

Stepping Down

Professor Carl von Ende Completes His Term as Interim Chair



*From Professor Carl von Ende,
former acting chair*

2008-2009 was another busy year for the department, culminating in a whirlwind end to the spring semester. During the last two weeks in April, we interviewed three chair candidates and were visited by two external reviewers of the department's programs. We are very pleased to welcome **Professor Barrie Bode** as the new department

chair (see page 2). Professor Bode comes from the Department of Biology at St. Louis University and assumed his new duties Aug. 16, 2009. In spite of the rather hectic schedule last spring, the close proximity of the two activities provided a fortuitous opportunity for a focused consideration of important issues for the department in the future. The external reviewers highlighted the high quality undergraduate and teacher certification programs, recognized the solid and diverse training available for students in the M.S. program, and suggested ways the Ph.D. program should be strengthened. Professor Bode and the faculty will be discussing these recommendations in the coming year in light of research areas recently identified as foci for the future.

Other faculty activities to note this past year include: **Professor Ana Calvo** was awarded a grant from National Institutes of Health for her research on the genetic regulation of morphology and natural product biosynthesis in the fungus, *Aspergillus*; **Professor Jozef Bujarski** received funding for five years from the National Science Foundation for his continuing research on Brome Mosaic Bromovirus; **Professor Linda Yasui** and Professor Narayan Hosmane (chemistry/biochemistry) obtained a collaborative grant from Kishwaukee Community Hospital to study boron neutron capture in the treatment of prostate and bladder cancer; **Pat Vary**, Distinguished Research Professor Emerita, wrapped up her NSF funded project on the sequencing of the genome *Bacillus megaterium*; **Professor Rick Johns** spent the fall semester on sabbatical leave developing better computer algorithms for the analysis of bacterial genomic data with the bioinformatics group at Argonne National

Laboratory; **Professor Neil Blackstone** devoted his fall sabbatical leave to studying the metabolic regulation of hyperproliferation in cnidarians.

This fall **Professor Jon Miller** welcomes the first class of students pursuing the new M.S. specialization in biology teaching, and **Professors Richard King** and **Carl von Ende** are among the group of faculty from eight departments on campus developing a new interdisciplinary curriculum in environmental studies.

Biological sciences undergraduate and graduate students have received university-wide recognition for their research activities: three BIOS undergraduates received USOAR grants for research projects they will be pursuing in a faculty member's lab this next year; master's student **Pratima Shrestha** was awarded a University Fellowship, and doctoral student **Joel Hutson** received a Dissertation Completion Fellowship, for 2009-2010; finally, fifty undergraduate and graduate students presented posters of their research projects at the annual Phi Sigma Research Symposium in April.

As part of the celebration this year of the 50th Anniversary of the College of Liberal Arts and Sciences, 50 alumni honorees were selected by a diverse committee assembled by the college. The department is extremely proud that five of the honorees are graduates of the Department of Biological Sciences. But unfortunately, joy in one regard cannot prevent sadness in another: the department was shocked this spring by the tragic, unexpected death of Animal Facilities Supervisor, **Jodi Scaletta**. Her cheerful smile and generous demeanor is greatly missed by all in the department.

Finally, we would like to underscore our sincere appreciation for the outstanding generosity the department alumni continue to demonstrate. The additional funds provided by your contributions enhance the teaching and research activities of the faculty and students, expand the travel opportunities for students to visit research facilities/sites or attend scientific meetings, and enable the department to provide more scholarships and awards for our outstanding undergraduate and graduate majors. All of these directly impact the quality of undergraduate and graduate programs the department is able to offer. ♦



From Professor Barrie Bode, chair

When I interviewed for the position of chair of the Department of Biological Sciences at NIU, what impressed me about the department and institution was the diversity and quality of its faculty and students, and the commitment of the administration (notably **Dean McCord** and **Provost Alden**) to supporting and improving research at this large public university. On August

16th, I officially began my term as chair of the Department of Biological Sciences, and I am very much looking forward to this opportunity to move the department forward in its missions of research and teaching. My goal is to make our department the flagship of the College of Liberal Arts and Sciences at NIU, and to build programs that annually increase in quality, attracting the top students and biologists to our institution. I would like to thank **Carl von Ende** for his leadership of the department during the transition from the departure of Mike Parrish in June of 2006 to my hiring this summer. I am certain that when Carl agreed to serve as “interim” chair, he had no idea that it would be a three-year commitment, but he did so splendidly, overseeing an external review in May of 2009 that will help guide and set priorities for the department in our strategic planning process. With the outside review as a reference, the department is poised to address challenges and seize opportunities that will result in exciting new programs and curriculum for undergraduate and graduate student training and research. I thank Carl for his ongoing help in tutoring me during my first couple of weeks here.

As I am new not only to the position, but the university, I figured that students, faculty, staff, and alumni would like to know a little bit about the “new guy” and how my experience will help shape the department in the coming years. I grew up and attended college in St. Louis (yes, I’m a lifelong Cardinals fan), earned my Ph.D. in biochemistry and molecular biology at the University of Florida, and did my postdoctoral research in liver biology at the Health Sciences Division of Monsanto (now Pfizer). From there, I took my first junior faculty position at Massachusetts General Hospital/ Harvard Medical School, where I helped set up and directed the Surgical Oncology Research Labs. My research group, composed of surgical residents, technicians, and summer undergraduates, studied the effects of catabolic states (cancer, diabetes, severe infection) on liver physiology and metabolism. It was there that I received my first independent NIH grant to study the role of amino acid transporters in the development of liver cancer. That topic remains the major focus of my lab to-date. In 1999, I accepted a position as an associate professor in the biology department at Saint Louis University, where I taught physiology, biochemistry, molecular biology and cancer biology at the graduate and

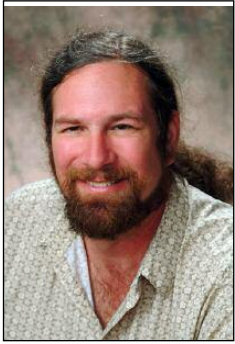
undergraduate levels and also participated in courses at our medical school. Membership in the SLU Institutional Review Board, Cancer Center, and Liver Center provided opportunities to forge productive collaborations with our biomedical research community. During that time, I was able to build and sustain a successful research program in molecular physiology and cancer biology that incorporated both graduate and undergraduate students – collective experiences that I hope to apply here at NIU to enhance teaching and research, particularly in the Ph.D. program.

While my academic strength is decidedly in the areas of biomedical research, pre-medical curriculum and molecular/cell biology, I have a deep working appreciation for the many disciplines of biological science, and how they integrate to comprehensively address problems in the field. As an undergraduate student, I was mostly interested in organismal biology and often went “herping” for snakes, lizards, and amphibians, as well as seining for fish; since then, I have retained my interest in all areas of biology, and intend to bring that holistic and integrated perspective to the position of chair. My transition from SLU to NIU has proceeded on an accelerated time track since accepting the position in June, so the first few months will be spent learning the operating procedures and administrative infrastructure, as well as performing a comprehensive assessment of curricula, programs, and research...and along the way, meeting administrative, operating, and reporting deadlines. The learning curve will be fairly steep, but I am looking forward to building on the existing strengths of the department, and creating initiatives with our faculty that will enhance curriculum, research, and governance – all leading to the recruitment of new faculty in the next few years. I like the small-town feel of DeKalb and its proximity to Chicago – an area from which NIU draws most of its students and generates its diversity. Drawing from my experience at an urban university in St. Louis, one of my goals as chair will be to develop programs that recognize and integrate students of diverse backgrounds into biological science through innovative approaches to teaching and research. Finally, while it may sound trite, cliché, and simplistic, my overarching goal is to make NIU biology a fun and exciting department in which to work, learn and grow, for students, faculty, and staff. I look forward to working with all of you in this mission. ♦



**VISIT US ON THE
WORLD WIDE WEB:**

www.bios.niu.edu/



by Professor Mitrick Johns

I spent the 2008 fall semester on sabbatical leave, which meant that I taught no classes and I (happily) attended no committee meetings. Instead I did two things. First, I sat in on **Professor Meganathan's** truly fascinating Microbial Physiology class and learned an incredible amount about biochemical pathways in bacteria. However, most of my time was spent at Argonne

National Laboratory, an hour's drive from DeKalb. I worked in the Mathematics and Computer Science Division under the auspices of **Ross Overbeek**, Ph.D., developing a computer-based method to correct frameshift errors in newly sequenced bacterial genomes.

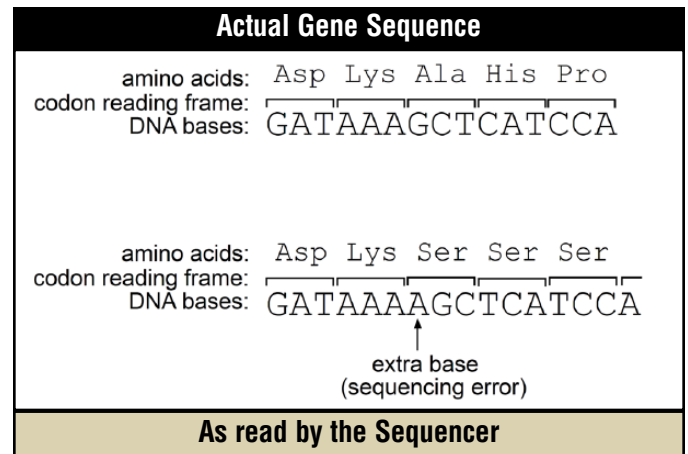
The "lab" I worked in was just a lounge surrounded by cubicals. Every day I sat on a couch, working on my laptop, while the other Argonne people came and went, chatting and discussing their projects. The laptop was just a terminal for me: I was constantly communicating with servers at NIU and Argonne over the Web, writing Perl computer code and sending it to the servers for processing.

My project dealt with a DNA sequencing problem: with newer sequencing methods, it is easy for the machine to miscount the number of bases in long runs of the same base. For example, if the DNA molecule actually has 8 A's in a row, sometimes the sequencer will count 7 or 9. This problem can be corrected by repeatedly sequencing the same area, but of course, the more times you sequence each region, the more it costs and the longer it takes. Simple economics opposes perfect DNA sequencing.

The problem with adding or removing DNA bases is that DNA is read in groups of 3 bases: the codons that are translated into the amino acids making up the gene's protein product. If a

sequencing error adds or removes a base, you alter the groupings of 3 (the reading frame), and you get a completely different, incorrect protein. What this means for genome sequencing is that some of the genes you think you have are very different from the genes actually present in the living organism. This is very bad, and my goal was to write a series of programs to locate and correct these errors in the raw DNA sequence.

My main collaborator in this project was **Stephen Snow**, a graduate student in the NIU Department of Computer Science. With the assistance of a few others (**Laura Kettner**, NIU Dept. of Mathematical Sciences, **Reva Freedman** and **Minmei Hou**, NIU Dept. of Computer Science, and **Gordon Pusch**, Fellowship for the Interpretation of Genomes), we produced a package called Pathfinder, which located hundreds of frameshift errors in the recently sequenced genomes of *Listeria monocytogenes*, a major cause of food poisoning. Steve's part of the project became his master's thesis, the first thesis-based master's degree ever granted in the Dept. of Computer Science. We also wrote up our results and submitted them for publication in a leading bioinformatics journal. Steve has now graduated, but I and my able bioinformatics students are continuing to work on analyzing DNA sequences from bacterial genomes. ♦



NIU Receives Grant from Kishwaukee Community Hospital

by Professor Linda Yasui

For the first time, NIU has been awarded a \$100,000 grant from Kishwaukee Community Hospital to undertake boron neutron capture studies in prostate and bladder cancer cells. The collaborative efforts between **Sajit Bux**, M.D., from



Kishwaukee Community Hospital, **Narayan Hosmane's** lab in chemistry, **Linda Yasui's** lab in biology, and the NIU Institute for Neutron Therapy at Fermilab will contribute to the development of novel therapeutic approaches in the treatment of prostate and bladder cancer. The goal of this collaboration is to specifically eradicate the tumor but spare the normal surrounding tissue. Dr. Bux, a urologist at Kishwaukee Community Hospital, will be giving a biology seminar soon to fulfill a requirement for adjunct status in the department. ♦





by Professor Pat Vary

The National Science Foundation sponsored Genome Sequencing Project of the soil bacterium *Bacillus megaterium* strain QM B1551 has been completed. This project has been a collaboration between Pat Vary here at NIU and Jacques Ravel of The Institute for Genomic Research (TIGR—"Tiger") and University of Maryland Baltimore Institute for Genome Sciences.

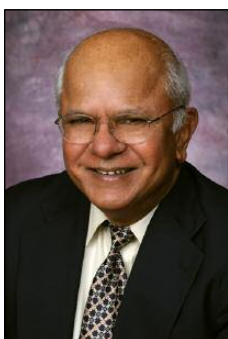
Sequencing was done at TIGR, annotation here at NIU, and analysis at both NIU and UMB. Early in the process we agreed to collaborate with the laboratory of Dieter Jahn in Braunschweig, Germany. They had begun sequencing the *B. megaterium* strain DSM 319, a plasmidless isolate from soil. The ability to compare two strains of the same species is revealing some interesting results and is clarifying the phylogenetic development of the aerobic spore-forming bacteria. QM B1551 has a 5,097,129 bp chromosome and seven plasmids totaling another 426,063 bp of DNA. It has almost 1 Mbp of DNA more

than many of the common *Bacillus* such as *B. subtilis*, and is similar in size to *B. anthracis* (anthrax), *B. cereus* (gastroenteritis) and *B. thuringiensis* (insecticidal crystal former). Here at NIU, most of the annotation has been done by **Professor Rick Johns, Kirthi Kutumbaka, Janaka Edirisinghe, Chris Braun, Dr. Scott Grayburn**, and me. *B. megaterium* genomics and annotation was also a project for the bioinformatics classes both in biological sciences and computer science. Two workshops were given during the three years of the project. The first was a two-day workshop, April 13-14, 2007, with speakers from this department, Argonne, and TIGR. It was for NIU faculty and students to become more familiar with genomics and bioinformatics. The second workshop on genomics was held this spring, March 21, 2009, for high school and community college students.

The completed, 10X coverage, closed, rotated genome sequence can be found at www.bios.niu.edu/b_megaterium/index.html

The annotated sequence should be available on GenBank by the time this newsletter is completed. We hope to have the sequencing paper with TWO *B. megaterium* sequences analyzed, submitted by September. ♦

What Causes the Characteristic Smell of Soil?



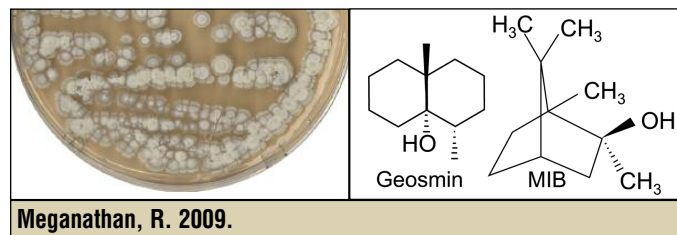
by Professor R. Meganathan

The smell of soil is due to the smell of two small molecules produced by small organisms. These small molecules are known as geosmin and 2-methylisoborneol (MIB). These compounds are mostly produced by bacteria belonging to the genus *Streptomyces*. The majority of antibiotics we use are produced by streptomycetes. A Petri dish with colonies of *Streptomyces* and the structures

of the two compounds are shown in the figure (at right). The smell of these compounds can cause reduced quality of drinking water. Geosmin and MIB also have been found to reduce the quality of fish in freshwater aquacultures as the odors penetrate and accumulate in the fish, thereby lowering the commercial value.

Humans can smell concentrations as low as 10 parts per trillion of geosmin and MIB in water. The characteristic odor of soil was first investigated by Berthelot in 1891. In 1965 the structure of the responsible compound geosmin was determined by Gerber. It was not until 1981 that the pathways for the biosynthesis of these compounds were determined. Prof. Bentley and I determined on the basis of isotopic labeling experiments that geosmin is a degraded sesquiterpene and MIB is a methylated monoterpene. According to Prof. David E. Cane of Brown University, "Although there have been more than 800 papers dealing with the production, detection and remediation of geosmin and other volatile metabolites in water supplies, aquaculture products and wine, there were no further reports on the mechanism of microbial geosmin biosynthesis until five

years ago" when the work was repeated. Recently, with availability of the genome sequence of *Streptomyces coelicolor*, Cane and associates have done extensive research on the enzymology and the reaction mechanisms of the geosmin and MIB biosynthetic pathways.



As pointed out earlier, the human olfactory system can detect extremely low concentrations of these compounds. It is interesting to note that the same compounds contribute to the well being and survival of the camel. The wild Bactrian camels (two humped camel, *Camelus bactrianus*) are reputed to be able to find water up to 50 miles away. In the desert, *Streptomyces* gives off the signature smell and that scent is carried on a breeze, and it can be picked up by the camel's well-tuned nostrils. In fact, it could be a matter of life or death for the camel. What does the *Streptomyces* get out of its scent? According to Professor Keith Chater, the smell could be a way of luring animals into carrying its spores. "You could imagine that the camels would disperse the spores as they take a drink, either they would eat or drink the spores, or they would get stuck on them and then get dispersed wherever the camel moves to."

(See www.bios.niu.edu/meganathan/smell_of_soil.shtml for references.)

by Professor Kenneth Gasser



The 2009-2010 academic year will mark the 50th anniversary of the College of Liberal Arts and Sciences at Northern Illinois University. To celebrate this significant milestone, the College of Liberal Arts and Sciences will host a series of special events throughout the year, including a September 2009 recognition of 50 outstanding graduates from the 17 departments that make up the college. The 50 Golden Anniversary Alumni were chosen based on out-

standing professional accomplishments or involvement in civic and cultural activities.

Five of those to receive this prestigious honor are alumni of the Department of Biological Sciences. They include:

Jerrold Zar (B.S. 1962), who returned to NIU and the Department of Biological Sciences in 1968 as an assistant professor. He was chair of the department from 1978-1984, and dean of the Graduate School and vice-provost for graduate studies and research from 1984 until his retirement in 2002. Professor Zar's scientific specialty was in ecology and biostatistics, and he is the author of the widely used textbook *Biostatistical Analysis*.

Arnold Hampel (B.S. 1963) was a professor of biological sciences at NIU for 30 years and achieved an international scientific reputation for his pioneering work on catalytic RNA.

Kevin Folta (B.S. 1989, M.S. 1992) is currently a professor of plant molecular biology in the Department of Horticultural Sciences at the University of Florida, with research programs in photomorphogenesis and strawberry genomics.

Mary Katherine Krause (B.S. 1990) is the associate vice president for university relations at Rush University Medical Center in Chicago. Mary has received numerous honors for health care administration.

Thomas Near (B.S. 1993, M.S. 1995) is an assistant professor of ecology and evolutionary biology at Yale University and is the curator of ichthyology at the Yale University Peabody Museum of Natural History.

The College of Liberal Arts and Sciences has had nearly 70,000 graduates in its 50-year history. To be part of the select fifty is a great honor for which we congratulate the award winners, pictured at right. ♦



Jerrold Zar



Arnold Hampel



Mary Katherine Krause



Thomas Near



Kevin Folta

Illinois Department of Natural Resources Press Release



Governor Pat Quinn has named **John D. Rogner** as the assistant director of the Illinois Department of Natural Resources (IDNR). Rogner joins the IDNR from the U.S. Fish and Wildlife Service (USFWS), where he has served since 1998 as supervisor of the Chicago Field Office.

"John Rogner is one of the most respected natural resource conservation professionals in the country and we are very happy to bring his knowledge, expertise, and wealth of ideas to state government," Governor Quinn said.

As IDNR assistant director, Rogner will serve as a liaison to the department's federal partners and work to rebuild its fish and wildlife programs, as well as help manage new initiatives on youth retention and recruitment. He is joining IDNR as part of an agreement with the USFWS intended to strengthen fish and wildlife programs and projects managed cooperatively by both agencies.

"I am thrilled to have John Rogner join us as we work to rebuild the Department of Natural Resources, restore public faith in the agency, and implement new ways to get more young people involved in outdoor recreation and conservation stewardship," said IDNR Director Marc Miller.

Rogner has more than 25 years of experience in federal wildlife, endangered species, and wetlands programs. As USFWS field office supervisor, Rogner has developed successful habitat restoration programs and relationships with public and private organizations dedicated to wildlife enhancement in northeast Illinois. For the past 10 years, he has chaired the Chicago Regional Biodiversity Council (Chicago Wilderness), a coalition of nearly 250 environmental, scientific, and cultural organizations.

John Rogner received both a baccalaureate (1977) and a Master of Science (1981) degree in biological sciences from Northern Illinois University in DeKalb. ♦

- **Anne Berg**
Epidemiology of Epilepsy.
atberg@niu.edu
- **Neil Blackstone**
Evolution of Development
and Complexity.
neilb@niu.edu
- **Barrie Bode**
Cancer Biology and
Molecular Physiology.
bbode@niu.edu
- **Jozef Bujarski**
Plant Molecular Biology;
Molecular Virology.
jbujarski@niu.edu
- **Ana Calvo**
Microbiology; Molecular
Biology; Fungal Genetics.
amcalvo@niu.edu
- **Sonya Conway**
Endocrinology; Neuro-
Endocrine Control Systems.
sonya@niu.edu
- **Melvin Duvall**
Molecular Phylogenetics
and Evolution.
mel-duvall@niu.edu
- **Kenneth Gasser**
Cell Physiology.
kgasser@niu.edu
- **Stuart Hill**
Pathogenic Microbiology.
sahill@niu.edu
- **Richard Hahin**
Nerve and Muscle
Physiology; Biophysics.
hahin@niu.edu
- **Gabriel Holbrook**
Plant Physiology; Plant
Biochemistry.
gholbrook@niu.edu
- **Christopher Hubbard**
Comparative analysis
of structure and function
in felids.
chubbard@niu.edu
- **Michael Hudspeth**
Molecular Biology;
Organelles; Mycology;
Fungal Plant Pathogens.
mykes@niu.edu
- **Mitrick Johns**
Plant and Animal Molecular
Genetics; Bioinformatics.
rjohns@niu.edu
- **Barbara Johnson-Wint**
Development; Matrix
Modelling and Remodelling;
Gravitational Biology.
barbara-johnson-
wint@niu.edu
- **Bethia King**
Behavioral Ecology;
Evolution; Entomology.
bking@niu.edu
- **Richard King**
Evolutionary Ecology;
Herpetology. rbking@niu.edu
- **David Lotshaw**
Cell Physiology; Ion
Channels and Signal
Transduction.
dlotshaw@niu.edu
- **R. Meganathan**
Microbiology; Microbial
Physiology; Biochemistry;
Genetics and Molecular
Biology.
meganathan@niu.edu
- **Peter Meserve**
Population and Community
Ecology; Biogeography;
Biology of Birds and
Mammals.
pmeserve@niu.edu
- **Jon Miller**
Cellular Physiology;
Invertebrate Immunology.
jsmiller@niu.edu
- **Virginia Naples**
Anatomy; Functional
Morphology; Mammalogy;
Forensic Anatomy;
Vertebrate Paleontology.
vlnaples@niu.edu
- **Neil Polans**
Genetics; Mapping &
Evolution of Complex Traits;
Plant Systematics.
npolans@niu.edu
- **Thomas Sims**
Self-incompatibility in
Petunia; Molecular Biology.
tsims@niu.edu
- **Joel Stafstrom**
Developmental Botany;
Cellular/Molecular Biology.
stafstrom@niu.edu
- **Ronald Toth**
General Botany; Economic
Botany; Creation/Evolution
Debate.
rtoth@niu.edu
- **Carl von Ende**
Population and Community
Ecology; Aquatic Ecology;
Plant Ecology.
cvonende@niu.edu
- **Linda Yasui**
Radiation Biology; DNA
Damage and Repair in
Chromatin.
lyasui@niu.edu
- **Shengde Zhou**
Microbiology.
szhou@niu.edu

Retired/Emeritus Faculty

- **Jack Bennett**—Genetics;
Population and Behavior Genetics.
- **W. Elwood Briles**—Avian
Immunogenetics. ebriles@niu.edu
- **Elon W. Frampton**—Microbiology;
Molecular Biology; Virology.
- **Arnold Hampel**—Molecular and
Cellular Biology; Biochemistry.
- **Laszlo Hanzely**—Developmental
Biology. lhanzely@niu.edu
- **Kenneth Harmet**—Plant Physiology.
- **Darryl Lynch**—Microbiology.
- **John L.A. Mitchell**—Cell Physiology;
Molecular Biology. jmitchell@niu.edu
- **Lowell Nicolaus**—Ethology.
- **K.V. Prahlad**—Developmental Biology.
- **Robert W. Pearson**—Environmental
Biology; General Biology.
- **Paul Sørensen**—Plant Taxonomy;
Systematics; Ecology; Conservation.
psorensen@niu.edu
- **Marvin J. Starzyk**
Aquatic/Pathogenic Microbiology;
Microbial Ecology.
- **Patricia Vary**—Microbial Genetics;
Molecular Biology; DNA Replication.
pvary@niu.edu
- **Jerrold Zar**—Physiological Ecology;
Biostatistics; Environmental Biology
jhzar@niu.edu.

Reintroduction of Amphibians into Restored Forested Wetlands

by Professor Richard King



Allison Sacerdote (Ph.D. 2009, R. King lab) defended her dissertation in July 2009. Entitled “Reintroduction of Extirpated Flatwoods Amphibians into Restored Forested Wetlands in Northern Illinois: Feasibility Assessment, Implementation, Habitat Restoration and Conservation Implications,” it examined the feasibility of reintroduction of three extirpated amphibians: spotted salamanders, wood frogs, and spring peepers into MacArthur Woods Forest Preserve

(MWFP) in Lake County, Illinois. MWFP is a flatwoods wetland north of Chicago that represents the largest remnant tract of continuous forest in Lake County, Illinois.

About her research, Allison says, “I examined the response of the amphibian community of MWFP to intensive habitat restoration implemented in 2000. Habitat restoration efforts included hydrologic alteration and removal of the exotic invasive shrub, European buckthorn. Four years after restoration commenced, I assessed the post-restoration amphibian community to determine if natural recolonization of the extirpated species had occurred. I examined amphibian response to restoration through changes in species diversity over time. After determining that natural recolonization had not occurred, I assessed feasibility of reintroduction for the three extirpated species from nearby extant source populations. Feasibility assessment included evaluation of restored habitat quality to ensure survival and recruitment of reintroduced amphibians,

identification of threats to amphibian recruitment and persistence, and recommendations for additional restoration needs. I used a series of *in situ* experiments to compare hatching success and larval survival of amphibians in source population sites and restored sites. I compared hatching success and larval survival of the extirpated spotted salamander with its congener, the blue-spotted salamander that had persisted in MWFP. Using hatching experiments, I identified dissolved oxygen requirements of spotted and blue-spotted salamanders as a habitat quality issue in need of additional restoration management. I used population viability analysis to project the probability of persistence of reintroduced spotted salamanders and wood frogs under several scenarios. Population models aided in the development of a reintroduction plan and in the evaluation of the probability of persistence of spotted salamanders and wood frogs released into MWFP.

Finally, I examined the developmental impacts of emodin, a metabolite produced by the invasive shrub, European buckthorn, on the development of



amphibians using the FETAX protocol. Emodin produced amphibian embryo malformation and mortality at ecologically relevant concentrations. This experiment identified a potential threat to the persistence of pond-breeding amphibians in areas where European buckthorn has become established.”

Allison joined the Department of Biological Sciences in a new role in fall 2009, as a visiting assistant professor teaching BIOS 456: Biology of Fishes, Amphibians, and Reptiles. ♦

Alumni Profile Christopher Yahnke

by Professor Peter Meserve



Chris Yahnke (M.S. 1993; Ph.D. 1999; P.L. Meserve, advisor) was elected chair of the Department of Biology at the University of Wisconsin, Stevens Point, in June 2007. He is an associate

professor and curator of birds and mammals there, and teaches mammalogy and comparative anatomy. When not involved with administration, he maintains research programs in Big Bend National Park, Texas, where he and his students study desert rodent communities (see photo), and northern Wisconsin where he conducts research on species overturn as it relates to global climate change. The Department of Biology at UWSP has 23 faculty and about 700 biology majors. The department has a strong organismal biology emphasis owing in large part to one of the largest natural history collections in the state. Chris and his wife, Bridget, still have many contacts and friends in Paraguay, where they both worked for the San Diego Zoo while Chris worked on his dissertation research. He will be returning to Paraguay in August to work with his colleagues at the Museo Nacional de Historia Natural and then will be attending the X International Mammalogical Congress in Mendoza, Argentina. Chris knows where all the former NIU Huskies are at UWSP and recently hired Kim Cherry-Vogt (*Blackstone lab*) as an adjunct faculty member for the coming academic year. ♦

BLACKSTONE

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BRILES

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University Fellowship is a monetary award that was established in 1965 to recognize academic excellence and high potential in a major field of study. University Fellowships are awarded by the Graduate School

Fellowship Committee to only 10 students university wide, selected from a large number of students nominated by academic departments.

Pratima Shrestha comes to NIU from Kathmandu University, Nepal. She is an M.S. student working under Professor Thomas L. Sims.

Gametophytic Self-incompatibility in *Petunia hybrida* by Pratima Shrestha, M.S. candidate

My research focuses on protein interactions in *Petunia hybrida* (garden petunia) that are believed to be responsible for self vs. non-self recognition in the Gametophytic Self-Incompatibility (GSI) response. GSI is a specific genetic mechanism that allows plants to recognize and reject “self” pollen, while accepting “non-self” pollen. GSI, which is found in more than 60 families of flowering plants, therefore helps to prevent inbreeding and promote genetic variability.

Two genes, the S-RNase (self-incompatibility ribonuclease) and SLF (S-locus F-box protein) control self/non-self pollen recognition in the pistil and pollen, respectively. When a pollen grain lands on the top of the floral stigma, it produces a pollen tube which starts penetrating through the transmitting tissue of the style. As pollen tubes grow through the transmitting tissue, they encounter the secreted S-RNase protein, which is then imported into pollen tubes by an as-yet incompletely understood mechanism. Although both self and non-self S-RNase proteins are imported into pollen tubes, the action of the S-RNase is inhibited in non-self pollen tubes. Conversely, in self pollen tubes, the S-RNase activity is not inhibited, and acts to degrade pollen RNA, slowing protein synthesis and growth of the pollen tube. The hypothesis underlying my research project is that protein interactions between SLF and non-self S-RNases are stronger than those between SLF and self S-RNases, thus allowing preferential recognition and inhibition of the non-self S-RNase.

F-box proteins, such as SLF, are known to be a class of proteins termed E3 ubiquitin ligases. E3 ligases play a key recognition role in the ubiquitin-proteasome system of targeted protein-degradation. It is thought that the strong interaction of SLF protein with the non-self S-RNase will recruit a SCFSLF E3 ubiquitin ligase complex to the S-RNase. This complex adds polyubiquitin protein chains to the S-RNase leading to its degradation via the 26S proteasome pathway. Non-self pollen tubes

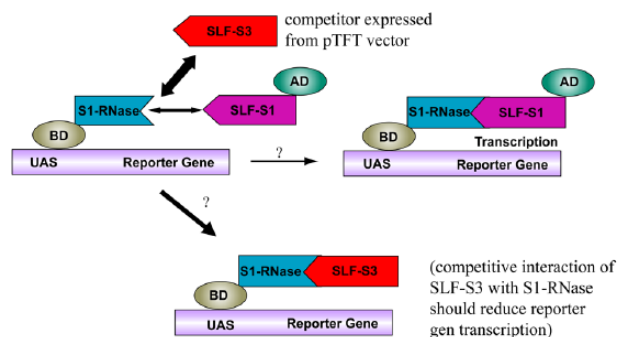
therefore are thought to degrade S-RNase, continue to grow and effect fertilization and seed set. On the other hand, the SLF protein is thought to interact only weakly with self S-RNases, which remain active, inhibiting protein synthesis, slowing pollen tube growth, and preventing fertilization.

Avani Patel, a previous student in our laboratory, carried out quantitative yeast two-hybrid protein interaction to measure the strength of interaction between different alleles of SLF and S-RNase. Ms. Patel used quantitative fluorescence to measure expression of a LacZ “reporter gene” that would be turned on by interactions between SLF and S-RNase. Using gene constructs that expressed different portions of the S1- and S3-RNase proteins in interaction assays with the SLF-S1 allele, Avani showed that non-self S-RNase/SLF pairs interacted more strongly than self S-RNase/SLF pairs.

My research extends the previous work in two different ways. First, rather than carrying out only pair-wise interactions, I will be using a yeast “three-hybrid” assay to introduce “competitive” gene constructs into the assay. An example of such an assay is shown in the diagram below. Here, “self” interaction between two chimeric proteins: the S1-RNase fused to the yeast GAL4 transcription factor DNA binding domain (BD), and SLF-S1 fused to the GAL4 transcription factor activation domain (AD) will give a certain level of transcription of the reporter gene (LacZ, assayed by quantitative fluorescence). Introduction of a non-self competitor protein, SLF-S3 (which should interact more strongly with S1-RNase than SLF-S1) is predicted to reduce the level of reporter gene activity. (The competitor is not part of a chimeric protein with part of the GAL4 transcription factor, and therefore can’t turn on expression of the reporter gene.) If our hypothesis is correct, we predict that competition from non-self S-RNase or SLF protein will result in a decrease in reporter gene expression induced by the interaction of self S-RNase/SLF constructs in yeast. Second, my project will extend the previous work by using a wider variety of gene constructs expressing different sub-domains of S-RNase and SLF proteins.

I see my area of work as one of the growing domains which can have implications in different sectors. The academic community, lab infrastructure, and research competency at NIU have allowed me to pursue advanced research in this area. I am very happy to have the University Fellowship, which will definitely help me to thrive in the biological sciences graduate program. ♦

Yeast Three-Hybrid Competition Assay





Joel Hutson, James Erman

Dissertation Completion Fellowships are awarded on a competitive basis to a limited number of doctoral students finishing their dissertations. A student applying for one of these awards submits a dissertation research

proposal to her or his major department, which reviews and ranks the proposals. Proposals are then reviewed and ranked again by a university-wide committee.

Learning to Unlearn: Dissecting the Effects of Misleading Human Anatomy-based Limb Etymology on Studies of Tetrapod Postural Evolution

by Joel Hutson, Ph.D. candidate

One of the most important aspects of becoming a scientist is learning to recognize that you are not objective and planning accordingly to try to contain your biases and self interests. This pervasive subjective side of science may not be something to which scientists like to admit. Nevertheless, an integral part of learning to use science as a process involves utilizing safeguards such as peer review, controls, statistical tests, etc., to monitor ourselves. But what happens when everyone involved in a particular research problem has the same bias? That hinders progress. Typically, this is not an obstacle to growth within a field as time goes by and cultures change; the old guard passes on and innovations in other fields offer fresh approaches. However, this has not been the case with my research topic, the subject of tetrapod (four-legged vertebrate) forearm evolution.

For over three hundred years researchers have overwhelmingly assumed that most tetrapods can rotate their wrists back and forth like humans until their forelimb joints all flex and extend in the same plane. My research demonstrates instead that the majority of nonmammalian tetrapods for the past 370 million years have all had forearms fixed in a constrained karate-chop position, causing their wrists and elbows to flex and extend in different planes. If you're a quadrupedal tetrapod this means that the only way to put your palm flat on the ground and walk is to take your arm and stick your elbow out sideways until you're in a push-up position. Since your arm is stuck in this position, you cannot stand up straight with your arms beneath you, or you'll be forced to karate-chop your way across the ground on the edge of your hand or fingertips. This constraint on hand orientation was inherited from our fish ancestors and caused by the radius twisting itself 90° around the

ulna (elbow bone) and phylogenetically dragging the attached wrist and hand with it.

My seemingly simple visual observation that almost all tetrapods have arms constrained to a karate-chop position and a sprawling forelimb posture actually took me years to notice by unlearning what "pronation" was. The dictionary definition of pronation describes either the ability to spin your radius and hand, or the position of placing your elbow on the table in front of you with your palm down. Almost every tetrapod that has ever lived could not have done either of these, yet the word "pronation," along with a list of other terms from human anatomy, has always been used to describe their forearms. Indeed, there are no terms in use for forearm orientation that aren't derived from misleading human anatomy-based etymology. This has made it immensely challenging to demonstrate my observations of plesiomorphically constrained forearms to other tetrapod forelimb experts. A rough analogy would be trying to describe to someone in your field the color purple, when the only terms available for use all have the word orange in them. This difficulty is dramatically compounded if the expert is too familiar with other misleading human anatomy terms. Thus, I have had to consciously unlearn human anatomy terms in order to study the phylogenetic, rather than human-based, pattern of tetrapod forelimb evolution.

That is the frustrating part of my research. The exciting part is that since almost every discipline dealing with tetrapod limbs is unaware that the majority of tetrapods have had their posture and locomotion constrained by arms fixed in a karate-chop position, this knowledge can be used to help solve many postural problems of the past and present. The focus of my dissertation research has been outlining the causes and history of this human pronation bias, the selection pressures that led to and caused almost all tetrapods to retain constrained forearms, and the selection pressures that allowed chameleons and mammals to overcome this constraint. Additionally a statistical test of the methodologies traditionally used by tetrapod researchers to measure joint ranges of motion in fossil tetrapods will be completed with the aid of this Dissertation Completion Fellowship.

The diverse array of fields in which I could apply this knowledge would benefit from quantitative analyses of forelimb kinematics. This Dissertation Completion Fellowship will help me begin designing a project with a potential collaborator to explore the fresh area of tetrapod forelimb biomechanics. In this way I hope to reverse the detrimental effects the pronation bias has had on our knowledge of the evolution of tetrapod limbs from fish fins. ♦

Joel Hutson's adviser is J. Michael Parrish.

Grants Awarded 2008 - 2009

PI Last Name	Sponsor	Project Title	Major Goals of the Project	Award
Berg	National Institute of Neurological Disorders and Stroke/NIH/DHHS	Longterm outcomes of childhood onset epilepsy	To extend the Connecticut Study, an ongoing cohort of 613 children recruited when first diagnosed with epilepsy in 1993-1997, to examine the presence and progression of hippocampal disease from childhood into adulthood.	\$852,261
Blackstone	National Science Foundation	Collaborative Research: Assembling the Tree of Life - An Integrative Approach to Investigating Cnidarian Phylogeny	To investigate evolutionary relationships in the phylum Cnidaria, one of the earliest diverging animal groups found on earth, in order to resolve key issues such as the monophyly of major cnidarian groups, the relationships among cnidarian lineages and the origins and evolutionary histories of coloniality, polymorphism, c medusae, and the acquisition of zooxanthellae.	\$5,046
Bujarski	National Science Foundation	Role of Subgenomic RNAs in Genetic Recombination of Brome Mosaic Bromovirus	To study basic mechanisms of genetic RNA-RNA recombination in viruses by using Brome mosaic bromovirus as a model system. This is to explain why RNA viruses evolve so easily producing often more dangerous strains of important viral pathogens of humans, animals and plants	\$495,000
Calvo	National Institute of Allergy and Infectious Diseases/NIH/DHHS	Study of the mechanism of action of VeA, a novel fungal-specific global regulator that controls secondary metabolism	To study a regulatory gene in a pathogenic fungus that is the most common cause of fungal respiratory infections worldwide.	\$210,440
King, R. von Ende	Lake County Forest Preserve District	Effects of Habitat Restoration on Herpetofauna of MacArthur Woods	To study the effects of a restoration project on amphibians in MacArthur Woods.	\$20,744
King, R.	Department of the Interior	Lake Erie Watersnake Recovery Plan Implementation	To test for changes in watersnake survival and reproduction before and after the round goby invasion, and to quantify the potential impact of watersnake predation on round goby population dynamics.	
King, R.	Department of the Interior	Annual Census of Lake Erie Watersnakes	To conduct annual censuses of Lake Erie Watersnakes (<i>Nerodia sipedon insularum</i>) on U.S. islands in Lake Erie to capture, tag, and release target snakes and estimate the size of the adult LEWS population.	\$4,668
King, R.	Ohio Department of Natural Resources	Enhancing Lake Erie Watersnake Recovery Through Population Monitoring and Public Outreach	To continue population monitoring and outreach activities regarding the Lake Erie watersnake, which is being considered for removal from the Endangered and Threatened Wildlife list by the U.S. Fish and Wildlife Service.	\$30,000
Meserve	National Science Foundation	LTREB: A Long-Term Investigation of the Interplay of Biotic vs. Abiotic Factors in a Chilean Semiarid Community	To continue experimental investigation of the importance of biotic interaction including predation, interspecific competition, and herbivory in a Chilean semiarid community; evaluate the effects of treatments and ENSOs on lizards, birds, and insects; and apply time-series and demographic modeling techniques to the small mammal populations.	
Miller	Illinois State Board of Education	Mastering Biology Teaching with Content, Pedagogy, and Technology	To establish a master's program for teachers to pursue certification in science areas.	\$21,198
Miller	Illinois State Board of Education	same as above	same as above	\$52,203
Vary	University of Maryland	Subcontract: Microbial Genome Sequencing of <i>Bacillus megaterium</i> QM B1551	To train students in annotation methods and software for sequencing <i>Bacillus megaterium</i> . Annotate genome. (final year)	8,259
Total:				\$1,699,819

Faculty

Professor Ana Calvo

Meetings:

- Invited Speaker: American Phytopathology Society (APS) Annual Meeting. Regulation of morphogenesis, secondary metabolism, and pathogenicity by the VeA system in *Aspergillus* and *Fusarium* species. August 1-5 2009. Portland, Oregon
- XXV International Fungal Genetics Conference. Whole genome transcript analysis to identify veA-dependent genes in *Aspergillus flavus* associated with aflatoxin production and fungal morphogenesis. Pacific Grove, California. March 17-22, 2009
- XXV International Fungal Genetics Conference. The Role of veA on *Aspergillus flavus* Infection of Peanuts, Corn and Cotton. Pacific Grove, California March 17-22, 2009
- XXV International Fungal Genetics Conference. Whole genome transcript analysis to identify veA-dependent genes in *Aspergillus flavus* associated with aflatoxin production and fungal morphogenesis. Pacific Grove, California. March 17-22, 2009
- IX International Conference of Plant Pathology. FvVE1 Differentially Regulates the Biosynthesis of Fumonisin and Bikaverin in *Fusarium verticillioides*. Torino, Italy. August 24-29, 2008
- X International Fusarium Workshop and Fusarium Genomics Workshop satellite meeting. Alghero, Sardinia Italy. August 30- September 2, 2008.

Funding

- National Institute of Health. Characterizing VeA, a fungal-specific global regulator controlling secondary metabolism. Amount funded: \$210,440
- SCA- USDA. Identification of regulatory genes in *A. flavus* that are involved in Mycotoxin Production, Morphogenesis and Virulence. Amount funded: \$25,000

Professor Richard B. King

Papers Read at Professional Meetings

- From models to management: power and pitfalls of snake conservation genetics. R.B. King. Snake Ecology Group, 2009.
- 10,000 watersnakes can't be wrong: demographic analysis of population recovery. K.M. Stanford and R.B. King. Joint Meeting of Ichthyologists and Herpetologists, 2009.
- Genetic variation of the eastern massasauga rattlesnake: implications for conservation and captive breeding. J. Ray, R.B. King, M. Duvall, J. Robinson, M. Dreslik, B. Swanson, and H.L. Gibbs. Joint Meeting of Ichthyologists and Herpetologists, 2009.
- Dissolved oxygen requirements for hatching success in spotted salamanders and blue-spotted salamanders. A.B. Sacerdote and R.B. King. Joint Meeting of Ichthyologists and Herpetologists, 2009.

Professor Jozef Bujarski- Presented/Abstracts:

- Presented: Sztuba-Solinska J. and Bujarski J.J. SgRNA3a-mediated RNA recombination in Brome mosaic bromovirus. 28th American Society for Virology Annual Meeting 2009. University of British Columbia, Vancouver, B.C., Canada.

Professor Gabriel Holbrook and members of his lab attended the American Society of Plant Biologists, Midwestern Section in Peoria, Ill. in March 2009. Papers presented at the meeting were as follows:

- Regulation of Ribulose Biphosphate Carboxylase/oxygenase (Rubisco) by CA1P in Soybean Leaves. Presenters: Gabriel Holbrook and Elizabeth Sterner.
- Water stress responses of the drought-sensitive plant *Impatiens wallerana*. Presenters: Lauri Carey, James Nitti, and Gabriel Holbrook

2009 NIU at Oxford program (June 28th through July 31st) included several Plant Biology classes taught at Oriell College Oxford this summer by Gabriel Holbrook, and were attended by a number of NIU biological sciences students, including, Niels Helstrom, Kristin McConnell, and Siobhan Sullivan.

Professor R. Meganathan:

- Invited Lecture on "Biosynthetic pathways for vitamins K₁, K₂ and Coenzyme Q: Targets for chemotherapeutics and herbicides" at the 13th Annual Industrial and Fermentation Microbiology Symposium in La Crosse, Wis.

Graduate Students

Kristin Stanford (*Ph.D. candidate, R. King lab*) applied for and received a grant from the Ohio Environmental Education Fund through the Ohio EPA for \$8,627 to set up weekly interactive programs on Lake Erie Watersnake (LEWS) and a permanent display at the Lake Erie Island Nature and Wildlife Center.

The summary objectives from the grant are:

- 1) to establish weekly interactive programming on the Lake Erie watersnake and other island wildlife at the Lake Erie Islands Nature and Wildlife Center (LEINWC)
- 2) to design a permanent educational LEWS display for the LEINWC and poster for distribution to teachers and other interested organizations
- 3) to maintain and update the current LEWS Web-based educational materials and create a new website and educational materials for the LEINWC.

Lisa Rooper and **Laurence Bradley** (*Meganathan lab*) were admitted to medical school.

J. Edrington and **K. K. Kutumbaka** (*Ph.D. students, Meganathan lab*) are pursuing their research on various aspects of vitamin K and coenzyme Q biosynthesis respectively.

J. Gundu (*Ph.D. student, Meganathan lab*) presented a paper entitled "A novel antibiotic from Northern Illinois University soil" at the 6th Annual Sigma XI Research Society graduate

Departmental News Continued...

student presentation competition. His presentation was awarded third place.

Alumni

Carolina Diaz-Rodriguez (M.S. 1988, *Meganathan lab*) used to be the supervisor of Legionella Laboratory at Nalco. Now she has been promoted to be supervisor of four laboratories: Legionella Lab, Microbiology Lab, Waste Water Biomass Lab, and Metallurgy Coupon Analysis Lab.

C. "Palani" Palaniappan (M.S. 1992, Ph.D. 1993, *Meganathan lab*) has been promoted to vice-president, research and development, at Invitrogen Corporation. Currently he manages a team of 140+ R&D scientists in diverse scientific fields with research and development focus on cellular applications in life sciences and diagnostics.

K. C. Suvarna, (M.S. 1992, Ph. D. 1994, *Meganathan lab*) microbiologist, Division of Special Pathogen and Transplant Products, Food and Drug Administration, has been promoted to consumer safety officer, Division of Manufacturing and Product Quality, Office of Compliance, Food and Drug Administration.

Rhykka Connelly (Ph.D. 06, *Gasser lab*) and her husband, Jeffrey Meserve, welcomed a son, Noble August Meserve, on May 8, 2009. Our own Professor Peter Meserve and his wife, Jan, are the proud grandparents. In addition to being a new mom, Rhykka is lead biochemist for the UT Austin Biofuels project. About her work, she says, "I work with a bunch of engineers at the Center for Electromechanics, UT Austin. They've patented a way to lyse algae by applying a short, but powerful voltage to the algae. I was brought on to analyze different strains of algae to determine which species have the highest oil content, modify algae growing conditions to improve the yield, and determine the optimal current/voltage to break the cell walls and membranes down so the algae can release its oil. We're funded by DARPA, which stands for Defense Advanced Research Projects Agency, to develop JP-8 jet fuel, and OFAT, a private organic fuels company, to develop algae biofuel for vehicles. We're now in the process of scaling up our operations to process 10,000 gal. of algae/day."



Kurt Spearing (Ph.D. student, *Naples lab*) was hired as a visiting instructor of biology at the University of St. Thomas in St. Paul Minnesota, teaching comparative anatomy and vertebrate paleontology. He presented a poster titled "Phylogeny of the Machairodontinae" at the International Symposium on Saber-toothed Mammals. He also assisted Prof. Naples with a poster titled "Reconstruction of the Forelimb Musculature and Function in *Xenosmilus hodsonae*: an Atypical Scimitar-Toothed Felid" at the Sixty-Eighth Annual Meeting of the Society of Vertebrate Paleontology. He presented a talk titled "Examination of the Posterior Cusps on the Lower Carnassial to Determine the Affinities of Extant and Fossil Pantherine Cats" for the Geological Society of America North-Central Section meeting this spring.

Alumni Profile by Professor Jozef J. Bujarski

Judit Pogany (M.S. 1992 and Ph.D. 1997, *Bujarski lab*) While in my laboratory, Judit's contribution was truly outstanding, leading to six peer-reviewed research articles and one review chapter. For this graduate work, she received the George Terwilliger Award in 1996. After her graduation, she moved on to work as a postdoctoral researcher in Anne Simon's laboratory (1997-1999) at the University of Massachusetts (U. Mass), Amherst, studying RNA virus recombination. She co-authored two papers resulting from her work at U. Mass. Her productivity continued after she moved to the University of Kentucky in 1999, where she was first a postdoctoral researcher and then became a research specialist in the Department of Plant Pathology, where she conducts very prolific, basic research on tombusvirus (TBSV) replication. She was a co-discoverer of a novel replication enhancer element (EMBO Journal, 1999). She also discovered a novel replication silencer element for TBSV (EMBO J. 2003), followed by identification of a cis-acting element required for selection of viral RNA as a template for replication (JVI, 2005). She developed two novel *in vitro* viral replication systems, described in J. Virology (2008). She has also identified that the assembly of the replicase complex required the host-coded heat shock protein 70, a major scientific break-through published in PNAS. Altogether, Pogany has published 23 papers in her young career. We wish her continued success in her outstanding career, with many new contributions in the field of molecular virology. ♦

Remembering Jodi Jodi M. Scaletta, March 13, 1962—June 18, 2009



Jodi M. Scaletta, 47, of Sycamore, Ill., died Thursday, June 18, 2009, at Kishwaukee Community Hospital in DeKalb. Born March 13, 1962, in Chicago, she was the daughter of Samuel P. and Joanne (Leonardi) Scaletta.

Jodi was the supervisor of the animal lab facility for the NIU Department of Biological Sciences for the past 10 years. She loved animals, and especially loved raising and riding horses. She was a volunteer at TAILS Humane Society in DeKalb. She liked Western apparel and decor.

Kristi Rhodes, storeroom manager for the department, remembers her friend: "Jodi was a great friend and a great person, and she meant a lot to me and many others here in the department. She had a lot of friends here. We're all going to miss her very much. She had a calmness about her and a fantastic smile, she was easy to laugh and had a good sense of humor. Jodi was a cowgirl through and through. She loved her horses - and horseback riding was her life. She was a good mother to her two kids, Kalyn and Kolton. Jodi loved animals and sometimes it was hard for her to deal with some of her duties as animal lab supervisor. But she also knew that she gave the animals here the best love and care that anyone could." ♦

UNDERGRADUATE DEGREES

August 2008

Chaudhary, Pranav
 Emerine, Katherine M.
 Fischer, Samatha J.
 Johnson, Allison R.
 Jones, Christopher A.
 Kays, Joshua K.
 Landis, Jacob R.
 Marcus, Amanda L.
 Patel, Manisha N.
 Richards, Sarah M.
 Saba, Arshiya R.
 Schrader, Jordan J.
 Vodicka, Michael A.
 Wagner, Serena G.

December 2008

Abdulhussain, Hussain
 Barello, Nicholas J.
 Boone, Tyler J.
 Bradley Jr., Laurence M.
 Briggs, Stephanie L.
 Desai, Alab Y.
 Froio, Katie L.
 Huffman, Jennifer C.
 Isaac, Jibi
 July, Eric R.
 Khaltarkhuu, Ariunbuyant
 Koester, Deborah M.
 Krantz, Eric B.
 Lennhardt, Matthew R.
 Lesley, Amanda E.
 Morrow, Nekeda L.
 Murray, Anne E.
 Park, Brian S.
 Patel, Bhargave B.
 Perez, Melissa

Roman, Susan A.
 Rosc, Angela M.
 Sevellaja, Melody B.
 Staddler, Tamara L.
 Whitlow, Brittany A.
 Winter, Amanda D.
 Wintersteen, Shea J.
 Zordan, Kaitlin M.

May 2009

Bennett, Jonathan
 Beno, Daniel
 Bice, Brandon
 Bunger, Melanie
 Clayton, Danielle
 Coaty, April
 Conway, Amanda
 Cowell, Jessica
 Ege, Lisa
 Estrada, Adam
 Fitzgerald, Paul
 Flahive, Katrina
 Flores, Rosalba
 Garcia, Laura
 Gentile, Nicole
 Glavan, Caitlin
 Glisson, Wesley
 Grimm, Adam
 Guer, Olga
 Gunderson, Matthew
 Hance, Jenna
 Hanna, Stacy
 Hatcher, Steven
 Henson, Kayla
 Hoffman, Heather
 Huling, Matthew
 Intihar, James
 Ippolito, Michael
 Jafari, Bezhan

Johns, Lynette
 Jokers, Amber
 Kararo, Matthew
 Kayser, Linda
 Kazecki, Thomas
 Kennett, Briana
 Kost, Kyle
 Kulle, Samantha
 Lee, Stacey
 Lezon, Laura
 Lucas, Lisa
 Lundgren, Abigail
 Manjarres, Rebeca
 Marszal, Lindsay
 McConoughey, Jennifer
 McQuillen, Kyle
 Mitchell, Eric
 Mockmore-Bennett, Lindsay
 Moser, Katherine
 Muersch, Ashley
 Naidoo, Lucannus
 Nenia, Marcus
 Niew, Jennifer
 Noble, Thomas
 Patel, Ravi Kumar
 Peterson, Rentia
 Pitman, Desirea
 Platon, Samantha
 Prochazka, Brian
 Promise, Jasmine
 Rojas, Hugo
 Saepharn, Maungmey
 Safford, Lauri
 Sarver, Joshua
 Seyfried, Megan
 Staron, Eric
 Stuart, Erica
 Thompson, Jaime

Tigrett-Hanks, Jodeen
 Tilleman, Amy
 Tumminello, Evan
 Verdick, Crystal
 Wertz, Jacob
 Whalen, Michelle
 White, Tyler
 Williams, Kyle
 Yankaitis, Christy
 Young, Rebekah
 Zasadil, Sarah
 Zettergren, Briant

GRADUATE DEGREES

August 2008

Bass, Clyde L. III (Sp. HAS)
 Gupta, Shefalika
 Hong, Sara S.
 Jahn, Regina P.
 Sterner, Elizabeth A. (Ph.D.)

December 2008

Grennan, Colin P.
 Patel, Avani T.
 Shah, Seva H.

May 2009

Bhagchandani, Karan R.
 Fransen, James W. (Sp. HAS)
 Kutumbaka, Kirthi K.
 (Sp. BI)
 Mangino, Michael J.
 (Sp. HAS)
 Morris, Leah M.
 Szerszen, Leanne T.
 Virnig, Katherine A.
 (Sp. HAS)
 Fischer, C. Robyn (Ph.D.)
 Wusterbarth, Theresa (Ph.D.)

Anything for a Cone



Professor Ronald Toth recruited the aid of the NIU grounds crew for a ride in a "cherry picker" up to the top of one of only two White Fir trees (*Abies concolor*) on campus, so he could photograph and collect a specimen of fir cones. This particular tree had not produced any cones in over 10 years, and this variety never falls, but decomposes on the tree, making it impossible to collect without climbing up for them. See more photos at www.bios.niu.edu/news_events/cherry_picker_cone.shtml



NIU Biological Forensics Files

by Professor Virginia Naples

Students select BIOS 482, Biology Basis of Forensic Analysis, for many reasons, but most expect to study cases as depicted in CSI-style TV programs. However, the NIU class deals more with real-life crime scene realities. In the first class, students learn that not all cases are solved, and definitely not in the typical 44-minute television "hour." Students also learn that not all information is "relevant, significant or competent" – in other words, red herrings abound, and they must navigate through the confusion of "evidence" to identify what happened. This semester's topics included classic and contemporary forensic methods: fingerprint, dental, anthropology and DNA identification of individuals. How these and other methods help determine the unique sequence of events at a crime scene was illustrated by a series of "crime scenarios" throughout the semester. The final class project, however, raised the bar dramatically. This "crime scene" involved locating victims (i. e., plastic "bones" from the human anatomy laboratory), arson, and hacking into computer records. This class proved that forensic methods are evolving rapidly, but so are the means students use in testifying as expert witnesses for their final exam. For the first time, the final was scheduled in the College of Law's "smart courtroom," to permit students to use PowerPoint. Not only were these presentations more sophisticated, but based on literally hundreds of digital images taken by class participants. Rather than limiting the "viewable evidence," the class generated its own web-based image-sharing website. The accompanying images are from the final crime scene, and student testimony. ♦



Expert witnesses testified in the BIOS 482 final "trial."



Crime scene evidence

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OCCUPATION

BUSINESS/ADDRESS

CITY

STATE

ZIP

BUSINESS TELEPHONE

Degrees earned at other institutions:

DEGREE/YEAR RECEIVED/INSTITUTION

DEGREE/YEAR RECEIVED/INSTITUTION

Mail to: Department of Biological Sciences
Northern Illinois University
1425 W. Lincoln Hwy
DeKalb, IL 60115-2828

Workshop on Genomics

by Professor Emeritus Pat Vary

A genomics workshop for high school and community college students and their teachers and instructors was held on March 21, 2009, in the Department of Biological Sciences. Attendees were from DeKalb and Elgin high schools as well as Kishwaukee College and Waubesa Community College. Talks were given by **Professors Patricia Vary, Mitrick Johns, and Melvin Duvall**. Professor Johns also developed a class computer exercise that was held in our computer lab for all to learn how DNA computer sequence analysis is done. A tour of the DNA core facility with **Scott Grayburn** and of an industrial bacterial genetics lab by **Professor Shengde Zhou** and his students completed the workshop. ♦

by Professor Linda Yasui



**NORTHERN ILLINOIS
PROTON TREATMENT
& RESEARCH CENTER**

On June 22-24, 2009, NIU, the University of Texas M.D. Anderson Cancer Center, and Rice University hosted a three-day symposium on Recent Advances in Proton Radiation Therapy Research at NIU's Naperville campus for physicists, physicians, biologists, and researchers. Sponsors for the symposium included Northwestern Medical Faculty Foundation, John and Ann Doerr Fund for Computational Biomedicine at Rice University, NIU Institute for Neutron Therapy and NIPTRC LLC. **Provost Ray Alden** kicked off the meeting by thanking the organizers at the Sunday evening social mixer. Symposium co-chairs and program committee were Wayne Newhauser from the medical physics department at M.D. Anderson, Pablo Yepes from the Department of Physics and Astronomy Research at Rice University, and George Coutrakon from the physics department here at NIU. The local organizing committee included **Lisa Bergeron, Linda Yasui, Gerald Blazey, Sue Willis, and Bela Erderlyi**.

The meeting was officially opened on Monday morning by **Congressman Bill Foster** who, as a physicist, business entrepreneur and politician, reiterated his support for NIPTRC at NIU.

Presentations included topics on current clinical uses of protons, radiation biology, new biological techniques and advances in imaging, treatment planning and therapy. In a keynote address, **Dr. Bharat Mittal**, M.D., director of radiation oncology at Northwestern, shared his vision of the collaboration between NIU and Northwestern University radiation researchers. Continental breakfast and lunch provided at the symposium site on Monday, Tuesday, and Wednesday offered ample oppor-

tunity to informally meet other guests, make contacts and establish collaborations. On Monday evening, the group gathered for a barbecue. Tuesday evening was an optional event at Fermi National Accelerator Laboratory, where the outgoing NIU Board of Trustees chair, Cheryl Muerer, talked to participants over dinner.



Artist's rendering of Northern Illinois Proton Treatment & Research Center

A biology workshop which **Gayle Woloschak** and I co-organized and co-chaired, closed the meeting. A wide variety of biological research topics were covered, ranging from mathematically modeling the relative biological effectiveness (RBE) of various kinds of radiations like proton irradiation, the genetics of retinoblastoma patients and proton radiation outcomes, computer simulations from Monte Carlo calculations for better treatment planning for proton therapy, cataract formation from space HZE radiation, beagle dog tissue sample database and data mining, space radiation effects on brain cells, and basic studies on radiation-induced cell death.

At the close of a very full three days, surveyed participants all agreed that the meeting was a success. For more information on the meeting, check out www.niptrc.org/conference.html to see the PowerPoint presentations from the meeting and other information as it becomes available. Next year the proton symposium will be hosted by Rice University, and planning is already underway. ♦

Center for Environmental Studies

by Professor Carl von Ende

Professors Rich King and **Carl von Ende** are working with faculty members from seven other departments in the colleges of Liberal Arts and Sciences, Law, and Engineering and Engineering Technology to develop undergraduate and graduate programs in the interdisciplinary field of environmental studies (ENVS). The program was selected as one of those to be funded through the Strategic Planning Initiative undertaken by the university over the past two years. The purpose of the program is to give students a broad-based background in environmental studies, as well as more advanced knowledge in a particular area related to their career interests. The goals in 2009-2010 are to develop and have approved the undergraduate curriculum, and to hire a director and a new faculty member for the program. During this past summer, the ENVS group already has developed a core curriculum of five new ENVS undergraduate courses and has proposed six areas of emphasis: biodiversity and environmental restoration, water resources, climate change, law and policy, environment and the human experience, and green technology. Undergraduates will be required to select one of these emphases as an area of concentration. Additional ENVS faculty will be hired in subsequent years. ♦

2009 USOAR Award Recipients

by Professor Kenneth Gasser



The "Undergraduate Special Opportunities in Artistry and Research" (USOAR) program is a competitive, university funded program sponsored by the Provost's Office to support undergraduate research in the six undergraduate, degree-granting colleges of Northern Illinois University. Students submit research grant proposals to the university and can request funding of up to \$2,500 to support their projects. The university encourages the

submission of grants to cover the range of academic experience and will support research and artistry both on campus and for study abroad. All grant proposals are reviewed by the College and the Committee on the Undergraduate Academic Environment. In the 2008-2009 academic year, the university chose 16 student projects to fund and the provost hosted a reception honoring the 2009 recipients on March 23, 2009. The Department of Biological Sciences is proud to announce that three of our majors were granted USOAR awards, which continues a tradition of success in undergraduate research in the department. The 2009 awardees were Elisabetta Apollinari, a junior research student in the Gasser Lab, for her project entitled "Kinase Control of Pancreatic Secretion," Christy Larey, a junior research student in the Calvo Lab, for her project entitled



2009 USOAR award recipients: left to right Elisabetta Apollinari, Christy Larey, April Gilbert

"Study of Clp protease in *Aspergillus nidulans*," and April Gilbert, a junior pre-optometry student working in the Gasser Lab, for her project entitled "Feedback Regulation of Digestive Enzyme Secretion." All three award winners have significant research experience in their respective labs, are members of the Phi Sigma Biological Honor Research Society, and have plans for graduate and professional careers following their graduation in 2010. ♦

Phi Sigma Research Symposium

by Professor Kenneth Gasser



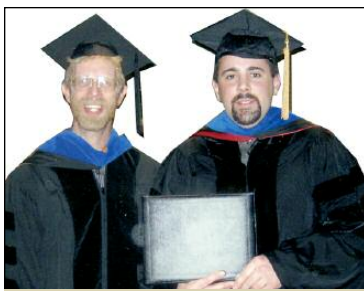
The Phi Sigma Biological Sciences Honor Society held its annual student Research Symposium on Saturday, April 4, 2009. Fifty graduate and undergraduate students participated in the symposium and presented the results of their research projects. Twenty different labs in the department were represented and projects ranged from ion channel structure, molecular phylogeny, and snake ecology to vitamin K gene transfer, secretion physiology, *Aspergillus* toxin production, sex pheromones, coral bleaching, DNA repair, and many others. Attending the event were over 100 students, friends, faculty, and staff. The Phi Sigma student membership gives annual awards to outstanding gradu-

ate and undergraduate research students based in part on the presentations at the symposium. This year the graduate award was given to Andrew Iverson, a member of S. Zhou's lab, for his work entitled "Doubling the Catabolic Reducing Power (NADH) Output of *Escherichia coli* Fermentation for Production of Reduced Products," and the undergraduate award was given to Urvis Desai, a member of A. Calvo's lab, for his project entitled "Study of *Fusarium graminearum* veA." As always, the Department of Biological Sciences is indebted to Phi Sigma for highlighting student research in the department and for their hard work and sponsorship of this important and educational yearly event. Special thanks go to Phi Sigma members Wesley Glisson, Shea Wintersteen, Lindsay Marszal, and Ryan Manow for their work in helping to organize the research symposium. ♦



Where Are They Going From Here?

- **Grennan, Colin**, M.S. Dec. 2008. Advisor: Duvall. Colin is currently teaching at Rock Valley College, Rockford, where he was formerly a student.
- **Leseberg, Charles**, Ph.D. Aug. 2009. Co-advisors: Duvall and Mao. Chuck is currently teaching at the Korean International School, Beijing, China.
- **Wusterbarth, Theresa**, Ph.D. May 2009. Co-advisors: King, R. and Duvall. Terry continues to teach at Northeast Wisconsin Technical College, Green Bay.
- **Morris, Leah**, M.S. May 2009. Advisor: Duvall. Leah is applying for lab positions in Chicago.
- **Fischer, Robyn**, Ph.D. May 2009. Advisor: King, B. Robyn is a visiting instructor at Aurora University, Aurora, Ill.
- **Dertien, Joseph**, Ph.D. Aug. 2009. Advisor: Duvall. Joe has a tenure-track position at Saint Xavier University, Chicago.
- **Moreno, Rachel**, Ph.D. Aug. 2009. Advisor: Polans. Rachel is teaching at Rock Valley College.
- **Ray, Jesse**, M.S. Aug. 2009. Advisor: King, R. Jesse is employed post-graduation as an NIU graduate teaching assistant in biological sciences for fall semester 2009.
- **Cherry Vogt, Kim**, M.S. defense, June 2009. Advisor: King, R. Kim has a position as an adjunct faculty member at the University of Wisconsin, Stevens Point, Wisconsin.
- **Sacerdote, Allison**, Ph.D. defense, July 2009. Adviser: King, R. Allison is teaching BIOS 456, Biology of Fishes, Amphibians, and Reptiles in the NIU Department of Biological Sciences as a visiting assistant professor.
- **Patel, Avani**, M.S. Dec. 2008. Avani is employed full-time at Monsanto Corporation, St. Louis, MO.
- **Shah, Seva**, M.S. Dec. 2008. Seva is employed full time at Monsanto Corporation, St. Louis, MO. ♦



Professor Duvall with Chuck Leseberg, Dec. 2009

2009 Biology Honors Convocation

- **Department Honors** - Katie Froio, Nicole Gentile, Wesley Glisson, Lynette Johns, Thomas Kazecki, Andrew Moore, Christy Yankaitis
- **Charles E. Montgomery Award** - Danielle Clayton
- **Mortar Board** - Michael Kelly
- **Lincoln Laureate** - Angela Rosc
- **Phi Sigma Graduate Research Award** - Andrew Iverson
- **Phi Sigma Undergraduate Research Award** - Urvish Desai
- **PMBC Graduate Research Assistantship** - Rocio Duran, Anni Moore
- **PMBC Undergraduate Research Fellowship** - James Nitti
- **Undergraduate Research Grants (USOAR)** - Elisabetta Apollinari, April Gilbert, Christy Larey
- **Dean's Award** - Wesly Glisson
- **Harvey A. Feyerherm Award** - Jessica Altersohn
- **NIU Outstanding Women Awards** - Allison Sacerdote
- **George L. Terwilliger Award** - Kimberly Cherry Vogt, Jesse Ray
- **Sidney Mittler Award** - Rocio Duran
- **University Fellowship** - Pratima Shrestha
- **Outstanding Graduate Teaching Assistant Award** - David Allen
- **Dissertation Completion Award** - Joel Hutson
- **Jerrold H. Zar Scholarship Award** - Michael Kelly
- **NIU at Oxford 2008 Biological Sciences Scholarship** - Kristin McConnell, Siobhan Sullivan
- **Sigma Xi Research Society** - Jaganadharao Gundu
- **August M. Gorenz Award** - Andrew Moore
- **Alumi Award** - Nicole Gentile
- **Key Research Award** - Sarah Netherton



Prof. Gasser and Wes Glisson; Prof. Duvall and Christy Yankaitis, Prof. Calvo and Rocio Duran; Prof. R. King and Jesse Ray



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- Sidney Mittler Award
- Charles E. Montgomery Award
- George L. Terwilliger Memorial Scholarship Fund
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For information about each of these scholarships and funds, see the website:

www.bios.niu.edu/about_us/giving.shtml

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