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In April 2018, the University at Albany launched a new strategic plan titled *Authoring Our Success*. The name is a reference to the commitment embedded in the University’s new mission statement to “empower our students, faculty, and campus communities to author their own success.”

This year’s Research Report is dedicated to that mandate—and to two of the core priorities of the strategic plan: Research Excellence and Student Success. In these pages, we have intentionally chosen to focus on student research from the undergraduate to the doctoral level. These excellent students work with UAlbany’s world-class faculty scholars and researchers across our diverse academic landscape.

For undergraduates, these opportunities help students develop skills in critical thinking, data analysis and teamwork, while supporting their deep exploration of a topic that might inform a future career path. Our graduate students’ research makes unique contributions to the knowledge base in their areas of specialization and raises new questions that inspire further inquiry.

Taken together, UAlbany’s research enterprise—from undergraduate explorations to faculty-led, federally funded projects—has a collective impact that is greater than any individual endeavor. We challenge and encourage our students and faculty to take the road less traveled, to think beyond traditional boundaries between disciplines, sectors and geography. In the process, our students and faculty not only author their own success, they also move the University toward its vision to be one of the nation’s leading diverse public research universities—providing leaders, knowledge and innovations to create a better world.

The stories in this report represent but a small selection of the depth and breadth of our work, but they paint a picture of the opportunities UAlbany provides to students and demonstrate our faculty researchers’ positive footprint. We hope that you, like us, will feel inspired—and optimistic about the potential of our students and our research to truly make a difference in our communities and across the globe.
Seven UAlbany undergraduate students spent the summer of 2017 on the tropical island of Taiwan — but it was no summer vacation.

The students, six majoring in atmospheric science and one in emergency preparedness and criminal justice, studied typhoons and other extreme weather in Taipei through a National Science Foundation Partnership in International Research and Education (PIRE) grant, part of a five-year, $4.5 million initiative to advance early warning detection and disaster response to major storms.

UAlbany’s participation was led by its Atmospheric Sciences Research Center (ASRC) and Department of Atmospheric and Environmental Sciences in partnership with Taiwan’s National Central University, National Taiwan University and Academia
Sinica, and disaster and weather forecast agencies in both the United States and Taiwan.

“The goal of this project is to help improve our resiliency against increasing extreme weather likely linked to climate change,” said Everette Joseph, director of ASRC. “We are not only improving our understanding and ability to predict these extreme weather events, but also preparing the next generation of atmospheric and social scientists.”

The project provides student researchers with travel and living expenses for the summer under the supervision of PIRE faculty.

Cidny Ramirez, an atmospheric science major who graduated in May of 2018, was the project’s first student grant recipient in 2016. The number of students grew substantially in year two, with UAlbany’s seven students joined in Taiwan by two others from Howard University. Eleven Taiwanese students also researched extreme weather in the United States in 2017 at UAlbany.

Taiwan provides students with a unique research opportunity, with three to four typhoons striking the island each year on average. Students in the summer of 2017 witnessed Typhoon Nesat dump more than 20 inches of rain on Taipeí.

Erin Lynch, another 2018 graduate in atmospheric sciences, said, “I feel very fortunate to be studying in the tropics during the summer months. We’ve experienced some incredible thunderstorms and heavy rain. It’s been a really fun experience. But what can I say? I am a weather nerd.”

For Dan Bennison, who graduated in December 2017 from the College of Emergency Preparedness, Homeland Security and Cybersecurity and is now a disaster preparedness coordinator in the AmeriCorps VISTA program, studying extreme weather in Taiwan provided invaluable emergency response experience. “I did not study weather, but through this experience I was able to learn of a new culture and study its response to extreme weather events,” he said. “It was an opportunity I could not pass up and helped me start my career.”

Lynch added high praise for her UAlbany mentors. “Our campus has some of the top tropical meteorology professors in the country and they want to see us succeed,” she said. “The NSF PIRE project has been one of the best experiences of my life.”

Exploring ancient ruins and examining prehistoric artifacts may sound like something out of an Indiana Jones movie, but for students taking part in the Las Mercedes Archaeological Field School in Costa Rica, perception means reality.

The project is part of an international collaboration between UAlbany and the National Museum of Costa Rica led by Associate Professor Robert Rosenswig of Anthropology, who has directed students on archaeological excavations at the Las Mercedes site since 2009.

Archaeological field schools offer students the chance to pursue archaeology in an academic setting, acquiring skills in setting up excavation units, recording elevations, and selecting excavation strategies and areas to test. They fill out field records, make field observations and draw plan maps, profile maps and site maps. They also spend time in the laboratory processing the artifacts they’ve discovered.

The skills acquired provide undergraduates with the credentials to be employed by private archaeology companies in the U.S.

“The Las Mercedes Archaeological Project field school extends a UAlbany tradition of providing undergraduate and graduate students with the opportunity to gain hands-on experience in archaeological research and to develop skills that will be valuable in their future careers.”

Unearthing Culture from Below and Above

continued page 13
GETTING A HAND IN, SURGICALLY

A UAlbany junior found herself in a hospital operating room in the summer of 2017, but instead of being the patient, she was scrubbing up to participate in surgery.

Caroline B. Apreku, a biochemistry and molecular biology major from Ghana, shadowed surgeons and medical students during a three-week internship at Nanjing Medical University in China.

After watching several laparoscopic surgeries, said Apreku, “the head female surgeon instructed another doctor to prep me up for surgery.” Her task — an important one during
a two-hour procedure — was to insert the laparoscope (a long tube-like surgical camera) through the patient’s navel into the uterus so the surgeons could begin a hysterectomy.

“I did that successfully with their verbal guidance,” she said. “During surgery, I had to aim the laparoscope towards the section of the uterus they were operating on.”

Apreku assisted in one other surgery and observed many more. “Every morning, I would follow a team of surgeons, residents and rotating medical students to visit patients in the wards,” she said. “They would ask me questions about the prognosis and treatments of patients and I believe if I were not a pre-health student, I would be clueless.”

As a Collegiate Science Technology Entry Program (CSTEP) student, Apreku took part in UAlbany’s Summer Research Program in 2016 and the CSTEP Conference in April 2017. She has served as a calculus tutor and an office assistant at CSTEP.

Through her CSTEP research presentations, Apreku made connections with her UAlbany mentors, Provost James Stellar and Professor JoEllen Welsh of Environmental Health Sciences. She commends Stellar for finding ways to increase opportunities for undergraduates — especially students of color — that will lead to their acceptance to graduate schools.

“Caroline is not only very able, she is also highly self-motivated,” Stellar said. “Students like her often do very well with these remarkable experiences outside the classroom, and having such a human surgical experience in Nanjing, China, certainly counts as a remarkable experience. We are quite proud of her.”

Apreku has worked with Welsh, a prominent researcher in the area of Vitamin D and breast cancer, and is now conducting research with biologist Gabriele Fuchs at UAlbany’s RNA Institute on “The moonlighting effects of Glycogen Synthase 1 in Cardiac Development.”

“Being mentored under these renowned researchers motivated me to follow my goals, and they also guided me on that path,” said Apreku, who took a serendipitous route to her medical work in China.

She originally planned to conduct research at Columbia University. However, her sister was earning a master’s degree from Nanjing University and Apreku did not want to miss her graduation. “Family comes first,” she said. Her mentor Stellar fully backed her decision. “He said I might never find a good opportunity to visit China,” said Apreku. “I am so glad I followed his advice.”

The trip turned out to be much more than sight-seeing and ceremony. Apreku’s sister mentioned her to a friend who is an OB/GYN in China, and the friend offered Caroline the chance to shadow her in the hospital. For Apreku, whose long-term goal is to become a surgeon, the experience was priceless.

“I want to work with women and children who are more vulnerable back home in Ghana,” said Apreku. “The plan is to go back home, build a modern state-of-the art hospital, and improve the health care system of my country.”

She credits the CSTEP program with giving her a strong support system. “Caroline’s medical work abroad is a great example of what happens when preparation meets opportunity,” said Mayra Santiago, director of CSTEP. “We’re proud of her growing accomplishments and very fortunate to have her as a role model for future students.”

After graduating in May 2018, Apreku accepted a summer 2018 internship in Germany to focus on the research she has been conducting with Fuchs.

Unearthing Culture from Below and Above continued

training in archaeological field methods,” said Rosenswig, noting that more than 170 undergraduate and 50 graduate students have participated in these projects in Costa Rica and Belize in the past decade.

This project also entered a new phase — literally taking to the air. Assistant Professor Alexander Buyantuev of Geography and Planning used drones with lidar and multispectral sensors to map archaeological features, with the goal of painting a better picture of Las Mercedes’ size and scope.

Las Mercedes, a pre-Columbian community occupied from 1000 to 1500 A.D, was first uncovered in the late 19th century when the United Fruit Company constructed a railway through the site in order to transport bananas to the coast for shipment to New York. Its artifacts are now displayed in the American Museum of Natural History.

Rosenswig and his students continued working on the site in 2018, thanks in part to a National Geographic Society research grant.
Justine Giffen, now a doctor of chemistry, came to UAlbany with science experience from books, knowing she needed living research. Ironically, she found it in death.

“Before UAlbany, I earned my bachelor’s degree in chemistry from a different institution,” said Giffen. “It was a great experience. I loved it there. But the focus was more on textbooks and much less on research. I knew for graduate school I needed to find a program that would offer more hands-on experience.”

The May 2018 Ph.D. graduate, conducting her work in the lab of Associate Professor Rabi Musah, took the lead in
Emma Thrasher proves that, with the right academic background, one acquires fresh perspectives — even on Shakespeare.

Thrasher, a junior with a double major and double minor, saw method behind Hamlet’s author in his assigning different uses of personal pronouns to his title character, a prince of medieval Denmark, and the prince’s uncle, King Claudius, who murdered Hamlet’s father in order to take the throne and marry his widowed queen.

“I linked their usage of ‘I’ — or the lack of ‘I’ — to the characters’ perceptions of their own legitimacy to the throne,” said Thrasher. “My goal was to write an academic paper linking these peculiarities in the play’s language to Hamlet’s broader themes.”

So well did Thrasher achieve her goal that her paper, “Hamlet Myself: A First-Person Examination,” was selected for presentation in Cincinnati, Ohio, at the March 2018 convention of Sigma Tau Delta, an international collegiate honor society for students of English with high academic standing at four-year institutions.
world transportation problems, such as safety and congestion. Their model was ranked first in one test set of the Vehicle Detection Challenge, and their vehicle detection and tracking results were used as a baseline to support all the other teams in the Smart Transportation Challenge.

A total of 28 teams from 18 universities met in San Jose, using authentic traffic camera video data and collaborating on projects devised to make transportation systems safer and smarter. Participants tested their algorithms to detect meaningful objects, such as vehicles and pedestrians, and automatically analyze traffic flow based on the detections.

“The technique that the UAlbany team used is a novel method based on deep learning, which solves complicated artificial intelligence problems with neural networks having many layers of artificial neurons,” said Lyu, CVML’s director, in alluding to the artificial neural networks that are used in machine learning.

“Deep learning is the same technique that was behind the recent success of Google AlphaGo and Tesla’s self-driving car,” he said. “Our team has been working at the cutting edge of this exciting technology, and the algorithm we developed is applicable to many other problems that require automatic and accurate detections — for instance, specific cell types in medical imaging and abnormal patterns in network communication.”

Wei learned how to train and tune a deep neural network to detect objects, calling it a “great experience.” Song, who trained the object detection model by localizing and identifying multiple objects in a single image, said, “It was amazing experiencing firsthand how creativity and state-of-the-art technology can advance human life.”

IEEE, the Institute of Electrical and Electronics Engineers, is the world’s largest and most prestigious professional organization for electrical and computer engineers and related sciences. Said Ke, “It is a great honor to apply our research to such a competition organized by industry and academia and to be recognized for our achievement.”

In 2018, the CVML team submitted a paper on the challenging problem of detecting human poses from very crowded scenes to the prestigious European Conference on Computer Vision. Such work could influence the detection of potentially dangerous intentions, such as at the 2013 Boston Marathon, and understand other aspects of human activity, action and interaction.
Cell biologist Prashanth Rangan and a host of talented students who make up his laboratory team want to know everything about the stem cell life cycle within the species Drosophila melanogaster — the fruit fly.

Their ultimate aim is to find out more about human afflictions, ranging from cancer to degenerative diseases and other human dysfunctions, and how to deal with them.

One of the dysfunctions the team studies is infertility.

Among the organs that work together for proper functioning of the body in human beings and other multicellular organisms
are those in the reproductive system: unique in producing gametes that give rise to new generations. Yet the system is also unique because it has different cell types that communicate with one another. This interaction begins during embryogenesis and lasts until a proper egg is formed. Loss of this interaction leads to infertility.

“One protein that has been shown to be required during mammalian oogenesis for this communication is Wnt4,” said Rangan, an assistant professor affiliated with UAlbany’s RNA Institute, and a 2014 Pew Scholar in the Biomedical Sciences. “However it is not known how it promotes this interaction.

“Our research on Drosophila oogenesis suggests that Wnt4 signaling promotes soma-germ line communication and thereby proper germ line cell differentiation into an egg at two stages of development.” By switching signaling modules at different stages of development, DWnt4 would, in theory, regulate proper oogenesis.

One of the students assigned a key role in this research was biology doctoral student Maitreyi Upadhyay, a native of India who graduated in May 2018 and is now a postdoctoral student at Harvard Medical School.

“In Dr. Rangan’s lab I worked on multiple projects that studied how epigenetic modifiers in the germ line and in the surrounding somatic niche regulate the progression of oogenesis from the primordial germ cell state to the formation of a mature egg,” said Upadhyay. “My primary work was on the role of DWnt4 during Drosophila oogenesis, where I focused on the conserved soma-germ line interactions and how extrinsic factors from the somatic cells regulate the proper formation of an egg.”

Upadhyay discovered that DWnt4 is expressed exclusively in a subset of somatic cells and uses a non-canonical pathway in the larval stages of development to regulate movement of the somatic cells — essential for the formation of a proper somatic differentiation niche later in the adult ovary. DWnt4 then uses the canonical pathway in the adult somatic niche to regulate proper encapsulation of the differentiating stem cells, necessary for proper egg formation.

Her work resulted in 2016 and 2018 articles in the peer-reviewed journal PLOS Genetics, the latter highlighted as an “Editor’s Choice” in Science magazine.

“I believe that understanding how epigenetic modulators shape the somatic niche and prime the primordial germ cells to make a high-quality egg will give key insights into the process of oogenesis and eventually aid in developing therapeutics to treat cases of infertility,” said Upadhyay.

“Maitreyi is a knowledgeable and ambitious researcher who has accomplished a lot in a short period of time,” said Rangan. “She

**Parsing the Bard continued**

“This was a great experience for Emma and nice for the University, too, to have one of our most accomplished majors garner this kind of national exposure and recognition,” said Carolyn Yalkut, associate professor of English and a mentor to Thrasher.

In the paper, Thrasher compared Hamlet’s nonuse of first-person pronouns in the “to be or not to be” soliloquy to Claudius’s ample use of them in his “confession” soliloquy. The king, noted Thrasher, says “I” or “me” 16 times in that piece, while Hamlet never directly refers to himself, more often using the royal “we” when not waxing philosophically on cowardice, death, honor, suicide and more.

“Claudius, with his relentless use of ‘I,’ implies doubt of his own legitimacy [to the throne],” wrote Thrasher. Hamlet, by contrast, as a prince born into a royal family, “has no need to prove his own legitimacy to himself or any others.” Thrasher expanded this usage into the various audiences each may be trying to reach: each other, their own psyches and, in Hamlet’s case, the universal listener, including us.

Thrasher credits Yalkut with “incredible” guidance and support. “This paper started in her AENG 305 class, and she offered many helpful suggestions and possible sources at various stages of the drafting process. Once the paper was selected, she worked diligently to ensure I had the funding needed to attend and present at the conference.”

Thrasher, who aims toward law school, majors in English and political science and minors in history and philosophy, and finds each complements her research. “It is often useful to understand the context in which something was written or a particular event took place — something I developed through studying history,” she said. “With philosophy, I focus on argument structures and styles, and that helps me best in formulating my own ideas and understanding the reasoning behind others’ ideas and arguments.

“My concentration in political science, public law, has made me sensitive to the presence of laws in a society and their far-reaching effects. This offers me a starting point for analysis regardless of which discipline I am studying at the moment. English has taught me to both condense a large amount of information into something much smaller and find a large amount of meaning in something else much smaller.

“These skills translate quite well across disciplines and I draw from them regularly — including in my ‘Hamlet Myself’ paper.”

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OUTSMARTING THE ‘PERFECT CRIME’

Chemistry Ph.D. student Ewelina Mistek is making it more dangerous for criminals to leave behind any trace of themselves or their victims.

Mistek’s work in the Lednev Research Laboratory is using spectroscopy — the study of the interaction between matter and electromagnetic radiation — to explore new ways for investigators to solve crimes through the characterization of even the smallest amount of blood. As she breaks ground in this area of criminal forensics, national organizations and the New York State Police are taking notice.

A major challenge investigators encounter analyzing crime scenes is that most techniques used to analyze bodily fluid destroy the sample, essentially rendering it useless once the initial analysis has been done. If more questions about the sample remain, it’s often too
late. Worse yet, current methods are often time consuming. To mitigate this, Mistek, a native of Poland, conducts research on ways to quickly analyze a sample without destroying it.

Employing vibrational spectroscopy, a branch of molecular spectroscopy, she sees a sample’s unique biochemical signature. Using a method called “attenuated total reflection, Fourier transform infrared spectroscopy,” which she combines with statistical analysis, Mistek is able to quickly differentiate between human, cat and dog blood.

This research is particularly helpful to police investigating hit-and-run accidents. It’s anticipated that police will eventually be able to use a device the size of a cell phone to determine the species of blood at a hit-and run scene.

Mistek’s mentor Professor Igor Lednev and his team work closely with New York’s Police Crime Lab to navigate the University’s research toward the most important problems in practical forensics.

To aid investigators in narrowing down suspects and identifying victims, Mistek also used Raman spectroscopy and statistical analysis to differentiate between Caucasian and African American blood — a project that was featured on the August 2016 cover of Analytical Chemistry.

“I’ve been interested in forensic sciences from a young age, and it was an easy decision for me to pursue the graduate program at UAlbany,” said Mistek. “It allowed me to continue working in the Lednev Laboratory on the fascinating subject of body fluid analysis for forensic purposes. It’s very exciting for me to see how these techniques show potential for being applied towards real crime scene investigations in the near future.”

Mistek’s work and dedication secured her the prestigious Coblentz Society Student Award at the National Meeting of the Society for Applied Spectroscopy in October 2017. In 2018, she presented at U.S. and international conferences and was awarded a three-year National Institute of Justice Graduate Research Fellowship.

Lednev said, “Ewelina’s success is a testimony that the University is offering an excellent environment for undergraduate research, which complements students’ class studies and allows for successful early career development and recognition at the highest national level.”

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It is not often that a researcher, especially a student researcher, can produce a bold new insight into a human subject that lived two centuries ago.

Sonya Helen Herbach, a senior history major, has applied that level of perception to the Austro-Hungarian Hapsburg Empire’s Empress Elizabeth of Austria (1837–1898).

In a paper she presented in September of 2017 in Madrid at the international conference “Kings and Queens 6: In the Shadow of the Throne,” Herbach revealed that the beauteous wife of Emperor Franz Joseph I — sometimes called the “lonely” or “reluctant empress” — probably concealed many
psychological troubles beneath her lovely exterior.

In delving into these mental aspects of Elizabeth, Herbach combined her studies in her minor, psychology, with her major. “This combination allowed me to look at the symptoms that ‘Sisi’ presented during her life and come up with a diagnosis for what she may have suffered from. My conclusion was that Sisi had a combination of agoraphobia and anorexia nervosa, and that she also suffered from an anxiety disorder.”

Herbach, an Albany native, has fought her own battles with illness and depression. At childhood, she was diagnosed with Type 1 diabetes, and she suffered during her teenage years from a combination of depression, anxiety and personal loss. “I found myself unable to complete a full day of high school after only a month into my ninth grade year,” she said.

In the spring of 2016, while a student at Hudson Valley Community College (HVCC) she began to get infections from her insulin sites, and in fall 2016, as a UAlbany junior, an accident resulted in a brain injury that remains an everyday problem. A kidney infection that evolved into sepsis added to her physical difficulties.

Given these trials, her progress and successes have been all the more remarkable, emotionally and academically. Upon coming to UAlbany as a junior, she revealed to her professors the distinctive talents of the natural-born researcher — one who liked presenting her results.

“All of which pointed me in the direction — despite my original interest in psychology — of becoming a college-level teacher in history,” she said. Aware of her physical challenges, her professors have allowed Herbach to do much of her class work at home and take several independent studies.

Her first presentation of the Elizabeth of Austria paper was in the spring 2017 UAlbany Undergraduate Research Conference. She said that made the Madrid presentation an enjoyable experience and “not terribly different” from her spring presentation — including the number attending her talk and the intellectual level of questions she was asked.

“Still, I was the youngest presenter and I was a bit nervous,” she said. “But everyone was so kind, amazing, and knowledgeable and fun! I was also blessed to have my family with me all the time . . . And Madrid is a marvelous city.”

Herbach credits the work and attention she has received at UAlbany with allowing her to advance academically at noteworthy speed. She began work in the master’s degree program in January 2018, with an eventual goal a Ph.D. in European history.

Prominent among her supporters has been full-time lecturer Ileana Camelia Lenart. “She has been an amazing mentor to me,” said Herbach. “Over the last year of working together she has helped me to follow my academic ambitions, both by helping me get into the Kings & Queens conference, and by supporting me with individual studies, which have helped me work during my brain injury immeasurably.”

Herbach’s research on Elizabeth of Austria was accepted and presented at a SURC conference in Oneonta, N.Y., in April 2018. She has continued working with Lenart, this time on a 16th century Transylvanian noble, Elizabeth Báthory, alleged to have participated in the murders of hundreds of young women between 1585 and 1609.

As with Elizabeth, she is looking at Báthory through a psychosocial-historical approach and is using a combination of primary and secondary sources in three languages: Hungarian, Romanian, and English. This new research was accepted to the “Kings & Queens 7: Ruling Sexualities” conference, held in England at the University of Winchester and Hampton Court in July 2018.

Health Careers, Passion-Based continued

Health Careers, Passion-Based the fungal pathogenesis, combined with mucosal immunology of the intestine and a study of how the intestine recognizes fungal-derived vaccine-delivery vehicles. With her students at her lab, she focuses on understanding how the gut recognizes all sorts of microbes, specifically fungi.

And while she mentors, she encourages these students to follow their passion, whether it’s in academia, basic science and/ or medicine.

She denoted many emerging public health issues for students to explore: Zika, newborn screening for genetic conditions, climate change and antibiotic resistance, as well as whatever virus du jour is waiting around the corner. De Jesus believes that the School of Public Health offers a great training ground for this via the classroom, the lab, internships and the school’s partnership with the New York State Department of Health.
Perhaps better known today as an agent of bioterrorism, in its natural form anthrax is an ancient and deadly bacterial disease of herbivorous wildlife and livestock. Wendy Turner, assistant professor of Biological Sciences, spent much of the summer of 2018 in Africa with a team of student researchers investigating what triggers anthrax outbreaks in certain ecosystems — research that could have ramifications for predicting and managing anthrax outbreaks worldwide.

Backed by a $2.5 million grant from the National Science Foundation, Turner’s team is comparing the transmission dynamics and evolutionary relationships of the anthrax bacterium *Bacillus anthracis* (*B. anthracis*) with its herbivorous hosts in two African national parks, Etosha National Park in Namibia and Kruger National Park in South Africa, whose mammalian species are similar but show very different characteristics in anthrax outbreaks.

Because of its lifecycle — with short bursts of population growth within a host followed by long periods in the environment as dormant spores — *B. anthracis* is considered a slowly evolving pathogen. In fact, isolates of *B. anthracis* from around the world are around 99.95% similar.

Therefore, when it comes to understanding why anthrax has such different outbreak dynamics among locations, the pathogen tends to be treated as a constant, with the source of variation attributed to the uniqueness of the environment or the locally available host species.

Recent work by Turner and colleagues, however, indicates that the pathogen’s genetic diversity can and does change significantly over time in one location but not the other. Therefore, she said, there is “something interesting going on” among locations that scientists don’t yet understand, possibly driven by differences in the pathogen’s environment or its evolutionary relationships with specific host species.

Turner says “by overlooking the role of the pathogen’s variation in these systems, we may be missing a critical part of the story.”

Her team and collaborators conduct both field and lab experiments to discover differences among *B. anthracis* strains that could affect their ability to survive in the environment or to kill a host more quickly, and study how the pathogen’s genome has changed over time in different environments.

The work includes fitting wild zebras, kudus, wildebeests and impalas with GPS collars, monitoring changes in host density with camera traps, testing the animals’ blood for recent exposure to *B. anthracis*, and comparing host populations for genetic evidence of resistance against the pathogen.

This information will help determine whether the absence of the disease in certain host species or locations is a result of a lack of exposure or a developed resistance. Findings could lead to predictive tools to better manage public health and related policies in developing countries. Furthermore, said Turner, “if you can understand what’s happening in animals, you can also better understand human infections, since most human infections have an animal source.”

Graduate students Zoe Barandongo and Yen-Hua Huang aided the field and laboratory studies, as did postdoc Spencer Bruce, a UAlbany undergrad, Celeste Champagne. “Zoe is doing the pathogen work, looking for genotype-phenotype relationships among the strains we’ve detected thus far,” said Turner. “Yen-Hua is looking at host behavior and anthrax transmission dynamics, using satellite collars, camera trap photos and long term datasets.”

“Graduate student researchers are critical to the success of my research program,” said Turner.
If your spouse has heart problems, wouldn’t you like to know which health insurance plan is rated the best statewide in managing a cardiac condition?

You can now have that information in a clear and understandable format, thanks to researchers and student scientists from UAlbany’s Center for Technology in Government (CTG), who developed software to produce easy-to-use “interactive data visualizations.”

The project was funded through the New York State Department of Health (DOH) by the federal Centers for Medicare and Medicaid Services and was part of CTG’s Student Technology Innovations Lab Experience (STILE)
The new visualizations provide information on the quality of various health insurance plans so that consumers can make informed decisions about which plan best suits them and their families’ needs.

The data on which the visualizations were based were made publicly available by DOH through Health Data NY, part of Gov. Andrew Cuomo’s open data initiative. It provided user-friendly, one-stop access to data from state agencies, localities and the federal government.

The quality performance results for health plans in New York State are now available on the NYS DOH website. Patients can see which plans manage a specific illness or condition “significantly better than average” or are below the state average. This information was available before, but now, through the CTG UAlbany project, it is in a clear, easy-to-digest format for comparing and choosing the best health insurance to meet each consumer’s needs.

“CTG’s STILE program has provided a tremendous opportunity for Health Data NY to expand its capability in presenting our own health data,” said Health Data NY’s director, Natalie Helbig. “We learned a great deal about what makes a good open dataset and ways in which to improve how we publish data.”

The Innovations Lab Experience recruits exceptional students at UAlbany for experiential learning opportunities through CTG projects with state and local agencies. For this project with DOH, CTG recruited two graduate students from the College of Engineering and Applied Sciences and one doctoral student from The Rockefeller College of Public Affairs & Policy.

Two of the students took regular, data-heavy charts and transformed them into interactive maps and graphs, while the third assessed their usefulness and efficiencies.

“This was a great opportunity to learn about current technologies and apply them to a project with a big impact,” said Meet Parikh, who graduated from UAlbany in 2016 with a master’s degree in computer science. “I am glad it is live (for the people of New York State). Apart from learning, I loved working at CTG. Thank you to CTG and UAlbany for helping me become a better developer.”

Parikh is now a software engineer at Walmart Global eCommerce.

“As a researcher in training, I very much enjoyed working on a team made of people with different types of expertise,” said Sora Park, a doctoral student in Rockefeller College’s Department of Public Administration & Policy. “We were able to feed off one another’s ideas and accomplish more because our different skill sets complemented each other. I was so excited to see my ideas become actualized in our new data visualization tools, and that was one of the unique experiences that I enjoyed while working at CTG.”

The open data framework developed by CTG is not limited to health data. “From our collaboration with DOH, we have developed and refined an approach that can be used with any government organization interested in maximizing the value of its open data, regardless of the open data set,” said CTG Director Theresa Pardo.

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Embryonic Insights Into Infertility continued

Upadhyay said she owes much to Rangan. “It is because of the training that I got in his lab that I got a position at Harvard, where I will continue to work in Drosophila germ cell biology. Basically everything that I learned here will be useful.

“Science is not just about research,” she added. “It is also about being able to communicate your findings. Under Prash’s guidance, not only did I become a better scientist, but also a better writer and a better speaker.”
S

Sometimes a single classroom course can turn a group of students into researchers.

Take one alumna. And two prints. In a classroom of undergrads in East Asian Studies. These became the ingredients that unraveled a long-held mystery.

Alumna Suzanne Zafonte Sennett ’77, who lives in nearby Averill Park, said it all started in November of 2017 when she sent a quick email to the Department of East Asian Studies.

“For a number of years I have owned two prints and have wondered about their origin and meaning, as they had Chinese text,” said Sennett, who earned her bachelor’s in anthropology and biology from UAlbany.

Sennett asked for a referral to someone who could translate the writing that is on the prints, and perhaps give her a sense of the age of the pieces.

Two days before Thanksgiving, Associate Professor Anthony DeBlasi turned Sennett’s question into a classroom exercise for the students in his Chinese Research and Bibliographic Methods course.

“As far as we know, no other school in the country teaches a course like this to undergraduates,” said Professor Susanna Fessler, a College of Arts and Sciences associate dean who teaches a Japanese version of the same course.

“This was the perfect opportunity for the students to experience how the various skills they are working to acquire can be harnessed together to solve a problem,” said DeBlasi.

The students used a number of methods to translate the text: First, they applied what they learned about calligraphy and calligraphic styles. Then, using the sexagenary calendrical system they’d studied, they determined the date in the Western (Gregorian) calendar. Finally, they had to employ biographical research methodology to find out more information about the artist.

“What happened makes me incredibly proud of calling the University at Albany my alma mater,” Sennett wrote in a note of appreciation to the department. “The faculty did what outstanding teachers do: turned it into a learning opportunity for their students.

The students believe both prints — one which bears the phrase “A scene of vitality,” the other “Happiness overflows from the brows,” — to be the work of a painter named Chen Zhenting, born in Chenghai in Guangdong province, arriving in Shanghai in 1939 and educated at the Shanghai Fine Arts Academy.
EXORCISING THE DEMONS OF EXERCISE

As the media and entertainment industries relentlessly spread the “Thin Ideal,” in which plus-size or “normal” figures are cast in a negative light, increasingly more people are falling victim to unhealthy lifestyles. Some, including college students, even begin to form an addiction to exercise, constantly craving physical activity.

Melissa Ertl, a third-year Ph.D. student at UAlbany, set out in 2017 to examine why exercise addiction was affecting so many on campus. Along with five other graduate students and Assistant Professor Jessica L. Martin of Counseling Psychology, Ertl sought to delineate the predictors, symptoms and effects of exercise addiction among female college students.

“It’s something that’s not studied as often as other behavioral addictions,” Ertl said, “so really there’s not a ton of research to examine what are the predictors and what potentially could be risk factors for or
protective factors against developing exercise addiction. Further, there’s even less research among college students.”

Examining exercise addiction was part of a much larger study done at UAlbany on health risk behaviors among college students. After finding a diverse group of students (based on age, race and economic class) to participate, Ertl and her team decided that exercise addiction would be the focus of their manuscript.

“The analyses and writing process for this paper was the most collaborative project I’ve worked on,” said Gabrielle Groth Hoover, the third author on the study, who graduated with a counseling psychology Ph.D. in May 2018. “We puzzled out the rather confusing results with diagrams and a long discussion all together. It was a challenge but exciting to have everyone’s input and expertise utilized.”

The team discovered both that body shame is a leading cause of exercise addiction and that self-esteem is a significant factor.

“Body shame increases behaviors affiliated with exercise addiction, and a woman’s self-esteem has the potential to reinforce or impede excessive exercise behaviors,” said Kate Berghuis, M.S. ’16, a doctoral student at the University of Louisville who assisted with literature research for the paper while working on her UAlbany master’s in mental health counseling.

Ertl added, “We found a negative relationship between body shame and self-esteem, so the more body shame a person had, the lower their self-esteem.”

Yet the team was surprised to discover that, in many cases, women who were body-shamed still exhibited high levels of self-esteem.

“It’s intuitive that high body shame would be connected to exercise addiction, but the high self-esteem is a bit more puzzling,” said Hoover. “We offer two possible explanations for this: It may be that the high body shame outweighs the impact of high self-esteem on unhealthy behaviors like excessive exercise, or it may be that high self-esteem encourages healthy behaviors like exercise and the high body shame increases the exercise to an unhealthy level.”

The article, titled “Running on Empty: High Self-esteem as a Risk Factor for Exercise Addiction,” was published in July 2017 in the journal Addiction Research and Theory. The team hopes that the information they gathered will benefit clinicians when treating exercise addiction.

Ertl explained, “We’re suggesting that all clients, regardless of levels of self-esteem, be assessed for exercise addiction because, despite high self-esteem, they may still exhibit high levels of exercise addiction.”

While their careers have continued, Ertl, Hoover and Berghuis each raved about the process that went into the study, and were grateful that UAlbany had brought them together to work on an important cause.

“I think a really unique part of conducting the study was that six of the seven co-authors are all master’s level or graduate students,” said Ertl.

When asked about her favorite part of the entire process, Berghuis said, “Hands down, it was the team. The drive and ambition of the co-authors are indescribable. It was a unique experience to conduct a modified paper chase where we came together for one day to construct the paper and collaborated to have an end product. Everyone worked well with one another and brought a different strength to the table.”

Tracking a Most Dangerous Game

“The work we do in the Turner lab is transcontinental, multidisciplinary, and requires considerable time away from campus to collect data and conduct experiments. They work in often-remote field sites, with limited resources at hand, which requires them to be highly motivated, independent, flexible, and creative.”

Huang, a native of Taiwan, expressed gratitude for the opportunity to both study in the United States and research the unique ecological systems of Africa first-hand. “To work on this study, not only are my field skills and analyzing methods but my communication ability being trained and improved,” he said. “I plan to combine these skills and to become a field disease ecologist in the future.”
Among the many dilemmas facing researchers trying to prevent, identify or cure the progressive neurodegenerative disease Alzheimer’s is the current state of diagnostic methods — expensive, invasive, time-consuming, and applicable only at Alzheimer’s late stages. It is an unwelcome predicament in the fight against this most common form of dementia among older adults, affecting more than 5.4 million people in the United States alone.

Igor Lednev, a chemist at UAlbany’s RNA Institute, has his sights on a quick, noninvasive test that will diagnose Alzheimer’s in its earliest stages.

His technology, patented in 2018, relies on a combination of advanced statistics and “Raman Hyperspectroscopy,” a spectroscopic technique that measures the intensity of scattered light by shining lasers on such samples as dry traces of blood or other bodily fluids. No two samples produce the same Raman spectrum, making each measurement unique.

To test his technology, Lednev built a deep ultraviolet Raman spectroscopy instrument that can identify the properties of amyloid fibrils — protein deposits found in the tissues and organs of patients with Alzheimer’s or other neurodegenerative diseases associated with high morbidity and mortality.

In his proof-of-concept study, Lednev analyzed blood samples from 20 Alzheimer’s patients, 10 healthy controls and 13 patients diagnosed with other neurological diseases. Lednev’s technology identified the samples correctly at a rate of over 95 percent.

It took more than four years for Lednev’s technology to move from initial application to patent, titled “Spectroscopic method for Alzheimer’s disease diagnosis.” He credits UAlbany’s Office for Innovation Development and Commercialization for expertise and patience in obtaining the patent amid “a highly competitive biomedical field.”

The initial proof-of-concept study was published in the Journal of Biophotonics and funded by the National Institutes of Health. It was led by Elena Ryzhikova, who graduated from UAlbany in 2014 with a Ph.D. in chemistry. Nicole Ralbovsky, a current chemistry Ph.D. student, is working on the project now.

Through funding from SUNY’s Technology Accelerator Fund, Lednev’s lab is preparing the Raman device for use in clinical trials. Upon completion, commercialization of the technology will follow.
By licensing innovations to companies and other organizations, UAlbany research helps create new products and solve pressing problems.

The Drug Recognition Expert Data Entry & Management System (DRE Data System) is a prime example. Developed by UAlbany’s Institute for Traffic Safety Management and Research (ITSMR), the system’s mobile app and database were designed to aid state law enforcement agencies in improving the management and monitoring of their Drug Recognition Expert (DRE) programs. The DRE Data System enhances states’ abilities to identify drug-impaired drivers and remove them from the roadways.

The system has two primary components, a web-based application and a tablet application, which can be used by DREs in the field to complete and submit their evaluations, narrative reports and corresponding toxicology results into a DRE database developed by ITSMR. DREs utilizing the system do not have to re-enter evaluation data in the National DRE database, because ITSMR does that by way of a secure file transfer. The application is tailored to meet each respective state’s data fields to further enhance efficiency and to improve data integrity.

To date, 10 states have entered into license agreements with ITSMR to participate in its DRE Data System. ITSMR is now working with additional states while it continues to enhance the system through the development of additional applications. 

UAlbany research is funded by many types of sponsors, including the federal government, New York State, private foundations, business, industry and non-federal agencies using federal monies (“flow-through funds”). This chart represents research expenditures by sponsor type.


total expenditures by sponsor type

Federal
Federal Flow Through
Federal
New York State Agencies
Industry/Other

HRI’S EXPENDITURES

2017-18 data of expenditures for Health Research, Inc. (HRI), which are solicited and administered for UAlbany faculty employed by New York’s Department of Health.

innovations: knowledge creation to market reality

14 Invention Disclosures
9 Patent Applications
6 Patents Issued
10 Licenses Executed

License Income:
$431,179
2017-18
President’s Excellence
in Research and Creative
Activities Award Recipients

SHAO LIN, Professor
Department of Environmental Health Sciences
School of Public Health

2017-18
Chancellor’s Award Recipients

LOUISE BURKHART, Professor
Department of Anthropology
College of Arts and Sciences

ZAI LIANG, Professor
Department of Sociology
College of Arts and Sciences

SIWEI LYU, Professor
Department of Computer Science
College of Engineering and Applied Sciences