

Biological Sciences

www.biol.vt.edu

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VIEW FROM THE DEPARTMENT: *ENGAGEMENT*

Teaching, research, and outreach are the foundations of Virginia Tech's land grant mission. Of these three, outreach (recently renamed "engagement") is least understood, yet just as important as the other two. So, what is "engagement" and how does our department go about "engaging?"



A simple definition might be "the development of partnerships between the university and the public (including industry, government, other organizations and individuals) to improve the human condition." There are

many flavors of engagement activities, but all involve bringing new discoveries into practical application, or promoting the expansion of research and education outside of Virginia Tech.

To maintain its excellence in engagement, Virginia Tech recently identified four goals representing university-wide strength areas and targets for future investments (see <http://www.president.vt.edu/strategicplan/>). The Department of Biological Sciences is making contributions toward each goal.

Goal 1: Increase Economic Vitality. Enhancing economic activity is important to everyone in the Commonwealth, especially within regions plagued by high unemployment and poverty. Biological Sciences faculty and students contribute toward this goal in two major ways. First, our faculty are developing and testing research technologies and discovering new biological processes that have potential for commercial development, and ultimately, opportunities to draw new industry to Virginia. The move of Oxford Diffraction North American headquarters to Blacksburg, and growth of spin-off companies in the Corporate Research Center show that our efforts are paying off. Second, Biological Sciences Alumni are highly prized and frequently employed by regional biotech companies. Some of our alumni have become leaders in expanding biotech business (see article about Ed Goyette on page 5).

Goal 2: Enhance International Education and Research. This goal reflects the world-wide trend of increasingly connected economies and cultures. We strongly believe that our department must develop a world-view of how life sciences can serve humanity. Several trends show that we are making progress. Many of our new faculty come from, or were trained in, countries outside of the United States (e.g., Turkey, Argentina, Italy, Germany, Iraq, Canada, Rumania, and China). Most have international research partners or studies overseas, and the level of such collaboration is

growing. Furthermore, our instruction is becoming increasingly international, with new study abroad courses conducted in Central and South America, Greater Antilles, East Asia, Africa, and Europe.

Goal 3: Enhance PK-12 education and its continuity with undergraduate and graduate education. Statistics are showing that the United States is losing its edge in science, technology, engineering and math (STEM) education. Maintaining strength in STEM education is vital for leadership in new technology development and increasing worker productivity. The Biological Sciences Department has a relatively large effort in STEM education, led by Dr. Mike Rosenzweig, director of the VT Science Outreach Program (SOuP), and also coordinator of the campus-wide Virginia Tech STEM Initiative. SOuP and VT STEM efforts are developing new resources, classes, and workshops to aid teachers who are responsible for STEM education from Pre-Kindergarten through 12th grade (PK-12). Efforts are also underway to provide programs for VT students to become PK-12 STEM educators, and to develop research and scholarship efforts related to PK-12 STEM education. Several of our faculty use part of their research grants to broaden the impact of their work. For example, Dr. Brent Opell has an NSF funded study of the design, diversity, and function of viscous prey capture threads produced by over 4000 species of orb-weaving spiders. He is working with Dr. Rosenzweig and SOuP to bring the excitement of spider web weaving and the concepts of biological form and function to high school classrooms.

Goal 4: Increase Student Engagement. The Biological Sciences Department has become very active in service learning, which connects students to public activities, usually via volunteer work with communities or agencies. Many of our students choose to work with local governments on land use or stream water quality issues. Coupled with rigorous expectations for learning outcomes, activities such as these help students become better at serving a diverse and complex marketplace and society, and of course, the communities that participate also gain by tapping into the talent of Virginia Tech students and faculty.

Though some people imagine that university faculty and students live and work in an ivory tower, isolated from reality, the truth is that Virginia Tech is highly engaged with local, regional, and international communities, and working hard to improve the human condition in many different ways.

Sincerely, Robert H. Jones, Department Head

RESEARCH HIGHLIGHTS

Sensible Senses of the Invisible

It is no surprise that mammals and plants use their senses to respond to their environment. Temperature influences how we dress. Sunny days bring out the cool shades. Leaves change color in the fall. Seedlings grow in the opposite direction of gravity. Injuries and infections activate the defense systems of both animals and plants. These higher or bigger organisms can respond to environmental changes because of their intrinsic or genetically encoded capability to appropriately interact with the environment.

But do you ever wonder how microbial organisms, the nearly invisible, interact with their environment? How do they, as single cell organisms, sense and respond to one another and to changes in their surroundings? That is, what cues do they take, how do they sense such cues outside of their little body, how is the information transferred to the inside of microbial cells and what responses or changes do such cues elicit in the physiology or behavior of a microbe?

Research in the lab of Dr. Zhaomin Yang (Associate Professor in Biological Sciences) attempts to make sense of microbial senses using a myxobacterium called *Myxococcus xanthus* as a model. So what are myxobacteria? Well, they are a group of gram negative bacteria quite unique in their life style. When nutrients are available, they grow and divide as metabolically active cells in a vegetative cell cycle. When nutrients become limiting, myxobacteria switch to a developmental cell cycle. Under such starvation or developmental conditions, hundreds of thousands of myxobacterial cells move over surfaces to aggregate. These aggregates eventually morph and mature into fruiting bodies filled with myxospores, which are differentiated dormant cells. Dormant myxospores can reenter the vegetative cell cycle when provided with nutrients.

The surface movement of *M. xanthus* or gliding motility is critical for both the vegetative and developmental cycles. It turns out that *M. xanthus* is a carnivore: it preys on other bacteria in the soil by moving as large groups or swarms. One bee might be of little harm, but a swarm can kill! Similarly, roaming groups or swarms of *M. xanthus* cells collectively produce killing and digestive power sufficient to sustain a vegetative cell cycle on a bacterial diet. Such group movement or social gliding motility is also critical for the aggregation phase of the developmental cycle by *M. xanthus*. In fact, the extensive social interaction among cells is a defining feature for myxobacteria which may be considered the ancestral mother of all social animals.

As far as we know, the languages for social interactions by myxobacteria can be chemical, physical or a combination of both. It has been known for some time that some signals are diffusible chemicals; these signals are for communication purposes over a relative long distance. On the other hand, although it was discovered quite some time ago that myxobacterial cells have physical senses or senses of touch, the underlying mechanism for such sensory functions remained a mystery until very recently.

Research from the Yang lab as well as others in the last few years suggested that *M. xanthus* uses something called pili as physical sensors for the sense of touch. Pili are protein polymers present at only one end of a *M. xanthus* cell. About the length of

one to two cells, pili can determine if adjacent cells are of the same or different bacterial species. The signal recognized by *M. xanthus* pili is a coat of polysaccharide or exopolysaccharide (EPS) produced by other *M. xanthus*. Once recognition occurs, pili will attach and retract to move two cells closer to each other. In addition, the signal of recognition is transduced or relayed to the cytoplasmic machinery that synthesizes EPS to increase EPS production. Such a regulatory circuitry enables and facilitates *M. xanthus* cells to move as swarms. For those who are inclined to ask questions as you did when you were a VT student, yes, there are indeed some middlemen between pili and the EPS production machinery. They are the components of the Dif signal transduction pathway. The Dif proteins form a membrane complex which converts the signal from pili from the outside of the cell to protein phosphorylation events in the cytoplasm. Protein phosphorylation then somehow modulates the activity of EPS biosynthesis in the cell.

We do not yet have all the answers to your pili questions, and that is probably part of the reason that we still have jobs! Current projects focus on a few unanswered questions. What is the nature of the recognition between pili and EPS? How does the recognition at the tip of a pilus propagate to the cell surface? How is the signal communicated subsequently to the Dif membrane complex? And what is the main point of regulation in EPS biosynthesis by the Dif signaling pathway? We are confident that answers to some of these questions will be forthcoming.

The research in the Yang lab has been supported by funds from various sources including National Institute of Health, National Science Foundation and Virginia Tech. Current members of the Yang lab include Dr. Wesley Black, C. Linn Cadieux, Kristen Huntington, Pamela Lauer and Qian Xu. ●

Article by: Dr. Zhaomin Yang, Associate Professor for Biological Sciences



M. xanthus fruiting body
White and Brun at [http://
jb.asm.org/content/vol1185/
issue4/cover.shtml](http://jb.asm.org/content/vol1185/issue4/cover.shtml)



M. xanthus swarming colony
Yang and Guglielmi

RESEARCH HIGHLIGHTS

Benfield attends International Workshop in Postojna, Slovenia

Dr. Fred Benfield, Professor of Ecology and Associate Department Head, was one of 15 U.S. scientists invited to participate in an international workshop sponsored by the National Science Foundation, the Slovenian Research Agency, and the Scientific Research Center of the Slovenian Academy of Science, at the Karst Research Institute in Postojna, Slovenia in October 2006.



The purpose of the workshop was to bring together karst and ecosystem scientists from Slovenia and the U.S. to explore mutual interests in **long-term ecological research** in the Slovenian karst, focusing on above ground

and below ground aquatic systems. Karst is any terrain based on a layer of soluble carbonate bedrock. The karst landscape is characterized by well eroded rolling hills, deep hollows, springs, caverns, sinkholes, losing streams (streams that disappear into the ground), natural bridges, and tunnels all formed as water containing acids percolates through and dissolves carbonate layers in the bedrock. Up to 20% of the earth's surface and 44% of the Slovenian landscape is karst. In the US, about 20% of the land cover is karst and 40% of the ground water used for drinking lies in karst aquifers. The Slovenian karst is recognized as a global "hotspot" of subterranean biodiversity and a European "hotspot" of above ground biodiversity for many groups of organisms. There is a long tradition of biodiversity research by Slovenian scientists in karst systems but study of ecosystem processes has not been a research priority.

There are presently 26 Long Term Ecological Research (LTER) sites funded by the US National Science Foundation (<http://www.lternet.edu/>), including 2 in Antarctica, in which over 1800 scientists and students are conducting research on ecological processes over long temporal and broad spatial scales. For example, the Virginia Tech Stream Team (Dr. Jack Webster, Dr. Maury Valett, and Dr. Benfield and their students) has an active research program centered at the Coweeta Hydrologic Laboratory LTER site in western NC (<http://coweeta.ecology.uga.edu/>). There is also an international LTER (ILTER) network (<http://www.ilternet.edu/networks/>) presently composed of 33 countries, with an additional 13 countries considering membership, conducting long term ecological research.

Slovenia recently joined the ILTER network and the workshop was an attempt to encourage initiation of long-term ecological work in the karst region of the country. The next step is to secure funding for a second workshop to be held in the U.S. to prepare joint research proposals. ●

Article by: Dr. Fred Benfield, Professor of Ecology and Associate Department Head, Biological Sciences

New Buildings for Biological Sciences Research

Virginia Tech is building two new life sciences buildings that will house a significant number of Biological Sciences faculty.

One is located on Washington Street between Litton-Reaves Hall and the new Virginia Bioinformatics Institute buildings. Named Life Sciences I (LS-I) because it is the first of several to be built within a newly designated "life sciences precinct," this facility will house approximately 12 faculty from three departments, including Biological Sciences. Research will focus on microbiology, cell biology and immunology with a strong biomedical theme. The 3-story, 72,000 square foot building will include a state of the art vivarium, biological safety level 3 laboratories to isolate and control infectious disease agents, and a new university center for proteomics research. LS-I is being funded in part by a bond issue passed by the voters of Virginia.

Because LS-I is clad with Hokie stone, and located on state property requiring a very lengthy government review process, it is an expensive building, and has taken a long time — eight years — to develop. To speed up the development of more research space, the university is partnering with the Virginia Tech Corporate Research Center (CRC) to build a second life sciences research facility known as the Integrated Life Sciences Building (ILSB). CRC is a private concern, yet located immediately adjacent to the VT campus. New buildings can be constructed much more quickly at CRC and with less expense than the typical VT campus building. ILSB will ultimately fit out at 77,000 square feet and initially will support a new X-ray diffractometry laboratory, and faculty from four different Virginia Tech colleges researching infectious disease, obesity, cancer, bio-nanotechnologies, cell biology and ecosystem science. As new life science buildings come on line in the university life science precinct, some programs will be moved out of ILSB making room for expansion of others.

Both projects are slated for completion in fall of 2007 with occupancy by January 2008. Nearly one half (about 20) of the faculty in the Department of Biological Sciences will move into LS-I or ILSB. The new facilities will help faculty co-locate with others doing similar research, and provide much improved facilities compared to our current home in Derring Hall. ●



Construction is proceeding rapidly for Life Science I building on Washington Street (photo taken December 2006)

RESEARCH HIGHLIGHTS

Dream of Curing Cancer

Virginia Tech finds itself in a novel position. In spite of its lack of a major state-sponsored medical school, the university has a vibrant and growing cadre of cancer researchers.

Why?

Because the newest directions for cancer research have been enabled by advances in supercomputing and bioinformatics — areas in which Virginia Tech has some of the best equipment and expertise in the world. In addition, Virginia Tech has developed some partnerships with medical schools who are already doing cancer research — schools like Georgetown and Wake Forest Universities. These institutions need us just as much as we need them.

Virginia Tech is home to one of the leading bioinformatics centers in the country—the Virginia Bioinformatics Institute (VBI)—as well as one of the world's fastest academic supercomputers, System X. New imaging technologies, including microdots, laser guided confocal microscopy, nano-sensors, and Virginia Tech's state-of-the-art CAVE environment are providing unprecedented capability to observe key activities within cells. Virginia Tech scientists are making use of these resources to study aspects of cell behavior that cause cancer, and to create new cancer therapies that will have fewer side effects and be more effective in treating the disease. Here are three recent of many new cancer research activities:

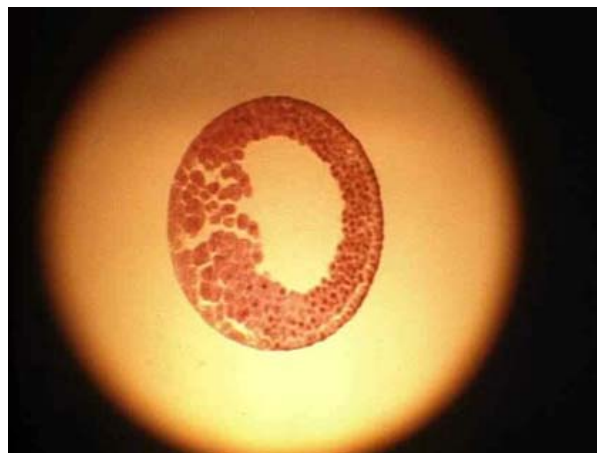
* Jill Sible in the Department of Biological Sciences uses frog embryos as a model system to understand how cells divide and how cell division can go out of control, as happens with cancer. She is collaborating with her colleague John Tyson, who is using computational science to map out cell behavior and study the genes that are responsible for specific functions in the genome.

* David Kingston in the Department of Chemistry is recognized internationally as a leader in the development of natural products in cancer therapies. His focus is using the bark of the yew tree to treat cancer. Natural products target their action more narrowly than synthetic drugs and have yielded promising results in ovarian and breast cancer therapy.

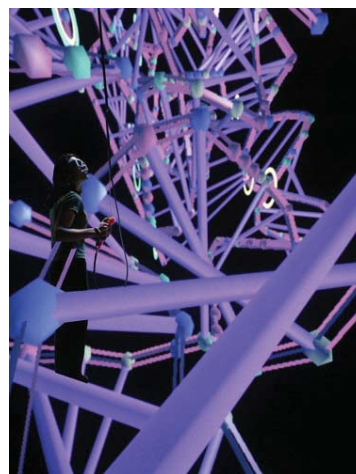
* In 2002, the Virginia–Maryland College of Veterinary Medicine chartered the Center for Comparative Oncology (CeCO). The mission of CeCO is to study the development of cancer in animals and in people, to develop new ways to diagnose cancer and to find new treatments to control and cure it.

Congratulations to Dr. Jill C. Sible!

Jill was one of the recipients of the Diggs Teaching Scholar Award. The Diggs program was initiated in 1992 to recognize and foster excellence, imagination, and innovation in linking scholarship and teaching. Competition is open to faculty of all ranks, and recipients are chosen by a committee of former Diggs Award recipients, the endowed Diggs Professors, the chair-elect of the Academy of Teaching Excellence, and the University Honors Scholar.



Jill Sible in Biological Sciences is studying cell division in frog embryos to better understand how this biological process becomes uncontrollable as a result of cancer.



Full three-dimensional reconstruction of DNA and cancer cells is possible in the virtual reality environment called the CAVE.



David Kingston in Chemistry is focusing his research on natural cancer-fighting agents found in Yew Tree bark.

MEET OUR NEW FACULTY...

Dr. Tad Seyler has accepted a position as Instructor of Microbiology and Cell and Molecular Biology. Tad earned a M.S. in microbiology from Virginia Tech and a Ph.D. in microbiology from the University of Georgia. He worked at the Virginia College of Osteopathic Medicine before joining our department in fall 2006.



Dr. Jeffrey Kuhn joined us in fall 2006 as Assistant Professor of Cell Biology. Jeff earned his Ph.D. in Zoology from the University of Texas and was a postdoc at Yale University before joining our department. Jeff's lab combines *in vitro* biochemistry, state of the art microscopy, and cellular imaging to understand how individual actin filaments are organized and regulated by signaling in motile cells.



Dr. Diya Banerjee joined us in fall 2006 as an Assistant Professor of Developmental Biology. Diya earned her Ph.D. from the University of Illinois in Molecular Genetics and had a postdoc position at Yale immediately before coming to Blacksburg. Her lab investigates the genes and molecular mechanisms that regulate the correct timing of cell fate determination.



Dr. Florian Schubot is a new Assistant Professor of Structural Microbiology. Florian earned his Ph.D. from the University of Georgia in Biochemistry & Molecular Biology and was a postdoc at the National Cancer Institute of Frederick, Maryland before moving to VT. He is studying protein structures of the type III secretion system of pathogenic bacteria.



Dr. Daniela Cimini has accepted an Assistant Professor position of Cell Biology. She studies mitotic chromosome segregation and aneuploidy origin as a consequence of inaccurate chromosome segregation in somatic cells. Daniela earned her Ph.D. from the University of Rome "La Sapienza." Before joining us, she was a postdoc at University of North Carolina at Chapel Hill.



Dr. Carla Finkielstein earned a Ph.D. from the University of Buenos Aires, Argentina in Molecular Biology. Carla was a postdoc at the University of Colorado Health Sciences Center before accepting an Assistant Professor position in our department. Her lab investigates some of the basic mechanisms that regulate cell cycle transitions, the circadian clock cycle, and how both cycles are interlocked at the molecular level.



Dr. Liwu Li is a new Associate Professor of Immunology. He earned his Ph.D. from the University of Michigan. Following a postdoc at Michigan, Liwu joined the faculty at Wake Forest University where he was promoted to Associate Professor, and won the Young Faculty Investigator Award from the International Cytokine Society. Liwu is now serving as an Associate Editor of the Journal of Immunology, and on the NIH study section of innate immunity and inflammation, which is his current area of research.



ALUMNI

American Biosystems Receives Exporter of the Year Award

Congratulations to **Edward Goyette**, a Biological Sciences graduate and member of our advisory board on his nomination and award for Virginia Small Business Exporter of the Year, awarded May 12. Mr. Goyette is the President of American Biosystems, Inc., which develops and markets microbial enzyme products for a wide range of applications. The company is currently a tenant in The New Century Venture Center, and will be one of the first tenants in Riverside Center, a prominent new local business park.



"We have found that opportunities exist for our company's products that are not available in the US. I firmly believe other small businesses could reap the rewards of higher sales and bigger profits if they tried to move some of their business beyond our shores. ABS reaped 60% of our sales last year from overseas markets. If we can do it, anyone can. The key is getting the proper help," states Goyette. He further states, "I am truly honored to receive this award. In part I attribute my success to the help from organizations such as the Commerce Department, the Virginia Export Development Partnership, the NewVA Tech Council, the SBDC, the Carilion Biomedical Institute, and The New Century Venture Center. I am proud to be part of the economic movement, in particular the biotechnology sector that is transforming Virginia's economy." ●

Article from: <http://www.ncvc.com/>

Welcome VHCF's New Trustee!

George A. Levicki, DDS, President and CEO of Delta Dental



of Virginia and also a member of our Department of Biological Sciences Alumni Advisory Board has been named a member of the Board of the Virginia Health Care Foundation. George's leadership and activities are far reaching. In addition to leading one of the state's most prominent insurance companies, he is also a member and former Chairman of the Board of Delta Dental Plans Association and DeltaUSA. He also serves on the board of the American Red Cross Roanoke Valley Chapter. ●

MARK YOUR CALENDARS

Research Day 2007

February 24th

Please check the Biological Sciences website for more information.

ALUMNI

World-renowned mycologist and professor emeritus of botany at Virginia Tech, Orson K. Miller, Jr., passed away



Orson K. Miller, Jr., passed away June 9, 2006, several months after being diagnosed with a brain tumor. He collapsed with a seizure at a mushroom foray in Oregon and died several days later in Boise, Idaho. Miller devoted his career to promoting and furthering the discipline of mycology.

Miller graduated from the University of Massachusetts and earned both a master's degree in forestry and a Ph.D. in botany from the University of Michigan. He was able to devote himself to both his

love of teaching and the fungi while he served as professor of mycology and curator of fungi at Virginia Tech from 1970 until his retirement in May 2002. During his 42 years as a professional mycologist (32 at Virginia Tech), he focused on the systematics and ecology of higher fungi (primarily Basidiomycetes), highlighting the Agaricales (gilled mushrooms), Boletales, and Gasteromycetes. His monograph established him as a world authority on the Gomphidiaceae.

Miller's 1972 *Mushrooms of North America*, one of the first field guides for this continent, is a notable milestone for mushroom identification. Shortly before his death, Orson and his wife Hope published a new mushroom guide (see accompany article). Miller published eight books, more than 150 papers, gave more than 500 presentations to professionals and amateur mushroom clubs, formally described more than 100 new species of fungi, and made over 28,000 fungal collections from all over the world, including Asia, the Greater Antilles, Belize, the Arctic, Europe and Australia.

Miller was elected a Fellow in the American Association for the Advancement of Science in 1995. In 1989 he received the William H. Weston Award for Teaching Excellence in Mycology, and in 1997, the Distinguished Mycologist Award, both from the Mycological Society of America for which he also served as president (2000-2001). At the time of his death, Miller had retired to the "private lab" of the conifer-aspen forests of McCall, Idaho, where he enjoyed fishing, hiking, and collecting mushrooms. He is survived by his wife, Hope, and three daughters. ●

By: Cathy L. Cripps, Department of Plant Sciences and Plant Pathology
Montana State University

BOOKS AND AWARDS

North American Mushrooms: A Field Guide to Edible and Inedible Fungi Book

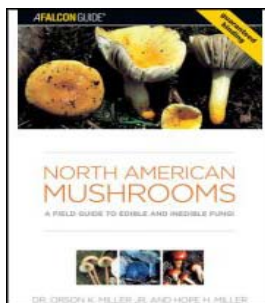
Dr. Orson K. Miller Jr. and Hope H. Miller. Falcon (2006)
ISBN 9780762731091

Reviewed by Juanita Watson for Reader Views (8/06)

"North American Mushrooms: A Field Guide to Edible and Inedible Fungi" is a comprehensive field guide that features most of the fungi one may encounter in the United States and Canada.

This field guide is part of "A Falcon Guide" series and is a necessary asset to the library of any wild mushroom, or edible plant disciple.

"North American Mushrooms" is authored by the husband/wife team of mushroom enthusiasts. The Millers have a long and extensive history in the world of fungi – they have worked all over North America, Europe, Australia, New Zealand, and parts of Asia, and recently have carried out



their field work in Biodiversity studies in the Greater Antilles and Belize. Orson is a Professor Emeritus of Botany and curator of Fungi from Virginia Tech, and is one of the leading mycologists in the United States. His wife, Hope, has authored a wild mushroom cookbook, taught classes, and supports Orson's work in the field. Basically, these people live and breathe mushrooms.

This comprehensive book has beautiful pictures, easy to understand keys, detailed drawings, interesting fungi information, listings of toxins, and useful information on habitat. This is not only a practical field guide but an interesting read into the world of wild mushrooms. In the wide range of selections available in the genre of field guides, I would recommend "North American Mushrooms" along with a couple area specific resources to round out a definitive package. ●

Charlie Clarkson: World Champion

Staff member Charlie Clarkson, who is the head technician on Jeff Walters' research project at Camp Lejeune Marine Base in coastal North Carolina, won a world championship in mountain biking in October. Officially Charlie is the "World Solo 24 Hours of Adrenalin™ Champion" in the age 25-29 men's category. This is endurance racing: Charlie rides his bike, night and day, for 24 hours straight with no breaks, and the winner is the person who completes the most laps on the course in that period. To qualify to compete in the World Championships, held at the Olympic course in Georgia, Charlie entered five national races, three of which he won (there are no categories in these races, only an overall winner; he placed third in the other two). Charlie just turned 25 this year, so more championships may lie ahead. As a result of his performance in Georgia, Charlie has now picked up a sponsor, which has provided him with, among other things, a state-of-the-sport light for his bike. Now that he can actually see the trail well during night laps, he is going faster than ever in the only race he has entered since the World Championships, the 6-hour Tidewater Challenge race. He not only won, but set a new course record for most laps completed in 6 hours.

GRANTS, AWARDS, PRESENTATIONS

Chelsea Black, was awarded the Biological Sciences Outstanding Undergraduate Researcher Award. This award is given annually to a senior Biological Sciences major who has demonstrated outstanding dedication and aptitude for research.

Fred Benfield has been appointed for a 3 year term to the US EPA Science Advisory Board, Ecological Processes and Effects Committee. The function of the EPEC is to provide advice to EPA on the Agency's Tiered Aquatic Life Uses Guidance, which outlines the use of biological information to define water quality standards.

Bela Novak, a close collaborator of John Tyson for the past 15 years and a frequent visitor to the Department, was recently named the first Professor of Integrative Systems Biology at Oxford University, UK.

Zhaomin Yang received tenure and promotion to Associate Professor. Dr. Yang earned a Ph.D. in microbiology from the University of California at Davis. He worked as a postdoc at the University of California, Los Angeles and an assistant professor at Auburn University before joining our department in August 2002.

Dorothea Tholl is the recipient of an Advance VT research seed grant of \$19,244 for 2006/2007. She will conduct a functional analysis of volatile organic compounds in plant roots.

Carla Finkelstein has been recently awarded a grant from the American Heart Association to investigate the regulation of cell proliferation during normal heart development and in response to pathological cardiovascular conditions. Two major problems arise in the cardiovascular medicine field: i) the *excessive* cellular division in vascular proliferative conditions (*e.g.* atherosclerosis, angiogenesis, and restenosis) and ii) the *inability* of differentiated myocytes to proliferate and regenerate new myocardial tissue following severe injury. In both events, modulation of endogenous levels of cyclin-dependent kinase inhibitors (CKIs), key components needed for cell cycle progression, is essential to the control of proliferation. The proposed studies are aimed to identify what molecules and alternative mechanisms can control the level of CKIs to help develop new therapies to treat proliferative diseases and to promote tissue regeneration.

Liwu Li co-chaired a meeting session for the international inflammation research association held in October at Cambridge Maryland. Dr. Li also participated in the National Institute of Health grant review panel on innate immunity and inflammation held in November at San Antonio, TX. Dr. Li gave a talk during the joint annual meeting of the society for leukocyte biology and the international endotoxin and innate immunity society, and participated in the education committee for the society of leukocyte biology at San Antonio, TX. Dr. Li was an invited guest speaker for the Microbiology and Immunology graduate program at the University of Maryland School of Medicine, Baltimore, MD. Dr. Li was also an invited speaker for the Cancer Immunology program at the University of Louisville School of Medicine, Louisville, KY.

Mary Schaeffer and **Arthur Buikema** received a grant from Li-Cor Biosciences and matching funds from the department and Provost's Office to purchase a \$102,720 Li-Cor 4300 sequencing system to be used for teaching undergraduate laboratory classes.

The equipment will sequence single-stranded, double-stranded, or PCR product DNA. It comes with a microsatellite package and an amplified fragment length polymorphism (AFLP) application package that allows genotyping of diploid and polyploid organisms in biodiversity, forensics and mapping research. This equipment will be used to enhance the laboratory exercises in Honors biology and freshman biology for majors courses and introduce our students to additional techniques in molecular biology. New laboratory exercises will be developed to help students understand the interconnectivity between cell and molecular biology with organismal biology and ecology. Once introductory laboratory exercises are established, the equipment will also be available for upper level cell and molecular laboratory classes and undergraduate research projects. Training in the use of this equipment at the freshman level will allow undergraduates to get more research experience prior to graduation.

Jack Cranford was recognized at the US Coast Guard Auxiliary Change of Watch (Command Change) of New River Flotilla 83 for his all volunteer service to the Coast Guard. Flotilla 83 has responsibility on the New River over its entire length in the state of Virginia; with a major focus on aides to navigation, search and rescue, and boater safety on Claytor Lake. He was recognized with a Certificate of Appreciation for his duties as the Marine Safety Officer and reappointed to that position for 2007. His work has been quite broad including Marine Safety and Environmental Education, Boater Safety Instruction service with the New River Valley Swift Water Rescue Team, and Search and Rescue service on Claytor Lake over the last 18 months. In any organization with an all volunteer service structure, education, training, water missions and service must continue in order to maintain certification; these often add up to considerable hours and Jack was recognized for the flotillas "Most Hours Recorded" for all duty types in the Coast Guard. At the completion of the ceremonies an Auxiliariest of the Year is recognized and Jack was the 2006 recipient of that award and will be moved forward to the Division as the Flotilla nominee at that level.



Dr. Cranford training fellow auxiliariests on use of a boat towing bridle.

Congratulations to Betsey Waterman!

Betsey was awarded the President's Award for Excellence on August 27, 2006. This award recognizes staff for their outstanding contributions to Virginia Tech. Nominations are received from all areas of the university and recognize extraordinary contributions and sustained excellence in their job duties and responsibilities.

Alumni and Friends

We need your support !

Your gifts to the Department of Biological Sciences and alumni projects have helped us move forward in our quest for excellence. Thank you!

With continued support, you can help us build strong scholars, make higher education affordable, and attract the brightest and best students and faculty to Virginia Tech. Tangible gifts reflect a donor's dedication to enriching the university experience for students and faculty alike.

We are also seeking large gifts to equip the new biology building and establish chaired faculty positions. Your contributions are tax deductible. For more information on "Ways to Give," visit <http://www.giving.vt.edu>.

**DONORS CAN TRULY SEE THE FRUITS OF THEIR LABOR AND
FEEL A SENSE OF PRIDE WITH EACH VISIT TO CAMPUS**

MAKE A GIFT THAT WILL LAST FOREVER

*Make check payable to the Virginia Tech Foundation.
Write "for Biological Sciences" on your check and mail to:*

**Dr. Robert Jones
Biological Sciences 0406
Virginia Tech
Blacksburg, VA 24061**

Help us keep our records updated

We welcome comments and items of interest for future newsletters. Please contact Dr. Robert Jones, Biological Sciences 0406, Virginia Tech, Blacksburg, VA 24061. You may also send an email to Tracy Price (tbolling@vt.edu) or Robert Jones (rhjones@vt.edu).

Had a Favorite Teacher?

Please drop us a line (rhjones@vt.edu) about your favorite Biology teacher. We will use your comments to support excellence in teaching at Virginia Tech.



2006 Summer Bloom of the Amorphophallus titanum "Corpse Flower." Check out the website for more detail www.biol.vt.edu/greenhouse/amorphophallus.htm

Photo taken August 8, 2006



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