. Roger Brown
Dr. Katie Shannon

Date	Speaker	Institution	Topic
Feb. 4	Dr. Robert Aronstam	Missouri S&T	G Protein Coupled Receptors- Regulation and Functional Analysis
Feb. 11	Dr. Yinfa Ma	Missouri S&T	Investigation of Cytotoxcity of Nanomaterials with Various Analytical Techniques and Biomarkers
Feb. 18	Dr. Roger Brown		Porous Bioactive Glass Scaffolds for the Repair and Regeneration of Bone
Feb. 25	Dr. Joel Burken	Missouri S&T	Phytoremediation
Mar. 3	Dr. Charles Chusuei	Missouri S&T	Characterizing Functionalized Carbon Nanotubes for Biological Sensor Design
Mar. 10	Dr. Delbert E. Day	Missouri S&T	Destroying Malignant Tumor Using Radioactive Glass Microspheres
Mar. 31	* Ms. Maria Potter	Missouri S&	AFLP Fingerprint Analysis of Hybrid Salamanders in the Missouri Caverns Section of Onondage Cave
Apr. 18	Dr. Nan-Shan Chang	National Cheng Jung University	WWOX/WOX1 in Cancer and Neurodegeneration
Apr. 21	* Ms. Su Young Park	Missouri S&T	Role of Microtubules in Bedding Yeast Cytokinesis
Apr. 28	Ms. Amy Reeves	KV Pharmaceutical	A Brief History of Clinical Research and the Ethics of Human Experimentation
May 5	Dr. Nathan Chen	Missouri S&T	Algae For Biodiesel: Why and How??
Sept. 8	Dr. Anne Maglia,	Missouri S&T	Paradigm Shifts in Comparative Morphology: Addressing Long-Standing Problems with Computational Solutions
Sept. 15	[+]Ajay Rao and [+]Ben Stephens	Missouri S&T	Summer Internship Experience
Sept. 22	Keith Strassner and Eric Anderson	Missouri S&T	Technology Transfer and Patents At Missouri S&T
Sept. 29	Dr. Daniel Forciniti	Missouri S&T	
Oct. 6	Dr. Philip Mayeux	University of Arkansas	Bridging Biology to Understand Disease
Oct. 17	Dr. Dennis Figgs,	Missouri Dept, Conservation	Wildlife Due to Climate Changes
Oct. 20	[+]Jamie Statler and Isaac Deatherage	Missouri S&T	Taiwan Summer Exchange Program
Oct. 27	Dr. Laurie Achenback	Southern Illinois University	Anaerobic Microbiology and Bioremediation
Nov. 6	Dr. Elizabeth Dumont	University of Massachusetts	Finite-Element Analysis of Biological Structures
Nov. 10	Dr. Kristen Walton	Missouri Western	Gut Bacteria and Inflammation
Nov. 17	Ms. Terry Wilson	Missouri S&T	Effects of Environmental Lead on Children's Immune Systems
Dec. 8	* Malavika Sinha	Missouri S&T	Biodiversity in Alkaline And Salt Lakes

* Masters degree candidates; [+] Undergraduate student

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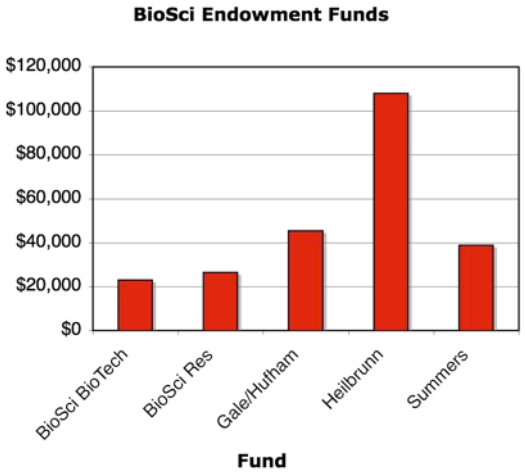
Donors

2008 Annual Report

We are pleased to acknowledge the support we receive from our alumni and friends. This consistent support provides the means to strengthen our academic community and support innovative in both teaching and research. Income from operations reflects student tuition and state support. The remaining departmental income comes from grants, contracts, biotech sales, endowment income and annual giving.

Unless otherwise designated, donations are used to enhance our endowments that provide funding for scholarships and research. The department's rapid growth in student population has created a particularly acute need for scholarship funds.

Departmental donors for 2008 are acknowledged below. We hope you will be able to support the department in its annual fund-raising campaign.



Value of BioSci endowment funds on August 31, 2008. The Gale-Hufham, Heilbrunn and Summers funds provide student scholarships; the other funds support research efforts.

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

Donations up to $100

Mr. Michael Abernathy
Matthew & Amy Banks
Bikis Water Consultants LLC
Dr. Kathleen Bottroff
Rachel Carter
Timothy Carter
Meghan Donnellan
Richalle Dav
Lisa Delaney
Dr. James & Rebecca Fiechtl
Jessica Gorman
Gerald Griffith
Sue Hufham
Amy Hunt
IBM
Jonathan Kwantes
Jeffrey Lewallen
Lisa & Stanley Lindesmith
Dr. Anne Maglia
Dr. Larry & Lynn McCallister
Linda Michaelsen
Kerstien & Hal Padgett
Robert & Katherine Phillips
Amanda Posgai
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Jessica Shaffer
Ashley Sheek
Shelley Spears
Joseph Sueme III
Margaret Thompson
Julie Townsend
Matthew Vogel
Adrian Winters
Youth Sports Awareness

Donations up to $999

Mark Algaier
Michael W McMenus
Steven Peppers
Mark Starler
Dr. Paul Stricker
Pauline Wvss

Donations > $1,000

Robert & Joan Aronstam
Joseph Safron

Equipment Donations

Federick Kielhorn
MSC Company

Contributions may be directed to:
Biological Sciences
105 Schrenk Hall
400 West 11th St.
Rolla, MO 65409

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Department of Biological Sciences

2008 – Extramural funding

	Shared effort	Direct cost	Indirect cost	Total		Project
Brown, Roger F	35	3,323.62	1,678.43	5,002.05	NIH Natl Inst Of Health	Periodontal Engineering by Gro
Brown, Roger F	20	3,404.93	244.12	3,649.05	DOD	Consortium for Bone and Tissue
Huang, Yue-Wern	100	16,674.31	0.00	16,674.31	MO Dept of Conservation	Evaluation of Health Condition
Huang, Yue-Wern	100	4,993.76	0.00	4,993.76	MO Dept of Conservation	Evaluation of Health Condition
Maglia, Anne Marie	50	53,767.09	21,360.35	75,127.44	NSF Natl Sci Fndtn	Semi-Automated Construction of
Maglia, Anne Marie	50	63,446.40	24,199.37	87,645.77	NSF Natl Sci Fndtn	Semi-Automated Construction of
Maglia, Anne Marie	50	7,102.62	0.00	7,102.62	NSF Natl Sci Fndtn	Semi-Automated Construction of
Maglia, Anne Marie	50	23,115.83	0.00	23,115.83	NSF Natl Sci Fndtn	Semi-Automated Construction of
Maglia, Anne Marie	60	17,038.73	8,348.99	25,387.73	NSF Dirc Bio Sci	Morphology Net: A Digital Library
Maglia, Anne Marie	60	4,107.54	2,012.64	6,120.18	NSF Dirc Bio Sci	Morphology Net: A Digital Library
Mormile, Melanie R	40	22,596.45	5,646.46	28,242.92	MSC Company	Development of Novel Animal Feed
Mormile, Melanie R	40	30,471.34	7,617.89	38,089.23	MSC Company	Development of Novel Animal Feed
Mormile, Melanie R	10	5,005.32	0.00	5,005.32	NSF Div Materials Res	Acquisition of a Dual Beam Foc
Westenberg, David J	5	331.89	26.55	358.44	MO Dept of Higher Educ	Science Education & Quantitati
Westenberg, David J	5	4,816.32	277.11	5,093.42	MO Dept of Higher Educ	Science Education & Quantitati
Shannon, Katie	100	24,010	0.00	24,010	U MO Research Board	Mitotic Exit Network in Yeast
Aronstam, Robert S	100	224,836.60	0.00	224,836.60	S&T cDNA Resource Ctr	Biotech sales – signal transduction clones
		509,042.75	**71,411.91**	**580,484.66**		

Most of the direct costs for research in the department comes from grants and contracts from external sources. Expenditures of these funds for the Calendar Year 2008 are listed above. Funds expended in 2008 from multiple grant funding periods are listed on separate lines. Research expenditures derived from a competitive grant form the University of Missouri Research Board as well from biotech sales from the S&T cDNA Resource Center are also listed

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Helix

2008 Annual Report

Mission: To spread love and knowledge of biological sciences across the campus and into the community.

2008 Fall Semester Events

August 29 – Ice Cream Social – welcome back party

September 10 – First Meeting – Plans for the semester

September 24 – Speaker from Monsanto

October 8 – Chicago information meeting

October 15 – evening event: academic advising help

October 22 – General meeting – Focused on Chicago Trip

October 31 – (Friday) Halloween Bake Sale

November 5 – Finalizing Chicago

November 7, 8 and 9th – (weekend trip) CHICAGO – Shedd Aquarium, Museum of Science and Industry, and International Museum of Surgical Science

November 19 - Talked about elections, wrapped up chicago

December 4 – (Thursday) Movie/Relaxation Night

December 10 – Last meeting, Bruce from Fit Phelps and Elections

Part of the Chicago trip crew

2009 spring semester events

January 28 – Welcome back. Discuss plans for the semester - Focus on research and Volunteer opportunities

February 2 – S'mores 'n' more social

February 4 – Joint meeting with Scrubs-Eddie from COC will talk about how to dress for interviews/career fair and interview etiquette.

February 11 - Students research – What others are already doing and how they got there.

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February 25 - Faculty research – how to get involved, OURE applications, what to expect
March 11 – Jeopardy/cupcakes and discuss elections
April 8 – Election Day
April 18 (Saturday) – Badge University
April 22 – Earth day (hope to have a booth, then no meeting)
May 6 – Last meeting

2008 Spring Semester Officers
President - Jen Kresse
Vice President - Amanda Watson
Public Relations - Krista Stewart
Treasurer - Taylor Hahn

2009 spring semester officers

Jen Kresse	- Co-President - Biological Sciences major
Krista Stewart	- Co-President - Biological Sciences major
Karen Schilli	- Vice-President - Biological Sciences major
Ashley Muehler	- Secretary - Biological Sciences major
Jimmy Rolufs, Jr.	- Public Relations - Biological Sciences major
April Rocha	- Treasurer - Biological Sciences major

2008 spring semester advisors
Dr. Melanie Mormile, Advisor - Associate Professor, Biological Sciences Department
Dr. David J. Westenberg , Co-Advisor - Associate Professor, Biological Sciences Department

Helix, Fall 2008

Scrubs

2008 Annual Report

Scrubs is Missouri S&T's organization for students who have an interest in health-related fields including:

-Medicine
-Dentistry
-Veterinary Medicine
-Physical Therapy
-Pharmacy

Spring 2008

2008-2009 Officers

Presidents	Taylor Hahn
	Jen Kresse
Vice president	Isaac Deatherage
Correspondence	Jimmy Moore
Treasurer	Karen Schilli
Secretary	Krista Stewart
Community outreach	Meagan Koerner
Public relations	Shalyn Lollar

2008 Fall Semester Activities

September 3	First meeting. PCRMC Patient Ambassador program
September 17	Jared England, The SAFERolla Program
September 18	A.T. Still University College of Osteopathic Medicine
October 1	Discuss upcoming events
October 6-10	Cystic Fibrosis "Shoe" Sales - 11 AM to 1 PM Havener Center
October 11	Great Strides Walk for Cystic Fibrosis - 11 AM Ber Juan Park
October 15	Kerry Poindexter , Hospice Programs
October 29	Presidential Health Care Plan Discussion.
November 12	Aaron Berger, Ohio College of Podiatric Medicine
December 10	Bruce Wade from PCCP, Fit Phelps; Officer Elections

Scrubs officers, Spring 2008

Cystic Fibrosis 5K "Shoe" Sale, Havener Center

The runners at Ber Juan park

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Phi Sigma

2008 Annual Report

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

2008-2009 officers:

President: Richard Campos
Vice President: Stuart Brune
Secretary: Krista Stewart
Treasurer: Sherea Stricklin

Faculty Advisor: Dr. Ronald Frank

2009 Spring Semester Activities:

- January 16: review application for freshman scholarship
- February 2: send out information about the scholarship the eConnection.
- February 6: plan chili cook-off and take pictures for silent auction.
- February 20: continue to plan for chili cook-off and silent auction.
- February 27: Chili cook-off to be held in Bio-Sci lounge as well as the announcements of the results from the silent auction. Send out invitations for membership around the department.
- March 2: Due date for freshman scholarship
- March 13: Send membership applications to nationals
- April 3: Begin interviews for scholarship
- April 17: Continue interviews
- April 26: Banquet, announce winner of the freshman scholarship and faculty member of the year award

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iGEM Team

2008 Annual Report

The international Genetically Engineered Machine competition iGEM is an international arena where student teams compete to design and assemble engineered machines using advanced genetic components and technologies.

2008 Highlights:

Team members:

Michelle Brosnahan
Stuart Brune
Cory Cheatham
Marcus Hayer
Rachel Klapper
Brian Pink
Jackie Schneider
Greg Schmoll
Daniel Schwent
Patrick Versteeg

Faculty advisors:

Katie Shannon
Dave Westenberg

Our Projects:

Methanol Sensor:

The purpose of this research is to use recombinant technology to culture yeast cells capable of determining the concentration of ethanol and using these cells to construct an ethanol sensor. Metabolic pathways exist for the metabolism of methanol and ethanol within some species of the Pichia taxa, including *Pichia pastoris*. Alcohol oxidase (AO) is the first and major enzyme produced in the methanol metabolic pathway. However, if both ethanol and methanol are present, *P. pastoris* will utilize the ethanol before consuming the methanol. Consequently, the AOXI gene will not be expressed until the ethanol has been consumed.

Fusing the AOXI gene promoter with the DNA sequence encoding a fluorescent protein will allow detection of AOXI expression. Supplying the yeast with ethanol and methanol simultaneously, the cells will produce the fluorescent protein once the ethanol is consumed. The concentration of ethanol can then be determined by measuring the time until fluorescence detection.

Microbial Fuel Cell:

Optimization of electron shuffle to external surfaces such as anodes is a primary goal. Geobacter sulfurreducens happens to be our model bacteria due to its ability in nature to efficiently export electrons extracelluarly. E. coli can be the chassis for this experiment due to its genome already containing some key proteins in our preferred pathway. The proteins, such as extracellular pilin, MacA, and many other cytochromes, which E. coli does not have will be isolated from Geobacter sulfurreducens and introduced into E. coli to formulate the most optimal pathway for generating electronmotive force in a microbial fuel cell apparatus.

Some problems will be faced concerning plasmid engineering and the simple fact that Geobacter is anaerobic and E. coli is aerobic. As a team, we will push in the right direction harder than an emf on the internal resistivity of a toroid. Many diverse team members will work in concert utilizing Missouri S&T's dominating Electrical, Chemical, and Biological Engineering undergraduates along with Biological Science masterminds.

Our Sponsors:

Chemical & Biological Engineering Department
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