



YOUNG INVESTIGATORS REVIEW

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A SPECIAL THANK YOU TO OUR FACULTY ADVISORS

Dr. John Peter Gergen and Mr. Joshua Rice (MFA)

A LETTER FROM OUR EDITOR-IN-CHIEF

At the Young Investigators Review, we proudly champion the belief that science should be shared and understood—not just by scientists, but by everyone. Our journal serves as a gateway for students beginning their research journeys and a platform that celebrates the scholarly contributions made by students and faculty throughout Stony Brook University. This semester, our persistence in these aims is no different, and I am happy to report the remarkable growth and impact we've experienced in these few months.

With a staff of over 70 dedicated students, we have greatly expanded our reach and strengthened our foundation, allowing us to advance our mission of making research accessible. Additionally, we are so overjoyed at the launch of our Introduction to Research series, a new initiative designed to guide students as they take their first steps into the world of scientific inquiry. Through workshop events, panels with accomplished students and professors, and discussions with career scientists, we created a pathway for students who are curious about research but unsure where to begin. Furthermore, we hosted our largest annual high school writing competition to date, receiving nearly 100 submissions from talented young scholars. This milestone reflects our ongoing commitment to fostering scientific communication and curiosity among the next generation of thinkers. As for our defining semesterly achievement, I am so thrilled to celebrate the successful printing of the 25th volume of the Young Investigator's Review journal: Animal Science, featuring groundbreaking work in animal science and beyond. This publication stands as a testament to the hard work of our staff, the creativity of our authors, and the passion that fuels our mission.

Lastly, some gratitude. I would like to thank my executive board for the countless hours they poured into fulfilling our club's mission. I thank our incredible staff for writing, editing, and layout-ing all of the work that lays in your hands—or on your screen—right now. To our friends at iGEM and NSBP, science is meant to be shared, and we appreciate your organizations for sharing your unique perspectives with us. I thank all of the students who showed up at our events with a blazing curiosity for knowledge. To Mr. Joshua Rice, Miss Christina Anselmo, and Miss Lisa Pfeifer, your support and advice behind the scenes is imperative to our continued success, and we cannot thank you enough. Finally, without the financial support of Stony Brook University's Undergraduate Student Government, the Alan Alda Center for Communicating Science, none of this would be possible. And to the reader, I would like to thank you for spending your precious time reading our work—we hope you find a meaningful place in research and science.

The power of a group of people, a shared mission, and their words is profound. I am so honored to lead a team that truly understands this ideal.

Luis-Jaime Caseñas '26



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Exploring Nature's Mysteries: Dr. Liliana M. Dávalos on Bats, Biodiversity, and Natural History

KANG LAI '26

Introduction

Amongst the diverse natural history research conducted here at Stony Brook University—ranging from disease modeling and behavioral studies to conservation—Dr. Liliana M. Dávalos’s work in the Department of Ecology & Evolution stands out for its profound impact on evolutionary and conservation biology, particularly in the study of biodiversity and bats. In addition to her research, Dr. Dávalos is a dedicated educator who teaches several undergraduate courses BIO 336 (Conservation Biology) and GLI 320 (Global Cultural & Environment), has taught BIO 211 (Statistics and Data Analysis), as well graduate-level courses and seminars.



Figure 2 A group of bats hanging from a branch.

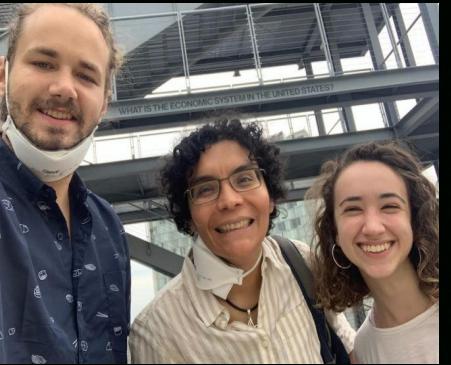


Figure 1 Postdoctoral Research Associate Bill (left), Dr. Liliana M. Dávalos (middle), and former summer undergraduate, Maria Alejandra Bedoya (right).

Dr. Dávalos pathway into research

Dr. Dávalos describes her path to research as full of serendipitous moments. Although her initial interests were in birds, an unexpected opportunity to study bats at the American Museum of Natural History opened a unique and rewarding avenue of research. From a young age, Dávalos knew she wanted to be a scientist. She started off watching TV specials on the Leakeys, a renowned Kenyan family of paleoanthropologists known for their fossil discoveries in the Turkana Basin—which motivated her to start digging for fossils in her own backyard. As it turns out, the “fossils” she unearthed were the buried remains of a neighbor’s dog. Years later, upon joining Stony Brook University she had the chance to meet Richard Leakey, the next generation of the Leakeys and founder of the Turkana Basin Institute (Turkana Basin Institute, n.d.), who had originally inspired her to scientific curiosity. “So I’ve always known I wanted to be a scientist—just not sure of the discipline,” she reflected.

During her undergraduate years, Dávalos lived in the northern Andes, one of the world’s richest biodiversity hotspots. Biodiversity hotspots are places in the world where there is a large amount of biodiversity, unique animals and plants. “Because of this, we were able to go directly in the field and look for frogs and bats, and count plants,” she explained. In graduate school, Dávalos’s fascination towards birds and their beauty initially guided her research focus, but after emailing a few professors and museum curators, that trajectory didn’t pan out. Instead, someone reviewing her application at the American Museum of Natural History took note of her background and asked if she would consider working with bats instead. “I had experience working with mammals, so I took the opportunity,” Dávalos said—a decision that would carry throughout her scientific career.

Dávalos went on to pursue a degree in evolutionary biology, captivated by the powerful idea that all organisms are connected through ancestral descent. In graduate school, Dávalos was able to get a fellowship that allowed her to immerse in this field of study.

Dr. Dávalos’s research

Dr. Dávalos’ research surrounds natural history—studying and observing animals in their natural environment rather than a controlled laboratory setting. She explains that both fieldwork and laboratory research offer unique advantages and challenges. Bats, for example, are not inbred, and therefore differ greatly from lab animals such as mice where you can

order from a catalog. In addition, bats are nocturnal. Observing them in nature requires a unique schedule, making their study very demanding. A lot of their behaviors and aspects were hidden until recently because instruments and machines that allowed night vision weren’t readily available until 50 years ago, and even then remained very expensive.

Natural history means we are asking a very different set of questions. Observing bats in their natural habitat limits the ability to manipulate experiment conditions, unlike the functional and mechanistic analysis conducted in labs. “It changes all kinds of questions.” Although mice are evolutionarily closer (to humans), their lifespan is very short making some aspects of biology divergent from humans. Bats, while more distantly related, possess features such as vocal learning and longevity (some weighing only 10 grams can live up to 40 years) allowing us to study them in ways that help us understand mammalian biology.

In one of her ongoing projects, Dávalos investigates bats as reservoir hosts and explores interactions between, environment, hosts, and viruses. The COVID-19 pandemic drew particular attention to bats due to their association with zoonotic viruses—a topic further explored in the PBS NOVA documentary featuring Dr. Dávalos’s lab (NOVA, 2021). Dávalos explains that many viruses that circulate in bats and are closely related to the virus that have spilled over to humans such as Nipah virus and the Marburg virus (a relative of Ebola). “I want to clarify that there are viruses that cause disease in humans and viruses that are related to those that are found in bats,” she says. Regarding SARS-CoV-2, the closest wild virus is found in bats, but the immediate ancestor has not yet been identified. Precisely how it has spilled over is not known but, as in past cases, there seem to be instances of close contact between people and wild caught animals that play a role in transmission.

In another project, Dávalos and her team studied a unique characteristic of shrews unlike that of any other animal. Eurasian common shrews are widely distributed from Britain, northern Spain to Siberia, but unlike other animals that migrate or hibernate in the winter, shrews shrink. This seasonal size reduction allows shrews to maintain their high metabolism on a per unit gram basis but shrink in size to conserve their energy. Their brains shrink the most—up to 25%—and regrow back in the spring. “Crazy.” This observation, also termed Dehnel’s phenomenon, created all kinds of interesting questions. “I get crazy weird looks whenever I tell people or give a talk on this study,” Dávalos laughs. The main question people ask is whether this shrinkage is associated with neuronal loss. Working with collaborators in the article, “Programmed seasonal brain shrinkage in the common shrew via water loss without cell death”, it was discovered that there is no neuronal loss, instead the shrinkage in the brain is due to changes in water balance (Baldoni et al., 2025). The Dávalos lab studied the different RNA signaling, gene expressions and metabolomics associated with the changes in RNA composition throughout the cycle and between different species. This work led to the publication of “Seasonal and comparative evidence of adaptive gene expression in mammalian brain size plasticity” (Thomas et al., 2025). The ability of shrews to undergo drastic changes in brain tissue without compromising function is important to understand signals of neuron degeneration and possible signals of neuroprotection. The shrew brain size plasticity may offer potential explanations for treating neurodegenerative diseases.

Beyond the lab

In addition to her research, Dr. Dávalos is a Fulbright Amazonia Fellow, a co-lead of the The Global Union of Bat Diversity Networks, and has appeared on the NOVA documentary *Bat Superpowers*. I asked Dr. Dávalos about her exhilarating experience conducting research in the Amazon. Dr. Dávalos joined the program the first time it was running, and described her fieldwork as a life changing experience. “I was not only able to work

on my own project but also with a team of 12 that were also working in the Amazonia.” The team consisted of scientists from the United States, Colombia, Ecuador, Bolivia, Suriname, Peru, and Brazil, and Dávalos mentioned it was fantastic being able to work with others that were in fields such as film, agriculture, or anthropology.

Dr. Dávalos work is highly international—she collaborates with researchers from Germany and the UK, and for her bat projects, she partners with collaborators

Figure 3 A bat eating a flower.

across Southeast Asia, Australia, Africa, and Latin America. Although her work allows her the privilege to be a part of a very large network, communicate with many people across the world, she also strives to limit air travel both for personal and environmental reasons.

Concluding remarks

As an accomplished and passionate researcher, Dr. Dávalos offers thoughtful advice for young students and aspiring researchers. “Anything that you do that shows agency and you are standing out in a pack will help you in a positive and constructive way. Especially when you are starting off as a young scientist it is important to have different experiences. Don’t limit yourself from one close lab to another close lab. Think and reflect on what are some broader experiences that can help you contextualize science.”

Reflecting on her career, Dávalos describes much of her career in science as having benefitted from many “fortunate accidents, serendipities.” Just as her pivot from her original interest in birds to bats, another serendipitous moment was when she had originally missed the main Fulbright deadlines. Later she discovered Fulbright Amazonia and figured she would try for that one instead. That missed opportunity led her to this highly competitive and upcoming Fulbright Amazonia experience that was particular and extremely enriching. This just shows how persistence is a key quality in science. “My experience in the scientific field is that there are setbacks and rejections.” She says. “The only thing you can do is adapt, follow your passions, and persist.”

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