



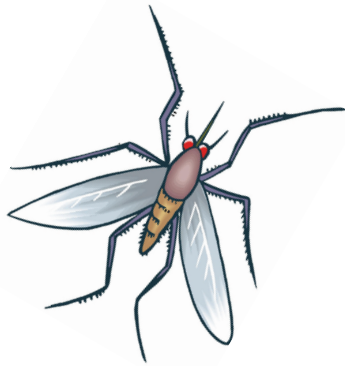
VirginiaTech

Fralin Life Science Institute

spring 2014

the

FRALIN EXPLORER



3

bird's eye view

an eye disease leaves finches vulnerable to predators

8

battling *Brucella*

Researcher Clay Caswell discusses the tricky bacterium

10

peptide power

a graduate student uses chemistry to fight HIV

13

roadside hope

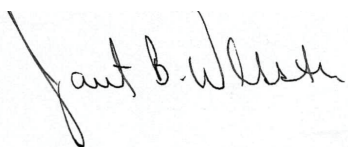
local volunteers explore new diabetes prevention method

WELCOME TO FRALIN



Janet B. Webster

Associate Director of Operations
Fralin Life Science Institute and Virginia
Bioinformatics Institute



Thanks for taking a look at our latest edition of *The Fralin Explorer*. We hope you enjoy reading about all of the exciting things going on in the Fralin Life Science Institute. This edition has stories about Dr. Kevin Davy's study of inulin as a diabetes prevention method, Dr. Clay Caswell's study of the *Brucella* bacterium, and Dr. Webster Santos' work with HIV, to name a few. We also have photos from the very successful microbiology symposium, which was held at the Inn at Virginia Tech on March 7.

Another very exciting change that has occurred at the Institute is that our director, Dennis Dean, has moved his office back to Fralin Hall after stepping back from his Director duties at VBI. Please see the article on page 4 for more information about these changes. In addition to his duties as the Director of

the Fralin Life Science Institute, Dennis will also provide leadership for Virginia Tech's life science community through the Office of the Vice President for Research. Come by room 103 and welcome Dennis back. We are thrilled to have him spend more time in Fralin!

In conjunction with Dennis' move back to Fralin, I have been assigned additional administrative duties related to communication, outreach, and education for both Fralin and VBI. As part of the reorganization, there will be more integration between the administrations of both institutes. I will be splitting my time between both buildings, but have moved my main office to VBI and my office in Fralin is now room 110. I will continue with all of the associate director responsibilities that I currently have at Fralin, including proposal development and manuscript editing, so please don't hesitate to contact me if you have work that needs editing.

ABOUT US

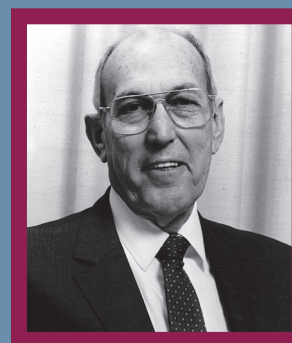
The Fralin Life Science Institute is an investment institute committed to supporting research, education and outreach in Virginia Tech's life sciences community. Residents of the institute's four flagship buildings are automatically considered affiliated faculty members and all other life science researchers on campus are invited to become affiliated faculty members.

Affiliated faculty members are given resources necessary to explore new, innovative science that benefits people in the New River Valley, the Commonwealth of Virginia and the world.

Through seminars, conferences and

research group support, the institute serves as a meeting point for progressive ideas involving multidisciplinary research. It is closely aligned with Virginia Tech's other six research institutes, which include the Virginia Tech Carilion Research Institute, Virginia Tech Transportation Institute, the Institute for Critical Technology and Applied Sciences, the Virginia Bioinformatics Institute, the Institute for Society, Culture and Environment, and the Institute for Creativity, Arts and Technology.

Research initiatives within the life sciences receiving the highest priority for support include vector-borne disease, infectious disease, plant sciences, ecol-



Horace Fralin

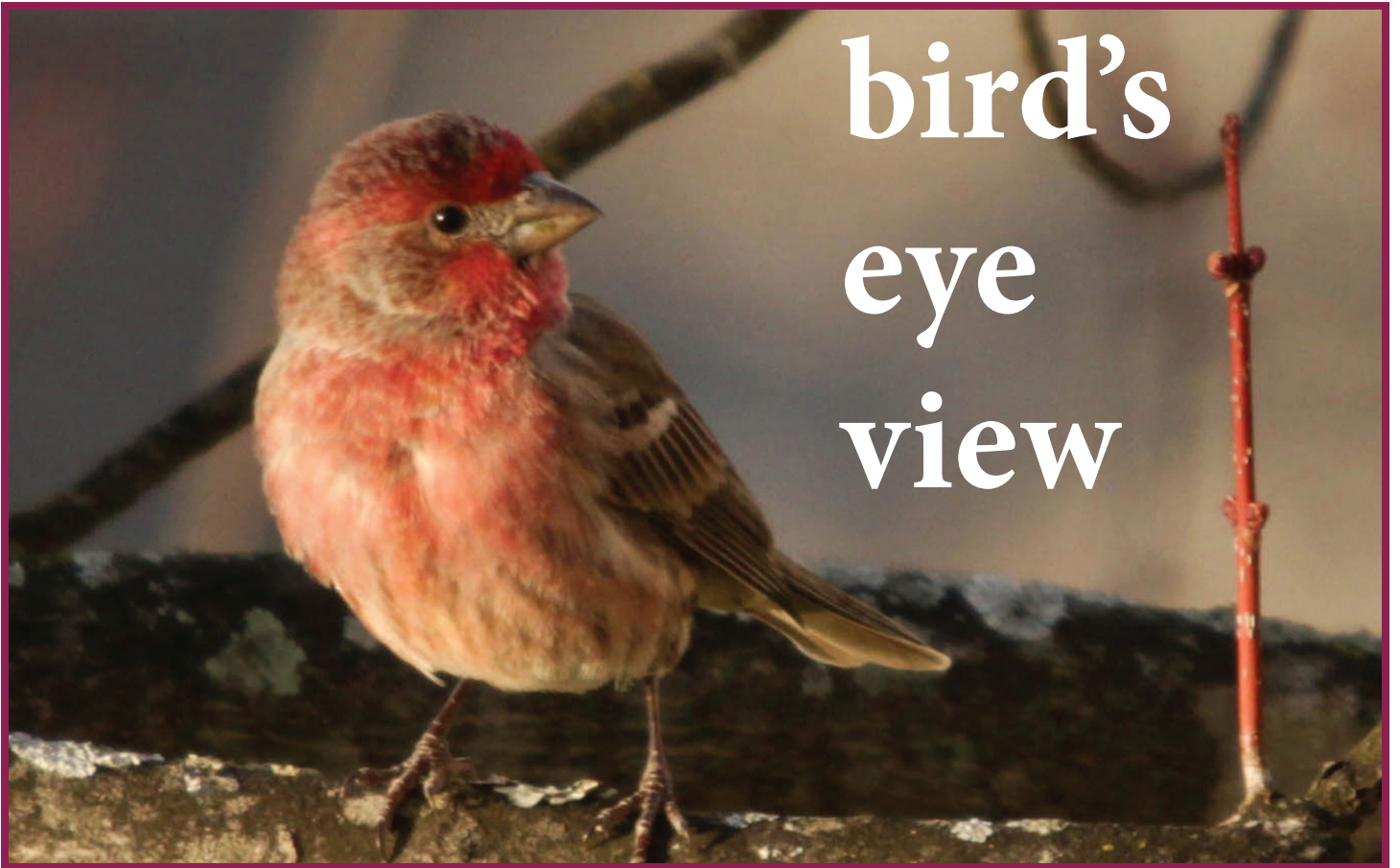
ogy and organismal biology, obesity, and cancer biology. The Fralin Life Science Institute is also actively engaged in cooperative partnerships with colleges, departments, and other institutes that support the life science community.

WHAT'S INSIDE

- 3 Bird's eye view
- 6 Cream of the crop
- 8 Q&A with Clay Caswell
- 10 Peptide power
- 12 Accelerated learning
- 13 Roadside hope

EDITOR: Lindsay Key
WRITERS: Audra Norris, Ricky Soto,
Lindsay Key





bird's eye view

By **Audra Norris**

Chirping birds can be one of the most iconic sounds of spring, but one undergraduate student worries about what happens when the chirping stops.

Corinne Mayer, a senior in biological sciences in the College of Science, has spent the last couple years working with Dana Hawley, an associate professor in that department, studying the contraction of *Mycoplasma gallisepticum* in house finches. *Mycoplasma gallisepticum*, or MG, causes conjunctivitis around the eye and affects anti-predator behavior in finches, causing large numbers in eastern United States populations to die off.

“In the wild they’re dying due to disease, but in the lab the disease doesn’t seem inherently fatal,” Mayer said. “We’re trying to figure out what else contributes to it in the wild. We do know that the disease causes lethargy, which can cause the finches to be preyed upon.”

***Mycoplasma gallisepticum*, or MG, causes conjunctivitis around the eye and affects anti-predator behavior in finches, causing large amounts of eastern United States populations to die off.**

Mayer first started working with Hawley and postdoctoral scholar James Adelman in her sophomore year. With her already-present passion for veterinary science and exotic animals, Hawley’s research in wildlife disease grabbed Mayer’s attention. Once she began working in the lab, she threw herself into the research.

“Corinne is one of the most dedicated and independent undergraduate researchers I have ever worked with. She had to arrive before sunrise on numerous days to complete her behavioral observations during the time of day when birds are most active. She spent hundreds of hours watching videos in



Dana Hawley



Corinne Mayer

order to quantify how birds behave in response to the threat of predation, and her talent and dedication earned her the opportunity to present her work at the ACC Meeting of the Minds (MOM).”

The MOM Conferences are histori-

cally highly competitive, and students are often chosen through a refereeing process. Mayer, along with seven other undergraduate researchers, is representing Virginia Tech at the annual research conference. She says that she finds real value in the collaboration with other researchers, and hopes that hers will be valuable too.

“Corinne is filling an important gap in our understanding of wildlife disease ecology by showing that pathogens can lead to population declines in their host by altering the ability of infected hosts to avoid predators,” Hawley said. “These kinds of indirect effects of disease on mortality are likely widespread, but not well documented.”

Mayer agrees that there is a concerning lack of research when it comes to the deadly disease. “There haven’t been very many studies looking at the internal effects of MG. We’re hoping that our findings will lead to more investigation regarding what’s going on because of

the disease, and also lead to a greater understanding of its inner workings,” Mayer said.

“Corinne’s work sits at the intersection of two historically separate fields—wildlife disease ecology and animal behavior— by asking how a common wildlife disease of birds alters the ability of a bird to detect and avoid predators,” Hawley said.

After graduation in May, Mayer plans to attend veterinary school at Virginia Tech. As for after school, Mayer likes to keep her options open. “I’d like to focus on wildlife disease, zoo animals, or maybe exotic animals. I’d never worked with birds before working with Dr. Hawley, but the research has really piqued my interest in them. I’ve also always had a soft spot for endangered animals, so I could see myself doing something with conservation.”

Fralin Life Science Institute, Virginia Bioinformatics Institute reorganize to build efficiency, synergy

The Virginia Bioinformatics Institute and the Fralin Life Science Institute of Virginia Tech are working more closely to share resources and take advantage of research synergies, university officials announced March 26.

In the new structure, life science researcher Dennis R. Dean, who had served as director of both the Virginia Bioinformatics Institute and the Fralin Life Science Institute, will continue as the director of the Fralin Life Science Institute, while the Virginia Bioinformatics Institute Scientific Director Christopher L. Barrett assumes executive director duties at the Virginia Bioinformatics Institute.

“We are extremely excited to have Dr. Barrett lead the way forward and grateful to Dr. Dean for his work directing the Virginia Bioinformatics Institute of Virginia Tech,” said Robert W. Walters, vice president for research. “Dr. Dean’s leadership at both [Virginia Bioinformatics Institute] and the Fralin Life Science Institute for the past two years has provided an excellent opportunity for us to assess and implement substantive integration of resources available to both institutes. Moving forward, my expectation is that Dr. Barrett and Dr. Dean will continue collaborating to increase operational efficiencies and maximize opportunities for the broad support of Virginia Tech faculty.”

Board of Visitors approves microbiology undergraduate degree

The Virginia Tech Board of Visitors approved three new interdisciplinary STEM-H bachelor’s degree programs in March, underscoring the university’s commitment to lead the way and prepare students for careers in critical 21st century fields of study and industry.

The three new degree programs — the Bachelor of Science Degree in Computational Modeling and Data Analytics, the Bachelor of Science Degree in Microbiology, and the Bachelor of Science Degree in Nanoscience — will all be administered in the College of Science.

Pending approval from the State Council of Higher Education for Virginia, students will begin to enroll in these programs during the next academic year. The microbiology program, which falls under biological sciences in the College of Science, will prepare graduates for interdisciplinary research and education, for employment in the private sector,

state and federal government agencies, and for post-baccalaureate training.

The new undergraduate degree is unique in Virginia and establishes Virginia Tech and the state as leaders in education in a field that affects all areas of human endeavor, as microbes play key roles in both deterioration and maintenance of human and animal health, in the preservation and degradation of food, in the generation of bio-fuels, and in maintenance of the earth's environment and climate.

As the need for qualified microbiologists continues to grow, the field of microbiology has virtually unlimited potential. Microbiologists are needed across many industries, including in academic, technology, industrial and environmental organizations.

The U.S. Bureau of Labor Statistics expects a 13 percent increase in the number of jobs for microbiologists and a 14 percent increase in the number of jobs for biological technicians between 2010 and 2020.

Stopping malaria transmission: A Virginia Tech biochemist is out for blood

Fighting malaria in today's world will require a new, targeted approach, and Virginia Tech researchers are out for blood.

The parasites responsible for the mosquito-borne infectious disease are increasingly resistant to current drug approaches, and almost half of the world is at risk of contracting an illness.

Maria Belen Cassera, an assistant professor of biochemistry in the College of Agriculture and Life Sciences, and a Fralin Life Science Institute affiliate, examines the metabolism of the malaria-

causing parasite *Plasmodium falciparum* in order to identify new drug targets.

Her newest project, funded by the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, will look at the crucial time when malaria is transmitted — when reproductive cell precursors known as gametocytes develop. Specifically, she wants to understand the role that certain metabolites called isoprenoids play in the early stages of development.

“We think that understanding the role of isoprenoids during gametocytogenesis and identifying metabolic steps absent or sufficiently different from its human host will allow us to design more efficient drugs to block malaria transmission, which is one of the key components for malaria elimination and eradication,” Cassera said.

The metabolic pathways that the parasite uses are not found in humans, so pathway-specific drugs would have little effect on the human host.

“Dr. Cassera has taken a leap forward in malaria research by identifying a unique pathway at an essential step in parasite development and transmission to mosquitoes,” said Vern Schramm, the Ruth Merns Chair and Professor of Biochemistry at the Albert Einstein College of Medicine, and former postdoctoral mentor to Cassera. “Dr. Cassera is one of a select few scientists who can work productively at the level of parasite biochemistry, biology, drug discovery, transmission, and even primate models of the disease. Her talents have been justly recognized by support from the NIH.”

Cassera is a member of the Virginia Tech Center for Drug Discovery, the Virginia Tech Vector-borne Disease Research Group, and the department of basic science at the Virginia Tech Carilion School of Medicine. She is also involved with the Translational Biology, Medicine, and Health graduate program as part of Virginia Tech's new faculty of health sciences.

These stories first appeared in Virginia Tech News.



Maria Belen Cassera (center) with her students



Virginia Tech remains commonwealth's top research institution: Fralin researchers weigh in



Virginia Tech is known for its innovations and countless scientific contributions, thanks to exceptional faculty and an emphasis on research. In a survey of more than 900 universities, the National Science Foundation recognized Virginia Tech as one of the top institutions in the country for research endeavors.

The NSF analyzed research and development expenditures for the 2012 fiscal year and compiled a list of top 50 universities. Virginia Tech remained number one in the state, and climbed the national rankings to number 40 from number 41. Virginia Tech is the only Virginia institution represented in the NSF's rankings and remains one of the top 25 public institutions.

"Increases in faculty-led sponsored research, combined with our university's strategic investment in areas of regional, national, and global importance have

raised Virginia Tech's prominence as a research university," said Virginia Tech President Charles W. Steger, in a recent Virginia Tech news release. "Research expenditures support student engagement in the process of creating new knowledge and answering society's challenges, creating future generations of thought leaders who will create new technologies, energize the economy, and add to the world's intellectual capital."

Researchers associated with the Fralin Life Science Institute, one of Virginia Tech's seven premier research institutes under the Office of the Vice President for Research, cite university support and diverse learning environments as positive factors in their research endeavors.

"To be successful in establishing your research and getting funded, you need to have the necessary skill set and an institution that supports you at every step.

That is what I found here in Fralin and Virginia Tech," said Belen Cassera, assistant professor of biochemistry in the College of Agriculture and Life Sciences. "Another thing that makes Virginia Tech a great place is the interdisciplinary environment and the diverse set of skills



Belen Cassera



that you can find.”

Since Steger became president in 2000, research and development spending as well as reinvestment in faculty has increased annually. According to the original release, the university’s research portfolio was \$454 million in 2012, almost doubled from \$192.7 million in 2000.

Government awards and agencies such as NSF fund nearly 80 percent of Virginia Tech’s research portfolio. Commercial sources and industry partnerships fund another 10 percent.

“There are a number of reasons why Virginia Tech is the best place to conduct this research. Most importantly, I feel very comfortable doing research here. Virginia Tech has continuously provided me with the resources necessary, from the scientific to the administrative level, to ensure my success,” said Carla Finkielstein, associate professor of biological sciences in the College of Science.

Virginia Tech’s particular emphasis on research shines at a time when investment in research and development is flat lining across the country, according to NSF. Of the top 30 universities, 12 experienced expenditure declines in 2012. Nationally, higher education research and development spending declined by more than one percent.

“The cornerstone of Virginia Tech’s success in today’s highly-competitive academic research environment is our exceptional faculty and students,” said Robert W. Walters, vice president for research, in the original release. “The expertise of our personnel, combined with strategic investment in interdisciplinary focus areas, favorably position Virginia Tech to engage in high-impact research that addresses global research challenges.”

The faculty at Virginia Tech, and Fralin in particular, feel that the uni-

versity’s appreciation of their efforts is often apparent. Many of the research and development aspirations, especially in recent years, are met with enthusiasm and support from the university community.

“We have a multidisciplinary campus that favors, and encourages, the type of collaboration I propose in my applications, and an administration that invests in the future and responds to our needs,” said Finkielstein. “Take, for example, the creation of the Institute for Critical Technologies and Applied Science and, more recently, the Virginia Tech-Carilion Research Institute and Medical School. I believe Virginia Tech has a lot to offer to the cancer field from brainpower to technology, and I am confident in its support of my work.”



Carla Finkielstein

“Virginia Tech has continuously provided me with the resources necessary, from the scientific to the administrative level, to ensure my success.”



Story by Audra Norris
Communications Assistant
Fralin Life Science Institute



COFFEE BREAK WITH A SCIENTIST

Clay Caswell, a new assistant professor of bacteriology in the College of Veterinary Medicine and a Fralin affiliate, discusses his research and why he came to Virginia Tech.

What is the focus of your current research?

Our laboratory studies a bacterium called *Brucella*, which causes infections in both animals and humans. In wild and domesticated animals, these bacteria can cause abortions and sterility, leading to significant economic losses, and in humans, *Brucella* causes an extremely debilitating, relapsing fever known as undulant fever. Importantly, *Brucella* strains represent the most common animal-to-human transmitted disease worldwide.

Moreover, there was unfortunately a time in which several countries maintained offensive biological warfare programs, and *Brucella* strains were developed as biological weapons. Even though these programs have been disbanded, the potential still exists for the use of *Brucella* strains as a means of biowarfare and/or bioterrorism.

To date, there is no human vaccine against *Brucella* infection, and the current treatment regimens for *Brucella* infection are complicated and often prone to disease relapse. In the 'big picture,' our laboratory uses basic science approaches to characterize components of *Brucella* that are essential for its capacity

to cause infection, with the long-term goal of targeting these elements as novel vaccine and therapeutic targets.

On a smaller scale, *Brucella* is fascinating because these bacteria have evolved to live inside cells of the host's immune system, particularly cells called macrophages. One of the day-to-day jobs of a macrophage is to attack, engulf, and kill invading bacteria, but the brucellae have evolved to survive and replicate inside these cells, living there quite comfortably once they are established.

Nonetheless, the journey of *Brucella* to the intracellular niche is quite harsh, as the bacteria are bombarded with a variety of stressful situations, including acidic conditions, nutrient deprivation, diminished oxygen levels, and exposure to reactive oxygen species. We are defining how *Brucella* can sense, respond to, and ultimately withstand these potentially deadly situations.

We are particularly interested in the genetic circuitry that allows *Brucella* to live inside host macrophages and circumvent the cell's innate defense mechanisms. On this front, our research has identified a pair of small regulatory RNAs that are essential for the ability of the bacterium to establish an infection in an animal model, and our current efforts are aimed at defining how the expression of these small RNAs is controlled at the genetic level, as well as the molecular function of the small RNAs.

A graduate student in our laboratory, Lauren Sheehan, has identified a protein that is vital for the expression of this small RNA system, and she is currently working to understand the mechanism and function of this regulatory protein. Lauren has determined that this protein, which she named VtIR, is absolutely required for *Brucella* to cause an infection, and interestingly, VtIR directly controls the expression of only four genes, of which three encode proteins of unknown function.

Another graduate student in the laboratory, Jimmy Budnick, is defining the role of these three hypothetical proteins, and more importantly, he is characterizing how these proteins contribute to the biology and pathogenesis of *Brucella*. While *Brucella* is independently mesmerizing, the fact that the brucellae belong to a larger group of medically- and environmentally-important bacteria is even more remarkable. The brucellae belong to a group called the alpha-proteobacteria, and this group contains many bacteria that are symbionts and/or pathogens of plants and animals. It is known that this larger group of bacteria possesses similar genetic elements required to interact with their given hosts, and our laboratory is interested in the evolutionary implications this genetic conservation.

We are seeking to understand how and why these bacteria have maintained seemingly identical genetic systems for



symbiosis and pathogenesis, and more importantly, how we might be able to exploit these systems to aid in combating detrimental situations and promoting beneficial interactions.

How did you become interested in your line of research?

I have been extremely fortunate throughout my academic life to have wonderful mentors, and I am forever indebted to these folks for introducing me to various aspects of science. During my undergraduate studies, I had the opportunity to study entomology, and this really opened my eyes to the diversity of life on this great planet.

My graduate studies under the superb guidance of my advisor Slawek Lukomski went a step further, and I learned how bacteria use an arsenal of mechanisms to combat the host and establish infections. In regards to *Brucella*, my post-doctoral advisor, Marty Roop (a Hokie by the way), introduced me to genetics and the many aspects of *Brucella* biology and pathogenesis. My time with Marty was instrumental in preparing me for my current work with *Brucella*, as well as my life as an independent researcher.

In the same vein, the *Brucella* research community is one of the most open and collaborating communities in science. This community as a whole has been essential for my development as a bacteriology researcher, and they have been a prominent driving force in my research foci. Overall, a great number of individuals are responsible for my current research interests and endeavors.

What do you feel are some of the biggest challenges scientists face today?

In short, data overload, which I think is a catch-22 in a way. The scientific community has developed incredible technologies for generating enormous data sets, and the means by which to analyze those data are similarly evolving rapidly. However, extracting the

Q&A

meaningful data and incorporating it into one's working models and hypotheses can be challenging. In the end, I don't feel this is a negative challenge, but rather quite a positive challenge. By appropriately analyzing these data and putting them in the context of larger, more complex models and systems, we will be able to solve a multitude of problems, and hopefully, this will allow us to address many of the issues facing our current and future societies.

Why did you choose to continue your career at Virginia Tech?

There is a very rich history of high quality research here at Virginia Tech, and specifically, the University has been home to a tradition of innovative *Brucella* research for several decades at the College of Veterinary Medicine. I was (and am) thrilled to have the opportunity to come to Virginia Tech to start my laboratory. Honestly, I cannot imagine a better place to carry out a research program, and I am very grateful to the Hokie community for taking me in as one of their own and allowing me to conduct research here at Virginia Tech.

Fun Facts

Where are you from? Hewitt, Texas.

Favorite Hobbies: My wife and I are very blessed to have two young sons (2 and 4 years old), and we are planning on welcoming a daughter into our family in late April. As a group, we love cooking (and eating), spending time outdoors, and playing with our beloved four-legged family member, our dog Aggie. Additionally, when life permits, I enjoy reading, zymology, and traveling.

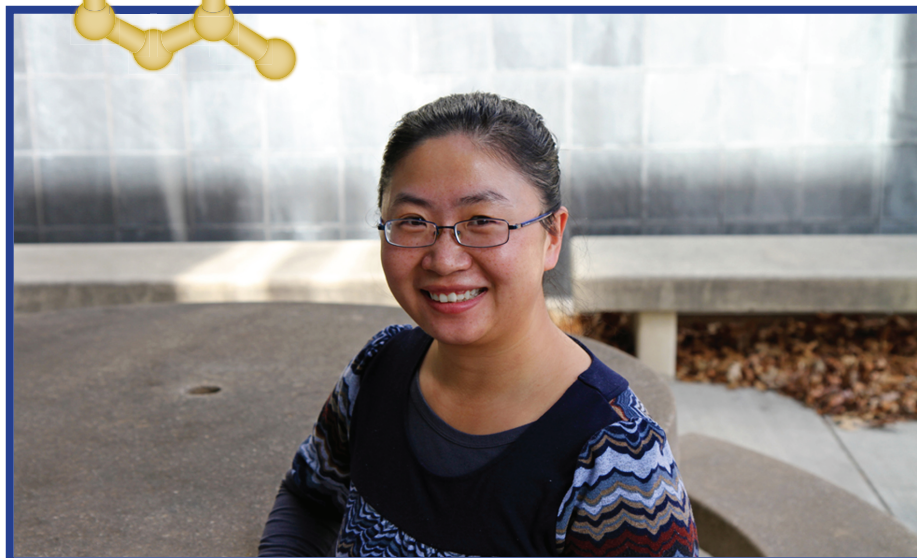
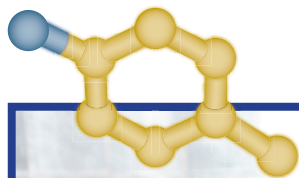
Favorite Season: The idea of four seasons was something I had only read about growing up in Texas. Now that I get to experience four different seasons, I honestly love them all.

Most interesting living organism: The mantispid, or mantid fly, is an extremely cool organism, but in addition to being really interesting, these insects also exemplify classic, larger themes in biology, including convergent evolution and targeted predation.

Favorite Quote: "Hang on just as long you can, get up whenever you fall, shake it off boys, and go around again. Don't be hanging your life on the wall." -Guy Clark



Brucella abortus 2308 *Brucella abortus* Δ vtIR



The power of peptides: on the path to find a cure

According to the United Nations Joint Program on HIV/AIDS, the virus takes numerous lives every 16 seconds of every day. Every 12 seconds, someone will contract HIV/AIDS. Wenyu Zhang, a sixth year graduate student, is working with her mentor Webster Santos, associate professor of chemistry, to develop drugs that reach clinical trials and can combat HIV.

Zhang develops medium-sized branched peptides to target RNA structures within HIV. These branch peptides work as a direct immunization to produce antibiotics.

“We are developing branched peptides that recognize conserved, structured RNA elements of the virus as the next generation anti-HIV therapeutics,” Santos said.

Zhang is immersed in her research and says she has seen significant improvement in the progress her team is making. In order to work with the branched peptides, she works with a piece of equipment called a peptide synthesizer, which helps create the structures she needs to enable her to conduct her research.

In her six years as a graduate student, Zhang has contributed to several research publications, which have appeared in *The Journal of Organic Biomolecular Chemistry*, *Chemical Communications*, the *American Chemical Society Chemical Biology*, *Analytical Chemistry* and *Molecular BioSystems*.

The Santos lab includes Zhang, Jessica Wynn and Dr. Neeraj Patwardhan. In order to stay focused and work collec-

tively, they meet weekly in Hahn Hall South.

Zhang said that Santos has been the biggest role model throughout her six years here at Virginia Tech. Coming to Tech from Hohhot, China in 2008, she didn't have a set foundation until working with Santos.

At a very young age, Zhang had interests in biology, astronomy and neurology. She was a chemistry major as an undergraduate at Wuhan University in China, but ultimately switched her research direction to biochemistry because she is interested in the origin of the universe and how molecules regulate creatures.

After graduation in May 2014, Zhang wants to continue as a researcher, but not directly related to the research she is currently conducting with branched peptides.

“I want to broaden my field,” Zhang said.

Zhang says that in pursuing your dream, “if you want to do it, then just do it!” This is a very simple thought; however, it has lead Zhang to the success she has in her research today.

Q&A: Zhang Fun Facts

What do you do in your spare time when you're not in the lab?

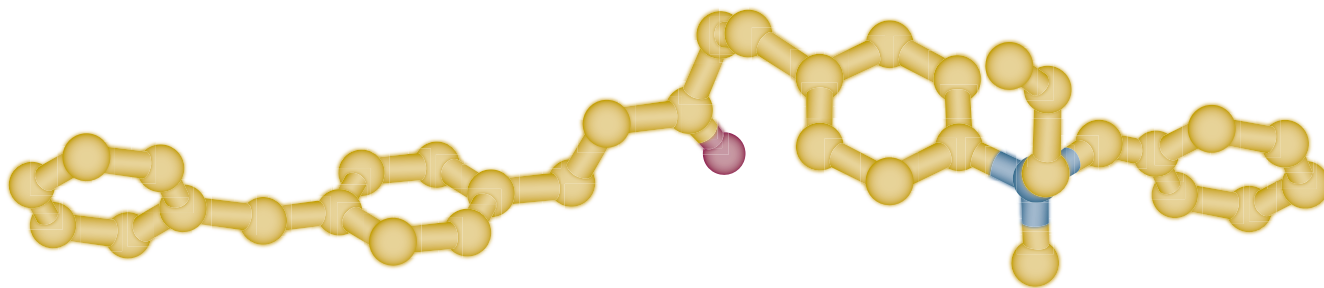
I hike with my two dogs, Plato and Pulp. They are Boston terriers. I got them as soon as I moved here to Blacksburg in 2008 and I love them a lot.

What is an important trait that a scientist needs to have to achieve success?

You need to be really patient and precise and think of all the possibilities. Most of the time you fail, but you need



Story and photo by Ricky Soto
Communications Assistant
Fralin Life Science Institute



to remain confident in your research

What is your favorite machine you work with your lab?

The peptide synthesizer, it does everything!

If you were to start your research all over again, are there any changes you would have made?

The main change I would make would be to narrow the focus of my research. It definitely would have helped in that aspect.

Do you have everything you need in your lab, or do you wish you had more?

No, I actually have everything I need. It is a great research environment and my team works well together. We do critique each other's work, but only to advance the success of our research.

Why were you interested in neurology as a high school student?

I wanted to know how people think about stuff. If your brain is complicated enough, will you figure out a complicated issue in life? On the other hand, if you have a simple brain, will that affect the way you think? I really wanted to know how to distinguish between those two aspects.

Virginia Tech Center for Drug Discovery Annual Workshop ~ January 20, 2014



About VTCDD

An interdisciplinary group committed to continuing the growth and advancing the stature of the existing drug discovery and development programs at Virginia Tech

www.fralin.vt.edu/vtcdd



High school student makes leap in education with cyanobacteria research opportunity

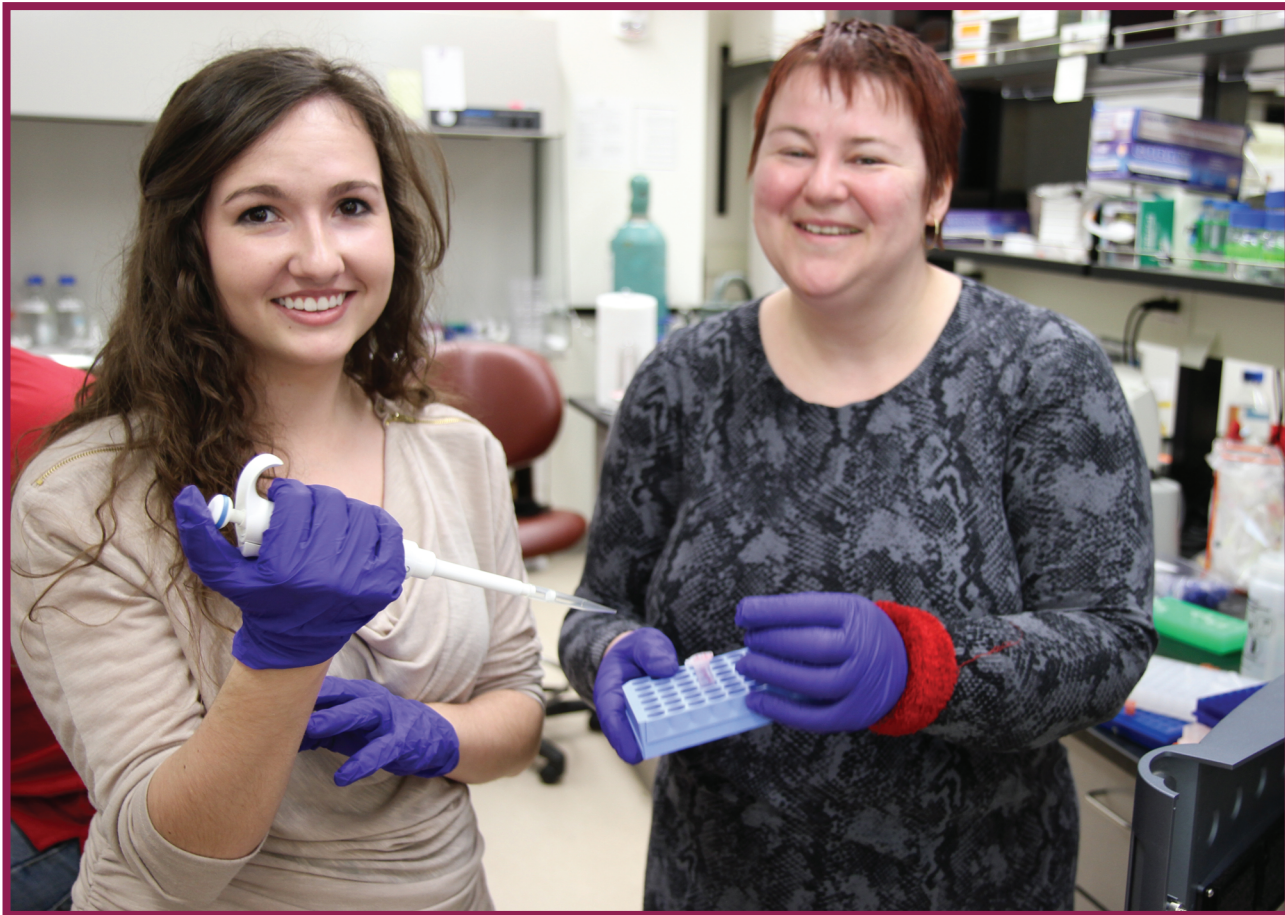


Photo: Sydney Fain works with Virginia Tech researcher Eva Colloko in her Latham Hall laboratory.



Stories and photos by Audra Norris
Communications Assistant
Fralin Life Science Institute

In any given lab on Virginia Tech's campus, you might expect to encounter a plethora of undergraduate and graduate students conducting experiments. What you might not expect, however, is a high school student with a thirst for knowledge taking on graduate-level work.

Like many students, Sydney Fain, a high school senior from Riner, Va., has big plans for her scientific career.

However, she's getting a head start on most of her classmates. Last summer, Fain worked on a National Science Foundation grant studying cyanobacteria metabolism and its fuel applications. She began helping to create an algorithm to predict cyanobacteria composition, working closely with Ryan Senger, assistant professor of biological systems engineering in the College of Agriculture and Life Sciences, and Eva Collakova, assistant professor of plant pathology,

physiology and weed science in the College of Agriculture and Life Sciences.

"My knowledge of lab procedure and microbiology increased exponentially over the course of the project and I am very thankful for Dr. Senger's and Dr. Collakova's guidance through the process," Fain said. "I have new confidence in myself that I can succeed in new, unfamiliar environments and pursue science and research at such an accelerated level."

Fain is currently taking classes at the Southwest Virginia Governor's School for Science and Technology, which offers extra education for gifted high school students. The school encourages



students to participate in its internship program wherein they can gain hands-on experience in their field. When Fain learned about the opportunity to work with Collokovova and Senger, the school's director personally recommended her for the position.

"She's essentially skipped an entire tier of education in her field," said Collokovova. "It's rare to see someone go from high school work to graduate work, even if she's working at an accelerated pace."

Fain says that endless curiosity and openness to possibilities are essential for high school students to make a splash in the scientific community. She also says that the right academic program makes all the difference.

"I recommend conducting your own research. Investigating my own ideas has been an enlightening experience and has opened many doors for my future. The Governor's School program has also helped me immensely and exposed me to possibilities for my future. I will forever be indebted to the program, and would without a doubt recommend SWVGS for any diligent student looking for science experience."

Fain will graduate from Auburn High School this year, and then plans to pursue a degree in biomedical engineering with the aspiration of attending medical school. She credits her success in part to her time among Virginia Tech researchers.

"Participating in research and investigating my own ideas has truly revolutionized how I see the world around me. It has incited a bit of rebellion inside me—the desire to challenge what is known and a desire to improve what is considered customary," Fain said. "Virginia Tech has been extremely helpful in this pursuit, and my experiences on campus have given me the notion that people who are never complacent are the best for society, and I strive to be the best for society that I can be."

Roadside hope: Local volunteers to participate in testing of new diabetes prevention method

By Lindsay Key

In search for new ways to prevent diabetes, Virginia Tech researchers will study the effects of inulin, a nondigestible carbohydrate from the roots of chicory — a wild, blue-flowered plant found along roadsides in North America, Europe, and Australia, and sometimes used as a coffee substitute.



"Obesity and the consumption of a high-fat, high-sugar diet lead to adverse changes in the gut microbiome and increases in intestinal permeability. In turn, endotoxin, a component of the outer wall of certain types of bacteria, can enter the bloodstream, causing inflammation, and often health problems such as diabetes and cardiovascular disease," said Kevin Davy, a professor of human nutrition, foods, and exercise, a Fralin Life Science Institute affiliate, and co-director of the Fralin Translational Obesity Research Center.

Davy and his colleagues are investigating whether inulin will reduce the risk of diabetes and cardiovascular disease by promoting the growth of beneficial bacteria, reducing intestinal permeability, and, as a result, the amount of endotoxin in the bloodstream.

With support from the National Heart, Lung, and Blood Institute of the Na-



Kevin Davy

tional Institutes of Health, the researchers will supplement 48 local people with either inulin or a placebo for six weeks. Davy is the principle investigator of the study, which will examine men and women between the ages of 50 and 75 who are overweight or obese and have elevated blood glucose levels.

Before and after the six-week diet intervention, researchers will take blood, urine, and muscle biopsy samples, and measure intestine permeability, insulin sensitivity, and muscle metabolism — the muscle's ability to burn fat and carbohydrates as fuel.

The ultimate goal of the project is to establish a simple and effective therapy that could prevent the development of diabetes and cardiovascular disease in people with prediabetes.

Matt Hulver, department head of human nutrition, foods, and exercise; Brenda Davy, an associate professor of human nutrition, foods, and exercise; Andrew Neilson, an assistant professor of food science and technology; and Monica Ponder, an assistant professor of food science and technology, will work with Davy, who is an expert on obesity and cardiometabolic health. All are affiliated with the Fralin Translational Obesity Research Center, the Fralin Life Science Institute, and the College of Agriculture and Life Sciences.

around fralin



Photo: Steve Melville invites the audience to ask questions after Bingyu Zhao's talk at the first annual Virginia Tech Microbiology Symposium held March 7, 2014 at the Inn at Virginia Tech.

Photo: Coy Allen, a new assistant professor of inflammatory disease in the department of biomedical sciences and pathobiology, gives a talk about his research at the first annual Virginia Tech Microbiology Symposium.

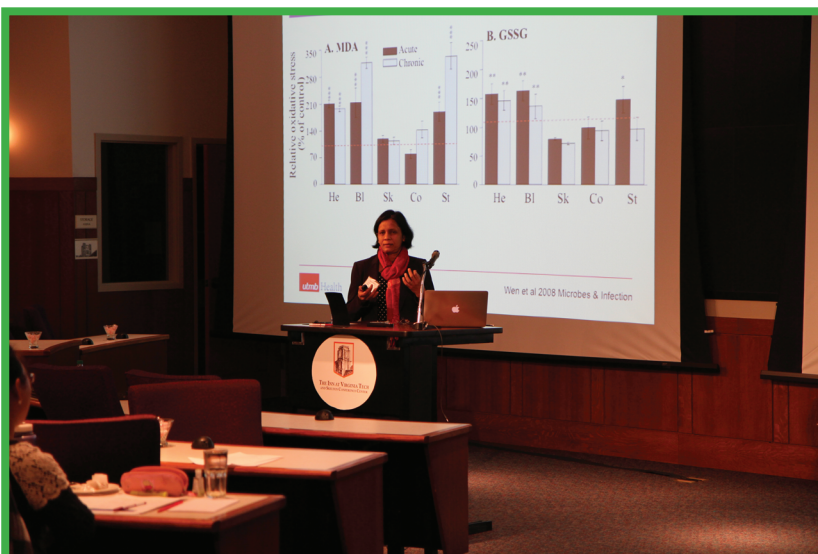
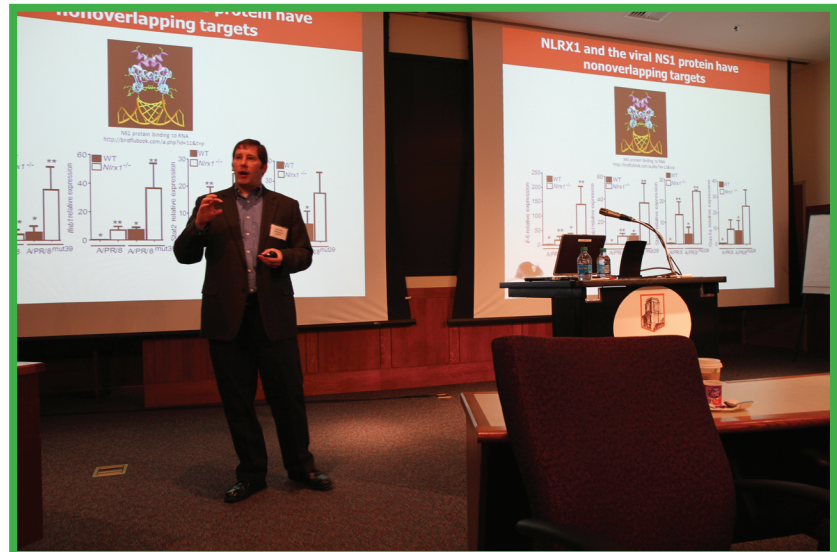


Photo: Nisha Garg, professor of microbiology and immunology at the University of Texas, gives a talk on “Cross-talk of parasite and host mitochondria in inflammatory chagasic cardiomyopathy” at the first annual Virginia Tech Microbiology Symposium.

Photo: Keith Yamamoto, the Vice Chancellor for Research at the University of California San Francisco, (center) visited Virginia Tech on March 19, 2014 to lead a workshop entitled “Mentoring and Being Mentored.” He was invited by former mentee Dr. Zac Mackey (center, back), assistant professor of biochemistry at Virginia Tech.



Photo: Sue Hassol, a climate change communicator, analyst, and author known for her ability to make complex science issues accessible to policymakers and the public, visited Virginia Tech on April 18, 2014, to give a talk to faculty members and fellows involved with the Interfaces of Global Change Interdisciplinary Graduate Education program.

Photo: Ashley Peery (left) and Jackson Means (right), graduate students in the department of entomology, recently received the 2014 Alwood Extension Award, which honors entomology graduate students who devote themselves to extension and outreach service. They are pictured here with Edwin Jones, director of Virginia Cooperative Extension.

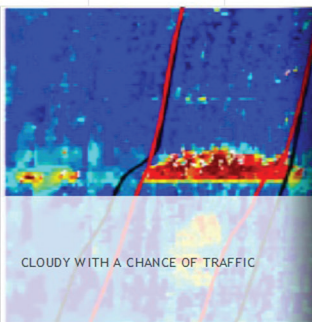
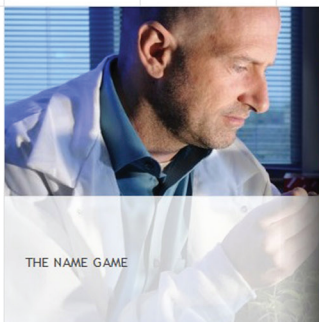


A BLOG IS BORN!

The Virginia Tech Research Blog

[About](#) [Bloggers](#) [Magazines](#) [Contact](#) [Create content](#)

[About](#) [Bloggers](#) [Magazines](#) [Contact](#) [Create content](#)



The Name Game

 Mar 24, 2014  No Comments  by lindsay

What's in a name? According to Shakespeare, not much. The bard's well known lines from Romeo and Juliet answer the preceding question thusly: A rose by any other name would smell as sweet. And if Boris Vinatzer had lived in Shakespeare's time he would have been able to answer that age-old question with a genome [...]

Archives

- March 2014
- February 2014
- January 2014
- August 2013
- July 2013
- December 2009

Please visit www.research.vt.edu/blog to follow Virginia Tech's official research blog, which provides a behind-the-scenes glimpse of endeavors taking place at our top-tier research university.

www.fralin.vt.edu

Fralin Life Science Institute

Fralin Hall
West Campus Drive
Room 101
Virginia Tech 0346
Blacksburg, VA 24061

540-231-6933 (v)

540-231-7126 (f)

