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Spring Phonathon!

Coming the third week of April

Your chance to update your contact info, share your thoughts and news, talk with current BioSci students, and contribute to the department.

BioSci research featured at STL Science Center

BioSci faculty members **MELANIE MORMILE** and **FRANCISCA OBOH-IKUENOBE** are once again gaining national attention for their research on the acid, neutral, and basic salt lakes of Australia. The environments of the acid lakes can serve as analogs for environments that might have existed on Mars, and by understanding life in these lakes, researchers may be able to determine if life once existed on the Red Planet.

As of January, the team's research is on exhibit at the St. Louis Science Center. The exhibit features information on the geology and geochemistry of the lakes and shows how the lake salts trap living organisms like pollen, algae, and bacteria. The display includes side by side photos of the Australian lakes and Mars surface, as well as a camera attached to a microscope that visitors can use to view sediment cores and salt samples taken from the lakes.

"The possibility of life on Mars is very exciting," **MORMILE** said. "The acidic saline lakes of Australia can serve as analogs for the previous presence of hypersaline environments on Mars. The lakes in Australia contain unique, diverse life." **MORMILE**, **OBOH-IKUENOBE**, colleagues at other universities, and several students visited the Australian lakes in 2005 and collected core and sediment samples. In these samples, they found trapped living material such as pollen and algae that date back to 3000 years ago.

OBOH-IKUENOBE and another colleague working on the project, Kathleen Benison, an Associate Professor of Geology at Central Michigan University and Brenda Bowen, an Assistant Professor of Geology at Purdue University, received funding from the National Science Foundation to return to Australia and drill boreholes in several of the acid lakes in the hopes of finding older specimens than those previously identified, and studying the evolution of acid conditions in the region.



Dr. Melanie Mormile (second from left) and Dr. Francisca Oboh-Ikuenobe (far right) and students collecting samples from the salt lakes of Australia.

The research team developed the exhibit so that visitors to the museum will realize that some environments on Earth are very similar to environments on Mars. Based on these similarities, if life can exist in the extreme environments on Earth, there may have been life in similar environments on Mars. The exhibit was designed to appeal to visitors of ages eight to adult. **MORMILE** hopes that because the exhibit highlights research conducted by a team of women scientists, it will encourage young girls to consider a career in science.

The National Science Foundation and the St. Louis Science Center provided funding for the exhibit. The exhibit took nearly six months to complete, and will be on display at the museum for at least three years.

Department Update

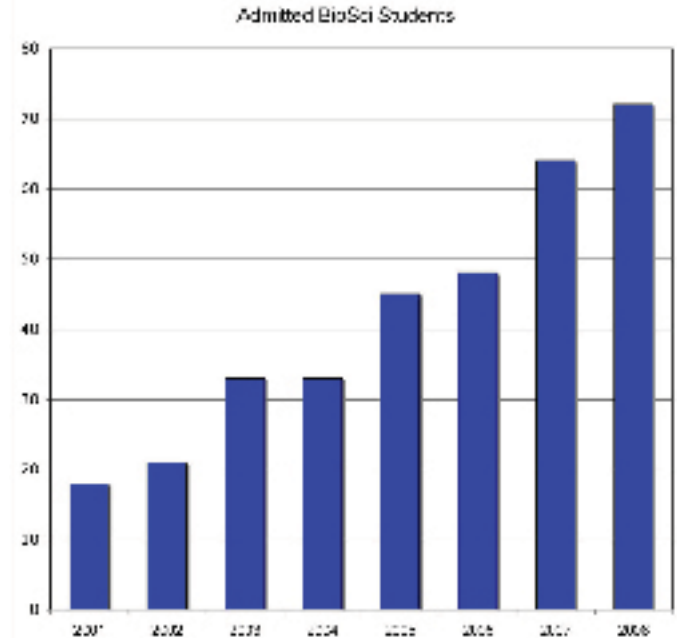
The faculty and staff of the Department of Biological Sciences are fundamentally committed to building a superior academic community in biology at Missouri S&T. This approach is based on our recognition of the fact that everyone in biological sciences – students, faculty and staff- are here for the same two reasons – to learn and to discover, and that accomplishments in these areas are fostered by an environment of encouragement and support. All of our faculty teach and perform research; almost all of our students perform original research; our staff provide the means to make these things happen.

Our Biological Sciences community presently includes:

- 12 faculty members
- 146 undergraduate majors
- 16 graduate students
- 12 staff members (research and support)
- ≈ 50 biologists in other Missouri S&T departments

The basis for an effective academic community is a conscious commitment to providing a challenging, supportive, and collegial environment. Some practical consequences of this commitment include 1) providing effective and personalized science instruction, 2) emphasizing effective advising and graduate/professional school/job placement, 3) providing research opportunities (grants and laboratories) to all our students, 4) modifying the physical layout of the department to encourage student-student and student-faculty interactions, and 5) including students in virtually all departmental functions (seminars, committees, etc.). Not only do we strive to keep our classes small, but our faculty members know all of our students (and visa versa). We also solicit continual student input on curricular and other matters.

Not surprisingly, we have some pretty happy students: Over the last 3 years, our graduating seniors have rated their BioSci experience a 8.6 on a scale of 1 to 10, and each year about 20



students transfer to BioSci from other departments and institutions. Over the years this commitment has made Biological Sciences one of the fastest growing departments on campus (the graph depicts students admission trends for the last 7 years).

Our commitment to creating an outstanding academic community is ongoing. We would welcome your ideas about how to improve our efforts.

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



BioSci Chair's Advisory Council to hold Spring meeting on April 19th

The BioSci Chair's Advisory Committee will meet on Saturday, April 19th in the Havener Center. The Council has a three-part mission:

- Consultancy - to counsel and advise the Chairperson on how to strengthen the educational, research, and service missions of the Department, and how to increase the professional opportunities for biological sciences students;
- Ambassadorship - to promote the goals and programs of the Department and to encourage participation of alumni and friends in advancing its mission and public image;
- Sponsorship - to advance the objectives of the Department by identifying and securing sources of financial support.

The Committee is comprised of alumni, colleagues, donors and others interested in the development of the biology program at Missouri S&T. Members include people in the teaching, health, research, pharmaceutical, manufacturing and other professions.

2008 Council Members:

Margaret Brown
Rachel Carter
Ted Day
Brian Haggard
Anthony Kaczmarek

Linda Michaelsen
Barbara Patterson
Amy Reeves
Joseph Safran
William Van Stoecker

Tell us about your family, special interests, employment, and projects for future issues of BioFiles. Send your information to:

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2007 Research Partners

We are pleased to acknowledge and celebrate the support we receive from our alumni and friends. This consistent support provides the means to strengthen our academic community and support innovation in both teaching and research. Student tuition provides about 40% of our operating funds and the state of Missouri provides a progressively shrinking portion (presently about 28%). The remainder comes from a variety of sources, including grants, contracts, endowment income and annual giving. Our department's rapid growth in student population has created a particularly acute need for scholarship funds.

Departmental Research Partners for 2007 are acknowledged below. We hope you will be able to support the department in its annual fund-raising campaign. You will receive a mailing in the near future and a call from one of our students during the annual Phonathon in April.

We appreciate all you have done 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 next time you are in Rolla. We are doing interesting things and we always like to talk about our work.

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Dr. Rebecca Siscel
Dr. Julie Stansfield
Julie Townsend
Matthew Vogel

BioSci student athletes vault to success

John Kean, Missouri S&T Public Relations

TAYLOR HAHN repeated as the pole vault champion in the Great Lakes Valley Conference by breaking the school record she set in the event, clearing 11-8 to also better her NCAA Division II provisional qualifying standard. **HAHN**, who won the event by nearly a foot over four others that cleared 10-8 1/4, helped the Lady Miners finish fourth as a team at the GLVC Indoor Championships.

The Lady Miners had four of the top six finishers in the pole vault, as **JAMIE STATLER** took third at 10-8 1/4, Leah Moreland fourth at the same height and Sarah Zaremba sixth at 10-2 1/2. S&T's 4x400-meter relay team of Katie Bruce, Aubrey Moore, Kierra Handley and Hillary Griffith captured the second place spot and all-league honors in that event with a time of 4:04.99, holding off Lewis by less than a second to take the runner-up position.

HAHN and **STATLER** were co-recipients of the Great Lakes Valley Conference's "Field Athlete of the Week" in women's track and field. Both Hahn and Statler cleared 11-5 3/4 -- the provisional qualifying standard -- on February 22 at the Central Missouri Classic in Warrensburg, Mo. The clearances that established the new school record in the event earned them each a third place finish in the event.

HAHN is from Salem, Ill., while **STATLER** hails from Francis Howell North High School in St. Charles, Mo.



Taylor Hahn



Jamie Statler

Student Organization News

Helix hosts Badge University

Saturday, March 8, nearly 50 brownie and junior Girl Scouts spent the day doing hands-on science activities under the direction of various campus student organizations, led by HELIX. For this year's Badge University (formerly called 2+2 in the laboratory and Bridging the Gap) girls earned a certificate and patch for being radiation detectives, learning about what makes bugs glow, measuring the golden ratio, making ice cream with liquid nitrogen, using chemistry to make things move and studying their own genes. Through Badge University, girls are introduced to science activities that will eventually lead to badges they can earn.



Badge University participants learning about science.

Phi Sigma members volunteer throughout the community

Dedicated to recognizing and promoting research and academic excellence, the Gamma Iota Chapter of the PHI SIGMA National Biological Sciences Honor Society is involved with events on campus and service to the community. This fall, the chapter co-sponsored a trip to the Body Worlds exhibition in St. Louis and provided members with the opportunity to volunteer at GRACE Fellowship. This spring, PHI SIGMA members

attended a Student-Missouri State Teacher Association seminar, volunteered at the Community Blood Center of the Ozarks Blood Drive, and helped with the February Food Distribution. PHI SIGMA also provides travel grants to its members who are planning to present research results at an academic event outside of the Missouri S&T community.

SCRUBS earns Blue Key top honors for service activities

SCRUBS has been active on campus and in the community, and the number of active members has greatly increased. The organization raised almost \$2000 with their annual 5K run to support the Cystic Fibrosis Foundation. Many SCRUBS members participate in the Prevention Consultants of Missouri "Mentoring Makes a Difference" program as mentors to middle school and elementary school students, while others dedicate hours to service through the hospice program. Others volunteer at the Salvation Army or at the "We Care" Clinic, the newly developed free clinic for people of the surrounding communities without health insurance. For these and many other reasons, SCRUBS

was awarded the Blue Key Honor Society's Organization of the Semester for Fall 2007. SCRUBS has also hosted several speakers so that its members may be exposed to a diverse range of career fields in all types of health care. Military representatives, current medical school students, and area physicians and alumni have been invited to share their experiences with members. In addition, upperclassmen offer advice and peer advising to underclassmen before advising week. Currently, SCRUBS is interested in hosting a biomedical engineer and other health related professionals, and a professional school/career fair is being planned in coordination with other science organizations for

Graduate Student News

We are pleased to welcome several new graduate students into the department this semester: BONNIE BEASLEY and BARBARA FEARS have joined ANNE MAGLIA'S lab. BEASLEY is examining the historical prevalence of skeletal malformations and declines in the cricket frog and FEARS will study the relationships among sound production, hyoid anatomy, and breeding ecology of frogs.

VERNON MODGLIN has joined ROGER BROWN'S lab and will be examining the use of scaffolds for bone and tissue repair.

JUNGEUN PARK successfully defended her thesis and received a Master of Science degree in December. She investigated the mutagenesis of phosphorylation sites in the cytokinesis protein Hof1 under the advisement of KATIE SHANNON.

December '07 BioSci Grads

Six students were awarded Bachelor's degrees in BioSci during the December commencement ceremonies.



Left to right: Decemeber Ruth-Smith, RyanCox, AmyHunt, Candace Reiter, Ashley Sheek, Jenna Tune.

Faculty News and Awards

YUE-WERN HUANG, associate professor of BioSci, and Yinfa Ma, professor of Chemistry, received the Best Paper Award from the American College of Toxicology for their 2006 paper on cytotoxicity of cerium oxide nanoparticles.



Dr. Yue-wern Huang

This summer, **HUANG** will take three undergraduate students (**JAMIE STATLER**, **ISAAC DEATHERAGE** and **ANGELA RUDOLPH**) and one graduate student (**JENNIFER YI**) to universities in eastern Taiwan to participate in research collaborations. This activity is part of a broader scholar exchange program to facilitate research and recruit quality international students between BioSci and several universities in Taiwan.

KATIE SHANNON, assistant professor of BioSci, was awarded \$36,500 by the University of Missouri Research Board for her project entitled "Regulation of Cytokinesis in Budding Yeast."



Dr. Melanie Mormile

MELANIE MORMILE, associate professor of BioSci, along with collaborators Oliver Sitton, and Thomas Schuman, received 18 months of funding from the Agricultural Feedstocks, MSC Company, Dundee, IL for their project to examine novel animal feed ingredients.

Researchers in Chen lab look for efficient biodiesel source

In the face of high energy prices, global warming caused by carbon dioxide emission, and potential food shortages, microalgae have become one of the most promising crops to ameliorate these problems. Research in the laboratory of **NATHAN CHEN**, assistant professor of BioSci, is exploring the use of microalgae, unicellular photosynthetic organisms that use solar energy to produce lipids, as a source for alternative fuels.

"Some microalgae can double their biomass in as short as one day, which is at least ten times the rate that land crops can achieve" says **CHEN**. "Among these fast-growing microalgae, many species produce lipids as their food reserves. Under stress, the lipid levels could double after a few days of nitrogen starvation. This phenomenon may be very useful in producing lipids to make biodiesel!"

How microalgae increase lipid production during stress is unknown. In higher plants, animals and yeast, nitrogen starvation activates a process called autophagy, in which cells recycle parts of their own cytoplasm and organelles to prevent death. Whether autophagy also happens in microalgae is not clear.



Microalgae could hold the key to biodiesel production.

CHEN studied autophagy in plant cells during his postdoc training, and is now studying the process in microalgae using genomic and proteomic approaches. He hopes to create mutants with a false-positive signal that will result in microalgae that synthesize high level of lipids under normal (no stress) conditions. These organisms could yield high amounts of lipids, and result in dramatic reductions in the cost of producing biodiesel.

Recent BioSci Publications

Brown, R.F., Rahaman, M.N., Dwilewicz, A.B., Huang, W., Day, D.E. Li, Y., and B.S. Bal. In press. Effect of Borate Glass Composition on its Conversion to Hydroxyapatite and on the Proliferation of MC3T3-E1 Cells. *Journal of Biomedical Materials Research*.

Firestone, M., Rozema, B., Earley, K. and C.-N.N. Chen. 2007. Identification of *Saccharomyces cerevisiae* YPR1 as a methylglyoxal reducing enzyme: Over-expression enhances oxidative stress tolerance in *E. coli*. *J. Genet. Mol. Biol.* 18: 162-168.

Macaulay, J.J., C.D. Adams, and M.R. Mormile. 2007. Diversity of tet resistance genes in tetracycline-resistant bacteria isolated from a swine lagoon with low antibiotic impact. *Canadian Journal of Microbiology*, 53: 1307-1315.

Niyogi, D., and J. Harding. 2007. Coal Mine Drainage: Complex Effects on Streams. *New Zealand Water and Wastes Association Journal*. November 2007.

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

Pollock, J., Weber, K.A., Lack, J., Achenbach, L.A., Mormile, M.R., and J.D. Coates. 2007. Alkaline iron(III) reduction by a novel alkaliphilic, halotolerant, *Bacillus* sp. isolated from salt flat sediments of Soap Lake. *Applied Microbiology and Biotechnology*, 77: 927-934.

Department News

Research team developing amphibian anatomy ontology

Missouri S&T Public Relations

Faculty and students in the biological and computer sciences departments are working with experts from around the world to develop a formal vocabulary, called an ontology, to describe the anatomy of more than 6,200 species of amphibians.

The group has been awarded a grant for \$1.1 million over three years from the National Science Foundation (NSF) to develop the ontology, which marks the first attempt to develop a comprehensive warehouse of information for an entire class of animals, rather than a single species.

"We're developing an agreed-upon set of terms that researchers will use when referring to amphibian anatomy," says ANNE MAGLIA, assistant professor of BioSci who is working on the project with Jennifer Leopold, assistant professor of computer sciences and ANALÍA PUGENER, a postdoctoral researcher in BioSci.

MAGLIA said hundreds of years of anatomical research has led to the use of multiple terms to describe the morphology, or form and structure, of amphibians, with detailed descriptions dating as far back as the early 1800s. The usage of many terms also has changed during the years and varies across languages. "This limits researchers' ability to integrate the results of gene expression and anatomy studies, or studies of one kind of amphibian to another," MAGLIA says.

Information extraction technology also is being used in the ontology's development. Another investigator on the project, Susan Gauch, head of the department of computer science at the University of Arkansas, has designed software that reads online scientific literature and scans the contents for terminology. The information then is sent back and stored in a database at S&T that Leopold and her team developed.



Experts from around the world discuss amphibian anatomy at the AmphibAnat ontology workshop last November.

To develop the ontology, the team is seeking input from experts around the world. At amphibanat.org, experts can create an account and log on to submit comments about the developing ontology. The website also contains information about the project that can be viewed by the public.

Part of the grant funding also is being used to organize yearly workshops where experts can gather to discuss the ontology as it progresses. "We've developed a consortium of anatomists who are working on this project," MAGLIA says. "This is allowing the world's experts to come together, and it is helping to modernize and synthesize our science."

MAGLIA says the team hopes to have a draft of the ontology completed by the end of the three-year grant. The goal is to have the groundwork laid so that, with support, the project can continue until a comprehensive ontology is built.



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