2011
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
cDNA Resource Center	www.cdna.org
BioSci Donations	givingtomst.missouri.edu
iGEM Team	www.mst.edu/~iGEM

Department of Biological Sciences

Chair's Summary - 2011

Robert S. Aronstam

Department Update

The S&T BioSci community provides a supportive, collegial, challenging and rewarding environment for its faculty, students and staff.

This report is a little long – there is a lot to report. We faced some considerable challenges in 2011, but have much to celebrate. As always, we maintained a consistent focus on preserving and enhancing the quality of our programs.

Faculty:

The BioSci community at Missouri S&T was energized as the department welcomed two new faculty members in 2011, Drs. Chen Hou and Matt Thimgan.

Dr. Hou uses theoretical and comparative approaches to study animals' energy budgets, i.e., how energy allocation strategies shape life history traits, and how animals alter their energy budgets to adapt to changes in the environment. Dr. Hou earned M.S. and Ph.D. degrees from the University of Missouri – Columbia and has held research positions at the University of Florida, the Santa Fe Institute, and, most recently, the Albert Einstein School of Medicine. Dr. Hou and his wife Sara and son Han moved to Rolla in August.

Dr. Thimgan is investigating the role of lipid metabolism in sleep behavior and cognition. Dr. Thimgan has demonstrated novel relationships between lipid metabolism and behavioral responses to sleep loss, and is using biochemical and genetic approaches to elucidate the mechanism by which lipids alter the response to sleep deprivation. Dr. Thimgan earned a Ph.D. from the University of North Carolina, and came to S&T from a research position at the Washington University in St. Louis. Dr. Thimgan lives in Rolla with his wife Dr. Katie Shannon and sons Marcus and Andrew.

In February, four BioSci faculty were honored with Faculty Achievement Awards. Dr. Ronald Frank received a Faculty Service Award, Dr. David Westenberg received a Faculty Teaching Award, Ms. Terry Wilson received a Faculty Achievement Award, and Dr. Yue-wern Huang received a Faculty Research Award.

BioSci faculty members receive Achievement Awards from Chancellor Jack Carney.: (*l-r*) Dr. Huang, Ms. Wilson, Chancellor Carney, Dr. Frank, Dr. Westenberg

Ms. Terry Wilson, M.S., was appointed as a Teaching Associate Professor. Ms. Wilson has won numerous teaching awards, and received a Faculty Achievement Award in February 2011. Ms. Wilson teaches Biodiversity (Bio 113) and lab (Bio 114), Principles of Biology (Bio 111), Cellular Biology lab (Bio 212), and General Biology (Bio 110) and lab (112). Ms. Wilson is now assistant state coordinator for the Project Lead The Way program, and shares PRO advising for first year students with Dr. Frank.

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Dr. Roger Brown, director of the Biomaterials Laboratory, retired as a professor of biological sciences at the end of the 2011 academic year, and was immediately named an inaugural Chancellor Professor. Chancellor Professorships are awarded to retiring faculty members in recognition of long-term meritorious service to the institution. Chancellor Professors continue to work part-time at the university. Dr. Brown continues to direct the S&T vivarium and is developing new laboratory courses in Human Anatomy & Physiology. Dr. Brown also continues his biomaterials research with colleagues in the Center for Bone and Tissue Repair and Regeneration.

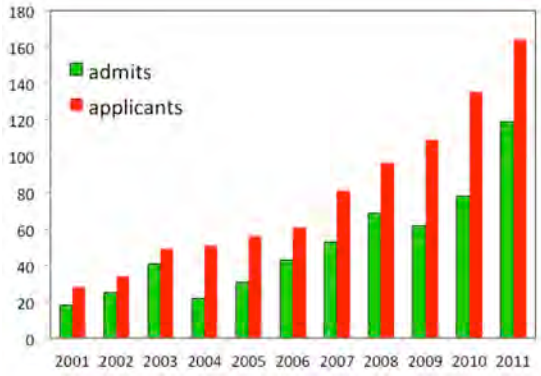
Dr. Brown joined the UMR faculty in 1978, as the third member of the Life Sciences Section of the department of chemistry (joining Dr. Nord Gale and James Hufham). Dr. Brown developed and taught several courses over the years, most recently offering courses in anatomy, physiology, biomaterials, tissue engineering and exercise physiology.

Dr. Brown was also accorded the title of Professor Emeritus by his colleagues in the department of biological sciences, an honor that was recognized at the December graduation ceremony.

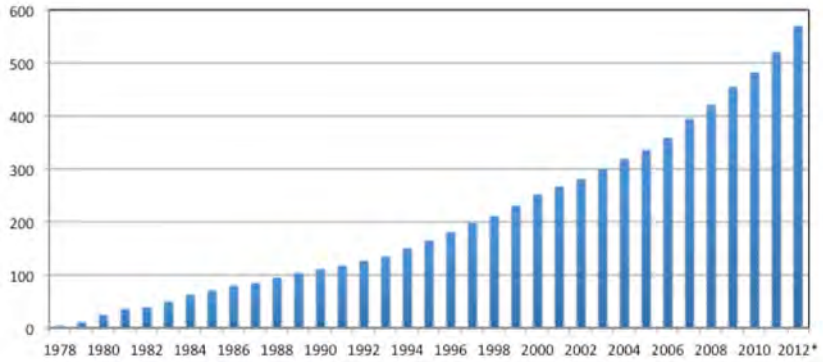
Students:

Degrees were awarded to 35 undergraduates and 8 graduate students at our May and December 2011 commencement ceremonies. This brings the number of BioSci graduates to 532 since the department was formed in 1978. Prior to 1978, biology at S&T existed as the Life Sciences section of the Chemistry Department; from 1978 through 1998, we were known as the Department of Life Sciences. More than 32% of all biology majors (173) have graduated in the last 5 academic years, reflecting the recent growth of the department.

Last year I reported that more than 45 new (first year and transfer) students matriculated in BioSci for the fall semester; this year that number swelled to over 70, and the number of applications for fall 2012 appears to be just as great. The BioSci community now includes 219 undergraduates (compared to 181 last year). In terms of enrollment, we are now the 6th largest department on campus (up from 7th last year).



This growth counters trends in Missouri demographics; the number of students graduating from Missouri high schools is dropping, and will continue to drop for the next 4 years. I attribute our growth to two factors: 1) we have a very good program and 2) people are starting to realize that we have a really good program. (*Warning*: boasting to follow). Our program is good because it is rigorous, comprehensive, student-oriented, research intensive, and hands-on. Moreover, we have uniformly dedicated and effective teachers (our student evaluations are well above the university average), and our graduates are both satisfied and well prepared. This preparation is reflected by a number of measures, including MFAT performance, professional and graduate school acceptance rates, and Praxis examination scores (for education minors). The increased recognition of our programs is the result of consistent and extensive recruitment efforts and a growing cadre of ambassadors – our appreciative graduates.



The growing population of BioSci alumni (*2012 estimated).

Department/University Finances.

This is not my favorite topic. Fortunately, we are a conservatively managed university and we remain in better shape than many similar universities. However, we have weathered repeated cuts in state funding, and the governor's proposal for fiscal year 2013 calls for a 12.5% decrease in funding (state funding accounts about 27% of our operating budget). The proposed decrease at S&T would be $4.5 – 5.0 million

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and return us to 1996 funding levels. Cuts of this magnitude will indeed be painful. Personnel are our greatest expense (≈70%), and the University of Missouri faculty is already among the lowest paid at any public university in the Midwest. Thus, it is likely that we are facing substantial tuition increases, increased student-faculty ratios, and an increase in the number of unfilled faculty populations.

On the bright side, BioSci can point to its growth of student population, an increased (and increasingly supportive) alumni population, increased donations, endowment growth, and increased ancillary income from biotech sales and summer, PLTW and continuing education fees. The economy will eventually improve, and I promise that we will retain our intense focus on the quality of our programs.

Rachel Wille at Undergraduate student Research Day

One particularly pressing need is to secure continuing support for our research efforts. Funding agencies are under severe strain, and funding rates are extremely unfavorable (i.e., only a very small fraction of approved grants receive funding). In order to maintain our momentum, we have created faculty research accounts funded with income from a variety of activities that can supplement general operating income (clone sales, certain educational fees, restricted gifts and endowment income). I expect to increase funding from each of these sources to stablize our academic research efforts.

Project Lead the Way. We had a busy summer hosting 5 training sessions for 75 master high school teachers involved in the Project Lead The Way – Biomedical Sciences curriculum. For the first time we offered training session in Biomedical Innovations. Under the direction of **Ms. Terry Wilson**, these sessions went exceptionally well**,** and we took full advantage of the opportunity to inform our guests about the unique training programs in biological sciences at Missouri S&T. We now offer academic credit to students in this remarkable program; we expect to be able to offer graduate credit for teachers this summer.

iGEM student research: loading gels

Research. BioSci faculty members published 18 peer reviewed research publications, presented 22 papers at national and international meetings, and were invited to give 19 talks in various professional venues. **Dr. Melanie Mormile** and her colleagues were awarded a patent for the invention Fossil Fuel-Free Process of Lignocellulosic Pretreatment with Biological Hydrogen Production. Six visiting scholars from Taiwan National Normal University spent part of 2011 in our department; five others will join us in the spring semester of 2012. Clones sales from the cDNA Resource Center increased 13% from $211,688 in FY2010 to $240,219 in FY2011, and have totaled $1.9 million since FY2005. The sequences of 44 signaling proteins were submitted to GenBank, and 38 clones were introduced to the collection and made available to the scientific community.

Student Affairs: Student organizations (Helix, Scrubs, iGEM and Phi Sigma) associated with the BioSci department had very active years, with invited speakers, service projects, and field trips. The department hosted a homecoming picnic, weekly faculty-student teas, two graduation receptions, and a holiday party. Our weekly student newsletter (BioConnection) completed its fifth year of publication. The iGEM cellular design team competed in its 4th national event, and was awarded a silver medal for submission of a novel genetic construct to the iGEM library.

Strategic Plan. The faculty refined the departmental Strategic Plan at our annual planning retreat. Our 5 year (2011-2015) rolling plan embodies our best strategies for realizing our mission to promote **learning** and **discovery** in the biological sciences. In last year's Annual Report I outlined 8 specific objectives. In the accompanying Table, I list these goals along with 2011 accomplishments and a "Grade" related to goal achievement. Please remember, these are one year scores for five year goals!!

BioSci fall picnic outside Schrenk Hall

Among the strategic plan goals receiving particular attention at our most recent (August 2011) retreat were 1) defining curriculum learning objectives, 2) engaging our first year students, 3) securing research equipment, notably a cell sorter and confocal microscope, 4) increasing scientific publication, 5) improving departmental communications, 6) developing a doctoral training program, 7) increasing faculty research/development funding from internal sources by at least $1,000/year, and 8) strengthening funding streams from PLTW activity, summer teaching, donations, and endowments.

Goals (2010-2014)	Activity 2011	Grade
1. adoption of a continuous curriculum improvement plan	4 new courses added/proposed; curriculum evaluation not designed	C
2. development of an advising handbook	no activity in 2011	D
3. engaging >90% of our students in lifelong learning activities	research, student clubs, service learning involve virtually all of our students	A
4. growing the BioSci academic community to include 200 undergraduate students	accomplished, further growth anticipated	A+
5. assessing implementation of an interdisciplinary Ph.D. training program	discussion initiated with sister institution for a cooperative program	C+
6. funding faculty development and research accounts	accounts maintained for the 2nd year with a funding increase of 30%	A
7. updating departmental protocols for supporting the career development of new faculty members	no activity in 2011	D
8. improving our research infrastructure through establishment of core facilities	equipment grants submitted; development office and alumni engaged; some gifts-in-kind received	B–

I am pleased to provide you with this report. Your comments and suggestions are welcome. As always, I invite you to visit the department for a tour and update on our work.

Sincerely,

Robert S. Aronstam, Ph.D.
Professor and Chair, Biological Sciences

Department of Biological Sciences
Mission Statement

To promote **learning** and **discovery** in the biological sciences while functioning as an inclusive academic community that is supportive, collegial, challenging and rewarding, and that values the personal and professional development of all its members (students, faculty, and staff).

Specific goals:

- Fostering the biology education of all students (majors and non-majors), and increasing the general public's awareness of contemporary issues related to biology;
- Facilitating students' mastery of biological knowledge, engaging them in the process of scientific discovery, and developing their ability to think critically and communicate effectively; and
- Conducting and communicating the results of innovative biological research

Robert S. Aronstam, Ph.D.

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

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 Kaighin (Research Technician); Student Research Group Leaders: Erica Shannon, Alexis Martin, Rhett Reichard,

2011 Presentations

Erickson, J.D., C.H. Wu, H.-J. Wang, R.A. Reichard, E.K. Shannon, A.G. Martin, A. Martin, Y.-W. Huang and R.S. Aronstam, Comparative Effects of Metal Oxide Nanoparticles on Muscarinic Receptor Mediated Calcium Signaling. American Society for Neurochemistry, 2011.

Martin, A.G, C.T. Chang, H.-J. Wang, J.D. Erickson, R.A. Reichard, E.K. Shannon, A. Martin, Y.-W. Huang and R.S. Aronstam, Halothane Suppresses Calcium Signals Generated in Response to Activation of M3 Receptors Expressed in CHO Cells, American Society for Neurochemistry, 2011.

Aronstam, R.S., T.H. Tang, C.T. Chang, H.-J. Wang, J.D. Erickson, A.G. Martin. R.A Reichard, E.K. Shannon, A Martin and Y.-W. Huang, Disruption of Muscarinic Receptor Signal Transduction by Oxidative Stress, American Society for Neurochemistry, 2011.

Erickson, J.D., H.-J. Wang, Y.-W. Huang, Disruption of Muscarinic Receptor Mediated Signal Transduction by Oxidative Stress, Society of Toxicology, 2011.

Huang, Y.-W., C.C. Chusuei, S. Mallavarapu, J.G. Winiarz, J.-S. Moon and R.S. Aronstam, Searching for Common Denominators that Explain Cytotoxicity Induced by Metal and Non-metal Nanomaterials, Annual meeting EuroTox, Paris, 2011.

Martin, A.L., K.Z. Williams, H.L. Chambers, R.A. Reichard, E.K.. Shannon, H.-J. Wang, A.G. Martin and R.S. Aronstam, Constitutive Activity of Orphan G Protein Coupled Receptors, Annual meeting, American Society for Cell Biology, Denver, CO, 2011.

Martin, A.G., H.-J. Wang, R.A. Reichard, P.-K. Chao, E.K. Shannon, A.L. Martin, Y.-W. Huang, M.-H. Chang, R.S. Aronstam, Honokiol blocks store operated calcium entry in CHO cells expressing the M3 muscarinic receptor, Annual meeting, American Society for Cell Biology, Denver, CO, 2011.

Huang, Y.-W., C.C. Chusuei, S. Mallavarapu and R.S. Aronstam, Mechanisms of Action of Cytotoxicity of Transition Metal Oxide Nanoparticles in Human Lung Cells, , Experimental Biology, 2012.

Aronstam, R.A., K.Z. Williams, H.L. Chambers, R.A. Reichard, E.K. Shannon, H.-J. Wang, A.G. Martin, and A.L. Martin, Orphan G protein coupled receptors: signaling pathways, Annual Meeting, American Society for Neurochemistry, Baltimore, MD, 2012.

Shannon, E.K., A.L. Martin, V.A. Kaighin, A.G.. Martin and R.S. Aronstam, Transcriptional regulation mediated by muscarinic acetylcholine receptors with native and constitutively active phenotypes, Annual Meeting, American Society for Neurochemistry, Baltimore, MD, 2012.

2011 Seminars

National Taiwan Normal University, "Disruption of muscarinic signal transduction by oxidative stress: Nanoparticles, honokiol and calcium", Department of Life Sciences, Taipei, Taiwan, June 22, 2011.

Tzu Chi University, "Muscarinic receptor-mediated signaling pathways", Hualien, Taiwan, June 24, 2011.

National Dong Hwa University, "Crosstalk in neurotransmitter signaling pathways; S&T and Taiwan scholar exchange program", Hualien, Taiwan, June 24, 2011.

National Cheng Kung University, "Characterization of muscarinic receptor-mediated signal transduction", Department of Life Sciences, Tainan, Taiwan, June 28, 2011.

Department of Biological Sciences, "Influence of oxidative stress on muscarinic receptor signal transduction. Update on cDNA Resource Center operations", Rolla, MO, September, 2011.

2011-2012 Teaching

SP11: Neurobiology (BioSci 384)

SS11: Cellular Biology (BioSci 211)

FS11: Cellular Biology (BioSci 211)

SP12: Pharmacology (BioSci 383)

Undergraduate advisees: 57 majors; ≈12 minors

Graduate Students: Hsui-Jen Wang, Adam Martin

Visiting Scholar: Chiung-Tan Chang

OURE fellows: Alexis Martin, Rhett Reichard, Megan Koerner, Alex Willis, Brittany Brand, Katie Bey, Katie Payne, Jeremy Willhoite, Hannah Chambers, Kyle Williams, Jordan Bridges

2010 Activities

- Directed the Missouri S&T cDNA Resource Center –marketed stably transfected cell lines; added 12 clones to the catalog
- Expanded graduate student exchange program with National Taiwan Normal University; 6 visiting fellows welcomed
- Committee: Institutional Biosafety Committee (chair); Radiation Safety Committee. Department committees (Development, Recruitment)
- GenBank submissions: 80 full length coding sequences of human signal transduction proteins
- Presented 4 "Science Spotlights" at S&T Open Houses

Laboratory of Neurobiology staff

Roger F. Brown, Ph.D.

Professor Emeritus
Chancellor's Professor
Director, Missouri S&T Animal Research Facility
Director, Biomaterials Laboratory

Research Interests

Biomaterials for soft tissue repair

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

2011 Publications

Kolan, K.C.R., M.C. Leu, G.E. Hilmas, R.F. Brown and M. Velez, Fabrication of 13-93 bioactive glass scaffolds for bone tissue engineering using indirect selective laser sintering, *Biofabrication*, 3:1-10, 2011.

Fu, H., M.N. Rahaman, D.E. Day, and R.F. Brown, Hollow hydroxyapatite microspheres as a device for controlled delivery of proteins, *J Mater Sci: Mater Med* 22:579-91, 2011.

2011 Presentations

Brown, R.F., Biocompatibility of bioactive borate glass, Missouri Musculoskeletal Conference**,** July 28-29, 2011, Ewing Marion Kauffman Foundation Conference Center, Kansas City, Missouri.

2011 Teaching

SP11: Human Physiology (BioSci 242)

SP11: Tissue Engineering I / Tissue Engineering II (BioSci 341/BioSci 441)

FS11: Human Anatomy (BioSci 241)

FS11: Biomaterials I / Biomaterials II (BioSci 340/BioSci 440)

Graduate student: Mr. Yinan Lin, MS degree candidate

2011 Extramural Funding

National Institute of Arthritis and Musculoskeletal and Skin Diseases R-15 grant, 'Periodontal Engineering by Growth Factor Release from Hollow HA Microspheres,' Co-PI (with Dr. M. Rahaman (PI), Missouri S&T Ceramic Engr.), 8/06/08-7/31/11, $250,000.

US Army Medical Research 'Consortium for Bone and Tissue Repair and Regeneration, Phase III' Co-PI (M. Rahaman, PI), 10/01/10-10/01/11, $500,000.

2011 Activities

Member of 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

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 plants

Structure and expression of phenylalanine ammonia-lyase gene family 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 Fellow, 1985-88

2011 Publications

Lee L, Leopold JL, Frank RL, Protein Secondary Structure Prediction Using BLAST and Relaxed Threshold Rule Induction From Coverings, *Proceedings of the IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB) 2011*, 7-14, 2011.

2011 Presentations

Robertson G, Frank RL. Analysis of a wound induced family in *Glycine max*. 13th Annual Fall Symposium, Plant Genomes to Phenomes, Donald Danforth Plant Science Center, St. Louis, MO, 2011.

Lee L, Leopold JL, Frank RL, Protein Secondary Structure Prediction Using BLAST and Relaxed Threshold Rule Induction From Coverings, IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB), Paris, France, 2011.

2011 Teaching

WS11: General Genetics (BioSci 231)

WS11: Genomics (BioSci 301)

FS11: Molecular Genetics (BioSci 331)

FS11: Evolution (BioSci 235)

Undergraduate advisees: 42 majors

Undergraduate researchers: Kristin Kelly (OURE), Karen Schilli (OURE), Shelby Emmett, David Kavish, Virginia Pacey, Thomas Reese (CompSci)

Graduate Students: Gena Robertson M.S., Satya Achanta Ph.D. (ChemE), Lisa Guntly Ph.D. (CompSci)

Chen Hou, Ph.D.

Assistant Professor

Director, Laboratory of Animal Physiology

Research Interests

Metabolic basis of aging; Energetic basis of animal growth and reproduction; Mammalian respiratory physiology; Eusocial insects

2011 Publications

Hou, C. and M. Mayo, Pulmonary diffusional screening and the scaling laws of mammalian metabolic rates, *Physical Review E*. 84:61915. doi: 10.1103/PhysRevE.84.061915, 2011.

Zuo, W., M.E. Moses, G.B. West, C. Hou, and J.H. Brown, A general model for effects of temperature on ectothem ontogenetic growth and development. *Proc. R. Soc. B*. doi:10.1098/rspb.2011.2000, 2011.

Hein, A., C. Hou, and J.F. Gillooly, Energetic and biomechanical constraints on animal migration distance. *Ecology Letters*. doi: 10.1111/j.1461-0248.2011.01714.x, 2011.

Hou, C., K. Bolt, and A. Bergman, A general model for ontogenetic growth under food restriction. *Proc. R. Soc. B*. doi: 10.1098/ rspb.2011.0047, 2011.

Hou, C., K. Bolt, and A. Bergman, A general life history theory for effects of caloric restriction on health maintenance. *BMC Systems Biology* 5:78. doi:10.1186/1752-0509-5-78, 2011.

Hou, C., K. Bolt, and A. Bergman, Energetic basis of correlation between catch-up growth, health maintenance and aging. *J. Gerontol. A. Biol. Sci*. doi: 10.1093/gerona/glr027, 2011.

2011 Presentations

Invited Speeches

Hou, C., Energy uptake, allocation and tradeoffs during growth. Colloquium seminar, China Agriculture University, Beijing, China, Feb, 2011.

Poster Presentations

Hou, C., Aging as a consequence of energy tradeoffs between growth and health maintenance. Cell Symposia Metabolism and Aging Conference; Cape Cod, MA, March, 2011.

2011 Advising

Undergraduate advisees: 6 majors

2010 Activities

Reviewer of peer-reviewed international journals: *Proc. Natl. Acad. Sci. of U.S.A* and *J. Theor. Biol*.

Yue-wern Huang, Ph.D.

Associate Professor

Director, Laboratory of Bionanotechnology and Molecular Toxicology

Research Interests

Nanomaterial toxicity in the aspect: how physiochemical properties of nanoparticles contribute to molecular toxicity mechanisms

Using nanomaterials and cell-penetrating peptides (CPPs) to deliver biologically active molecules into the cell

Pollutants and environmental health

2011 Publications

Lee, C-Y, J-F. Li, J.-S. Liou, Y.-C. Chang, Y.-W. Huang and H.-J. Lee, A gene delivery system mediated by both a cell-penetrating peptide and a PiggBac transposase into human cells. Biomaterials 32:6264-6276, 2011.

Liu, B.R., Y.-W. Huang, J.G. Winiarz, H.-J. Chiang, H.-J. Lee, Intracellular delivery of quantum dots mediated by histidine- and arginine-rich HR9 cell-penetrating peptides through the direct membrane translocation mechanism. Biomaterials 32:3520-3537. (Y. H. and H. L. are corresponding authors.), 2011.

2011 Presentations

Invited Speeches

University of Missouri-Columbia, Cell-Penetrating Peptides and Fluorescent Nanomaterials as a Versatile Nanocarrier System. Columbia, MO, USA. Nov 29, 2011.

Academia Sinica, Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry. Taipei, Taiwan, July 5, 2011.

National Cheng Kung University, Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry. Tainan, Taiwan, June 28, 2011.

National Dong Hwa University, Non-metal vs. Metal Oxide Nanoparticles: Roles in ROS-Induced Toxicity. Hualien, Taiwan, June 24, 2011.

National Taiwan Normal University, Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry. Taipei, Taiwan, June 22, 2011.

Missouri S&T Department of Chemical and Biological Engineering, Nanobiotechnology. Rolla, MO. USA, Feb. 24, 2011.

Conference Presentations

Martin, A.G., H.-J. Wang, R.A. Reichard, P.-K. Chao, E.K. Shannon, A.L. Martin, Y.-W. Huang, M.-H. Chang, R.S. Aronstam, Honokiol blocks store operated calcium entry in CHO cells expressing the M3 muscarinic receptor, Annual meeting, American Society for Cell Biology, Denver, CO, 2011.

Huang, Y.-W., C.C. Chusuei, S. Mallavarapu, J.G. Winiarz, J.-S. Moon, and R.S. Aronstam, Searching for common denominators that explain cytotoxicity induced by metal and non-metal nanomaterials, 47th Congress of the European Societies of Toxicology. Paris, France, Aug 28-31, 2011.

Chusuei, C., S. Mallavarapu, and Y.-W. Huang. Correlation of metal oxide nanoparticle physicochemical properties with cytotoxicity, 242nd ACS National Meeting, 2011..

Erickson, J.D., C.H. Wu, H.-J. Wang, R.A. Reichard, E.K. Shannon, A.G. Martin, A. Martin, Y.-W. Huang and R.S. Aronstam, Comparative Effects of Metal Oxide Nanoparticles on Muscarinic Receptor Mediated Calcium Signaling. American Society for Neurochemistry, 2011.

Aronstam, R.S., T.H. Tang, C.T. Chang, H.-J. Wang, J.D. Erickson, A.G. Martin. R.A Reichard, E.K. Shannon, A Martin and Y.-W. Huang, Disruption of Muscarinic Receptor Signal Transduction by Oxidative Stress, American Society for Neurochemistry, 2011.

Martin, A.G, C.T. Chang, H.-J. Wang, J.D. Erickson, R.A. Reichard, E.K. Shannon, A. Martin, Y.-W. Huang and R.S. Aronstam, Halothane Suppresses Calcium Signals Generated in Response to Activation of M3 Receptors Expressed in CHO Cells, American Society for Neurochemistry, 2011.

Erickson, J.D., H.-J. Wang, Y.-W. Huang, Disruption of Muscarinic Receptor Mediated Signal Transduction by Oxidative Stress, Society of Toxicology, 2011.

Huang, Y.-W., C.-H. Wu, C.C. Chusuei, S. Mallavarapu, J.G. Winiarz, Contribution of physicochemical properties of 4th period metal oxide nanoparticles to their cytotoxicity in cultured human lung cells, Society of Toxicology, 2011.

2011 Teaching

SS11: Toxicology (BioSci 370/470); Issues in Public Health (BIO201); Techniques in Appl & Env Bio (BioSci 475)

FS11: Ecology (BioSci 251); Techniques in Appl & Env Bio (BioSci 475)

Undergraduate advisees: 15 bio majors

Graduate Students: Chi-heng Wu; Ninu Madria

2011 Extramural Funding

2009-2011. Using Quantum Dots and Protein Transduction Domains to Analyze Cargo Dissociation, Uptake, and Localization in Live Cells. PI: Yue-wern Huang. Co-PI: Jeffrey Winiarz & Katie Shannon. National Institutes of Biomedical Imaging and Bioengineering. R15EB009530.

2011 Activities

- Reviewer of peer-reviewed international journals: 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
- S& T Institutional Animal Care and Use Committee Chair
- Departmental Graduate Program Chair
- Coordinator of the student exchange program with National Taiwan Normal University. Four visiting graduate students came to study for a period of six months in 2010. Another four students will arrive in January 2011.

Melanie R. Mormile, Ph.D.

Professor

Environmental Microbiology Laboratory

Research Interests

Microbial populations in hypersaline environments

Bio-energy production by halophilic/halotolerant bacteria

Members of Laboratory

Daniel Roush-Master's Thesis Candidate

Elise Kittrell-Master's Thesis Candidate (co-advised with Dr. Joel Burken)

Varun Paul-Ph.D. Student (co-advised with Dr. David Wronkiewicz)

Andrew Alseth-Undergraduate Researcher

Brandon Boies-Undergraduate Researcher, OURE

Elizabeth Studt-Undergraduate Researcher, OURE

2011 Publications

Brown, S.D., M.B. Begemann, M.R. Mormile, J.D. Wall, C.S. Han, L.A. Goodwin, S. Pitluck, M.L. Land, L.J. Hauser, and D.A. Elias. Complete genome sequence of the haloalkaliphilic, hydrogen producing Halanaerobium hydrogenoformans. Journal of Bacteriology, **193:** 3682-3683.

Findley, S.D., M.R. Mormile, A. Sommer-Hurley, X-C. Zhang, P. Tipton, K. Arnett, J.H. Porter, M. Kerley, and G. Stacey. Activity-based metagenomic screening and biochemical characterization of bovine rumen protozoan glycosyl hydrolases. Applied and Environmental Microbiology, **77:** 8106-8113.

Begemann, M.B., M.R. Mormile, V.G. Paul, and D.J. Vidt. Potential Enhancement of Biofuel Production Through Enzymatic Biomass Degradation Activity and Biodiesel Production by Halophilic Microorganisms. *In* A. Ventosa, A. Oren, and Y. Ma (eds), Halophiles and Hypersaline Environments: Current Research and Future Trends. Springer-Verlag, Berlin, Heidelberg, Germany, 2011, p. 341-357.

2011 Patent

Dwayne A. Elias, Melanie R. Mormile, Matthew B. Begemann, and Judy D. Wall. Fossil Fuel-Free Process of Lignocellulosic Pretreatment with Biological Hydrogen Production, U.S. Patent No. US 8,034,592 B2, Date of Patent: Oct. 11th.

2011 Invited Presentations

A Focus on the Environmental Microbiology of Soap Lake, Washington and Its Extremophilic Inhabitants. College of Science, Washington State University. Pullman, Richland (Telecast), and Vancouver (Telecast), Washington, April 15. *(National Level)*

Are there Martians in Australia? Institute for Microbial Biotechnology and Metagenomics, Department of Biotechnology, University of the Western Cape, Cape Town, South Africa, June 29. *(International Level)*

Do halophilic microorganisms possess the enzymatic capabilities to pre-treat biomass for subsequent fermentative biofuel production? 61st Annual Meeting of the Society for Industrial Microbiology. New Orleans, Louisiana, July 24-28, 2011. (Co-authors: M.B. Begemann, V.G. Paul, and D.J. Vidt) *(National level)*

2011 Teaching

SP11: Bio Sci 402, Problems in Applied and Environmental Microbiology, focused on bio-fuel production

SP11: Bio Sci 452, Astobiology

FS11: Bio Sci 102, Introduction to Biological Sciences

FS11: Bio Sci 221, Microbiology

FS11: Bio Sci 455, Bioremediation

2011 Honors

Selected to participate in the University of Missouri/University of Western Cape Linkage Program, awarded by the University of Missouri South African Education Program, traveled to South Africa June 26 through July 16.

2011 Activities

- Academic Editor for PLoS ONE
- Member of the Editorial Boards for Applied and Environmental Microbiology; Environmental Technology; Agricultural, Food and Analytical Bacteriology; Frontiers in MicroBio Technology; Frontiers in Extreme Microbiology
- Served as peer-reviewer for the following journals: Astrobiology; Process Biochemistry; Ecological Engineering; FEMS Microbiology Letters; International Journal of Systematic and Evolutionary Microbiology; Journal of Basic Microbiology; Journal of Industrial Microbiology; Water Resources Research; and Water Research
- Review member for the National Science Foundation's Graduate Research Fellowship Program (GRFP), Arlington, Virginia
- Review member for the National Institute of Environmental Health Sciences' Innovative Bioavailable Assays for Remediation Program, Research Triangle Park, North Carolina

Dev Niyogi, Ph.D.

Associate Professor

Director, Laboratory of Freshwater Ecology

Research Interests

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

2011 Publications

Greenwood, M.J., J.S. Harding, D.K. Niyogi, and A.R. McIntosh, Improving the effectiveness of riparian management for aquatic invertebrates in a degraded agricultural landscape: stream size and land-use legacies. Journal of Applied Ecology. doi: 10.1111/j.1365-2664.2011.02092.x, 2011.

2011 Presentations

O'Brien, J.M. F.J. Burdon, M.J. Greenwood, J.S. Harding, D.K. Niyogi, A.R. McIntosh. 2011. Riparian management protects structure and function of New Zealand urban stream ecosystems. North American Benthological Society, Annual Meeting, Providence.

2011 Teaching

SP11: Ecology (Bio 251)

SP11: Global ecology (Bio 364)

SP11: Invasive species ecology (Bio 300)

FS11: Freshwater Ecology (Bio 354)

FS11: Introduction to Environmental Science (Bio 151)

SU11: Field class in freshwater ecology (through University of Colorado)

Graduate research advisees: 2

Visiting scholars from NTNU: 3

Undergraduate research advisees: 4

2011 Activities

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. Two graduate students and several undergrads have been helping with these studies. I also have hosted several visiting scholars from National Taiwan Normal University, who have conducted research on the effects on aquatic fungi and leaf decomposition. I am also continuing my research collaboration with colleagues at the University of Canterbury in Christchurch, New Zealand. My main research focus there is the effects of active and abandoned coal mines on streams.

Katie Shannon, Ph.D.

Assistant Professor , Department of Biological Sciences
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 tumoriogenesis. 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 involved in cytokinesis, including actin, a small GTPase, and formins, a class of actin nucleating proteins. How these interactions are regulated during the cell cycle is an area of active research.

2011 Publications

Shannon, K.B. (2011) IQGAP family members in yeast, *Dictyostelium*, and mammalian cells. *International Journal of Cell Biology* Focus Issue on Cytoskeletal Proteins (in press)

2011 Presentations

Miller, D. and K.B. Shannon, (2011) Determining the Function of Iqg1 CDK Phosophorylation from Analysis of Mutant Proteins, Sept. 24-25, 2011, Midwest Yeast Meeting, Northwestern University, Chicago, IL.

Shannon, K.B., Using Budding Yeast To Study The Regulation Of Cytokinesis, Department of Molecular Microbiology and Immunology, University of Missouri-Columbia, 2011.

Shannon, K.B., Choosing a Career Focused on Teaching and Research, Keynote speaker at Graduate Student Retreat, Biochemistry and Biophysics Graduate Program at Washington University, Cedar Creek Conference Center, 2011.

2011 Teaching

WS11: Cellular Biology (Bio211)

FS11: Senior Seminar (Bio310)

FS11; Developmental Biology (Bio315)

2011 Advising

OURE student: Daniel Miller

Undergraduate researchers: Jeremy Bolin, Mydah Choudhry

Fifteen Undergraduate Advisees

2011 Activities

- iGEM student synthetic biology team, advised, supervised project
- Reviewer, Molecular Biology of the Cell
- Advisory Board member, Women in Science and Engineering (WISE)

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

Teaching

FS 2011: Bio244 Anatomy & Physiology

Undergraduate researchers: Lindsey Schobert, Carlos Rivera, Christie Koch, Dillon Barton, Thomas Congdon, Alex Lore

Graduate Student: Karen Schilli

Publications

Thimgan, M.S., S.P. Duntley, and P.J. Shaw, Changes in Gene Expression with Sleep. Journal of Clinical Sleep Medicine. Oct 15;7(5 Suppl):S26-7, 2011.

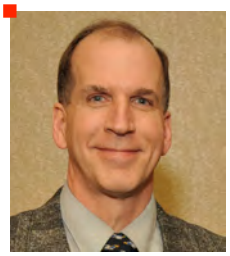
Donlea, J.M, M.S. Thimgan, Y. Suzuki, L. Gottschalk, and P.J. Shaw, Inducing sleep by remote control facilitates memory consolidation in *Drosophila*, Science. Jun 24;332(6037):1571-6, 2011.

Presentations

Thimgan, M.S., Disruption of peripheral lipid metabolism genes alters the response to sleep deprivation**,** SLEEP meeting, San Antonio, TX, 2011.

Thimgan, M.S., Disruption of peripheral lipid metabolism genes alters the response to sleep deprivation Gateway Behavioral Neuroscience Conference, Iowa City, IA, 2011.

Thimgan, M.S., Disruption of peripheral lipid metabolism genes alters the response to sleep deprivation, Missouri University of Science & Technology, 2011.



David J. Westenberg, Ph.D.

Associate Professor
Chair, Pre-Medicine Advisory Committee

Current Lab members.

Research Interests

Rhizosphere microbiology. legume symbiosis, quorum sensing, bioenergetics, nitrogen fixation

Research Lab Members: Satya Achanta, April Rocha, Shannon Franks, Ashley Mueller, Aaron Carson, Matt Coates, Katelyn Heil, Natalie Updyke, Kassie Osborne, Kristin Kelly, Raheel Hassan, Habiba Inusah, Tiara Brown-Crosen, Heather Branstetter.

Refereed Publications:

Fumeaux, C., N. Bakkou, J. Kopciñska, W. Golinowski, D.J. Westenberg, P. Müller, and X. Perret, Functional analysis of the nifQdctA1y4vGHIJ operon of *Sinorhizobium fredii* strain NGR234 using a transposon with a NifA-dependent read-out promoter. Microbiology 157::2745-58, 2011.

Abstracts:

Westenberg, D.J. and A. Chang, Reaching Out to the K-12 Community: A Survey of ASM Membership Involvement in K-12 Outreach. American Society for Microbiology, New Orleans, LA, 2011.

Rocha, A. and D.J. Westenberg, Isolation and Characterization of Bacteria Symbionts from *Crotolaria spectabilis* Grown on TCE Contaminated Soil. American Society for Microbiology, New Orleans, LA, 2011.

Invited Presentations

Westenberg, D.J., Tips and Tools for K-12 Outreach. ASM Conference on Undergraduate Education, Johns Hopkins University, Baltimore, MD June 2-June 5, 2011.

Westenberg, D.J., K-12 Education and Outreach: what ASM can do for you. Annual meeting of the Missouri Branch of the American Society for Microbiology. St. Louis, MO, April 2, 2011.

Teaching

SP11: Microbiology (BioSci 221); Microbiology Lab (BioSci 222); Communication Workshop for Pre-Health Professions (Pre-Med 310), Biological Design and Innovation (BioSci 375)

SS11: Synthetic Biology (BioSci 201)

FS11: Microbiology Lab (BioSci 222), General Genetics (BioSci 231), Pathogenic Microbiology (BioSci 321)

Extramural Funding

Missouri Dept. of Higher Ed. Grant, $179,636 Science Ed. & Quantitative Literacy: An Inquiry-based Approach

US Department of Education GAANN, $174,208 Graduate Education in Alternative Energy

2011 Activities

Co-Advisor for the Missouri S&T iGEM team

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

Summer SEQL Workshop for K-12 teachers on genetics and microbiology activities in the classroom

Chair of the American Society for Microbiology Committee on K-12 Education

Convened a session on virology (ASM Goes Viral at NABT) for the National Association of Biology Teachers national conference

Member of the Missouri S&T Performing Arts Series, Service Learning Advisory and Athletics Advisory Committees

2011 Awards, Honors

Outstanding Teaching Award, Missouri S&T

Faculty Teaching Award, Missouri S&T

Aaron Carson, David Pohlman, April Pummill, Kerwin Razmus, Logan Sauerbrei and Natalie Updyke earned S&T OURE awards

Amanda Foster and Erica Shannon earned an S&T OURE Fellows award

Amanda Foster and April Pummil earned first place for their poster in the Undergraduate Research Symposium.

Amanda Foster and April Pummil earned first place for their research proposal selected by the Shamsher Prakash Foundation.

Terry Wilson, M.S.
Associate Teaching Professor

2011 Teaching

SP11 : Biodiversity (Bio113)
SP11 : Biodiversity lab (Bio 114, 3 sections)
SP11: Cellular Biology Lab (Bio 212)
FS11: Principles of Biology lecture (Bio 111)
FS11: General Biology Lab (Bio 112, 3 sections)
FS11: Cellular Biology Lab (Bio 212, 3 sections)

2011 Activities

Provided staff support for Project Lead the Way summer training institute

- PRO advisor for first year students
- Attended On Course I Workshop in Baltimore, Maryland, Aug. 2011
- GTA assessment workshops

Awards

- Missouri University of Science and Technology Faculty Achievement Award, Feb. 2011

Project Lead the Way Training – 2011

5 sessions
75 teachers
Session I: PBS 13
Session II: PBS 16
Session II: HBS 16
Session III: PBS 20
Session III: BI 10

Contents

Faculty Publications

2011 Annual Report

BioSci Faculty (*l-r*):
Melanie Mormile (standing),
Dev Niyogi,
Terry Wilson,
Matt Thimgan (seated),
David Westenberg,
Robert Aronstam,
Ronald Frank,
Chen Hou,
Yue-wern Huang,
Katie Shannon,

Research Articles:

Begemann, M.B., M.R. Mormile, V.G. Paul, and D.J. Vidt. Potential Enhancement of Biofuel Production Through Enzymatic Biomass Degradation Activity and Biodiesel Production by Halophilic Microorganisms. *In* A. Ventosa, A. Oren, and Y. Ma (eds), Halophiles and Hypersaline Environments: Current Research and Future Trends. Springer-Verlag, Berlin, Heidelberg, Germany, 2011, p. 341-357.

Brown, S.D., M.B. Begemann, M.R. Mormile, J.D. Wall, C.S. Han, L.A. Goodwin, S. Pitluck, M.L. Land, L.J. Hauser, and D.A. Elias. Complete genome sequence of the haloalkaliphilic, hydrogen producing Halanaerobium hydrogenoformans. Journal of Bacteriology, **193:** 3682-3683.

Donlea, J.M, M.S. Thimgan, Y. Suzuki, L. Gottschalk, and P.J. Shaw, Inducing sleep by remote control facilitates memory consolidation in *Drosophila*, Science. Jun 24;332(6037):1571-6, 2011.

Findley, S.D., M.R. Mormile, A. Sommer-Hurley, X-C. Zhang, P. Tipton, K. Arnett, J.H. Porter, M. Kerley, and G. Stacey. Activity-based metagenomic screening and biochemical characterization of bovine rumen protozoan glycosyl hydrolases. Applied and Environmental Microbiology, **77:** 8106-8113.

Fu, H., M.N. Rahaman, D.E. Day, and R.F. Brown, Hollow hydroxyapatite microspheres as a device for controlled delivery of proteins, *J Mater Sci: Mater Med* 22:579-91, 2011.

Fumeaux, C., N. Bakkou, J. Kopciñska, W. Golinowski, D.J. Westenberg, P. Müller, and X. Perret, Functional analysis of the nifQdctA1y4vGHIJ operon of *Sinorhizobium fredii* strain NGR234 using a transposon with a NifA-dependent read-out promoter. Microbiology 157::2745-58, 2011.

Greenwood, M.J., J.S. Harding, D.K. Niyogi, and A.R. McIntosh, Improving the effectiveness of riparian management for aquatic invertebrates in a degraded agricultural landscape: stream size and land-use legacies. Journal of Applied Ecology. doi: 10.1111/j.1365-2664.2011.02092.x, 2011.

Hein, A., C. Hou, and J.F. Gillooly, Energetic and biomechanical constraints on animal migration distance. *Ecology Letters*. doi: 10.1111/j.1461-0248.2011.01714.x, 2011.

Hou, C. and M. Mayo, Pulmonary diffusional screening and the scaling laws of mammalian metabolic rates, *Physical Review E*. 84:61915. doi: 10.1103/PhysRevE.84.061915, 2011.

Hou, C., K. Bolt, and A. Bergman, A general life history theory for effects of caloric restriction on health maintenance. *BMC Systems Biology* 5:78. doi:10.1186/1752-0509-5-78, 2011.

Hou, C., K. Bolt, and A. Bergman, A general model for ontogenetic growth under food restriction. *Proc. R. Soc. B.* doi: 10.1098/ rspb.2011.0047, 2011.

Hou, C., K. Bolt, and A. Bergman, Energetic basis of correlation between catch-up growth, health maintenance and aging. *J. Gerontol. A. Biol. Sci.* doi: 10.1093/gerona/glr027, 2011.

Kolan, K.C.R., M.C. Leu, G.E. Hilmas, R.F. Brown and M. Velez, Fabrication of 13-93 bioactive glass scaffolds for bone tissue engineering using indirect selective laser sintering, *Biofabrication*, 3:1-10, 2011.

Lee C.-Y., J.-F. Li, J.-S. Liou, Y.-C. Chang, Y.-W. Huang, and H.-J. Lee, A gene delivery system mediated by both a cell-penetrating peptide and a PiggBac transposase into human cells. *Biomaterials* 32:6264-6276, 2011.

Lee L, Leopold JL, Frank RL, Protein Secondary Structure Prediction Using BLAST and Relaxed Threshold Rule Induction From Coverings, *Proceedings of the IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB) 2011*, 7-14, 2011.

Liu BR, Y.-W. Huang, J.G.. Winiarz, H.-J. Chiang, H.-J. Lee, Intracellular delivery of quantum dots mediated by histidine- and arginine-rich HR9 cell-penetrating peptides through the direct membrane translocation mechanism. *Biomaterials* 32:3520-3537, 2011

Thimgan, M.S., S.P. Duntley, and P.J. Shaw, Changes in Gene Expression with Sleep. Journal of Clinical Sleep Medicine. Oct 15;7(5 Suppl):S26-7, 2011.

Zuo, W., M.E. Moses, G.B. West, C. Hou, and J.H. Brown, A general model for effects of temperature on ectothem ontogenetic growth and development. *Proc. R. Soc. B.* doi:10.1098/rspb.2011.2000, 2011.

Presentations at Professional Meetings:

Aronstam, R.S., T.H. Tang, C.T. Chang, H.-J. Wang, J.D. Erickson, A.G. Martin. R.A Reichard, E.K. Shannon, A Martin and Y.-W. Huang, Disruption of Muscarinic Receptor Signal Transduction by Oxidative Stress, American Society for Neurochemistry, 2011.

Brown, R.F., Biocompatibility of bioactive borate glass, Missouri Musculoskeletal Conference**,** July 28-29, 2011, Ewing Marion Kauffman Foundation Conference Center, Kansas City, Missouri.

Chusuei, C., S. Mallavarapu, and Y.-W. Huang. Correlation of metal oxide nanoparticle physicochemical properties with cytotoxicity, 242nd ACS National Meeting, 2011..

Erickson, J.D., C.H. Wu, H.-J. Wang, R.A. Reichard, E.K. Shannon, A.G. Martin, A. Martin, Y.-W. Huang and R.S. Aronstam, Comparative Effects of Metal Oxide Nanoparticles on Muscarinic Receptor Mediated Calcium Signaling. American Society for Neurochemistry, 2011.

Erickson, J.D., H.-J. Wang, Y.-W. Huang, Disruption of Muscarinic Receptor Mediated Signal Transduction by Oxidative Stress, Society of Toxicology, 2011.

Hou, C., Aging as a consequence of energy tradeoffs between growth and health maintenance. Cell Symposia Metabolism and Aging Conference; Cape Cod, MA, March, 2011.

Huang, Y.-W., C.-H. Wu, C.C. Chusuei, S. Mallavarapu, J.G. Winiarz, Contribution of physicochemical properties of 4th period metal oxide nanoparticles to their cytotoxicity in cultured human lung cells, Society of Toxicology, 2011.

Huang, Y.-W., C.C. Chusuei, S. Mallavarapu, J.G. Winiarz, J.-S. Moon and R.S. Aronstam, Searching for Common Denominators that Explain Cytotoxicity Induced by Metal and Non-metal Nanomaterials, Annual meeting EuroTox, Paris, 2011.

Lee L, Leopold JL, Frank RL, Protein Secondary Structure Prediction Using BLAST and Relaxed Threshold Rule Induction From Coverings, IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB), Paris, France, 2011.

Martin, A.G, C.T. Chang, H.-J. Wang, J.D. Erickson, R.A. Reichard, E.K. Shannon, A. Martin, Y.-W. Huang and R.S. Aronstam, Halothane Suppresses Calcium Signals Generated in Response to Activation of M3 Receptors Expressed in CHO Cells, American Society for Neurochemistry, 2011.

Martin, A.G., H.-J. Wang, R.A. Reichard, P.-K. Chao, E.K. Shannon, A.L. Martin, Y.-W. Huang, M.-H. Chang, R.S. Aronstam, Honokiol blocks store operated calcium entry in CHO cells expressing the M3 muscarinic receptor, Annual meeting, American Society for Cell Biology, Denver, CO, 2011.

Martin, A.L., K.Z. Williams, H.L. Chambers, R.A. Reichard, E.K.. Shannon, H.-J. Wang, A.G. Martin and R.S. Aronstam, Constitutive Activity of Orphan G Protein Coupled Receptors, Annual meeting, American Society for Cell Biology, Denver, CO, 2011.

Miller, D. and K.B. Shannon, (2011) Determining the Function of Iqg1 CDK Phosophorylation from Analysis of Mutant Proteins, Sept. 24-25, 2011, Midwest Yeast Meeting, Northwestern University, Chicago, IL.

Mormile, M.R., Do halophilic microorganisms possess the enzymatic capabilities to pre-treat biomass for subsequent fermentative biofuel production? 61st Annual Meeting of the Society for Industrial Microbiology. New Orleans, Louisiana, July 24-28, 2011. (Co-authors: M.B. Begemann, V.G. Paul, and D.J. Vidt), 2011.

O'Brien, J.M. F.J. Burdon, M.J. Greenwood, J.S. Harding, D.K. Niyogi, A.R. McIntosh.. Riparian management protects structure and function of New Zealand urban stream ecosystems. North American Benthological Society, Annual Meeting, Providence, 2011.

Robertson G, Frank RL. Analysis of a wound induced family in *Glycine max*. 13th Annual Fall Symposium, Plant Genomes to Phenomes, Donald Danforth Plant Science Center, St. Louis, MO, 2011.

Rocha, A. and D.J. Westenberg, Isolation and Characterization of Bacteria Symbionts from *Crotolaria spectabilis* Grown on TCE Contaminated Soil. American Society for Microbiology, New Orleans, LA, 2011.

Thimgan, M.S., Disruption of peripheral lipid metabolism genes alters the response to sleep deprivation**,** SLEEP meeting, San Antonio, TX, 2011.

Thimgan, M.S., Disruption of peripheral lipid metabolism genes alters the response to sleep deprivation Gateway Behavioral Neuroscience Conference, Iowa City, IA, 2011.

Westenberg, D.J. and A. Chang, Reaching Out to the K-12 Community: A Survey of ASM Membership Involvement in K-12 Outreach. American Society for Microbiology, New Orleans, LA, 2011.

Westenberg, D.J., K-12 Education and Outreach: what ASM can do for you. Annual meeting of the Missouri Branch of the American Society for Microbiology. St. Louis, MO, April 2, 2011.

Westenberg, D.J., Tips and Tools for K-12 Outreach. ASM Conference on Undergraduate Education, Johns Hopkins University, Baltimore, MD June 2-June 5, 2011.

Invited talks, Seminars

Aronstam, R.S., Department of Biological Sciences, "Influence of oxidative stress on muscarinic receptor signal transduction. Update on cDNA Resource Center operations", Rolla, MO, September, 2011.

Aronstam, R.S., National Cheng Kung University, "Characterization of muscarinic receptor-mediated signal transduction", Department of Life Sciences, Tainan, Taiwan, June 28, 2011.

Aronstam, R.S., National Dong Hwa University, "Crosstalk in neurotransmitter signaling pathways; S&T and Taiwan scholar exchange program", Hualien, Taiwan, June 24, 2011.

Aronstam, R.S., National Taiwan Normal University, "Disruption of muscarinic signal transduction by oxidative stress: Nanoparticles, honokiol and calcium", Department of Life Sciences, Taipei, Taiwan, June 22, 2011.

Aronstam, R.S., Tzu Chi University, "Muscarinic receptor-mediated signaling pathways", Hualien, Taiwan, June 24, 2011.

Hou, C., Energy uptake, allocation and tradeoffs during growth. Colloquium seminar, China Agriculture University, Beijing, China, Feb, 2011.

Huang, Y-W., Academia Sinica, Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry, Taipei, Taiwan, July 5, 2011.

Huang, Y-W., Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry National Cheng Kung University, Tainan, Taiwan, June 28, 2011.

Huang, Y-W., Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry. National Taiwan Normal University, Taipei, Taiwan, June 22, 2011.

Huang, Y-W., Cell-Penetrating Peptides and Fluorescent Nanomaterials as a Versatile Nanocarrier System, University of Missouri-Columbia, Columbia, MO, USA. Nov 29, 2011.

Huang, Y-W., Nanobiotechnology, Missouri S&T Department of Chemical and Biological Engineering, Rolla, MO. USA, Feb. 24, 2011.

Huang, Y-W., Non-metal vs. Metal Oxide Nanoparticles: Roles in ROS-Induced Toxicity, National Dong Hwa University, Hualien, Taiwan, June 24, 2011.

Katie Shannon, K.B., Choosing a Career Focused on Teaching and Research, Keynote speaker at Graduate Student Retreat, Biochemistry and Biophysics Graduate Program at Washington University, Cedar Creek Conference Center, 2011.

Mormile, M.R., A Focus on the Environmental Microbiology of Soap Lake, Washington and Its Extremophilic Inhabitants. College of Science, Washington State University. Pullman, Richland (Telecast), and Vancouver (Telecast), Washington, April 15, 2011.

Mormile, M.R., Are there Martians in Australia? Institute for Microbial Biotechnology and Metagenomics, Department of Biotechnology, University of the Western Cape, Cape Town, South Africa, June 29, 2011.

Shannon, K.B., Choosing a Career Focused on Teaching and Research, Keynote speaker at Graduate Student Retreat, Biochemistry and Biophysics Graduate Program at Washington University, Cedar Creek Conference Center, 2011.

Shannon, K.B., Using Budding Yeast To Study The Regulation Of Cytokinesis, Department of Molecular Microbiology and Immunology, University of Missouri-Columbia, 2011.

Shannon, K.B., Using Budding Yeast To Study The Regulation Of Cytokinesis, Department of Molecular Microbiology and Immunology, University of Missouri-Columbia, 2011.

Thimgan, M.S., Disruption of peripheral lipid metabolism genes alters the response to sleep deprivation, Missouri University of Science & Technology, 2011.

BioSci office staff (*l-r*);
Ms. Vicky Rowden,
cDNA Center Business Manager,
Ms. Connie Behrick
Department Administrator,
Ms. Jessica Pelc
Senior Secretary

Extramural Income – Grants, Contract, BioTech Sales

2011 Annual Report

CY09 Summary- Sponsored Programs Activity 1/1/2010 - 12/31/2010

NAME	DIRECT COST	NET INDIRECT	TOTAL COSTS	SPONSOR NAME	PROJECT NAME
Aronstam, Robert S	$240,219	$0	$240,219	cDNA Resource Center	Biotech sales - clones, cells
Brown, Roger F	$9,115	$4,623	$13,778	NIH Natl Inst Of Health	Periodontal engineering
Brown, Roger F	$56,525	$21,485	$57,924	Dept Of Army	Bone and tissue repair
Huang, Yue-Wern	$10,900	$5,505	$16,405	NIH Natl Inst Of Health	Novel drug delivery systems
Mormile, Melanie R	$0	$873	$873	MSC Company	Novel Animal Feeds
Mormile, Melanie R	$18,924	$7,132	$26,055	Mo Dept Nat Resources	Monitoring bacteria in water
Mormile, Melanie R	$1,253	$645	$1,898	Sage Sustainable Energy	Biofuel development
Shannon, Katie B.	$5,450	$2,752	$8,202	NIH Natl Inst Of Health	Quantum dots/protein cell entry
Westenberg, David J	$21,063	$0	$21,063	US Dept of Ed	Science education
Westenberg, David J	$29,765	$841	$29765	MO Dept. Higher Ed	Graduate Education
	$393,214	**$43,856**	**$437,070**		

Most of the funds for research in the department come from grants and contracts from external agencies. Expenditures of these funds for **Calendar Year 2011** are listed above. Funds expended in 2011 from multiple grant funding periods are listed on the same line. Research expenditures derived from biotech sales (signal transduction protein and clones and cell lines) from the S&T cDNA Resource Center are also listed.

Dr. Dev Niygi discusses biodiversity with elementary school students during 2011 Earth Day celebrations.

Seminar Program
2011 Annual Report

Seminar directors: Dr. Ronald Frank (Spring)
Dr. David Westenberg (Fall)

Date	Date	Institution	Topic
Jan 31	Dr. Ronald Frank	Missouri S&T	Functional ncRNA Searches in Arabidopsis and Gene Family Identification in Glycine max
Feb. 7	Dr. Francisca Oboh-Ikuenobe	Missouri S&T	Why Palynology? What Organic-Walled Microfossils Tell Us
Feb 21	Dr. Matt Thimgan	Washington U. St. Louis	:Lipid Metabolism Protects Flies from the Consequences of Sleep Deprivation
Feb 24	Dr. Romy Chakraborty	Lawrence Berkeley National Lab	From Field to the Lab and Back: Bioremediation of Cr(VI) at DOE Hanford site
Feb 28	Dr. Alessandro Catenazzi	U California Berkeley	The Role of Fungal Disease and Climate Change in the Collapse of Mega-Diverse Amphibian Assemblages
Mar 3	Dr. Chen Hou	Albert Einstein Coll. Medicine	Energy Uptake, Allocation, and Tradeoffs During Ontogenetic Growth
Mar.07	Dr. Patty Parker	U. Missouri – St. Louis	Conservation medicine on the Galapagos islands
Mar. 14	Dr. Amy Zane	U. Missouri – St. Louis	Woody plant systems: construction and destruction
Mar. 16	Philip Yi-Chun Lo, M.D.	Section of Epidemiology for Public Health Practice	Food Revenge: Human paragonimiasis After Eating Raw Crayfish — Missouri, 2006–2010 Gold Rush Tragedy: Childhood Lead Poisoning Outbreak — Zamfara State, Nigeria, 2010
Apr. 4	Dr. Mindy Steiniger	U. Missouri – St. Louis	A Core Cleavage Factor is Required for Processing Histone and Poly(A) mRNAs
Apr. 11	Shinghua Ding	U. Missouri – Columbia	Ca^{2+} signaling in astrocytes and its role in neurotoxicity
Apr. 18	Carl Bumba	University of Vienna- Austria	Nested organization of gene silencing and lineage restriction in vertebrate development through genome-wide promoter methylation
Apr. 25	Mrs. April Rocha	Missouri S&T , M.S Candidate	Isolation and Characterization of Bacteria Symbionts from Crotolaria Spectabilis Grown on TCE Contaminated Soil

Date	Date	Institution	Topic
Sept 19	Dr. Robert Aronstam	Missouri S&T	Muscarinic receptor signal transduction: Disruption by honokiol and oxidative stress
Sept. 26	Dr. Bethany K. Zolman	U. Missouri – St. Louis	Inside the peroxisome…insights from mutant weeds
Oct. 10	Chris Barnhart	Missouri State University	Wonders down under: the conservation significance of native freshwater mussels
Oct. 17	Dr. Bethany Stone	University of Missouri-Columbia	Using Bench Research Skills to Improve Teaching and Learning in Biology
Oct. 31	Dr. Kelly Monk	Washington Univeristy in St. Louis	A genetic screen in zebrafish uncovers new regulators of myelination
Nov. 7	Dr. Ursula Goodenough	U. Missouri - Columbia	Obtaining Diesel Fuel from Algae
Nov. 14	Robert Blankenship	Washington University in St. Louis	Early Evolution of Photosynthesis and the Transition to an Aerobic World
Dec. 5	Dr. Susan Spencer	U. Missouri – St. Louis	Ed and Fred: Regulators of Growth and Differentiation in the Fly Eye

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Undergraduate Education

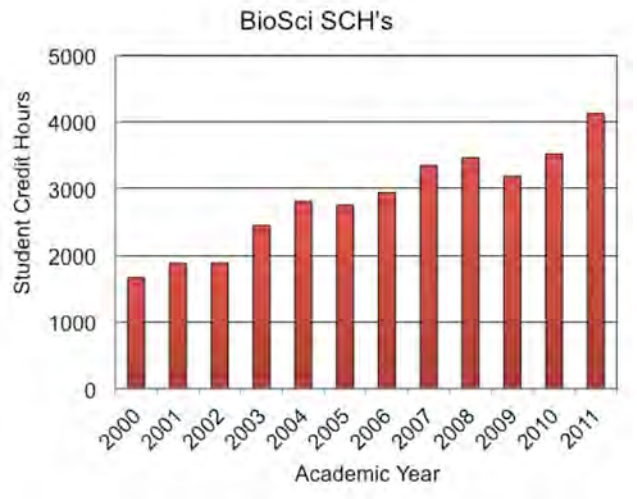
2011 Annual Report

Some of our May 2011 graduates

Missouri S&T's thriving **Biological Sciences** community included 219 undergraduate majors in 2011 (4th week fall semester enrollment reports), a 21% increase from 2009. **Dr. Dev Niyogi** chaired the Undergraduate Education Committee in 2011.

2011 Highlights

- record number of student credit hours (>4000)
- record number of majors (219 vs. 181 in FS2009)
- 74% of graduating seniors participated in research
- service learning courses engaged in by all seniors
- 84 BioSci students were named to the Provost's Academic Scholars List for the fall 2011 semester (vs. 51 last year).
- 3 BioSci students graduated with perfect 4.0 grade point averages: **Mindy Merenghi**, **Ashley Muehler** and **Jill Wildhaber**
- 33 BioSci majors graduated in 2011, 22 graduated with honors: 6 summa cum laude, 10 magna cum laude, 5 cum laude
- 20 students were awarded OURE scholarships to perform research in the BioSci department (vs. 11 in 2010)



Courses Offered

Spring 2011

- Bio 110 General Biology
- Bio 112 General Biology Lab
- Bio 113 Biodiversity
- Bio 114 Biodiversity Lab
- Bio 150 Biotechnology in Film
- Bio 201 Issues in public Health
- Bio 211 Cell Biology
- Bio 212 Cell Biology Lab
- Bio 218 Plant Biology
- Bio 221 Microbiology
- Bio 222 Microbiology Lab
- Bio 231 Genetics
- Bio 242 Human Physiology
- Bio 234 Human Physiology Lab
- Bio 251 Ecology
- Bio 300 Special Problem
- Bio 301 Genomics
- Bio 341 Tissue Engineering 1
- Bio 370 Toxicology
- Bio 382 Neurobiology
- Bio 388 Bio Medical Problems
- Bio 390 Undergraduate Research

Some of our December 2011 graduates

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Fall 2011

- Bio 102 Intro to Biological Sciences
- Bio 110 General Biology
- Bio 111 Principles of Biology
- Bio 112 General Biology Lab
- Bio 151 Introduction to Environmental Sciences
- Bio 211 Cell Biology
- Bio 212 Cell Biology Lab
- Bio 221 Microbiology
- Bio 222 Microbiology Lab
- Bio 231 General Genetics
- Bio 235 Evolution
- Bio 241 Human Anatomy & Physiology I
- Bio 245 Human Anatomy & Physiology lab
- Bio 251 Ecology
- Bio 300 Special Problems
- Bio 301 Nanobiotechnology
- Bio 301 Cancer Cell Biology
- Bio 301 Microbial Genetics
- Bio 301 Nanobiotechnology
- Bio 310 Seminar
- Bio 315 Developmental Biology
- Bio 321 Pathogenic Microbiology
- Bio 331 Molecular Genetics
- Bio 332 Molecular Genetics Lab
- Bio 340 Biomaterials I
- Bio 354 Freshwater Ecology
- Bio 390 Undergrad Res

Bio-Star Awards

BioStar award winners for AY11 were announced in April. These awards recognize outstanding achievements by BioSci students. A faculty committee selected the winners, and the winners received a certificate and flash drive.

Graduating Senior	**Joshua Erickson**
Graduate Teaching Assistant	**Kele Thrailkill**
First year Student	**Kyle Williams**
Graduate Student Research	**Chi-Hneg Wu**
Undergraduate Research	**Amber Kreps**
Service	**Brooke Honeycutt**
Leadership	**Karen Schilli**
First Year Transfer Student	**Nancy Davis**

BioSci Graduates 2011

May 2011

Undergraduates
Bethany Bray
Lesley Lewis
Diara McCole
Brett Vessell
Jill Wildhaber
Katrina Banderet
Veronica Breen
Joshua Erickson
Shannon Franks
Jennifer Gumpenberger
Samantha Harris
Katie Herington
Colleen Koebbe
Patrick Martin
Ashley Muehler
Jeffrey Nye
Ryan Rader
Jimmy Rolufs Jr.
Gregory Romine
Daniel Roush
Karen Schilli
Rachel Willie

December 2011

Undergraduates
Ann Caudill
Mindy Merenghi
Suzanne Simpson
Adrienne Angelos
Tiara Brown-Crosen
Whitney Cowan
Brian Haslag
Elizabeth Honeycutt
Robert Kayser
Elizabeth Keehn
Matthew Keppler
Richard Watters

Some of our 2011 BioStar award winners: Chi-Weng Wu, Josh Erickson, Kyle Williams, Brooke Honeycutt and Karen Schilli

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S&T Undergraduate Research Day

BioSci students participated in the 7th **Annual Undergraduate Research Conference** (April 2011).

BioSci Award winners were:

Erica Shannon: 1st place for her oral presentation "Changes in Gene Expression of Muscarinic Acetylcholine Receptors Mediated by a Constitutively Active Phenotype"

Kristin Kelly: 3rd place for her oral presentation "Genomic Analysis of an Unknown Gene Family in *Glycine Max*"

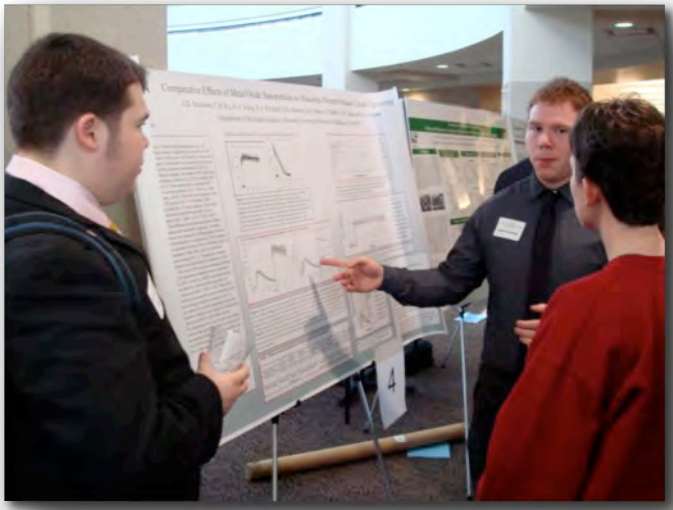
Alexis Martin and **Megan Koerner Shannon:** 2nd place for their poster "Honokiol Blocks SOCE Calcium Entry in M3-CHO cells"

Amanda Foster and **April Pummil** (iGEM students): 1st place for their research proposal paper poster "Saving the Honeybees: A Synthetic Biology Approach"

Erica Shannon and **Amanda Foster:** OURE Fellows awards

Erica Shannon: Bibliography Award sponsored by the S&T library

Some of our student winners at the 2011 S&T Undergraduate Research Day: Megan Koerner, Alexis Martin, Erica Shannon, Amanda Foster, April Pummil



Senior Josh Erickson explaining his posters to Research Day visitors.

Graduating BioSci students and their families were honored at reception in December.

Erica McFarland was named the 6th recipient of the Gale-Hufham Scholarship.

Graduate Education

2011 Annual Report

The Department instituted a M.S. degree in Environmental and Applied Biology in 2002, and graduated its first students in 2004. 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.

Dr. Yue-wern Huang chaired the department's Graduate Studies Committee in 2011. A graduate student handbook was produced, and options for instituting doctoral level training in biology on the Rolla campus are being explored.

Three thesis students earned their degree in Environmental and Applied Biology.

2011 Graduate Students
(* non-thesis)

Yousf Ali Albozidi*
Kholoud Ghanem*
Yinan Lin
Ninu Madria
Gena Robertson
April Rocha
Daniel Roush
Erin Sind*
Stephanie Smith*
Katie Stockstill
Keke Thrailkill
Richard Watters
Kaitlyn Wong*
Chi-Heng Wu

Graduating M.S. students: (clockwise from upper left); Katie Stockstill, Yousf Ali Albozidi, Kholoud Ghanem, Kaitlyn Wong, April Rocha, Ninu Madria, Erin Sind and Stephanie Smith

Student	Thesis Title	Advisor
Katie Stockstill	Mutation of the HOFl PEST Domain Affects Cytokinesis in Budding Yeast	Katie Shannon
April Rocha	Isolation and Characterization of Bacteria Symbionts from *Crotolaria spectabilis* Grown on TCE Contaminated Soil	David Westenberg
Ninu Madria	Synthesis and Toxicity Studies of Inidazolium-Based Ionic Liquids	Yue-wern Huang

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cDNA Resource Center

Annual Report 2011

The Missouri S&T cDNA Resource Center is a service that provides full-length cDNA clones encoding human signal transduction proteins to the international research community. www.cDNA.org

The **Center** provides clones of human proteins that are:

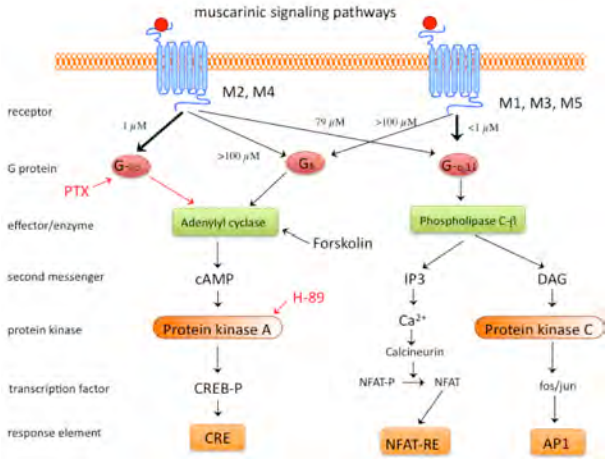
- Full-length
- Sequence verified
- Expression verified by coupled in vitro transcription/ translation assays
- Propagated in a versatile mammalian expression vector
- Free of extraneous 3' and 5' untranslated regions
- Available in wild-type, epitope-tagged and useful mutant forms (e.g., constitutively-active,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

cDNA Center Staff (*l-r*):
Adam Martin, M.S., Manager
Vicky Rowden, Business Manager
Erica Shannon, Student Intern
Robert S. Aronstam, Ph.D., Director
Alexis Martin, Student Intern
Connie Behrick, Administrator
Hsiu-Jen Wang, Technical Assistant
Vanessa Kaighin, Sr. Lab Technician
Rhett Reichert, Student Intern

In 2011, proceeds from the Center were used to support 1) faculty and student research; 2) faculty travel; 3) the Taiwanese student exchange program; 4) research in the Laboratory of Neurobiology; 5) the departmental seminar program; and 6) departmental operations.

2011 Highlights

- sales surpassed $1.9 million since 2005, including over $240,000 in 2011 (up from $211,688 in 2010)
- special projects service instituted: cloning and stable transfections
- introduced 38 new clones to the collection
- submitted 44 wild-type sequences to NCBI, including
- employed/trained 8 student technicians
- supported research rotations in basic molecular biology and DNA sequencing for the campus



www.cdna.org

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Senior Seminar Service Learning Class

2011 Annual Report

Since 2008, the Biological Sciences Department has included a service-learning practicum as part of its required senior capstone course.

Students work in groups to propose, 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.

S&T students working on Rebuild Joplin projects (*l-r*): Jordan Bridges, Megan Koerner and Alexis Martin.

The nature of our students' service learning projects is diverse and impressive. Students developed a peer mentoring program for the department, helped the Tri-County Humane Society, put on a bike safety presentation at a local elementary school, started a recycling project at Fort Leonard Wood, and raised money for Heart Disease and cancer patients at PCRMC.

Student Projects 2010 – 2011

- **Spay and neuter clinic** – Veterinarian donated services; students organized and provided supplies)
- **Bike Rodeo** – Bicycle safety event at Truman Elementary (S&T cycling club Rolla PD)
- **St. James animal shelter** - Fundraising and improvements; web presence established (FaceBook, PayPal)
- **Biological Sciences mentoring program** - upperclassmen interact with underclassmen.
- **Heart Disease Awareness** in Women – Rolla Manor Care presentation; fund raising
- **Celiac's Disease** Awareness.
- **Joy in Caring Cancer Fund** fundraising
- **Clean, Green** Fort Leonard Wood
- **Bray Conservation Area** educational exhibits - ephemeral pond and rotting log exhibit.
- **St. James animal shelter** - "puppy chow" fundraiser; new cat tower
- **Puppies at the Puck** - A fundraiser for the St. James Tri-county Humane Society, raised a total of $525 and led to the adoption of one dog.
- **Rebuild Joplin** –3 trips to Joplin to volunteer in the rebuilding effort. Thirty seven students traveled to Joplin on October 22 and volunteered with Extreme Home Makeover or Americorps.
- **Diabetes Awareness** - booth on campus; pamphlets; blood sugar screeing
- **Fit for Life** presentation at Rolla Middle School –
- **Graduate Study** opportunities in Biology web site/database designed and populated
- **Intellectually Disabled student workshop** at Wyman Elementary School.
- **Rolla Animal Shelter** – volunteering, fundraising
- **Careers in the Sciences** – presentation to Science Olympiad team in elementary school.

Dr. Katie Shannon has directed the department's service learning course for the last 2 years. Dr. Shannon presented the department's program to the Board of Curators at their monthly meeting in December. In recognition of her efforts, it was recently announced that Dr. Shannon will receive the **2012 Faculty Service Learning Award.**

NTNU Visiting Scholar Program

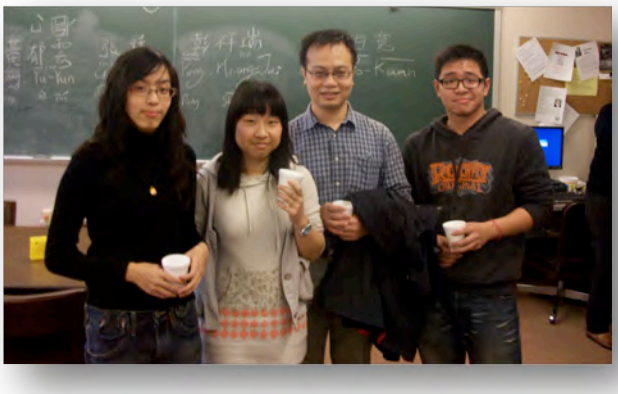
2011 Annual Report

Dr. Robert Aronstam delivering lecture in the Department of Life Sciences at NTNU in June 2012

A visiting scholar program between National Taiwan Normal University (NTNU) and Missouri University of Science & Technology (S&T) was initiated in 2009 with the arrival of two graduate student scholars from NTNU, **Tso-hao Tang** and **Tien-chun Wang**. In February 2010, three new scholars arrived **Tien-chun Tang, Hsiang-Yu Wang,** and **Chia-Yi Hu.** In January 2011, four students entered the program (**Po-Kuan Chao, Hsiang-Jui Peng, Ching Chang, Yu-Yun Huang**). Two students began their studies at S&T in September 2011; five NTNU students are scheduled to arrive in March 2012. The students are assigned to a laboratory in the department of biological sciences. The scholars participate in departmental seminars and weekly laboratory meetings.

In addition to their research experiences, the scholars have a chance to visit various places in the United States (recently, St. Louis, Chicago, New York, Florida, and Washington DC, as well as a Caribbean cruise) and to sample local offerings (St. Louis arch, fishing, Missouri caves, etc.) Their English language skills improve considerably, and they have been welcomed, admired, productive and well-liked additions to the bioscience community at Missouri S&T.

Student	Laboratory	Dates
Tien-Chun Wang	Molecular Toxicology	July – Sept. 2009
Tso-Hao Tang	Neurobiology	July 2009 – July 2010
Chiung-Tan Chang	Neurobiology	Feb. – July 2010
Chia-Yi Hu	Freshwater Ecology	Feb. – July 2010
Hsiang-Yu Wang	Molecular Toxicology	Feb. – July 2010
Po-Kuan Chao	Neurobiology	Jan – Jul 2011
Hsiang-Jui Peng	Freshwater Ecology	Jan – Jul 2011
Ching Chang	Molecular Toxicology	Jan – Jul 2011
Yu-Yun Huang	Freshwater Ecology	Jan – Jul 2011
Yu-Ju Chen	Fresh Water Ecology	Sept. 2011 – Feb. 2012
Ya-Chu Yu	Cytokinesis	Sept. 2011 – Feb. 2012



Recent visiting scholars from National Taiwan Normal University, Ching Chang, Yu-yun Huang, Po-Kuan Chao, Hsiang-Jui Peng

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iGEM Team

2011 Annual Report

The international Genetically Engineered Machine (iGEM) competition is an international event in which student teams compete to design and assemble biologically engineered organisms using advanced genetic components and technologies. Our team includes students from many diverse areas including Missouri S&T's Electrical, Chemical, and Biological Engineering department, along with BioSci students.

2011 Highlights:

Team members:

Erica Shannon– President
Amanda Foster – Vice Presidnet
April Pummel – PR Officer
Blythe Ferriere – Treasurer
Brice Curtin – Secretary
Lou Harmon – Webmaster
David Pullman – Lab Manager
Nick Jentsch
Hamilton Vernon
Amber Kreps
Laura Townzen
Lindsey Schobert
Logan Sanerbrei
Catherine Kinchen
Heather Carmon
Emily Puelo
Gavin Pringle
Lizzi Deister
Erin Harvey
Katie Fowler
Dana Roderer
Thomas Congon
Beth Wilkins
Hannah Frye
Erica McFarland
Jesse Townsend
Avery Joseph

Faculty advisors:

Katie Shannon
Dave Westenberg
David Henthorn
Change-Soo Kim

2011 Project

Glucose Sensor

In the bodies of people with diabetes, the ability to recognize and respond to glucose concentrations in the blood has been compromised. As a result, glucose accumulates to dangerous levels. High blood glucose concentrations can cause irreversible damage to critical organs, impairing their function. With parts from the iGEM registry, our team created a glucose-controlled promoter linked to a yellow fluorescence production gene in *E. coli*. The concentrations of glucose to which the promoter responds can be determined. Once the concentration is known, the promoter can be mutated so that it will be activated by varying concentrations of glucose and used as a glucose sensor for people with diabetes. In the future, an insulin gene could be added to this system for use in insulin pumps in which specific glucose levels trigger insulin production in E. coli.

http://2011igem.org/Team:Missouri_Miners

Our Sponsors:

Biological Sciences Department
Chemical & Biological Engineering Department
Chemistry Department
Exxon Mobil
Materials Research Center
Energy Research & Development Center
OURE

2011 Activities and Achievements

- Earned a silver medal at iGEM Americas Conference
- Became an official Student Design Team through the SDELC
- Earned publicity for the glucose sensor project though news articles
- Established and planned a comprehensive lab training program for new members
- Recruited team members from other departments
- Secured additional funding from sponsors

Helix: Missouri S&T's Life Sciences Club

2011-2012 officers:

President: Grace Bay
Vice President: Kristin Kelly
Secretary: Lara Applegate
Treasurer: Shelby Emmett
Off-Campus Events Coordinator: Kyle Williams
Open Lab Coordinator: Megan Ottomeyer
Historian: Megan Ottomeyer
Webmaster: Megan Ottomeyer/Cera Thomason

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

2011-2012 Activities:

- Freshman welcome: float trip
- Ice-cream social
- Open lab to introduce students to research opportunities within Schrenk
- Adopt-A-Family
- Helix Trip to St. Joe Missouri for the regional ASM conference
- Adopt-A-Highway

Phi Sigma

2011 Annual Report

Phi Sigma members during tornado relief effort in Joplin, MO

Pink week" t-shirt design used to raise funds for Breast Cancer Research

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

2011-2012 officers:

President:	Megan Ottomeyer
Vice President:	Erica Shannon
Secretary:	Kristin Kelly
Treasurer:	Jordan Bridges

Faculty Advisor: Dr. Ronald Frank

2011 Fall Semester Activities:

- Raised money to improve conditions of the freshwater aquarium in the department lounge
- Became regular volunteers at the Tri-County Humane Society in St. James, MO by walking dogs and socializing with cats
- Joined Helix in "adopting" an under-privileged family for the holidays by purchasing and wrapping Christmas gifts for the children
- Raised $240 for the Breast Cancer Research Foundation from t-shirt sales
- Raised funds towards the Outstanding Freshman Scholarship
- Had two successful social events to boost participation and encourage camaraderie among members.
- Visited the Veteran's Clinic in St. James, MO and sang Christmas carols for the residents
- Joined Helix in traveling to Joplin, MO to assist in cleaning debris and repairing damage from tornadoes in May 2011.

Scrubs – PreHealth Club

Plans for Spring 2012

- Put on a Interactive Program for Elementary Kids about nutrition
- Practice MCATs
- Planning Trips/Tours to Mizzou Medical and Veterinary School
- Speakers at each meeting listed below:
    - Medical, Pharmacy, and DO students
    - Medicolegal Death Investigator
    - Hospice Volunteer Coordinator
    - AHEC Representative
    - Kaplan Representatives
    - Mizzou Medical School Admissions
    - Veterinarian

Scrubs members are interacting with Medical Students and Residents when they are the guest speakers.

http://web.mst.edu/~scrubs/

Scrubs Officers

President: Kristin Kelly
Vice President: Shalyn Selby
Secretary: Clayton Buback
Treasurer: Nicci Vossmeyer
Public Relations Officer: Alex Willis
Hospital Relations Officer: Aaron Carson
Correspondence Officer: Mydah Choudhry

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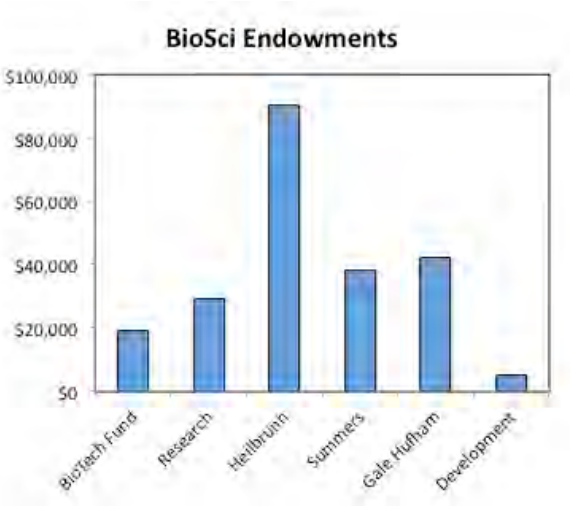
Donors

2011 Annual Report

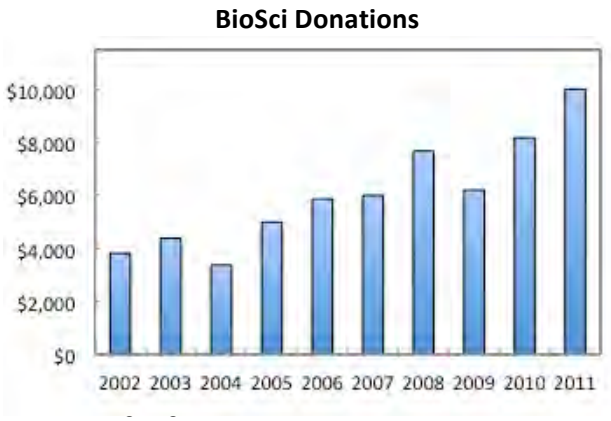
BioSci Partners 2011

We are pleased to recognize those who generously supported the department in 2011. A record $23,615 was received in 2011. The consistent support we receive from our alumni and friends provides the means to strengthen our academic community and support innovation 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 now exceeds 525, although half have graduated in the last 10 years, reflecting our recent consistent growth.



Value of BioSci endowment funds at the end of 2011. The Gale-Hufham, Heilbrunn and Summers funds provide student scholarships; the other funds support research.



The **new BioSci fund raising schedule** is simple: there is a direct written solicitation in November, and we participate in the S&T Phonathon in April. If you contribute in November, you won't be called in April.

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 the department whenever you are in Rolla.

Donations of $1000 and above

Robert & Joan Aronstam
Marcus H. Hayer
Joseph A. Safron & Baxter International Match
Thomas Wetteroth and Mary Lynn Formanack

Donations of $500 to $999

Dr. James Francis Flechtl

Donations of $100 to $499

Herman Armstrong
Carol A. Bain
Matthew and Amy Banks
Denise M. Denner
Mark Raymond Ely
Helen P Law
Andrew Ryan Martine
Michael W. McMenus
Hal Stover & Kerstien Andrea Padget
April Rocha
Lisa Kay Schipper
Matthew F. Vogel
Dr. Laurie Behm
Rachel Lee Carter
Kimberly Earl
Dr. Anthony and Julie Kaczmarek
Ashley Jo Sheek
Dr. David E. Schlarman
Betsy Marie Dampier
Dr. Paul Robert Stricker

Donations up to $99

Meghan Ruth Donnelian
Susan Nickols
Christina and Richard Schmidt
Cynthia and Jeffrey Fischer
Dr. George W. Karr
Dr. Julie and John Stanfield
Julie Sellmeyer Townsend
Peggy and David Borrok
Lisa and Stanley Lindesmith
Marcie Lanette & Brad Alan Rucker
Jennifer L Jacobi
Meghan Ruth Donnelian
Susan Nickols
Christina and Richard Schmidt

We apologize for any oversights or errors; please correct us, and stay in touch.

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