

Biological Sciences

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Our International Connections: Vital Links for Research and Learning

Thomas Friedman, Pulitzer Prize winning reporter and author of *The World is Flat*, has argued that the world's economic and social systems have become so highly intertwined as to make national and international borders increasingly irrelevant. Probably over a century ago, and perhaps for much longer, science had reached the same point. Indeed, science has long held a common philosophical approach; i.e., to uncover truth by comparing evidence against predictions derived from hypotheses and theories. What's more, recent years have seen a marked increase in multi-national cooperation in scientific research. Witness the Nobel prizes for medicine, chemistry and physics; in 2009, these three awards went to nine scientists who were citizens of, or born in seven different countries.

We are proud that our Department has many international connections, especially in research and graduate education. Nearly every faculty member has one or more research colleagues from overseas. Some have very extensive international activity; in 2008, 12 faculty had co-funded projects or co-authored papers with scientists from 15 different countries. Each year, graduate students and faculty attend dozens of international research conferences held in the US or overseas. Thirteen Biological Sciences faculty serve on editorial boards of international research journals, and 14 have one or more college degrees or postdoc experiences from overseas, including Argentina, Canada, China, France, Germany, Iraq, and Italy. Nearly 30% of our currently enrolled graduate students hold citizenship outside of the United States.

Global perspectives are also strongly rooted in our courses. Dr. Khidir Hilu teaches the very popular "Plants and Civilization" class, which charts the biological origin and domestication of useful plants over human history. Dr. Jeb Barrett has developed a new course on "Global Change Biology", which focuses on human-driven changes in the world's climate and physical environments, and the impacts of these on biodiversity and ecosystem function. Dr. Barrett has firsthand knowledge of climate change impacts through his studies of Antarctic soil ecosystems, which are being funded by the National Science Foundation's Polar Program. We have offered several study abroad courses in recent years, spread across the globe from Australia to the Caribbean, South America, Europe and East Asia.

In this issue of our newsletter, we highlight a few individual examples of international connections, including one of our most treasured kinds of experience, the "sabbatical" (see Dr. Brenda Winkel's experience in The Netherlands, page 4). Sabbaticals are important opportunities - some would say critically so - for faculty to retool, reflect, or deepen or redirect scholarship. Each sabbatical is uniquely crafted to meet the needs of an individual faculty member. Many involve overseas visits, though some simply provide a break from teaching and service to permit the completion of a challenging project, e.g., writing a book.

For several decades, the Department of Biological Sciences has been highly "internationalized". In recent years, our connections have expanded, driven by new developments in communication technology, and massive investments in higher education in many of the world's developing nations. We welcome these trends and look forward to many new ventures with our international partners.

Sincerely,

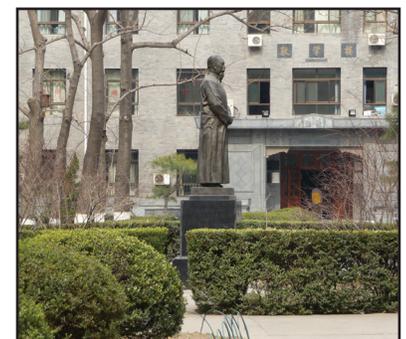
Robert H. Jones, Department Head



Jeb Barrett in Antarctica



Khidir Hilu's study abroad, Swiss Alps



Bob Jones visits Beijing Normal University



Ignacio Moore in the Andes Mts. of Ecuador

This newsletter was created by Valerie Sutherland, Program Support Technician for the Department of Biological Sciences. We welcome comments and items of interest for future newsletters. Please contact Dr. Robert Jones (rhjones@vt.edu) or Valerie Sutherland (vsutherl@vt.edu) via e-mail, or write to us at the Department of Biological Sciences, Mail Code 0406, Virginia Tech, Blacksburg, VA 24061.

RESEARCH HIGHLIGHTS

Ecotoxicological Consequences of Coal Mining in Southwestern Virginia Streams

The search for and removal of nonrenewable sources of energy, such as coal, have contributed to large-scale destruction of ecosystems. Over the past 30 years, **Don Cherry**, Professor of Biological Sciences, has been studying ecological impacts of coal mining. His specialty is ecotoxicology, which assesses influences of chemicals and other contaminants on aquatic environments using both laboratory and field techniques.



Salt Brine Discharge, North Fork Holston River, near Saltville, VA

Cherry's recent efforts have examined coal mining impacts on aquatic biodiversity in the Clinch River watershed of Southwestern Virginia, a hotspot of biodiversity. Of significant concern are the imperiled freshwater mussel communities, which are particularly diverse in this region. Aided by doctoral student **Brandi Echols**, Cherry is using laboratory toxicity testing of various coal mining effluents and sediments with standard US EPA test organisms such as *Ceriodaphnia dubia* (water flea), *Daphnia magna* (water flea), and *Pimephales promelas* (fathead minnow). To provide a more environmentally realistic assessment of toxicity, Cherry and Echols are also using lab tests on field collected *Isonychia bicolor* (mayfly) and juvenile *Villosa iris* (freshwater mussel) produced by the Freshwater Mussel Culturing Center at Virginia Tech. In the field, they are sampling water and sediment to measure concentration of heavy metals, and using a surrogate test organism, the Asian clam (*Corbicula fluminea*), in 60-day in situ (in the field) toxicity testing. The clams are placed in the field and then assessed for survivorship, growth impairment and bioaccumulation of various mining-related constituents, including heavy metals. Benthic macroinvertebrate surveys (aquatic insects) are also used as a biomonitoring tool to assess the overall health of selected sites in the watershed. Certain insects such as mayflies (*Ephemeroptera*), stoneflies (*Plecoptera*) and caddisflies (*Trichoptera*) are key indicators of impairment, specifically, if these organisms are not present at sampled sites.

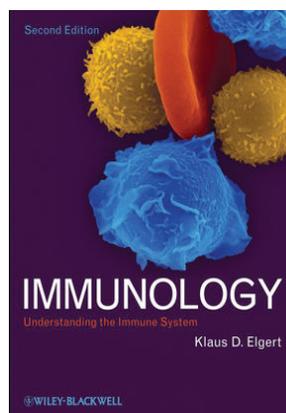
Selecting the most appropriate test species for sediment and water column toxicity tests is very important when attempting to evaluate contamination or to set water quality standards to protect aquatic environments. Standard test organisms and established test guidelines exist, but US EPA recommended species may not be the most sensitive organisms to pollution. Mayflies are currently regarded as the most sensitive aquatic insect taxa in North American streams, and they have several attributes which qualify them as good laboratory test organisms. Cherry's lab is currently examining the use of one mayfly, *Isonychia bicolor*, as a standard test organism for use in protecting streams impacted by coal mining.

Culturing of most mayfly species has not yet been attempted; therefore, organisms must be locally available and readily obtainable. *Isonychia* nymphs are prevalent in local streams and available most of the year, making them a suitable candidate.

Along with the Clinch River, the Powell River is a highly valued watershed for biodiversity and has been the subject for numerous studies of coal mining impacts conducted by graduate students in Dr. Cherry's laboratory. In 1995, Ely Creek, a Powell River tributary, was determined to be the most negatively affected acid mine drainage subwatershed in all of Virginia. In 2003, remediation efforts were conducted in Ely Creek by the United States Army Corps of Engineers and Virginia Department of Mining, Minerals and Energy. Successive alkalinity producing systems (SAPS) were constructed to remediate acid mine drainage by channeling the contaminated water through a layer of organic compost over limestone gravel, which produces alkalinity resulting in pH neutralization and metal precipitation. Dr. Cherry and his student Michael Chanov studied chemical changes in the water, and used both laboratory toxicity tests and field assessments to show that the SAPS had some positive impacts on water quality and insect diversity, thereby limiting the effects of historical acid mine drainage inputs. In the Black Creek watershed of the Powell, Cherry and his students, using similar research approaches, showed some benefits of using new post-mining landscaping, development of outlet control ponds for runoff, establishment of riparian habitat, and protection of existing wetland areas to reduce impacts of acid mine drainage.

Although many of the research projects conducted in the Cherry lab focus on the evaluation of the influences from active mining and abandoned mined land areas, other contaminants of concern have included remnant mercury contamination and salt brine discharges in the North Fork Holston River (NFHR). Two recent publications from this research authored by Echols, Cherry and others, document the effects of both contamination sources and the implications for freshwater mussel species in the river downstream. Legacy mercury contamination from the Olin Corporation from 1953-1972 in the NFHR has been well documented. It has been assumed that the majority of this mercury has migrated far downstream from the original contamination source in Saltville, VA, now a US EPA Superfund site. However, Echols, Cherry and co-workers found that remnant mercury remains bound to sediments and therefore bioavailable to organisms both at the original contamination site and more than 50 river miles downstream. In addition to the presence of mercury at these sites, an unregulated brine discharge enters the river less than two river miles upstream from the mercury contamination site. The combination of these two influences is undoubtedly having adverse effects on the aquatic biota, including mussels.

We thank Dr. Rebecca Currie and Ms. Brandi Echols for their help in preparing this article.



The second edition of Professor Klaus D. Elgert's textbook, *Immunology: Understanding the Immune System*, was released this September. The new edition has been revised to reflect the most up-to-date references, and also has full-color graphics, including over 50 new figures.

For more information on Dr. Elgert visit <http://www.biol.vt.edu/faculty/elgert>.

RESEARCH HIGHLIGHTS

Targeting Hospital-Acquired Infections: Exploring how Bacteria Evade our Immune System

Bacterial infections pose a major challenge to the medical community. Decade-long exposure to antibiotics has led to the emergence of multi-drug-resistant strains that are difficult if not impossible to treat. Scientists, in their quest for the development of novel therapeutic options, are striving to understand the various means and mechanisms these pathogens employ to combat drug treatment and the human immune system.

The laboratory of **Florian Schubot, Ph.D.**, a recent recruit of the Department of Biological Sciences, focuses its research efforts on the pathogen *Pseudomonas aeruginosa*, a ubiquitous bacterium found throughout the environment in water, soil, plants, and animals. Though harmless to healthy individuals, *P. aeruginosa* infections befall people whose defenses have been weakened by other afflictions, such as burn victims, cancer patients, or organ transplant recipients. *P. aeruginosa* is perhaps best known, however, for causing the chronic lung infections that are the leading cause of mortality among people with cystic fibrosis.

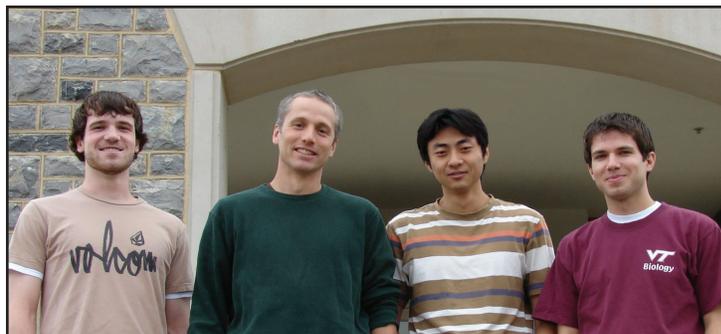
Pseudomonas infections may follow two entirely different paths. Burn victims and transplant patients may develop quickly-progressing acute infections that cause a high fever and, if not immediately treated, may be fatal within days. The chronic lung infections encountered in cystic fibrosis-affected patients, on the other hand, show few symptoms and may persist for decades. Chronic infections, however, are no less dangerous. The low-grade inflammation caused by these infections gradually destroys the lung, ultimately leading to organ failure.

So, how is it possible that *P. aeruginosa* infections can follow such distinct paths? How and when does the bacterium decide on which path to follow?

The answer to at least the second question is still unknown. We do know, however, that underlying the two different pathologies are two distinct bacterial lifestyles. In acute infections the bacteria are free-floating and aggressively attack the host immune system by injecting toxins into the host cells. The injected toxins interfere with signaling mechanisms that are critical for alerting the immune system to the presence of an invading pathogen. The specialized apparatus that delivers the toxins into the host cells is called a type three secretion system and resembles a nanoparticle-sized syringe.

Chronic infections, on the other hand, are characterized by the bacteria colonizing the surface of the afflicted tissue. The bacterial cells clump together forming so-called biofilms that, by some estimates, display a thousand-fold higher resistance to antibiotics than their free-floating counterparts. Remarkably, the type three secretion system, so important for sustaining acute *P. aeruginosa* infections, is not active in the biofilm bacteria.

Type three secretion system and biofilm formation are both critical to the survival of the bacterium inside the human body. However, because both processes are very energy intensive they are tightly controlled and only deployed by the bacteria during infection. While these control mechanisms help the organism to preserve energy, they also offer scientists additional opportunities to target either or both virulence mechanisms in their efforts to combat acute and chronic *Pseudomonas aeruginosa* infections.



Current members of the Schubot Lab, l to r: David Miskel (undergraduate researcher), Florian Schubot, Xing Jing (graduate student), and Robert (Cory) Bernhards (graduate student)

Dr. Schubot and his team of student researchers have received funding from the American Heart Association to uncover the environmental signals that cause the bacterium to abandon its free-swimming lifestyle in favor of forming biofilm colonies. A structural biologist, Dr. Schubot examines the three dimensional structures of individual proteins and multi-protein assemblies that constitute critical components of the underlying signaling processes. Most recently, work carried out by graduate student Xing Jing revealed that a key environmental signal for the formation of biofilm colonies is a sugar-like molecule. While the exact nature of the signal is not yet known, this finding has important implications for future research efforts. The ultimate goal of the work in the Schubot lab is to characterize critical junctions in the studied signaling processes that may be targeted for the development of novel antibiotics. Ideally these drugs would not only be effective against acute *P. aeruginosa* infections but also the hard-to-treat chronic biofilm infections.

The laboratory of Dr. Schubot is located in the new Life Science I building, which is also home to other research groups with interests in microbiology, immunology, genomics, and proteomics, thus creating an ideal environment for interdisciplinary research.

For more information on research in the Schubot Lab, visit <http://www.biol.vt.edu/faculty/schubot/>



Bruce Parker Receives Phycological Society of America's Award of Excellence

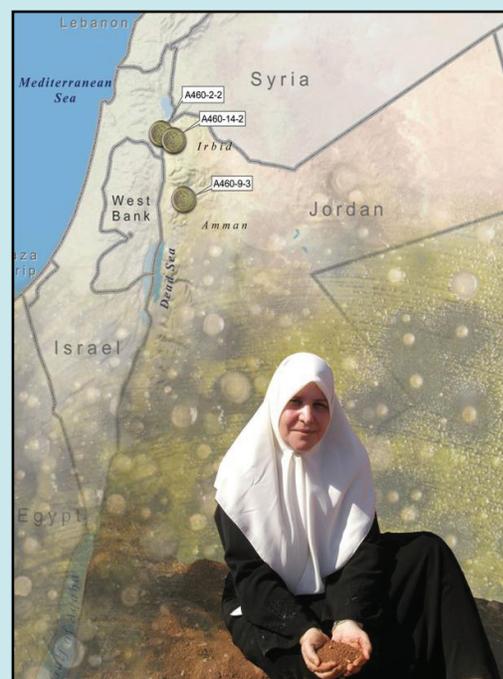
Bruce Parker, Professor Emeritus of Botany since 2002, received the Phycological Society of America's highest tribute - the Award of Excellence – at the Society's summer 2009 meeting in Hawaii. PSA's President, Charles Amsler presented the award and said "Bruce Parker's career has led to the publication of >200 papers and book chapters, plus 10 edited books. In 1970, he received the Botanical Society of America's Darbaker Prize for scholarly research on algae, and he served as Secretary-Treasurer, Vice President and President of the Phycological Society of America. In the mid-1970s, he established the Archives of the Phycological Society of America and continues to serve as Archivist today. His research discoveries have included the phloem-like sieve tubes in giant kelps, B vitamins in rainwater which induce blooms of vitamin-requiring freshwater algae, stromatolites in permanently ice-covered Antarctic lakes which escape through the ice and colonize new habitats, and several major advances in understanding algal cell wall biochemistry. In 1976, Parker Mesa in Antarctica's Victoria Land was named in honor of Bruce's limnological studies there and on the Antarctic Peninsula. Bruce Parker was the first U.S. scientist to bring undergraduate men and women to Antarctica and to open the doors for Antarctic research for women." Dr. Parker remains active in research and teaching, and continues to provide valuable service to Virginia Tech and his profession.

We're All Over the World

Through funds provided by the Fogarty Center of NIH, **Joe Falkinham**, Professor of Biological Sciences, his Ph.D. student **Justin Tanner**, Professor Nick Oberlies of UNC-Greensboro (UNCG), and Professor Feras Alali of Jordan University of Science and Technology (JUST), initiated a project to determine whether predatory bacteria in soil are potential sources of novel antibiotics. To date more than 100 strains of predatory bacteria have been isolated from Jordanian soil samples and shown to have antibiotic activity.

In addition, the UNCG - JUST - VT team showed that predatory bacteria are responsible for the antibiotic activity of the “Red Soils” of Jordan. These soils are widely used for treatment of skin infections and for diaper rash as an alternative to expensive antibiotics. In addition to isolating the predatory bacteria in “Red Soils” and identifying the novel antibiotics, the team is developing ways to create soil-farms for production of “Red Soil”; a low cost, low tech approach to producing antibiotics. Their work was recently published in an article appearing in *Applied and Environmental Microbiology* (2009, 75: 2735).

Dr. Falkinham serves on the board of editors for three international scientific journals, and is participating on a committee to recommend the most logical place to establish a VT campus in India. Since 2000, he has been an invited speaker at international workshops and symposia in Belfast Ireland, Auckland New Zealand, Dubrovnik Croatia, and Helsinki Finland.



Brenda Winkel, Professor of Biological Sciences, spent the spring of 2009 on research leave at Wageningen University in The Netherlands. She was accompanied by her husband, Dr. Jim Westwood, on research leave from Virginia Tech's College of Agriculture and Life Sciences, and their 7-year-old twins, John and Anna. While in Wageningen, Professor Winkel established a research collaboration with Luisa Trindade aimed at engineering the production of medically-important flavonoid compounds.

Winkel and Trindade are using *Agrobacterium rhizogenes* to produce hairy root cultures for a variety of plant species, including potato, strawberry, and apple, at the same time introducing various flavonoid regulatory genes to induce flavonoid metabolism. Preliminary work was also performed with *Scutellaria baicalensis*, a plant that has long been used in traditional medicine to treat a wide range of conditions, including epilepsy, hepatitis, bacterial infections, and cancer and whose flavonoids may also provide neuroprotective capabilities useful for treating Parkinson's and Alzheimer's disease. Professors Winkel and Trindade plan to seek funding that will allow them to continue exploring the use of hairy root cultures to produce high-value flavonoids, while promoting the international exchange of students and expertise.

Dr. Winkel has engaged in several other international activities, including the co-coordination of international conferences on Arabidopsis research and macromolecular structure, held in Oxford UK, Berlin, and Madison WI. She is an active member of the North American Arabidopsis Steering Committee, one of five world-wide committees responsible for maintaining genetic data and organizing meetings on the model plant Arabidopsis.

Each Year, **Ignacio Moore**, Associate Professor of Biological Sciences, teaches two study abroad courses, a two-week segment of a semester long course in the Dominican Republic and a spring plus summer semester course on Ecuador that includes the Galapagos Islands. Both courses focus on the evolution of animals in response to unique environments, and the relationships between humans and natural ecosystems, including the principles of conservation. Students visit a large variety of habitats, from high elevation mountains to tropical reefs, and get first hand experiences with many life forms, ranging from llamas to sharks.

Overall these courses are providing an opportunity for VT students to experience a different part of the world and gain an appreciation and understanding of their place in it.



Camille Harris, a Ph.D. student in biological sciences, has been awarded a prestigious National Institutes of Health (NIH) Graduate Research Fellowship for her study of forest disturbance and its ecological impacts on LaCrosse Virus, a mosquito-borne disease that can cause seizures, coma, paralysis, and permanent brain damage in severe cases. The two-year, \$30,000 fellowship is for Harris to study habitat disturbance, disease ecology and the role of invasive species in transmission of the virus.

Her research is titled “Ecological Impacts of Forest Disturbance on Lacrosse Virus Dynamics.” She is advised by biological sciences Assistant Professor Dana Hawley. “Camille’s research is unusually compelling because she is using experimentally logged forest plots to examine the effects of habitat on disease vector distributions,” Hawley said. “Past studies have made broad links between habitat change and disease dynamics, but the underlying mechanisms are usually unknown. Camille is studying how logging alone influences mosquito vector distributions and resulting disease dynamics.”

Harris earned a Master of Science and a Doctorate of Veterinary Medicine at Mississippi State University. Once she completes her Ph.D., Harris says she plans to pursue postdoctoral training in disease ecology.



In mid September, **Anne McNabb**, Professor of Biological Sciences, was the 2009 speaker in the Distinguished Professor Lectureship Series of the Health Sciences Graduate Students’ Association at the University of Manitoba in Winnipeg. She presented two seminars on Avian Thyroid Disruption by Environmental Contaminants at the Medical School on the Ballantyne Campus and in the Biology Department at the Fort Gary Campus, had meetings with graduate students in five basic science departments and social interactions with a number of graduate students and faculty. The lectures were during Orientation Week for the university. Speakers in this lectureship series are selected by the Graduate Student Association to provide breadth of academic perspective and to act as role models for them. The graduate students raise all funds and make all the arrangements for the speaker’s visit, working with the Assistant Graduate Dean for Health Sciences.

ALUMNI NEWS

Felicia Dare Goodrum, a native of Roanoke, VA, received her B.S. in Biology from Virginia Tech in 1992. In 1999, she earned a Ph.D. in molecular genetics from Wake Forest University, and went on to conduct postdoctoral work in virology and molecular biology at Princeton University. In 2006, she accepted a joint position as an Assistant Professor of the Department of Microbiology and Immunology and the Department of Molecular and Cellular Biology at the University of Arizona College of Medicine.



Goodrum's research focuses on understanding the interactions between host cells and the human cytomegalovirus (HCMV) and its latency in the hematopoietic cells of infected individuals. She hopes that her research will eventually contribute to the development of improved antiviral therapies that target latent viruses in humans.

In 2008, Goodrum was named a Pew Scholar of Biomedical Sciences by the Pew Charitable Trust. The award is given annually to approximately twenty exceptional researchers; the scholars receive \$240,000 over four years to support their research, and gain access to a wide variety of support throughout the scientific community.

In 2009, Goodrum was given a Presidential Early Career Award for Scientists and Engineers, which is presented yearly to 100 scientists, and is "the highest honor bestowed by the United States government on young professionals in the early stages of their independent research career". She will be attending a ceremony and meeting President Obama in Washington, D.C. this fall, and will also receive up to a five-year research grant to further her study.

Richard "Dick" Stouffer graduated from Virginia Tech with a B.S. in Biology (Zoology) in 1971. In 1975, he received a Ph.D. in physiology from Duke University Medical School, and in the next decade, conducted research at the NIH and served as faculty member at the University of Arizona College of Medicine.



In 1985, Stouffer accepted a position at the Oregon National Primate Research Center (ONPRC); he currently acts as a Senior Scientist and Head of the Division of Reproductive Sciences at the ONPRC and as a Professor of the Department of Obstetrics and Gynecology and of the Department of Physiology and Pharmacology at the Oregon Health and Science University.

Stouffer's current research focuses on understanding the function and regulation of the maturing follicle and corpus luteum in nonhuman primates during the menstrual cycle and early pregnancy in rhesus monkeys. He hopes that his research will lead to improvements in clinical approaches to treating infertility and high-risk pregnancies, and lead to new methods of contraception. Additionally, he is working with a research consortium on "oncofertility", which is striving to develop methods of maintaining or restoring fertility in cancer patients.

Of his time at Virginia Tech, Stouffer says, "I am forever grateful to **Anne McNabb** (Professor of Biological Sciences) and Rod McNabb (former faculty member in Biological Sciences) for their inspirational teaching in comparative physiology and the opportunity to perform undergraduate research in their laboratory. Although originally on a 'pre-med' path, their ability to relate the intriguing unknowns about animal physiology and the excitement of using the scientific method to explore and discover new knowledge prompted me to jump to the 'research' path. I never regretted it; every day still offers something new in my lab and the opportunity for me to pass along to other students what the McNabbs gave to me!"

VT BioSPIRE: Supporting the Growth and Success of Biotechnology-Related Organizations

One of the central goals of VT BioSPIRE is to support and enhance a vibrant biotechnology-based economic sector in the mid-Atlantic region. There are good reasons to do so. According to the Virginia Biotechnology Association, Virginia has about 175 biotechnology, equipment, pharmaceutical, and medical device companies. Most are located near universities (including Virginia Tech), or in the Richmond, Norfolk, or Northern Virginia areas. Of these companies, approximately 82 are biotechnology firms, 29 are medical device companies, 28 do contract research or other kinds of biotech-oriented support, and 31 produce bioscience equipment. Each of these companies employs highly-skilled labor and contributes to the general economy in many other ways, including construction of facilities, purchase of sophisticated equipment, consumption of raw materials, transportation and distribution, research and development, advertising, and of course, contributions to the tax base. The co-location of many biotech firms with universities is no accident; universities are vital partners in supporting research and development and providing skilled labor. It is not surprising, therefore, that biotech companies have become one of the largest employers of Virginia Tech graduates. A true win-win situation!



GRANTS, AWARDS, AND OTHER NEWS

John Barrett, Assistant Professor, received a \$244,066, three-year grant from the National Science Foundation to research "The Role of Snow Patches on the Spatial Distribution of Soil Microbial Communities and Biogeochemical Cycling in the Antarctic Dry Valleys."

Matthew Becker, an M.S. student in the Belden Lab, was quoted in the journal *Science* (Volume 326, October 23, 2009) concerning his research on the role of beneficial skin bacteria in preventing amphibian infection.

Lisa Belden, Assistant Professor, received a four-year, \$375,298 grant from the National Science Foundation to study community composition and disease outcomes in a multihost-parasite system.

Daniel Capelluto, Assistant Professor, received a \$132,000 two-year grant from the American Heart Association to conduct NMR-based studies of phospholipid recognition by the Tollip C2 domain, a potential factor in inflammation and heart disease.

Daniela Cimini, Assistant Professor, received a \$943,737, four-year grant from the National Science Foundation to research "Experimental and Computational Analysis of Merotelic Kinetochores Formation, Dynamics, and Correction". Esma Civelekoglu-Scholey of the Molecular and Cellular Biology Department at the University of California-Davis is a co-principal investigator.

Joe Falkinham, Professor, is a co-editor of *The Ecology of Mycobacteria: Impact on Animal's and Human's Health*, which was released in 2009.

Carla Finkelstein, Assistant Professor, received a \$1,081,348 Career Award from the National Science Foundation to research "Circadian control of cell division and homeostasis". She also received a \$300,000 grant from the Avon Foundation to study environmental risk factors in breast cancer.

Sarah Foltz, a Ph.D. student in the Moore Lab, has been named as a 2009 Institute for Critical Technology and Applied Science Doctoral Scholar. The program honors exceptional Ph.D. applicants by awarding full graduate tuition plus a stipend for four years.

Kristina Hartman, a junior majoring in Biological Sciences, will serve as a student representative from the College of Sciences on the Board of Visitors during the 2009-2010 academic year.

Rick Jensen, Professor, was a co-PI on a National Institutes of Health award to conduct a capture-sequence analysis of genomic regions associated with diabetes. Dr. Jensen's portion of the grant was \$630,965.

Noel Krieg, Alumni Distinguished Professor Emeritus of Biological Sciences, is a coeditor for two volumes of the second edition of the *Bergey's Manual*, the "encyclopedia" for bacterial systematics. Given the huge diversity of bacteria, this is a multi-volume and multi-year project. Volume 3, coedited by Dr. Krieg, was just released.

Christopher Lawrence, Associate Professor, received a \$267,559, three-year grant from the NSF to estimate speciation/reticulation boundaries in asexual *Alternaria* using genomics approach.

A \$30,000 seed grant was awarded to **David Popham**, Professor of Biological Sciences; **Stephen Melville**, Associate Professor of Biological Sciences; and Charles Schlepner, VTC Professor of Internal Medicine and Director of the Carilion Clinic Infectious Disease Fellowship Program. They will study and develop "Improved Decontamination of *Clostridium difficile* spores." The seed grant is one of six that have been awarded to advance the Virginia Tech Carilion (VTC) School of Medicine and Research Institute.

Ann Stevens, Associate Professor, received a \$409,000, three-year National Science Foundation grant to study novel aspects of signal transduction in *Pantoea stewartii*, which causes a bacterial wilt in corn.

Bruce Turner, Professor of Biological Sciences, was elected as a Fellow of the American Killifish Association, in recognition of his life-long commitment to the AKA and to the study of killifish.

Maury Valett, Professor, is a co-PI on a National Science Foundation three-year award of \$798,430 (with \$276,000 to Valett) to study interactive effects of chronic N deposition, acidification, and phosphorus limitation on coupled elemental cycling in streams.

Jeff Walters, Bailey Professor of Biology, recently received two Department of Defense research grants: a \$2,088,449 (\$1,729,930 to Walters lab) three-year award to continue endangered species management and monitoring on Eglin Air Force Base in Florida, and a five year \$1,351,000 grant (\$268,901 to Walters lab) to develop dynamic reference models and a decision support framework for longleaf sandhill ecosystems.

Brenda Winkel, Professor, is principal investigator on a \$2 million (\$875,776 to the Winkel Lab), four-year, multi-institutional National Science Foundation 2010 grant to model biological networks in Arabidopsis through integration of genomic, proteomic, and metabolomic data.

Zhaomin Yang, Associate Professor, received \$197,308 from the National Institutes of Health to continue his research on the regulation and mechanism of social gliding in the bacterium *Myxococcus xanthus*.

Retiring

Robin Andrews (Professor)
Anne McNabb (Associate Dean of the Graduate School and Professor)
Linda Vaught (Housekeeper, Derring Hall)

Promotions and Tenure

Christopher Lawrence (Tenured Associate Professor)
Iuliana Lazar (Tenured Associate Professor)
Liwu Li (Professor)
Ignacio Moore (Tenured Associate Professor)
Michael Rosenzweig (Advanced Instructor)
Maury Valett (Professor)

New Faculty Members

Harold "Skip" Garner (Director of VBI and Professor of Biological Sciences)
Katie Rodgers (Laboratory Coordinator, Microbiology Labs)
Daniel Wubah (Vice President and Dean for Undergraduate Education and Professor of Biological Sciences)

New Postdoctoral Associates & Research Associates

Paulo Jorge (Phillips Lab)
Urmila Maitra (Li Lab)

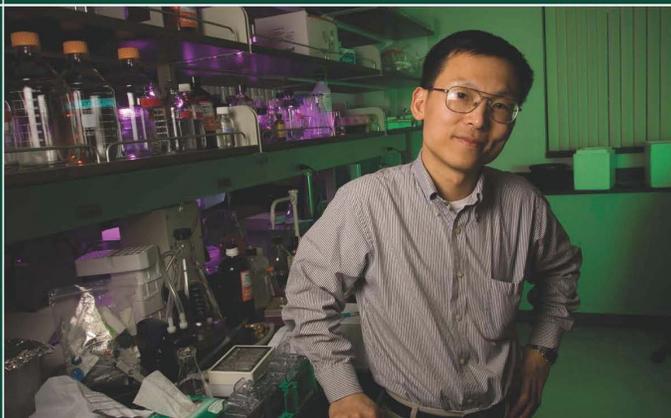
New Staff

Katie Akers (Administrative and Program Support)

New Arrivals

Annabelle Yiru Wen (Annie) (born June 15, 2009 to postdoctoral associate Jianhua Yang (Finkelstein Lab))

Say hello to the future.



Meet Liwu Li, a professor of biological sciences at Virginia Tech whose research group is studying the human immune system. Li's team has unraveled some of the mysteries of why inflammation, our body's normal response to invading pathogens and wound healing, can sometimes lead to cardiovascular disease, diabetes, asthma, rheumatoid arthritis, and other neurological inflammatory diseases. His research may well lead to better treatment for these conditions.

When you support the Department of Biological Sciences at Virginia Tech, you are inventing the future. You are supporting scholars like Liwu Li, who are discovering ways to improve human health that will change the world of tomorrow.

Find out how you can invent the future. Contact us today.

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