

Bio Files

October 2011

Missouri S&T Department of Biological Sciences

Department Update

Two new Bio Sci faculty

Dr. Frank investigates Gene Families

Academic Scholars

Student News

Freshwater Ecology Students collect data

Dr. Brown retires

Undergraduate Research Conference

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Homecoming

MINER LEGACY 2011 OCTOBER 7-8

Biological Sciences Picnic Oct 7, 2-4 p.m.
outside Screnk Hall

Football game Oct 8 1 p.m.
Allgood-Bailey Stadium

Biological Sciences Welcomes Two New Faculty

DR. CHEN HOU

Why does restricting caloric input increase an organism's longevity? Ask our new assistant professor of Biological Sciences, **DR. CHEN HOU**. **DR. HOU** uses theoretical and comparative approaches to study animals' energy budgets: how energy allocation strategies shape their life history traits, and how they alter the budgets to adapt to changes in environment, such as changes in temperature and resources.

DR. HOU joins S&T following postdoctoral research in the Physiology department of Albert Einstein School of Medicine. Originally from China, **DR. HOU** earned M.S. and Ph.D. degrees in Physics from the University of Missouri – Columbia in 2005. **DR. HOU** has also held research positions at the University of Florida and the Sante Fe Institute. **DR. HOU** has published a score of papers on the relationship of factors contributing to ontogenic growth, including lifespan, cell size, stress, temperature and food intake.

DR. HOU and his wife and son moved to Rolla in August.



DR. MATTHEW THIMGAN

How can the way you metabolize lipids possibly affect sleepiness and loss of cognitive function during sleep loss? Ask our new assistant professor of Biological Sciences, **DR. MATTHEW THIMGAN**, who is addressing these questions in his newly established Laboratory of Sleep Biology.

DR. THIMGAN earned a Ph.D. in Cell and Molecular Physiology from the University of North Carolina in 2005. **DR. THIMGAN'S** thesis work involved neurotransmitter transporters responsible for the amine levels in various excitable tissues. **DR. THIMGAN'S** postdoctoral research was performed in the department of Anatomy and Neurobiology at Washington University in St. Louis. **DR. THIMGAN'S** studies the genes, biochemical pathways and anatomy underlying sleep loss responses in *Drosophila melanogaster* (fruit flies). **DR. THIMGAN** has demonstrated novel correlations 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, wife **KATIE SHANNON** and sons Andrew and Marcus are moving to Rolla from St. Clair.

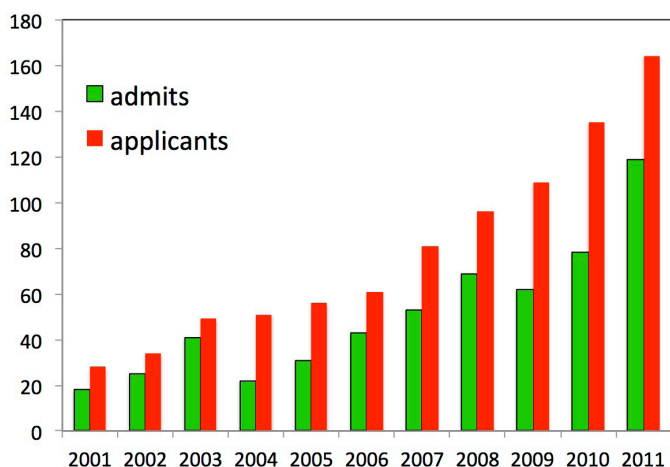
Department Update

It has been a remarkable year, and many of the positive trends I have been reporting to you over the past 6 years are accelerating and forcing us to adopt new ways of providing our research and teaching services.

Faculty: We are pleased to welcome **DRS. CHEN HOU** and **MATT THIMGAN** as assistant professors of biological sciences (see article on page 1). **DR. HOU** has established the Laboratory of Animal Physiology and will continue his theoretical and experimental work on metabolic factors that contribute to growth, reproduction and aging. **DR. THIMGAN'S** work involves the neurobiology of sleep, including the contribution of lipid metabolism to sleep behavior and disorders. **DRS. HOU** and **THIMGAN** will both be involved in teaching our new integrated anatomy and physiology course.

DR. ROGER BROWN retired as Professor of Biological Sciences after a distinguished 33-year career at S&T. **DR. BROWN** was named a Chancellor's Professor and will continue his work with biocompatible glasses. **DR. BROWN** is also developing a new laboratory class in human anatomy and physiology.

Students: The department continues to enjoy unprecedented growth (see accompanying graph), with record numbers of inquiries, applicants, and admitted and matriculated students. BioSci is now one of the largest departments on campus. We welcomed 73 new first year students this fall, up from 45 last year. The number of admitted students for the fall semester increased by 53% in just one year, extending a seven-year trend. These steep increases come at a time when the number of students graduating from Missouri high schools is stagnant (and will actually decrease by about 5% over the next 4 years). We believe this reflects a more wide-spread appreciation of the value of science education at S&T: S&T can be a great place to not be an engineer! The training in biological sciences at S&T is personalized and research-intensive, and our students find themselves exceptionally well prepared for professional and graduate school. Also, we have a rapidly growing cadre of ambassadors, advocates and recruiters – our alumni.



Growth of BioSci application and enrollment in the past ten years

Project Lead the Way: We continue to support the Project Lead the Way – Biomedical Sciences program by serving as state affiliates. We hosted 5 training sessions this past summer in all four core courses. **MS. TERRY WILSON** also serves as a site visit evaluator charged with monitoring program implementation in various Missouri high schools. The department is now able to provide undergraduate elective college credit for students competing the program, as well as graduate credit for high school teachers attending the summer training institutes.

Research: Securing funds for research efforts is a constant and time-consuming process, and BioSci faculty are very active in the grant wars. However, it is essential that we be able to provide individual faculty members with seed money and interim support. To this end, the department has established faculty research development accounts funded by biotech sales, distance education credits, grant overhead, summer teaching revenues, endowment income, and direct alumni contributions. This is a prudent investment of scarce resources that will pay handsome dividends. Six visiting scholars from Taiwan National Normal University performed research in our department in 2011. Clones sales from the cDNA Resource Center are up 21% (year to year), and we are now distributing cells lines stably transfected with specific neurotransmitter receptors. The cDNA Center now offers custom cloning services to scientists throughout the world.

Biological Science at Missouri S&T: This newsletter is full of indications of remarkable growth in the biological sciences at S&T. With this growth come both challenges and opportunities, and the faculty is dealing with several important issues: How can we retain small class sizes and personalized instruction, how can we continue to provide research opportunities for all our students, how can we maintain a cohesive academic community that is both challenging and supportive? Your ideas and support are needed. We have invited a record number of alumni back to talk to our students and student organizations. Other alumni have provided internship opportunities for our students.

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

Sincerely,



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

Freshwater Ecology Students Collect Data

The Freshwater Ecology students (BioSci 354) have been out sampling some local streams and lakes this semester with **DR. DEV NIYOGI**. On a field trip to Mill Creek, a tributary to the Little Piney Stream near Newburg, **SARAH WILLIAMS** and **HANNAH CHAMBERS** set up a flow meter to measure discharge in the creek (top photo). Discharge is a key factor that controls the biology of streams, including the types and amounts of algae and animals. Students collected biological samples for identification, and assessment of the health of the stream.

Students also traveled to several nearby lakes and ponds. At these sites, students measured vertical profiles of temperature, dissolved oxygen, and conductivity, using a water quality meter (bottom photo). **ALEXIS MARTIN**, **TIARA BROWN-CROSEN**, and **SARAH WILLIAMS** conducted these tests at a small pond at the Bray Conservation Area outside Rolla.



Hannah Chambers and Sarah Williams set up a flow meter as Tiara Brown-Crosen and Megan Koerner watch



Students Sarah Williams, Tiara Brown-Crosen, and Alexis Martin take a canoe onto a pond at Bray Conservation area

Dr. Roger Brown named Chancellor Professor

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 as 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'S** efforts will include coordinating new laboratory courses in Human Anatomy and Physiology and continuing his work on cell and tissue engineering performed in collaboration with colleagues in the Center for Bone and Tissue Repair and Regeneration. **DR. BROWN** will also continue to direct the operations of the S&T vivarium. **DR. BROWN'S** research interests include the development of biomaterials for use as 1) bone repair stimulants, 2) glass coatings on titanium implants to enhance bonding at implant sites, 3) porous scaffolds for in vitro engineering of new bone tissue, 4) bioabsorbable composites for bone fracture fixation, and 5) neutron-activatable glass microspheres for radiotherapeutic applications.

DR. BROWN joined the UMR faculty in the fall of 1978, as the third member of the Life Sciences section in the Department of Chemistry (Life Sciences – now Biological Sciences – was instituted as a separate department in 1983). **DR. BROWN** developed and taught several courses over the years, most recently offering courses in anatomy, physiology, biomaterials, tissue engineering and exercise physiology.

According to department chair, **ROBERT ARONSTAM**, “**ROGER BROWN** has been a consistently productive and effective member of the S&T faculty for 33 years. **ROGER** has maintained a steady focus on biomaterials research and the engagement of students in this research. I am pleased that he was accorded this honor and will continue his work at S&T.” **DR. BROWN** will be awarded Emeritus Professor distinction at the December commencement ceremony.

**Dr. Roger Brown, Emeritus
Professor of Biological
Sciences and Chancellor
Professor**



Biological Sciences Students Win in Annual Undergraduate Research Symposium



From left to right, Biological Sciences students Amber Kreps, Josh Erickson, Rachel Willie, Alexis Martin, Megan Koerner



Dr. Harvest Collier presents Erica Shannon with an award

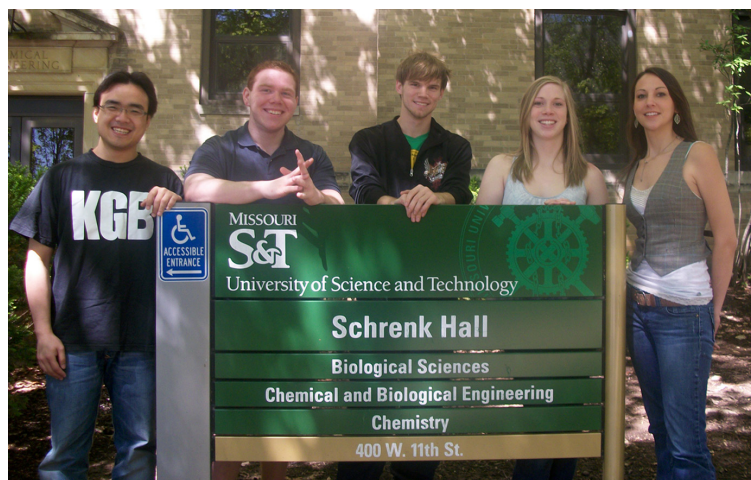
Biological Sciences students won several awards at the Annual Undergraduate Research Conference in April 2011. Senior ERICA SHANNON received First Place in the Sciences Oral Presentation for her presentation “Changes in Gene Expression of Muscarinic Acetylcholine Receptors Mediated by a Constitutively Active Pheontype” and was awarded Best Bibliography in the Sciences. ERICA has been conducting research in DR. ARONSTAM’S lab. Junior KRISTIN KELLY won Third Place, Sciences Oral Presentation for her talk “Genomic Analysis of an Unknown Gene Family in *Glycine Max*”. KRISTIN works in DR. FRANK’S lab. Seniors ALEXIS MARTIN and MEGAN KOERNER received Second Place, Sciences Poster for their presentation on “Honokiol Blocks SOCE Calcium Entry in M3-CHO cells”. They conducted their research in DR. ARONSTAM’S lab. iGEM students AMANDA FOSTER and APRIL PUMMIL took First Place, Research Proposal Poster for their poster titled “Saving the Honeybees: A Synthetic Biology Approach”. In addition, ERICA SHANNON and AMANDA FOSTER were recipients of the OURE Fellows award. Congratulations to all our students for the awards!

Biological Sciences Announces 2011 Bio Star Award Winners

The winners of the third annual Bio Star awards were announced at the end of semester picnic in April. The awards recognize outstanding achievements by Biological Sciences undergraduates and Masters students. Winners received a certificate and flash drive in recognition of their achievement. Nominations were submitted by students and faculty and the winners were chosen by a faculty committee. Congratulations to all the winners!

The 2011 Bio Star Winners are:

Graduating senior - JOSHUA ERICKSON
Graduate TA - KELE THRAILKILL
First year student (freshman) - KYLE WILLIAMS
Graduate research - CHI-HENG (MARTIN) WU
Undergraduate research - AMBER KREPS
Student service - BROOKE HONEYCUTT
Student leader - KAREN SCHILLI
First year student (transfer) - NANCY DAVIS



From left to right, Bio Star award winners Martin Wu, Josh Erickson, Kyle Williams, Brooke Honeycutt, and Karen Schilli

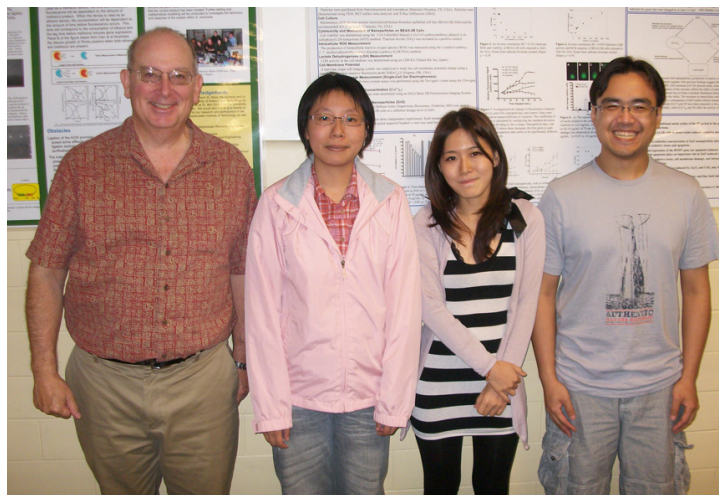
Seventy-seven BioSci Students Named Academic Scholars

Adrienne Angelos	Samantha Clemens	Brandon Drennen	Thomas Hilterbrand	Michael Little	Rhett Reichard	Elizabeth Studt
Lara Applegate	Matt Coates	Heath Dreyer	Brooke Honeycutt	Alexis Martin	Tyler Robinson	Laura Townzen
Katrina Banderet	Nancy Cory	Shelby Emmett	Habiba Inusah	Patrick Martin	Jimmy Rolufs	Natalie Updyke
Grace Bay	Janelle Cottrell	Joshua Erickson	Avery Joseph	Erica Mcfarland	Greg Romine	Stephanie Voertman
Brandon Boies	Whitney Cowan	Abigail Feeny	Elizabeth Keehn	Jamila Mcnair	Elizabeth Rusinko	Nicole Vossmeier
Jeremy Bolin	Megan Cox	Carolyn Harper	Kristin Kelly	Mindy Merenghi	Karen Schilli	Richard Watters
Callie Bracht	Kevin Creighton	Brian Haslag	Thimothy Kenny	Ashley Muehler	Lindsey Schobert	Jill Willdhaber
Heather Branstetter	Lesley Cremer	Peter Haw	Antonette Knar	Anna Neubert	Shlyn Selby	Rachel Willie
Nicholas Burke	Kristi Curtis	Cathryn Heil	Tyler Knobbe	Jeffrey Nye	Erica Shannon	Sarah Williams
Aaron Carson	Nancy Davis	Katelyn Heil	Amber Kreps	Kasie Osborne	Suzanne Simpson	Alex Willis
Chantal Chambers	Charles Dewsnup	Katie Herrington	Kent Lin	Megan Ottermeyer	Lisa Snoderly-Foster	Christine Wood

Visiting Scholars from Taiwan arrive in Rolla

The Biological Sciences department recently welcomed two visiting scholars from the National Taiwan Normal University (NTNU). **YA-CHU (AUDREY) YU** is working with **DR. KATIE SHANNON** on protein interactions contributing to cytokinesis. **AUDREY** is currently a Masters student in the lab of Dr. Kang Fang. Her thesis work is on signaling pathways and apoptosis in lung cancer cells. **YU-JU (ESTER) CHEN** is working with **DR. DEV NIYOGI** on fungal diversity in fresh water ecosystems. **ESTER** is working on her Masters in the lab of Dr. Yuying Hsu, studying the relative importance of fighting ability and previous winning/losing experience on contest decisions. **AUDREY** and **ESTER** will spend the fall semester in Rolla, participating in research, seminars, and community activities.

The NTNU – S&T scholar exchange program has supported 11 visiting scholars over the past 2 years, and strengthened research collaborations between the two institutions.



Dr. Aronstam with Ester, Audrey, and Martin from NTNU

2011 BioSci Graduates

Twenty three Missouri S&T students received a B.A. or B.S. in Biological Sciences during the spring of 2011.



BioSci graduates at the May 2011 commencement ceremony.

Graduate Student News

Three new graduate thesis students joined the department: **KAREN SCHILLI** is working in the lab of Somnobiology, **DANIEL ROUSH** joined the lab of Environmental Microbiology, and **GENA ROBERTSON** is conducting research in the Plant Molecular Biology Lab.

One Graduate Student received their M.S. In Biological Sciences this year:

KATHERINE STOCKSTILLS' thesis was "Mutation of the HOF1 PEST Domain Affects Cytokinesis in Budding Yeast."



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Gene Families Investigated by Students in the Plant Molecular Genetics Lab

All genes come from pre-existing genes either by segmental duplication of chromosome regions or by whole genome duplication events (polyploidy). Since plants do not have motility to avoid predators or to migrate to more favorable climate when necessary, they have adapted by being evolutionarily flexible or plastic. One manifestation of this is the duplication of genes followed by subfunctionalization (altered regulation) or neofunctionalization (new function). Plants have an astonishing number of gene families (12,000 estimated in soybean).

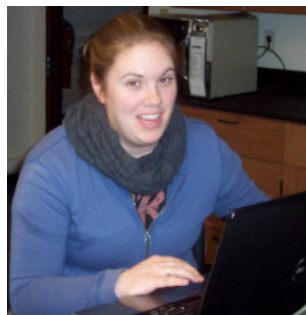
The soybean genome sequencing project was completed in January 2010. Since then student researchers in the laboratory of **DR. RONALD FRANK** have been identifying and characterizing gene families in this important crop species. Each student is working on a different gene family.

Once a gene family is chosen by the student researcher she searches the soybean genome for other potential members of the family using the BLAST (basic local alignment search tool) algorithm at NCBI (National Center for Biotechnology Information) then employs a variety of bioinformatics tools to study the evolution of the family as well as its possible function.

GENA ROBERTSON, a graduate student who first worked in the lab as an undergraduate, is studying a gene family induced in response to wounding. This family was first investigated by **SHEREA STRICKLIN** who graduated in 2009. It has 10 members on 5 different chromosomes. **KRISTIN KELLY**, an undergraduate student, chose to study a gene family whose function was unknown. By comparing conserved domains on the encoded protein sequences, **KRISTIN** was able to assign a putative function to the gene family as encoding a phospholipase A2 enzyme. The family has 6 members on 4 different chromosomes and

KRISTIN was also able to identify closely related sequences that do not appear to encode functional products. Further investigation of these potential pseudogenes will be the work of another semester or two. **KAREN SCHILLI**, then an undergraduate student and now a graduate student, chose her gene family because it was unknown in plants but showed sequence similarity to a gene that is amplified in mammalian breast cancers. Although a possible function of this gene family has not been established in soybean, **KAREN** was able to identify potential functional domains of the protein.

The most recent additions to the lab group are **DAVID KAVISH** and **SHELBY EMMETT**. They are currently in the process of identifying all members of the gene families they chose to study. **DAVID** has chosen a gene whose function is unknown and **SHELBY** has chosen a gene associated with reproductive self-incompatibility in plants. This family should be interesting because soybean plants are not self-incompatible and yet **SHELBY** has already discovered that soybean harbors roughly 22 versions of this gene at unique loci.



Gena Roberson, left, and Kristin Kelly, right in the Plant Molecular Genetics Lab