Biological Sciences

VIRGINIA TECH

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In this issue:

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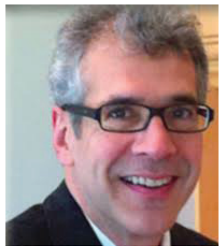
We welcome comments and items of interest for future newsletters.

Please contact Valerie Sutherland (vsutherl@vt.edu) via email, or write to us at the Department of Biological Sciences, Mail Code 0406, Virginia Tech, Blacksburg, VA 24061.

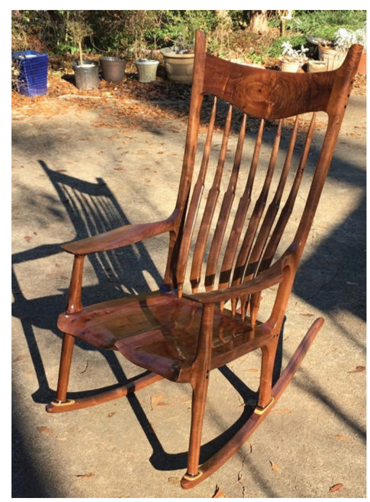
Meet Our New Department Head, Bob Cohen



Greetings! I am writing this letter from Clemson University, eagerly counting the days until I start my new position as department head of Biological Sciences. Over the last few months, I have gotten to know your current head well and have realized that I have big shoes to fill, just as **Brenda Winkel** must have realized she had big shoes to fill when she took the reins of department head from **Bob Jones,** who is now the current Provost at Clemson University! It is indeed a small world.

I plan to spend most of my first semester as department head learning about the department. What works great? What works not so great? Where are the new opportunities and how can we best take advantage of them? To this end, I plan to reach out to all of you. You share many of the same concerns that we in the Department do and you know how Virginia Tech can best serve our state, nation, and world. I am eager to get to know you and hear your thoughts.

Perhaps you also want to know about me? I was born and raised in the greater Philadelphia area. My Ph.D. work was on the molecular genetics of cancer-causing viruses, but over the years my interests broadened to include studying how genes are turned on and off and how gene products (mRNA and protein) are targeted to specific regions of the cell, with the ambitious goal of understanding how cells acquire their unique identities and organize to form tissues and other functional units.



Over the years, I have also become interested in departmental administration. Virginia Tech will be my third stint as department chair/head, having served that role at both the University of Kansas and Clemson University. I have often heard people say, "Department chair is the toughest job on campus", but I do not feel that way at all. Helping students, staff, and faculty succeed in their careers is a really rewarding experience and there is no other job I would rather have. I've found many similarities between running my research program and running a department. They both require problem solving skills or at least a desire to put things together in the right way, like solving a puzzle. I draw similar satisfaction from my hobby—woodworking. One of my pieces is displayed at right.

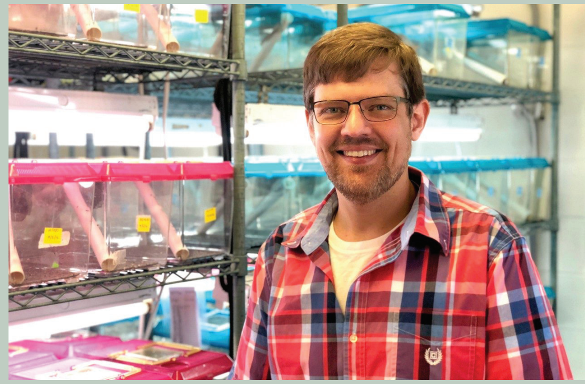
In a way, the Department of Biological Sciences at Virginia Tech—the buildings and people—is a colossal, problem-solving super-organism. From feeding and powering the planet to improving human and environmental health, it is difficult to conceive of a modern world challenge that would not benefit from the expertise of our faculty and staff, and the students we train. The research in our department is diverse both in the questions we ask and the approaches we use. We work collaboratively and across scales—from single molecules and cells to whole organisms and ecosystems. As such, our faculty bridge traditional disciplinary boundaries and serve as a hub, connecting academic units across our campus and across institutions worldwide with the common goal of creating a more informed and better tomorrow.

The next time I write, I will have several months of learning behind me and a better fix on where the department stands and is going. I look forward to sharing those observations and thoughts with you. In the meantime, please introduce yourselves and do not hesitate to write or, better yet, arrange a visit. I--we--would love to see you!

--Bob Cohen

Study: Genetic variation can leave long-lasting stamp on evolutionary patterns

By Steven Mackay, Director of Communications Advancement, VT College of Science



A new study from Virginia Tech takes on the decades-old battle of which has more impact on evolution: genetic variation or natural selection.

In a study published in the latest issue of Evolution Letters, Virginia Tech researcher **Joel McGlothlin** has found that genetic variation can leave a much longer-lasting stamp on evolutionary patterns than was previously thought. Started when McGlothlin was a post-doctoral researcher at the University of Virginia, the study focuses on Anolis lizards, which McGlothlin and other scientists say are "icons" of adaptive radiation, an evolutionary pattern involving the origin of group of related species that differ in appearance and ecological role.

"Different anoles species have evolved different traits that allow them to live in different habitats such as in treetops or on tree trunks," said McGlothlin, an associate professor in the Department of Biological Sciences, part of the Virginia Tech College of Science. "During the past 40 million years or so, species with body types fitting them into these habitats have evolved several times across different islands in the Caribbean. This suggests that natural selection has had similar effects on evolution under similar conditions."

However, scientists know that natural selection doesn't always push a species in the optimal direction, McGlothlin said. Because natural selection works with existing genetic variation, evolution can be "constrained" by genetics. For example, if some traits are not as heritable as others, they may evolve more slowly. Also, when traits are correlated with each other — such as arm length and leg length — it may be more difficult for them to evolve on their own, he added. Although these constraints are important over a few generations, whether they are important over millions of years of evolution is more controversial.

McGlothlin and his team sought to disentangle the roles that natural selection and genetic constraints played in the evolution of body shape among anoles. "What we found was the species become differentiated from each other in ways predicted not only by their habitat, but also by patterns of genetic variation," McGlothlin said. "Traits that were more genetically variable showed greater evolutionary changes across species. We were really surprised that we still saw this pattern when looking across 40 million years of evolution."

In the study, McGlothlin and his team — which included Edmund "Butch" Brodie III, a professor at the University of Virginia and McGlothlin's former postdoctoral mentor, and Jonathan Losos, a professor of biology at Washington University in St. Louis, Missouri — measured patterns of genetic variation for body-shape traits in seven different species of anoles and compared it to how traits evolved across species. The team also included several undergraduate students from several universities.

They collected adult lizards from Puerto Rico, Jamaica, and the Bahamas and bred them in the lab to produce thousands of offspring. Measuring traits, such as head shape and limb length, in these offspring allowed the researchers to measure how much trait variation was due to heritable differences that could be passed down from parent to offspring.

The team found another surprising result: The relationship between genetic variation and evolution was maintained even though the genetic variation they measured also changed across evolutionary time. Their analysis suggests that genetic variation isn't just passive material for natural selection. Instead, it seems to co-evolve with the traits themselves, perhaps changing in response to selection.

"When we began this study, we thought we might be able to provide strong evidence favoring either selection or constraint, but instead, we may have demonstrated just how difficult they are to separate," McGlothlin wrote in a blog post for Evolution Letters. "At least in anoles, constraint shapes the evolutionary response to selection, but also evolves in response to selection in such a way to keep the two entwined. Perhaps it's this never-ending creative dance that makes evolution so interesting in the first place."

The study of these lizards can help scientists understand the evolution of other species, said McGlothlin, who is an affiliated member of the Fralin Life Science Institute's Global Change Center. "Our results are pretty general, and I wouldn't be surprised if we saw similar patterns if we looked genetic variation in humans and our closest relatives," he added.

McGlothlin is continuing to research the role of genetic variation in evolution. "Now, we are asking some similar questions using a single species, the brown anole," McGlothlin added. "In that species, males and females are really different, and we're trying to apply what we've learned about the evolution of different species to understand how males and females evolve to become different in appearance."

Researchers discover insights into cellular surveillance pathway that may have implications for cancer treatment

By Kristin Rose, Communications Manager, Fralin Life Science Institute

The more complex a system is, the more likely it is to break, simply because there are more potential breaking points.

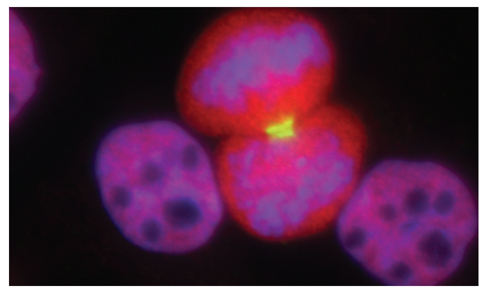
How does a complex system, like a cell undergoing cell division, ensure that it survives and remains healthy?

Silke Hauf, an associate professor of biological sciences in the College of Science at Virginia Tech, studies a cellular surveillance pathway, or a cellular "checkpoint," that prevents cells from acquiring the wrong number of chromosomes.

"This checkpoint delays cell division until any errors are repaired. But cancer cells, although capable to activate the pathway, are more prone to escape the surveillance and produce abnormal daughter cells," explained Hauf, a Biocomplexity Institute Fellow and an affiliated faculty member of the Fralin Life Science Institute.

To understand how this checkpoint protects dividing cells and how cancer cells escape this control, the Hauf lab recently teamed up with Andrea Ciliberto and his research group in Milan, who are experts in computational modeling.

Last year, the two groups met for a retreat in northern Italy to exchange research findings and to discuss their respective results during hikes and communal cooking.



During the discussions, a picture emerged that cancer cells may escape surveillance by accumulating more of a protein that is targeted by the checkpoint.

"But not all cells show the same response to this extra protein, which puzzled us," said Ciliberto.

By computationally modeling the pathway, the U.S.-Italian team identified one crucial reaction in the network that determines whether the pathway response is weakened by accumulation of the target protein or not.

This research was recently published in PLoS Computational Biology.

"This is exciting, because our findings suggest that modulating this single reaction with drugs may tune the pathway," explained Hauf.

The researchers predict that reinforcing the reaction may kill cancer cells that have accumulated more of the target protein but still allow other cells to divide normally.

"How to target dividing cancer cells but not other dividing cells in the body is a recurrent problem in cancer therapy," said Hauf.

Unfortunately, this does not mean the problem is solved. "Finding such a drug will be extremely challenging," said Ciliberto. Nevertheless, the new results will make it easier to predict how this checkpoint responds to any interference.

The groups are now planning another retreat - this time in the mountains around Blacksburg - to hash out the next steps. For Ciliberto, this would be a return, since he spent several years in Blacksburg as a post-doctoral fellow in the group of John Tyson, a University Distinguished Professor in biological sciences.

For now, the groups have picked slightly different questions to follow but they expect the results to be complementary. Hauf's group is exploring how cells control the concentration of checkpoint proteins and target protein. Ciliberto's lab has started to focus on the cells that accumulate the target protein and what makes them so successful that they can outcompete normal cells.

Both Hauf and Ciliberto are sure: "More questions will come up once we start cooking."

GIVING DAY
VIRGINIA TECH

Save the Date for the Spring Semester is March 19, 2019! Our First Giving Day was a great success with 79 donors contributing $7,838 to the Biological Sciences Annual Fund. These contributions all the department to support student and faculty recruiting, Research Day and the Biology Graduate Student Association. A sincere thanks to our loyal alumni and friends. The future is indeed bright for the Department of Biological Sciences!

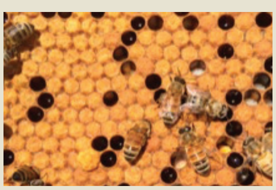
Selected New and Renewed Grants

Life-cycle assessment of biochar in agricultural and forest ecosystems: Effects on production, soil fertility, and economic impact
(USDA/NIFA/ BRDI, 3 years, $610,000)
Principal Investigator: **John Barrett** (Professor of Biological Sciences; Co-PI's: Marcella Windmuller-Campione (U. of Minnesota), Harry Groot (Dovetail Partners Inc.)

The objective of this project is to test the effectiveness of biochar, the bio-based product of pyrolysed biomass applied to soils, in enhancing soil fertility, productivity, and soil carbon sequestration in diverse managed ecosystems, including pasture, vegetable gardens, and forests across a national network of sites. Researchers will use locally-sourced material as feedstock to support biochar production and applications in a network of small- and mid-size agricultural and forestry operations across the U.S. The team will conduct replicated, controlled, experiments to compare the effects of different biochar feedstocks and activation methods on soil fertility, primary productivity and examine the mechanisms by which biochar influences biogeochemical cycling and soil microbial communities (using standard stable isotope and amplicon sequencing approaches). The results of this research will advance the understanding of how biochar works to promote soil fertility and agro-ecosystem productivity and hence be of interest to producers, land-managers and soil scientists alike. Working directly with landowners and managers we will seek to provide practical information to producers about the effective use of locally-sourced biochar to enhance their operations and potentially stimulate biobased product development and markets in rural communities.

Functional Analysis of a Non-coding RNA in the Mammalian Circadian Clock System
(National Institutes of Health, 5 years, $1,630,000)
Principal Investigator: **Shihoko Kojima** (Assistant Professor of Biological Sciences); Co-I: **Jing Chen** (Assistant Professor of Biological Sciences)

Disruption of our internal timing system can lead to many pathological states in humans, and yet, in this modern world, our internal clock is constantly abused by lifestyle factors such as jet lag, artificial light, and shift work. This proposal focuses on deepening our understanding of how daily rhythms are generated by exploring the function of a recently discovered non-coding gene in the mammalian circadian clock system using both experimental and mathematical approaches to provide an accurate, quantitative analysis of circadian gene regulatory networks. Outcomes from this study will help us develop therapeutics for people who suffer from disrupted internal clocks.



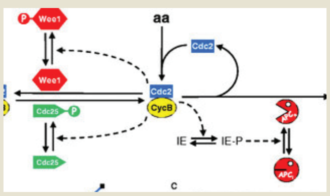
A systems approach to understanding signaling networks in host-microbiome-parasite interactions
(National Science Foundation, 4 years, $958,000 with $750,000 to Virginia Tech)
Principal Investigator: **Lisa Belden** (Professor of Biological Sciences); Co-PI's: Richard Fell (VT Entomology), T.M. Murali (VT Computer Science), David Haak (VT Plant Pathology and Weed Science), **Jenifer Walke*** (Eastern Washington U.)

All animals contain complex communities of bacteria and other microbes, known collectively as the microbiome. These microbes perform many important functions for their host, including defense against infection by parasites and pathogens. To accomplish these functions the microbes must interact closely with both host and parasite cells. Increasingly, scientific evidence suggests that these interactions occur through the production of chemical messengers that allow communication among the bacteria in the microbiome, the host and the parasite. This research project advances understanding of the microbiome by devising a model honey bee gut system. Such a system has significantly fewer bacterial taxa and performs the same functions as other gut microbiomes, including playing a role in host defense against parasites. In this honey bee system, both network models and experimental manipulations of the gut microbiome are used to further understanding of the microbiome and its role in host defense. The knowledge derived from the project would be important for manipulating the microbiome for host health, including, ultimately, that of humans. A computer science and biology-based outreach module for elementary school students is being developed. Students and teachers are guided through the building of Raspberry Pi clusters, which are then used for student-driven projects based on the research datasets.

****former Belden research scientist***

Host ocular microbiome and pathogen dynamics: from individual to population-level effects in a songbird
(National Science Foundation, 3 years, $625,000)
Principal Investigator: **Dana Hawley** (Associate Professor of Biological Sciences); Co-PI: **Lisa Belden** (Professor of Biological Sciences)

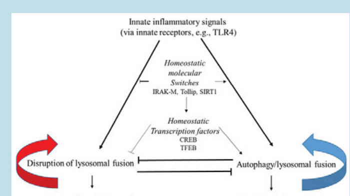
Animals harbor many microbes that serve key beneficial roles for their hosts, including protection from disease. While the beneficial roles of many microbes are well established, it is not yet known how these benefits scale up to an entire population and influence disease outbreaks in populations. This award focuses on a contagious 'pink- eye' disease of a common songbird, the house finch. Beneficial bacteria in the eyes of finches can protect birds from developing severe 'pink-eye'. This project examines how the dose of infection impacts the ability of beneficial bacteria to protect birds against disease, and whether beneficial bacteria on the eye can prevent or slow down the spread of this highly contagious disease within a flock of birds. Findings of this research will have important implications for understanding infectious disease outbreaks in wildlife, domestic animals, and humans. Investigators will engage undergraduate and graduate students in the use of new genomics tools to identify beneficial microbes. Using this study system and others as examples, project personnel will work with the Science Museum of Western Virginia to design a permanent, interactive 'Friendly Microbes' exhibit that illustrates the many ways that microbes benefit their hosts. Graduate students at Virginia Tech will learn how to better communicate science by assisting with the exhibit design and summer workshops associated with the exhibit.



ABI Innovation: Automated Prioritization and Design of Experiments to Validate and Improve Mathematical Models of Molecular Regulatory Systems
(National Science Foundation, 3 years, $1,520,000))
Principal Investigator: T.M. Murali (VT Computer Science), Co-PI's: **John Tyson** (University Distinguished Professor of Biological Sciences), Kristy Collins (VT Biocomplexity Institute)

Complex networks of interacting molecules control all the physiological processes that occur in a living cell. It is impossible to deduce the functions of these networks using intuitive reasoning alone. Therefore, scientists construct mathematical models of cellular processes that can be simulated in the computer. Unfortunately, it takes many years of careful study of the scientific literature and steady incremental progress to construct detailed comprehensive and accurate mathematical models. This project will create an integrated computational - experimental framework that will significantly accelerate the process of mathematical modeling. The project will create several scientific innovations including: (a) novel approaches to searching the space of model simulations to identify promising predictions; (b) computational techniques to efficiently plan experiments; (c) experimental methods that use these plans to rapidly test model predictions; and (d) automatic techniques to extend and refine the models to accommodate the results of these experiments. The project will benefit science by applying this framework to develop a comprehensive new model that describes how nutrients control the growth of baker's yeast cells. Long term benefits to society will accrue from the use of the methods developed by this project to study any complex cellular system, e.g., those implicated in cell proliferation in cancers, wound healing, and tissue regeneration.

Modulation of innate immune cellular homeostasis and inflammation resolution
(National Institutes of Health, 4 year renewal, $1,610,000)
Principal Investigator: **Liwu Li** (Professor of Biological Sciences)



Non-resolving chronic inflammation due to defective homeostatic resolution underlies the pathogenesis of atherosclerosis, a significant cardiovascular complication that imposes enormous health and economic tolls. Studies from the PI's group and others indicate that the lack of effective homeostatic negative regulators may underlie the run-away inflammation and the pathogenesis of chronic atherosclerosis. The PI's group has identified that IRAK-M (interleukin-1 receptor associated kinase M) is one of the key negative regulators of monocyte inflammation. At the molecular level, the PI observed that IRAK-M may selectively suppress inflammatory activation of monocytes through suppressing key inflammatory transcription factors such as NFκB and IRF5. At the sub-cellular level, the PI discovered that IRAK-M may maintain and restore cellular homeostasis through facilitating the proper completion of autophagy. At the tissue and pathophysiological level, the PI reported that IRAK-M deficient mice are prone to develop aggravated atherosclerosis, due to enhanced recruitment of low-grade inflammatory monocytes to the aortic plaque. The levels of monocyte IRAK-M are significantly reduced in mice under low-grade inflammatory conditions. The long-term goal is to define novel therapeutic targets for maintaining a proper balance of immune environment and treating atherosclerosis associated with chronic low-grade inflammation.

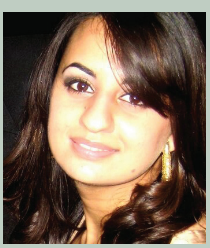
Alumni Spotlights

Karen Holl received a B.S. in Biology from Stanford University in 1989, and a Ph.D. in Biology from Virginia Tech in 1994, working with **John Cairns**. She is currently a Professor of Environmental Studies at the University of California, Santa Cruz. Her research focuses on understanding how local and landscape scale processes affect ecosystem recovery from human disturbance and using this information to restore damaged ecosystems. Her current research is focused in rain forests in Latin America and chaparral, grassland and riparian systems in California. She oversees a long-term tropical forest restoration study in southern Costa Rica and has worked with students and collaborators in Mexico, Brazil, Colombia, and Panama. She advises numerous land management and conservation organizations in California and internationally on ecological restoration. She works to further efforts to conserve tropical forest, in part by training students from Latin American countries. She was selected as an Aldo Leopold Leadership Fellow, a Fellow of the California Academy of Sciences, and the 2017 co-winner of the Theodore Sperry Award of the Society for Ecological Restoration. She teaches courses in restoration ecology, conservation biology, and environmental problem solving. She has served as chair of the Environmental Studies Department at UCSC and is currently the faculty director of the Kenneth S. Norris Center for Natural History. She is the associate editor for the Island Press-Society for Ecological Restoration book series.

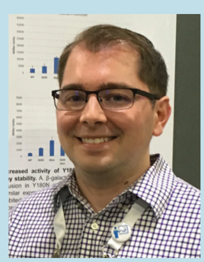
Randal Hand received a B.S. in Biology from Virginia Tech in 2001, and a Ph.D. in Pharmacology from the University of North Carolina at Chapel Hill in 2010. From 2010 to 2016, he worked as a postdoctoral fellow in the Department of Neuroscience at the Johns Hopkins University. He is currently a Research Specialist at Howard Hughes Medical Institute / Johns Hopkins. His research focuses on the genetic basis of neural circuit assembly in the cerebral cortex and retina of mice. In addition to his research, he leads scientific workshops and mentors junior scientists including undergraduates, graduate students, and medical students.

Lori Kam received a B.S. in Biology from Virginia Tech in 2001. She currently works as a Sponsored Research Administrator for the Santa Fe Institute in New Mexico. Her office provides services to ensure the submission of competitive proposals and effective management of awards. "My career path definitely has worked in ways that I wouldn't have expected when I graduated, but I feel fortunate to have had the opportunity to become a member of this dynamic and nurturing community in the southwest," says Kam.

Jan Zajdowicz received a B.S. in Biology, with a Microbiology/Immunology emphasis, from Virginia Tech in 1998. He went on to earn an M.S. in Biotechnology from Old Dominion University in 2000. He is currently Senior Manager of R&D Operations/Research Microbiology with AlloSource in Centennial, Colorado. AlloSource is "one of the largest nonprofit cellular and tissue networks in the country, offering more than 200 types of precise cellular, cartilage, bone, skin and soft-tissue allografts to advance patient healing. For more than 20 years, AlloSource's products have bridged the proven science of allografts with the advanced technology of cells, offering life-saving and life-enhancing possibilities in spine, sports medicine, foot and ankle, orthopedic, reconstructive, trauma and wound care procedures."



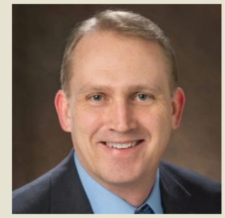
Aleea Farrakh Khan received B.S. degrees in Biology and Psychology from Virginia Tech in 2005. She is currently the Senior Manager of Science Communications Strategy and the Media Relations Manager for the American Society for Microbiology in Washington, DC. Her duties include oversight and implementation of all strategic communication plans for ASM programs and products, including journal research, scientific reports, and meetings. She is also responsible for managing all communication partnerships with stakeholders, including media relations and public outreach, as well as crisis communication and executive leadership communication.



Michael Betteken received a B.S. in Biological Sciences, with a concentration in Microbiology and Immunology, from Virginia Tech in 2009. During his junior and senior years at VT, he worked as an undergraduate researcher in **David Popham's** lab. In 2015, he earned a Ph.D. in Microbiology and Immunology from East Carolina University, then worked for a year as a postdoc at the East Carolina University Division of Health Sciences in Greenville, NC. Dr. Betteken is currently a postdoctoral associate in the Department of Population Medicine and Diagnostic Sciences at the Cornell University College of Veterinary Medicine.

We love hearing from our alumni! Drop a note to vsutherl@vt.edu to let us know about your time at Virginia Tech, and about what you're doing now!

Djanan Nemours received a B.S. in Biology from Virginia Tech in 1990, and an M.S. in Science Education from Florida State University in 2001. She is currently a Biological Scientist in the Wetland Soils Lab at the Center for Water Resources at Florida A & M. Her duties include soil sampling, analysis, and soil erosion research. Currently her interests lie in soil nutrients testing and analysis, including the use of Biochar as a soil amendment. Her past teaching experiences foster a strong affinity for working with students of diverse backgrounds. Ms. Nemours partners with the International Agriculture Department to train FAMU's Farmer-to-Farmer clientele in soil conservation methods and laboratory techniques.



D.J. Ferguson received a B.S. in Biology from Virginia Tech in 1992, and a Ph.D. in Microbiology from Ohio State University in 2000. He went on to work as a postdoc at Veteran's Administration Medical Center in Cincinnati, and as a research associate and adjunct assistant professor and the University of Cincinnati. He is currently an associate professor of microbiology at Miami University. His research interests include: the role of microbial metabolism of quaternary amines in cardiovascular disease, quaternary amine metabolism in *Desulfitobacterium hafniense*, and quaternaryamine dependent methanogenesis. He also currently serves as the President of the Ohio Branch of the American Society for Microbiology.

The Third Annual **Virginia Tech Science Festival** was held on campus Saturday, October 27th, with 93 hands-on minds-on learning booths and activities showcasing dozens of science education and research programs across the university. Events were held in the Moss Arts Center, Carol M. Newman Library, Torgersen Hall, and along Alumni Mall.

The Department of Biological Sciences was represented by five different festival exhibits, which could be explored using an "Activity Passport":

- "Our Green World" by the **Massey Herbarium** included a digital microscope for examining plants, a botanical wheel of destiny, and a make-your-own mini herbarium.

- "Microbiology in Your Daily Life" by the **Microbiology Club** featured microscopes, live microbes on Petri dishes, and information on the importance of proper hand washing.

- "Inside Reptiles (And You)" by **Joel McGlothlin's** lab, showed how the lab uses X-rays to look at lizard bones to discover what bones tell us about how humans and other animals are related.

- "Build-a-Stream" by the **Stream Team** (which includes the labs of **Jeb Barrett**, **Bryan Brown**, **Cayelan Carey**,
- **Erin Hotchkiss**, and **Meryl Mims**,) featured a hands-on stream table, where vistors could design a landscape and discover how streams flow and change over time.

- "The Balance of Nature" by the **Interfaces of Global Change Interdisciplinary Graduate Education Program** (which includes 25 Biological Sciences graduate students) had an exhibit with games, activities, specimens and lab tools, which allowed visitors to explore how the study of pollution, habitat loss, disease, invasive species, and climate change are connected.

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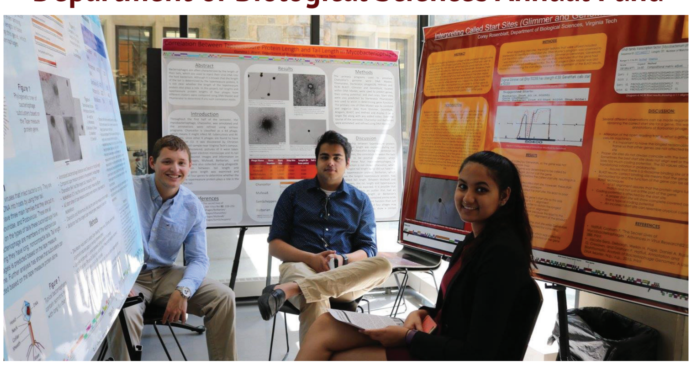
Department of Biological Sciences Annual Fund



One person can make a big difference!

The Department of Biological Sciences is the hub for life sciences research and teaching at Virginia Tech, with interdisciplinary connections that span the entire university and a commitment to training the next generation of scientists at the forefront of the discipline.

Our faculty tackle the world's most challenging problems through both basic and applied research, from human disease to the effects of global change. As one of the university's largest departments, we were honored this year with the University Exemplary Department Award for our outstanding teaching efforts and innovative learning environments.

Your support is critical to our future success. Contributions from our alumni, parents and friends help our many deserving students, provide state-of-the-art facilities, expand research activities, and allow our students explore a wide array of career opportunities. Gifts made without restriction allow departmental leaders to respond to opportunities immediately and to allocate resources where they can have the greatest impact.

When you receive your College of Science Annual Fund letter or phone call, please earmark your support for the Department of Biological Sciences Annual Fund (fund number 881317). Simply make a notation on the gift card or let the caller know that you want to direct your donation to Biological Sciences. To make an immediate contribution, you may visit the university's web site at givingto.vt.edu or contact the Office of Gift Accounting at (800) 533-1144.

For more information or to learn about other ways to support the College of Science, please contact Wade Stokes, Assistant Dean of Advancement, at (540) 231-4033 or lwstokes@vt.edu. We thank you in advance for your support!