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ASBMB TODAY

THE MEMBER MAGAZINE OF THE AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

THE POLICY & FUNDING ISSUE

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American Society for Biochemistry and Molecular Biology

We ask hard questions.

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— Alex Toker

Biochemist focused on oncogenic signaling pathways
Professor, Beth Israel Deaconess Medical Center, Harvard Medical School
Editor-in-chief of the Journal of Biological Chemistry

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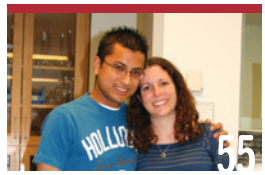
CONTENTS

NEWS

FEATURES

PERSPECTIVES



ASBMBTODAY
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Why we advocate

By Sarina Neote

When I first moved to Washington, D.C., over 10 years ago, I had no idea I would end up working in science policy. I thought I wanted a job in international development or global health policy. Everyone I knew aspired to work on Capitol Hill or become a diplomat. Some of them focused on health policy but mostly on patients' access to drugs or reforming the health care system.

Back then, I knew very little about science policy or advocacy. Now, through an odd turn of events, I spend most of my days trying to get scientists to advocate for funding and legislative support — and trying to get policymakers to listen to those scientists.

As American Society of Biochemistry and Molecular Biology members, most of you do foundational work, not only ensuring we can treat diseases but also discovering renewable energy sources and making our food systems more sustainable. Businesses are reluctant to fund such foundational work — after all, if we don't know where basic scientific research leads, what for-profit company would support it?

Without basic research, however, we won't have new drugs, cutting-edge innovations or the knowledge we need to address the challenges of the 21st century. This is what the ASBMB public affairs staff and Public Affairs Advisory Committee work to get policymakers to both understand and believe in so they will support (and fund) federal agencies such as the National Science Foundation and the National Institutes of Health — the agencies that support you.

That's why we work closely with Congress, the NIH, the NSF and others, and with our members, to advocate for basic scientific research funding. In this issue of ASBMB Today, you'll read about some of our major wins and some efforts we still need to do a lot of work on. You'll also read about funding opportunities that are a little unusual but might help support your work.

Our committee and our staff are passionate about advocating for science. If you are interested in becoming an advocate, know that there are always ways you can get involved. Never hesitate to reach out to us at publicaffairs@asbmb.org. And, if you want to stay in the loop on our efforts, make sure you subscribe to our Advocacy Newsletter on the ASBMB website.

Sarina Neote (sneote@asbmb.org) is the ASBMB's director of public affairs.

CORRECTION

"Next-gen biopsies take the sting out of diagnosis" in the September issue provided an incorrect affiliation for Alexander Niculescu. He is at Indiana University.

HHMI recognizes early-career scholars

The Howard Hughes Medical Institute has named the inaugural class of Freeman Hrabowski Scholars. These 31 exceptional early-career faculty have the potential to become leaders in their research fields and to create diverse and inclusive lab environments in which everyone can thrive. Among them are four American Society for Biochemistry and Molecular Biology members: **Josefina del Mármol, Elizabeth Johnson, Juan Mendoza** and **Judith Simcox**.

del Mármol is an assistant professor of biological chemistry and molecular pharmacology at Harvard Medical School. The del Mármol lab uses structural biology, electrophysiology and neurogenetics to understand how olfactory receptors translate the chemical complexity of the environment into interpretable neuronal signals that enable robust odor-driven behavior. She received a National Institutes of Health MOSAIC K99/R00 Pathway to Independence award, the Polak Young Investigator Award by the Association for Chemoreception Sciences and the Blavatnik Regional Award in Life Sciences. She was recently named a Pew Biomedical Scholar.

DEL MÁRMOL

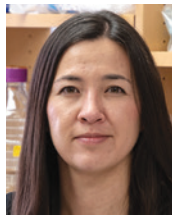
JOHNSON

Johnson is an assistant professor of molecular nutrition at Cornell University. Her lab focuses on how specific nutrients promote the development of the infant gut microbiome and impact infant health. Johnson's work will better inform caregivers about nutritious food for their babies to support lifelong, microbiome-dependent health. In 2022, Johnson was named a Pew Biomedical Scholar, and she was named an NIH National Institute of General Medical Sciences Judith H. Greenberg Early-Career Investigator Lecturer and a CIFAR Azrieli Gobal Scholar in the Humans & Microbiome Program in 2021.

Mendoza is an assistant professor of molecular engineering at the University of Chicago, Pritzker School of Molecular Engineering. His lab studies cytokine-related interactions outside and inside of cells and aims to find new ways to improve immunotherapies by using small molecules or engineered proteins. As a postdoctoral scholar, he was awarded an NIH National Cancer Institute Career Development Award and fellowships from the Helen Hay Whitney Foundation and the Damon Runyon Cancer Research Foundation. In 2019, the International Cytokine and Interferon Society gave him the Milstein Young Investigator Award for his contributions to the field. In 2022, he was elected to the ASBMB Nominating Committee.

MENDOZA

Simcox is an assistant professor of biochemistry at the University of Wisconsin–Madison. The Simcox lab works to identify novel lipids in the circulation, determine how their production is regulated and discover how these plasma lipids function in metabolic disease. In 2017, she was awarded the American Heart Association Postdoctoral Fellowship for her work on circulating lipids as a fuel source for the heart during cold exposure. More recently, she was named an Emerging Investigator by the University of Illinois Chicago in 2020. The ASBMB recently announced that she will receive the 2024 Walter A. Shaw Young Investigator Award in Lipid Research.



SIMCOX

The Freeman Hrabowski scholars are appointed to a renewable five-year term and will receive up to $8.6 million over 10 years, including full salary, benefits, a research budget and scientific equipment. In addition, they will participate in professional development activities to hone their leadership and mentorship skills.

Va Tech honors Gallegos, Truong, Marine

American Society for Biochemistry and Molecular Biology members **Sara Gallegos, Eric Truong** and **Sasha Marine** were recognized by Virginia Tech's College of Agriculture and Life Sciences at the 2023 commencement ceremony in May.

Gallegos received the Madelynn Todd Trailblazer Award, Truong received the Ut Prosim Award, and Marine received an Academy of Teaching Excellence Award. These awards honor achievements including undergraduate teaching and research, diversity and inclusion and leadership.

GALLEGOS

Gallegos is an undergraduate in biochemistry. She conducts computational research with Anne Brown, an associate professor of research and

informatics, studying protein aggregation in Alzheimer's and Type II diabetes. Gallegos was a Howard Hughes Medical Institute student fellow and leader. In this role, she advocated for diversity, equity and inclusion for underrepresented groups within the biochemistry department.

Truong graduated this year with a degree in biochemistry. He conducts research on the gut microbiome with Lijuan Yuan, a professor of virology and immunology. Truong has been a biochemistry peer mentor and College of Agriculture and Life Sciences ambassador.

TRUONG

Marine is a collegiate assistant professor in the biochemistry department at Virginia Tech. She conducts research on the impact of topic order on student self-efficacy and performance and leads a summer undergraduate research program on translational plant sciences and food security. Marine is passionate about science and undergraduate education.

MARINE

Iowa State honors for Nilsen-Hamilton and Underbakke

Two members of the American Society for Biochemistry and Molecular Biology are among the Iowa State University faculty honored at a community celebration in September.

Marit Nilsen–Hamilton, a professor in the biochemistry, biophysics and molecular biology department, received the lifetime title of university professor, given to faculty who act as positive change agents on campus. **Eric Underbakke** won the James Huntington Ellis Award for Excellence in Undergraduate Introductory Teaching.

NILSEN-HAMILTON

Much of Nilsen-Hamilton's recent research revolves around aptamers, bits of synthetic single-stranded nucleic acids that bind a target molecule. She has published 111 studies in peer-reviewed journals. Her new status reflects her contributions to Iowa State, where she has worked for more than four decades. Her leadership roles include nearly six years as chair of an interdepartmental program in molecular, cellular and developmental biology and a five-year stint as chair of her department. She has served on more than 25 university committees, notably the Faculty Review Board, which she twice chaired.

UNDERBAKKE

Underbakke's lab focuses primarily on protein biochemistry, exploring the interplay and posttranslational modifications of signaling proteins that tune the strength and plasticity among neural synapses. He is an associate professor of biochemistry, biophysics and molecular biology, and he started his research group at Iowa State University in 2014.

Nogales receives Shaw Prize

Eva Nogales, a professor of biochemistry, biophysics and structural biology at the University of California, Berkeley, has won the 2023 Shaw Prize in Life Science and Medicine. Nogales, who is also a researcher at Lawrence Berkeley National Laboratory and a Howard Hughes Medical Institute investigator, shares the award with Patrick Cramer, director of the molecular biology department at the Max Planck Institute for Multidisciplinary Sciences in Germany.

Nogales was chosen for her use of cryo-electron microscopy to visualize early steps in human gene transcription, with a focus on the preinitiation complex, or PIC, and transcription factor II D, or TFIID, which recognizes DNA sequences marking the beginning of a gene and then recruits the rest of the PIC. Though TFIID and the PIC are scarce, fragile and extremely flexible, Nogales revealed how TFIID rearranges as it binds promoter DNA and liberates the transcription factor TBP to initiate PIC assembly. She showed the steps of that assembly, how RNA polymerase II then engages DNA, and how the large transcription factor II H opens the DNA and brings the transcription start site to the active site of the polymerase. This work led to a model of how sequential PIC states allow transcription initiation.

NOGALES

Nogales won the American Society for Biochemistry and Molecular Biology's Mildred Cohn Award in Biological Chemistry in 2016 for using cryo-EM to shed light on crucial multiprotein complexes. She was elected to the National Academy of Sciences in 2015 and the American Academy of Arts and Sciences in 2016. She was named a fellow of the American Association for the Advancement of Science in 2021.

Marqusee to head NSF directorate

Susan Marqusee has been chosen to lead the Directorate for Biological Sciences of the National Science Foundation in Alexandria, Virginia.

Marqusee, a distinguished professor of molecular and cell biology and a chemistry professor at the University of California, Berkeley, served for 10 years as associate director of UC Berkeley's California Institute for Quantitative Biosciences and another decade as its director.

MARQUSEE

Marqusee won the American Society for Biochemistry and Molecular Biology's William Rose Award in 2012 and served on the society's Council from 2015 to 2018. The ASBMB named her one of 20 fellows this year. She is a member of the National Academy of Science and the American Association for the Advancement of Science. Other honors include the Margaret Dayhoff Award from the Biophysical Society and the Dorothy Crowfoot Hodgkin Award from the Protein Society.

Marqusee began her NSF appointment on June 30. She aims to continue her research at Berkeley where she and her team study the structural and dynamic information encoded in the linear sequence of amino acids.

Hobbs and Cohen win Ross Prize

Helen Hobbs and **Jonathan Cohen**, researchers at the University of Texas Southwestern Medical Center, have received this year's Ross Prize in Molecular Medicine from the Feinstein Institutes for Medical Research. The collaborators won the prize for their research defining the genetic risk factors for dyslipidemias and metabolic liver disease, which sparked the development of new treatments.

Hobbs is a Howard Hughes Medical Institute investigator. Her previous honors include the Breakthrough Prize in Life Sciences in 2016, the Fondation Lefoulon–Delalande Grand Prix Award and the Harrington Prize for Innovation in Medicine, both in 2018, and the Gerald Auerbach Award for Outstanding Translational Research and the Anitschkow Prize, both in 2019.

HOBBS

Cohen is a distinguished chair and professor in the Center for Human Nutrition at UTSW. He launched his career as a postdoctoral fellow there with Hobbs and Scott Grundy. With Hobbs, he has pinpointed the genes that help shape the metabolism of fats, cholesterol and triglycerides.

COHEN

Loertscher awarded fellowship

Seattle University named **Jenny Loertscher** a recipient of the James B. McGoldrick, S.J., Fellowship. This award is given to outstanding faculty who exemplify "Seattle University's Jesuit educational mission," according to the SeattleU website. It is the most prestigious honor the university confers upon its faculty.

Loertscher is an associate dean of science and engineering and a professor of chemistry at Seattle. Her research is focused on understanding and improving student learning in undergraduate chemistry and biochemistry. Specifically, she is interested in how classroom practices influence students' understanding of foundational concepts in biochemistry and their ability to work together and analyze complex problems. She is a coauthor of an active learning biochemistry textbook titled "Foundations of Biochemistry."

LOERTSCHER

Loertscher serves on the ASBMB Education and Professional Development Committee as well as the Accreditation and Exam Subcommittee. She has also written education articles for ASBMB Today. In 2017, she won Seattle U's Provost Award for Teaching.

Munson to lead cell biology society

Mary Munson, a professor in the biochemistry and molecular biotechnology department at the University of Massachusetts Chan Medical School, was recently elected president of the American Society for Cell Biology, or ASCB. She is set to become president-elect of the group's executive committee in 2024.

Munson was named assistant vice provost of health equity on her campus earlier this year. She also has been the faculty adviser for UMass Chan's student chapter of the Society for Advancement of

Chicanos/Hispanics and Native Americans in Science, or SACNAS, a leader in her department's Diversity Action Committee and a trained facilitator for the Entering Mentoring and Restorative Justice programs. In 2022, she received the Chancellor's Award for Advancing Institutional Excellence in Diversity and Inclusion.

The Munson lab studies the regulation of membrane trafficking, the flow of material between the plasma membrane bounding a cell and the cell's inner components. The team probes the control of exocytosis, the orderly fusion of secretory vesicles with the cell membrane. Another research focus is the link between severe congenital neutropenia (a dangerously low count of white blood cells known as neutrophils) and mutations in VPS45, a critical regulator of the endocytosis pathway.

MUNSON

Munson served on the Journal of Biological Chemistry editorial board from 2017 to 2022. She is co-chair of the ASCB's Women in Cell Biology committee and a co-investigator of the society's Maximizing Opportunities for Scientific and Academic Independent Careers, or MOSAIC, program for select K99/R00 scholars. She was elected in 2022 as a fellow of the ASCB.

Serio appointed provost and VP

Tricia Serio has been named provost and executive vice president for academic affairs at the University of Washington. She began her duties on Aug. 1, at which time she became a faculty member at the UW School of Medicine. Serio was previously the provost, senior vice chancellor for academic affairs and a professor of biochemistry and molecular biology at the University of Massachusetts Amherst.

SERIO

Serio will move her lab to UW later this year. Her research focuses on the cellular regulation of self-perpetuating protein conformations in yeast and the pathogenesis of severe neurodegenerative diseases. She has earned numerous honors including the Howard Temin Award from the National Cancer Institute and the Mid-Career Award for Research Excellence from the American Society of Cell Biology. Serio is a fellow of the American Association for the Advancement of Science.

Outside of the lab at UMass, Serio led initiatives to increase diversity, equity and inclusion for faculty, staff and students. She promoted faculty scholarship and creative activities focused on sustainability, healthy aging, society and technology, inclusive excellence, data science and mid-career research leaves. As a member of the American Society for Biochemistry and Molecular Biology Public Affairs Advisory Committee, she advocated for research funding, workforce equity and science literacy.

Carroll wins highest faculty honor

Dana Carroll, a distinguished professor of biochemistry in the Spencer Fox Eccles School of Medicine at the University of Utah, received the 2023 Rosenblatt Prize for Excellence for his work in genome editing.

Carroll discovered the potential of zinc-finger nucleases as tools for genome editing, laying the groundwork for gene editing platforms such as CRISPR/Cas and transcription activator-like effector nucleases, or TALENs.

The university's highest faculty honor, the $50,000 Rosenblatt Prize is presented annually for teaching, research and administrative contributions.

CARROLL

During his 48 years on campus, Carroll has served as a researcher, educator, mentor and leader. He helped create clinical and agricultural applications for genome editing. He was biochemistry department chair from 1998 to 2009 and served on 26 university-wide committees, 50 committees in the School of Medicine and 20 National Institutes of Health study sections.

Carroll has played a role in public debates on the ethics of gene editing, notably as a member of the global commission behind the 2020 report "Heritable Human Genome Editing" from the U.S. National Academies of Science and Medicine and the U.K. Royal Society.

Carroll is a fellow of the American Association of the Advancement of Science and of the American Academy of Arts and Sciences and a member of the National Academy of Sciences. He received the Sober Lectureship from the American Society for Biochemistry and Molecular Biology in 2014 and the Novitski Prize from the Genetics Society of America in 2012.

Kanipes receives lifetime achievement award

The University of North Carolina Association of Student Governments has named **Margaret Kanipes** as a recipient of the William C. Friday Lifetime Achievement Award. This award honors a public figure who has demonstrated a lifetime of exemplary service to UNC students.

Kanipes is a professor and dean of the Honors College at North Carolina Agricultural and Technical State University. Her research focuses on science, technology, engineering and mathematics education and STEM leadership. Her previous work was in food-borne pathogen detection. She is particularly interested in advancing Black women in STEM and at historically Black colleges and universities.

KANIPES

Kanipes has won many scientific and teaching awards including the Technology Merit Teaching Award, Department of Chemistry Teaching Excellence Award and the Young Investigator of the Year Award from A&T. She is a member of the American Society for Biochemistry and Molecular Biology Education and Professional Development Committee and was named an ASBMB education fellow in 2016.

Engevik wins ASIP award

The American Society for Investigative Pathology named **Mindy Engevik** as the recipient of the 2024 Cotran Early Investigator Award. The award goes to early-career scientists who are doing research that deepens knowledge of human disease.

Engevik, an assistant professor in the regenerative medicine and cell biology department at the Medical University of South Carolina, studies how commensal microbes may benefit the mucus layer and host health, and how pathogens use the mucus layer to produce infection. One focus of her lab is Clostridium difficile, a pathogen common in U.S. hospitals. Looking ahead, she aims to characterize the microbe–microbe signaling networks that play a role in C. difficile infection. She has authored 60 scientific studies.

ENGEVIK

Over her career, Engevik's honors have included the ASIP's Dani and Erik Zander Junior Faculty Scholar Award in 2021 and George K. Michalopoulos Junior Faculty Scholar Award in 2020. She also won the Histochemical Society's Early Career Investigator Award in 2022 and the 2021 Young Investigator Award from the Crohn's and Colitis Foundation.

Humanitarian honor for Lamb

The University of Kentucky selected **Jessica Lamb** to receive a 2023 Algernon Sydney Sullivan Award. According to the UKY website, this humanitarian award goes to individuals who embody a "spirit of love for and helpfulness to other men and women."

Lamb graduated summa cum laude from UKY in May 2023, with a B.S. in agricultural and medical biotechnology, and is now a first-year medical student at the University College of Medicine. She was an American Society for Biochemistry and Molecular Biology student chapter member, and she participated in the two-year UKY Appalachian Career Training in Oncology program, during which she performed cancer research, conducted clinical observations and provided cancer education and outreach to the local community. In addition to many other scholarships and awards, she received an ASBMB Student Chapter Travel Award in 2022.

Lamb conducted undergraduate research with Ramon Sun, then a UKY assistant professor of neuroscience, studying the role of glycogen metabolism in lung adenocarcinoma tumor progression. She continues to work with John Villano, a professor and director of clinical neuro-oncology, investigating long-term adverse effects of immunotherapy, and she recently began a research project with Neil Toupin, a UKY assistant professor of neurology, identifying biomarkers for spinal muscular atrophy severity and progression, in response to treatment.

LAMB

Bioengineer is MOSAIC scholar

By Anna Crysler

Colin Hisey grew up in rural Ohio and has chased his interest in bioengineering and extracellular vesicles or EVs, to Spain, New Zealand and home again.

Now a postdoctoral scholar at the Ohio State University, where he studies the characterization and detection of EVs in cancer, Hisey is also an American Society for Biochemistry and Molecular Biology Maximizing Opportunities for Scientific and Academic Independent Careers, or MOSAIC, scholar.

He earned bachelor's and master's degrees in chemical engineering from the University of Dayton where he was a part of the Multi-Ethnic Engineering Program, which helped place him in a lab doing materials research. After learning that he enjoyed working at the bench while also being interested in medicine, Hisey began a Ph.D. at Ohio State in biomedical engineering.

During his Ph.D., Hisey spent time at the Centre for Technical Research and Studies of Gipuzkoa in Spain. When he returned, he focused his research on creating microdevices with application in cancer engineering

"I had a materials background in clean room fabrication and knew enough about the biology," he said, "so I thought this was a cool way to combine these two very different fields."

Specifically, he worked on building a microfluidics device to capture and release extracellular vesicles. "I became obsessed with these biological particles," Hisey said. "So much so that I thought, 'I don't want to stop doing this research even though I'm finishing my Ph.D.'"

Combining his desire to travel with a continued interest in EVs, he did a postdoc at the University of Auckland in New Zealand where he helped initiate and run the Hub for Extracellular Vesicle Investigations. He helped maintain the organization for three years and gained research and publishing experience beyond his Ph.D.

When Hisey returned to the U.S., he joined the Leading Engineering as Agents of Change and Equity Postdoctoral Scholars Program at Ohio State. LEGACY, as it's known, aims to help underrepresented scientists transition into faculty positions through personal mentorship. Hisey said the support of this program led to his successful application to the ASBMB's Maximizing Opportunities for Scientific and Academic Independent Careers, or MOSAIC, program.

MOSAIC, in an agreement between the ASBMB and the National Institutes of Health's National Institute of General Medical Sciences, supports postdoctoral fellows and new investigators from diverse backgrounds embarking on careers at research-intensive institutions.

Hisey has been involved in diversity, equity, and inclusion work since he was in the Multi-Ethnic Engineering Program at Dayton, which engaged students in peer-to-peer mentoring. Throughout his Ph.D. he mentored historically marginalized students and volunteered at engineering camps.

Hisey's MOSAIC project is titled "Machine learning–enabled classification of extracellular vesicles using nanoplasmonic microfluidics."

COURTESY OF COLIN HISEY

Colin Hisey combines an interest in extracellular vesicles with a passion for diversity, equity and inclusion.

"I feel like I have permission from the NIH to do the DEI work that I think needs to be done and do science in a way that is more inclusive," he said. "I feel like I can put people first and be kind to people first, and let the research come second."

Hisey has accepted a faculty position as part of the Northwestern University Recruitment to Transform Underrepresentation and Achieve Equity, or NUTURE, Program. He's excited to transition into his own lab in late 2024.

"I'm a MOSAIC scholar, and now I'm a part of the FIRST, Faculty Institutional Recruitment for Sustainable Transformation, program at Northwestern," he said. "I can produce excellent innovative research while having the mentorship and financial support to focus on DEI work."

Anna Crysler (alc18@albion.edu) is a predoctoral research associate at Adimab LLC. She holds a B.A. in biochemistry from Albion College.

A chapter builds connections

By Inayah Entzminger

When Lauryn Ridley was applying to universities for her undergraduate studies, she looked for two things: a great science program and a supportive pre-medical program. She chose St. Mary's College of Maryland, a national public honors college in the county where she grew up. Her conversations with pre-med advisors and biochemistry and chemistry faculty convinced her that St. Mary's would be a good choice.

"It felt unmatched in the sense that I'm not going to get this one-on-one mentorship at some big university," Ridley said. "It was the best decision I ever made because I had support on campus and I also had the support from my family if I needed it."

Encouraged by her undergraduate research mentor, Pamela Mertz, Ridley became an American Society for Biochemistry and Molecular Biology Student Chapter member at St. Mary's. The chapter was combined with the Biomolecular Organization of St. Mary's Students, or BOSS. Ridley joined as a junior and served as president during her senior year.

St. Mary's has only about 1,500 students, and the ASBMB chapter consisting of biochemistry, biology and chemistry students was very close-knit. They held tutoring sessions one evening a week where some students received academic help while others met with peers and casually connected. They hosted beginning of and end of semester parties with BOSS, the chemistry club and faculty from the biochemistry and chemistry department. Members also organized

Since graduating from St. Mary's College of Maryland, Lauren Ridley has worked as a postbaccalaureate research fellow at the NIH.

outreach events, including science demonstrations for elementary school students at the county fair.

Having this outlet helped Ridley build a community among her peers, she said. "It's outside the classroom, and you can be free to relate to other people who are going through the same things that you're going through."

The St. Mary's chapter faced specific challenges in recent years because post-COVID-19 student engagement was low. Ridley and other chapter members advertised the club and encouraged professors to share information with their classes, but interest in outreach activities still lagged.

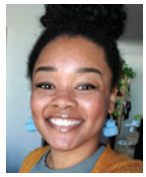
"As we've gotten further out of that time of isolation, I think focusing on going out on campus and finding people who would like to be a part of your club is really important," Ridley said, adding that organizers need to "find things that make your club different than what other clubs are offering."

Ridley graduated from St. Mary's with a bachelor's degree in biochemistry and biology and a minor in neuroscience. She is working as a postbaccalaureate research fellow at the National Institute of Allergy and Infectious Diseases. She is a part of the Intramural Research Opportunities Program for students underrepresented in the biomedical sciences. Her lab studies hemoglobinopathies and malaria, to understand the relationship between these genetic mutations and changes within the vascular system.

"What specifically led me to sickle cell research was knowing the impact it has on minority health and wanting to contribute to research in that field," Ridley said. "The tie-in with malaria resistance is really interesting, and that's definitely why I pursued this lab."

Ridley's goal is to attend medical school following her postbaccalaureate research experience. Her own experience with having a congenital heart defect and fond memories of being treated at Walter Reed National Military Medical Center as a child inspired a special interest in pediatric cardiology. Outside of research, she exercises; she has been signing up for 5K and 10K runs, which she says helped her with the mental stressors of COVID-19, finishing her undergraduate degree and her new research position.

Inayah Entzminger (ientzminger@gradcenter.cuny.edu) is a doctoral student at the City University of New York Graduate Center and an ASBMB Today careers columnist.



Addressing disparities in research and beyond

Stephen D. Williams hopes to take his concerns about health care equity into a role in industry

By Jessica Desamero

When Stephen D. Williams did an elementary school project on the solar system, he became fascinated with learning about the different planets and their evolution. "It was that introduction to science that really sparked that inquisitiveness inside of me," he said.

In high school, Williams learned how cool chemistry could be, including how he could mix different chemicals and what caused things to explode. "That actually sparked my curiosity even further," he said.

In his undergraduate chemistry classes, Williams was introduced to the study of biochemistry. Understanding how the fields of biology and chemistry can be mixed and learning about biological and biochemical processes in the human body fueled his interest in biomedical science.

"I wanted to understand: What is medicine, how is it controlling your body, and how is the body responding and having these different mechanistic types of effects?" he said.

Williams was particularly interested in medical conditions that affected his family, such as cardiovascular diseases and diabetes.

While working on his Ph.D. in biomedical sciences from Meharry Medical College, Williams' thesis research introduced him to the field of oncology. In Amos Sakwe's lab, he studied the role of the protein annexin A6 in the ability of triple-negative breast cancer, or TNBC, cells to alter their metabolism to meet increased energy needs and in their response to targeted therapies that interfere with two growth receptors, epidermal growth factor receptor and androgen receptor. TNBC cells lack two steroid hormone receptors that are common in other breast cancers, estrogen and progesterone, making it harder to treat. It also tends to grow and spread more aggressively than other cancers. This work piqued Williams' interest, and he continued to study cancer in his postdoctoral fellowship.

COURTESY OF STEPHEN D. WILLIAMS

ASBMB Maximizing Access Committee member Stephen D. Williams is a postdoc who believes in and advocates for gender and racial equity and inclusion in STEM.

Race and cross talk

Williams is now a medical genetics postdoctoral fellow at Baylor College of Medicine in Houston, Texas. He works in Benny Kaipparettu's lab, where research focuses on breast cancer and breast cancer metabolism. More specifically, the researchers look at how the mitochondria, the powerhouses of the cell, alter their energy metabolism and how the signaling pathways of the mitochondria and the nucleus affect each other.

Metabolic reprogramming, allows cancer cells to overcome energy limitations and adapt to changing environmental conditions as the disease progresses. Also, one mitochondrial cellular process significantly contributes to cancer metastasis. However, researchers do not yet understand the regulation of these processes. Therefore, the researchers in Kaipparettu's lab want to look at the genetic and metabolic factors that lead to the incidence of breast cancer and what causes high mortality rates in certain cancer types.

Kaipparettu's lab studies various classifications of breast cancer, and Williams has continued his focus on TNBC. Specifically, he seeks to understand the role of metabolic

reprogramming in TNBC metastasis.

Additionally, TNBC disproportionally affects women of color, with higher mortality and incidence rates in Black and Hispanic women than in non-Hispanic White women. Therefore, Williams also wants to look at the genetic and metabolic factors leading to these racial disparities in TNBC patients of color.

Advocating for equity and inclusion

Williams believes in and advocates for gender and racial equity and inclusion in science, technology, engineering, and math. "Everyone has a place, and everyone deserves a voice," he said. "Everyone should have equal access to the endless career opportunities in STEM, and everyone has an equal responsibility when it comes to promoting and pushing forward the need for minorities in biomedical research."

Over the years, Williams has served on several committees related to diversity issues, and he has participated in many outreach and extracurricular activities. Since October 2022, he has been a member of the American Society for Biochemistry and Molecular Biology's Maximizing Access Committee. So far, he has had a great experience with the MAC, he said, and loves working with renowned leaders in diversity, equity, inclusion and accessibility.

Williams is also an educator. Most recently, at Baylor, he teaches molecular and cellular biology to underrepresented postbaccalaureate students in the Human Genome Sequencing Center pregraduate education and training program. Williams advises his students: "Be diligent and be resilient at what it is that you aim to do. Never stop, never give up."

He also emphasizes the importance of building networks and establishing relationships. "You have to believe in yourself," he said, "and you have to be committed to achieving those goals."

In April, his alma mater, Meharry Medical College, named Williams one of the 10 recipients of the 2023 10 Under 10 Awards for distinguished young alumni. This award recognizes Meharry alumni who have graduated within the last decade and had a significant impact on promoting health care and serving their community.

"I'm really pushing forward," Williams said of the award, "on getting people that look like me, and that look like us from underrepresented populations, seats at these tables and letting them know that they deserve a spot and they deserve access in the same rooms I'm in."

A future in biopharma

After his postdoc, Williams hopes to continue working in the oncology space but in a biotechnology or biopharmaceutical setting. He is interested in how basic science leads to drug development.

"I want to look at how we take the knowledge that's applied and applicable at the bench … and get it to the whole drug development and the whole process at the pharma level," he said. He also wants to look at how biopharma companies approach disparities-related research.

COURTESY OF STEPHEN D. WILLIAMS

Stephen D. Williams receives his academic hood from his mentor, Amos Sakwe, at Williams' Ph.D. graduation ceremony from Meharry Medical College.

Williams recently started the Scientist Mentoring and Diversity Program as a biotechnology scholar. In this one-year career-mentoring program offered through the International Center for Professional Development, ethnically diverse graduate students and postdoctoral researchers are paired with professionals who work at biotechnology and consumer health care companies. The scholars learn about career opportunities in these industries, receive personalized career mentoring and guidance and attend a major industry conference. Williams said he believes the program will help him accomplish his goals and stay at the forefront of oncology care.

About the Research Spotlight

These articles highlight ASBMB members from diverse backgrounds as a way to inspire up-and-coming scientists to pursue careers in the molecular life sciences. Eligible candidates include Ph.D. students, postdoctoral fellows, new or established faculty and researchers in government and industry. To nominate a colleague for this feature, contact us at asbmbtoday@asbmb.org.

Jessica Desamero (jdesamero@gradcenter.cuny.edu) is a graduate student in the City University of New York's biochemistry Ph.D. program and volunteers with science outreach organizations.

Receptor regulation clues may scratch an itch

By Anna Crysler

Whether you've been stung by an insect or suffer from allergies, most people have experienced itchy skin, which usually can be relieved with time or simple remedies. However, for certain patients with liver disease, an intense itching sensation, known as cholestatic pruritis — the medical term for itch — often does not respond to standard treatments.

Thomas Sakmar's lab at the Rockefeller University uses biochemical and biophysical methods to study transmembrane signal transduction by G protein-coupled receptors. GPCRs play an important role in human physiology; they make up the largest family of membrane proteins and mediate many signaling pathways. Therefore, these receptors are frequent drug targets for a wide variety of diseases and disorders such as cancer, depression, hypertension and more.

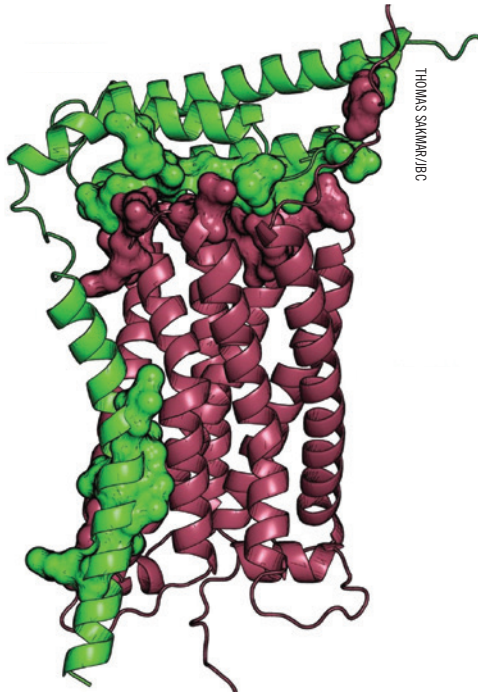
In a recent paper in the **Journal of Biological Chemistry**, Sakmar and his team write about their work on the regulation of a particular GPCR through receptor activity–modifying protein 2, or RAMP2. This receptor, mas-related GPCR subtype X4, or MRGPRX4, is associated with cholestatic itch and is present in the sensory neurons of the skin.

"Our research is unique in that it illustrates a role for RAMPs in MRGPRX4 biology," Sakmar said. "Since GPCRs represent the molecular targets of approximately one-third of current Food and Drug Administration-approved drugs, a better understanding of GPCR regulation can lead to the development of more potent and selective drugs for a large range of diseases."

The Sakmar lab had already collaborated to create a multiplexed screening platform to better understand and explore how commonly expressed GPCRs interact with RAMPs. With this technology they identified, for the first time, MRGPRX4 interacting with RAMP2, which they further characterized using pharmacological and computational methods.

In addition to characterizing the MRGPRX4–RAMP2 complex, Sakmar's team studied how bile acids can activate the receptor. The slowing or stopping of the flow of bile from the liver, known as cholestasis, is believed to cause intense itching in patients with cholestatic disorders. Bile acids are elevated in patients with liver disease, so, taken together with the newly discovered MRGPRX4–RAMP2 interaction, this research improves a broader understanding of the role MRGPRX4 plays in cholestatic itch.

Researchers need to understand the regulation of GPCRs to elucidate how therapies act on these receptors, Sakmar said. "Our discovery that many GPCRs, including MRGPRX4, are regulated by RAMPs might improve drug discovery paradigms, and it is possible that our work might lead to new drugs to treat cholestatic itch or minimize the chance that a drug candidate might cause itch as a side effect."



THOMAS SAKMAR/JBC

This predicted complex formation between MRGPRX4 (maroon) and RAMP2 (green) was generated with AlphaFold-Multimer and interacting residues shown as surfaces were calculated by PDBePISA.

The lab plans to take their findings to the next level by increasing the depth and breadth of their work, Sakmar said. "We plan to study the MRGPRX4–RAMP2 interaction in primary skin cells to gain a better understanding of how this protein–protein interaction affects the pharmacology of MRGPRX4 in a highly physiologically relevant environment."

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Breast milk from rhinos and alpacas and whales — oh my!

By Marissa Locke Rottinghaus

The American Academy of Pediatrics and the World Health Organization recommend that mothers exclusively breastfeed their babies for the first six months of life because breast milk promotes infant survival and a healthy immune system. However, the Centers for Disease Control and Prevention report that fewer than 30% of infants in the U.S. are breastfed; the reasons for this include maternal health and lack of support and resources. Therefore, researchers need to develop a formula that more accurately mimics breast milk to promote the health of future generations.

In a recent study published in the journal **Molecular & Cellular Proteomics**, researchers report they have discovered that components of breast milk from land and sea mammals possess immunomodulatory components that may promote healthy microbiome colonization in offspring. These findings could inform efforts to develop better formulas for human and animal infants.

According to Daniel Bojar, an assistant professor of chemistry and molecular biology at the University of Gothenburg in Sweden who oversaw the study, scientists need to know more about nonhuman breast milk.

"For nearly all mammals, we have shallow or zero knowledge about what makes up their breast milk sugars," Bojar said. "Knowledge from these species can shed light on human milk and therapeutic opportunities.

Bojar and his colleagues examined breast milk from nine understudied mammal species: alpaca, beluga whale, black rhinoceros, bottlenose dolphin, impala, L'Hoest's monkey, pygmy hippopotamus, domestic sheep and striped dolphin.

They found that the collective mammalian breast milk contained more than 100 novel milk sugars, including glucuronic acid, and these sugars were shared across species. According to Bojar, glucuronic acid is also found in cartilage and connective tissues.

After identifying these new milk sugars, Bojar's team wanted to know what purpose they serve. The researchers exposed macrophages, immune cells responsible for ingesting foreign invaders, to glucuronic acid–containing milk sugars and observed how this exposure influenced the macrophage behavior and activation. Glucuronic acid dampened macrophages' inflammatory response to bacteria, indicating that this milk sugar could help prevent excessive immune activation, common in autoimmune diseases, and promote healthy microbiome development in infants.

"We showed that these special sugars are advisers that help the baby's immune system make better decisions," Bojar said. "In particular, these new molecules seem to aid in the development of the infant microbiome by allowing the good kind of bacteria to colonize the infant gut."

Bojar said his team's future work will focus on further dissecting the novel milk sugars found in these mammals and others. He said the findings could help create formula for human babies that better promotes a healthy microbiome.

"Understanding these 'super ingredients' can lead to exciting possibilities, such as creating better baby formula or finding new ways to strengthen our immune systems," Bojar said. "By understanding the powerful properties of breast milk across different animals, we can potentially design better infant formulas that mimic some of these beneficial qualities. For many babies who cannot be breastfed for various reasons, this could be a game changer."

DOI: 10.1016/j.mcpro.2023.100635

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Detecting biomarkers for deadly lung disease

By Meric Ozturk

Researchers don't yet know the precise cause of idiopathic pulmonary fibrosis, or IPF, but they know it's deadly. Patients usually survive about three years after diagnosis. A sudden and unpredictable increase in IPF symptoms, such as shortness of breath and dry cough, could be fatal. Thus, early diagnosis and monitoring are crucial.

Lysophosphatidic acid, or LPA, is produced during lipid metabolism. In the past, researchers have reported that the LPA levels increase in lung fluid following lung injury in mice genetically altered to have pulmonary fibrosis. Deleting one receptor, LPA1, protected mice from fibrosis, indicating that LPA receptors have a role in IPF and may be a potential therapeutic and diagnostic target.

A group led by scientists from Genentech Inc. is now studying whether bioactive lipid species can predict IPF progression. "We had initially been working on chronic obstructive pulmonary disease, COPD," Genentech senior scientist Margaret Neighbors said. "We compared gene expression levels between COPD patients and healthy patients."

In this experiment, the gene autotaxin, or ATX, was overexpressed in COPD, and the team already knew that ATX has a role in the LPA signaling pathway, Neighbors explained. ATX generates most of the LPA detected in blood and inflamed tissues, and previous studies showed the role of the ATX–LPA signaling pathway in lung fibrosis in animal models. The team used targeted mass spectrometry to quantify LPA subspecies and assess how it affected COPD exacerbation.

"Then, we turned our focus to another lung disease, IPF, in which autotaxin has a role," Neighbors said. "We used the same mass spectrometry approach to determine the role of bioactive lipids in IPF for this study."

They profiled lipid metabolism beyond LPA to compare more lipid species associated with the disease, then combined this with protein biomarker data to learn more about the IPF phenotype than in previous studies.

Neighbors and her colleagues worked with data from about 100 IPF patients between 40 and 80 years old. "Having a rich and diverse cohort helped us to examine how the different lipid species associated with individual clinical measures of IPF," she said. "This individualistic approach can shed more light to better understand detailed connections between molecular pathways and each clinical manifestation."

The researchers found that IPF patients had significantly higher levels of five LPA subspecies, and disease in patients with higher levels of one of these, LPA 20:4, worsened sooner than in patients with lower LPA 20:4. Also, patients with higher levels of LPAs have greater declines in diffusion capacity of carbon monoxide, which indicates decreased oxygen capacity of the lungs, an association that has never before been published.

"Our findings suggest LPA subspecies can play roles in pulmonary fibrosis through multiple pathways, rather than any key signal pathobiology," Neighbors said. "Our study adds a road to the existing lipid map."

In this study published in the **Journal of Lipid Research**, the researchers established the association of LPAs with IPF progression. Using mass spectrometry, they characterized lipid dysregulation in IPF. They hope to replicate these findings with additional cohorts and then to observe the molecular mechanisms behind increasing LPA subspecies expressions and their association with IPF.

"We are trying to connect LPAs to clinical manifestations that might be downstream of pathobiologies," Neighbors said. "Association between higher levels of LPA and declined levels of DLCO (diffusing lung capacity for carbon monoxide) is one new road on this lipid map."

DOI: 10.1016/j.jlr.2023.100375

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From the journals

By Ken Farabaugh, Nivedita Uday Hegdekar & Preeti Karwal

We offer summaries of papers recently published in the **Journal of Biological Chemistry**, the **Journal of Lipid Research** and **Molecular & Cellular Proteomics**.

Expanding tools to study ion channels

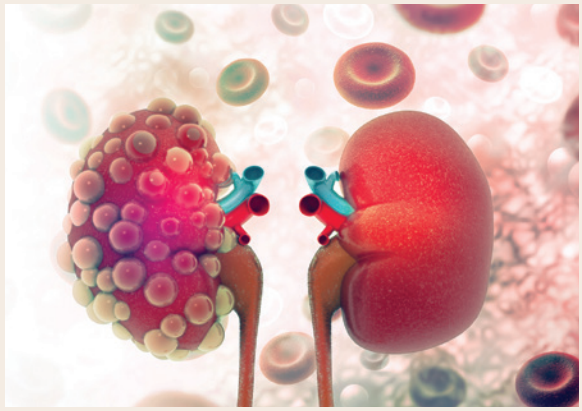
The voltage-gated sodium channel $Na_V1.5$ is an essential channel protein that regulates the influx of sodium ions during action potentials, permitting the transmission of signals along neurons and regulating such diverse processes as sensation, muscle contraction and even behavior. The trafficking, pharmacology and voltage-gating properties of $Na_V1.5$ are regulated by interaction with five Na_V beta-subunit isoforms, the loss of which can lead to arrhythmias including the heart signaling disorder known as long QT syndrome. However, the role of specific β-subunits is difficult to discern because endogenous proteins confound the results of existing overexpression models used to study their individual functions.

In a recent article in the **Journal of Biological Chemistry**, Annabel Minard, Colin Clark and colleagues at the University of Iowa College of Medicine describe a newly developed cell line devoid of expression of all five β-subunits as well as phylogenetically related proteins of the same β/myelin protein zero, or MPZ, subfamily. The researchers used CRISPR–Cas9 gene editing to generate this β-subunit-eliminated haploid, or BeHAPe, cell line and confirmed that exogenous expression of individual subunits had profound variable effects on voltage conductance as measured by patch

Protein cleavage in polycystic kidney disease

Autosomal dominant polycystic kidney disease, or ADPKD, is a genetic disorder characterized by oxidative stress, abnormalities reminiscent of the metabolic changes in cancer cells known as the Warburg effect and fluid-filled cysts in the kidneys that can lead to end-stage renal failure. Mutations in the gene encoding the transmembrane protein polycystin-1, or PC1, can lead to accumulation of the entire protein and enhanced cleavage of its C-terminal end to create the 30 and 15 kilodalton products associated with ADPKD. However, scientists do not yet know the precise mechanisms by which PC1 and the PC1 cleavage products drive cyst growth in this disease.

In a recent paper in the **Journal of Biological Chemistry**, Hannah Pellegrini, Elizabeth Sharpe, Guangyi Liu and colleagues at the University of California, Santa Barbara, describe how they showed that PC1-p30, normally rapidly degraded by the proteasome, is stabilized by reactive oxygen species and can localize to the nucleus and affect gene transcription. Using immunofluorescence, they demonstrated that PC1-p15 is generated by caspase cleavage of PC1 and localizes to the mitochondrial matrix. They further show that both of these cleavage fragments induce mitochondrial fragmentation



A kidney with multiple cysts (left) compared to a normal kidney (right).

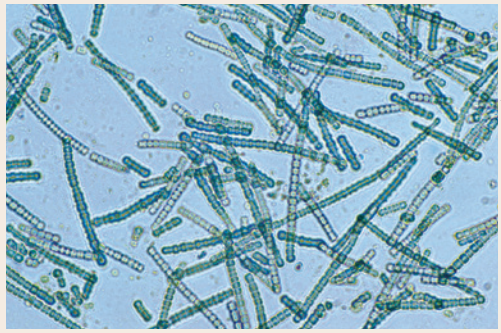
and lactate production and impair fatty acid oxidation, inducing the aerobic glycolysis and mitochondrial dysfunction observed in the Warburg-like state characteristic of ADPKD.

These findings suggest novel mechanisms that regulate PC1 and its cleavage fragments, which contribute to the ADPKD disease phenotype. Further studies will be necessary to show the exact function of PC1 and its cleavage products in these biological processes.
DOI: 10.1016/j.jbc.2023.105158

— Ken Farabaugh

Creating the ideal PROTAC

Cyanobacteria, unique organisms capable of plant-like photosynthesis, are vital for producing oxygen and sustaining life on Earth. One specific cyanobacterial type, Synechocystis, was the first photosynthetic bacterium to be sequenced and is widely used as a model organism for studying photosynthesis and biotechnological applications.



WILLEM VAN AKEN, CSIRO

Understanding this new enzyme and its function in Cyanobacteria enhances our global comprehension of photosynthesis and holds promise for future potential biotechnological applications.

Recent research has highlighted the significance of posttranslational modifications, or PTMs, in regulating photosynthesis in both cyanobacteria and plants. Lysine methylation, a specific PTM involving the addition of a methyl group to a protein's amino acid, has diverse functions in organisms. While researchers have studied it extensively in eukaryotes, they do not yet fully understand its role in bacteria (including cyanobacteria).

Gaoxiang Cao and a team at the Chinese Academy of Sciences in Wuhan recently analyzed the proteins in Synechocystis that have lysine methylation and found many proteins involved in photosynthesis that can be modified in this way. This reversible modification may play a role in regulating photosynthesis in both cyanobacteria and plants. However, researchers had not yet characterized the enzymes responsible for adding and removing the methyl group.

Lysine methyltransferase, or KMT, enzymes help with the transfer of methyl groups from S-adenosyl methionine molecules to proteins. The team focused on Synechocystis and unveiled a novel KMT named cKMT1. Experiments showed that cKMT1 could add methyl groups to lysine residues in proteins, both in controlled laboratory settings and within cells. Additionally, the researchers observed that cKMT1 modifies a crucial protein called ferredoxin-NADP(+) oxidoreductase and influences its activity, indicating its role in regulating energy transfer in Synechocystis.

The findings, recently published in the journal **Molecular & Cellular Proteomics**, provide insights into the regulation of photosynthesis in cyanobacteria. Understanding this new KMT and its function enhances our global comprehension of photosynthesis and holds promise for future potential biotechnological applications.

DOI: 10.1016/j.mcpro.2023.100521

— Nivedita Uday Hegdekar

clamping. They show that different β-subunits had different effects on $Na_V1.5$ conductance-voltage and steady-state equilibrium as well as channel inactivation kinetics; furthermore, they found β2 co-expression could nullify β1-induced accelerated inactivation, while MPZ unexpectedly also affected the cell's equilibrium potential.

These findings demonstrate the utility of a β-subunit-null cell line in differentiating the properties of multiple related proteins. While this model will be useful in elucidating functional outputs of interactions among specific combinations of $Na_V1.5$ β-subunits, scientists will have to wait for structural data to fully understand the mechanisms by which these properties are conferred.

DOI: 10.1016/j.jbc.2023.105132

Molecular target for alcohol consumption uncovered

Protein kinase C epsilon, or PKCε, a crucial signaling molecule within cells, plays a significant role in transmitting signals and influences various cellular functions. In research studies, it has been implicated in modulating behavioral responses to alcohol consumption and anxiety.

Michael P. Dugan and a team at the University of Texas at Austin conducted a study using innovative techniques to explore PKCε's role in alcohol and anxiety. They used chemical–genetic methods and mass spectrometry on mouse brain lysates, identifying 39 protein substrates directly interacting with PKCε, including known and novel interactors.

Among those known to interact with PKCε (such as myristoylated alanine-rich C-kinase substrate),

associations were found with alcohol-related and anxiety-related behaviors. Additionally, numerous novel PKCε substrates (such as BR serine/threonine kinase 1 and Abelson interactor 1) emerged that were unrelated to alcohol and anxiety but involved in critical cellular functions, such as cytoskeleton maintenance and synaptic activity.

The study, published in **Molecular & Cellular Proteomics**, presents a list of proteins that could be potential targets for developing drugs to reduce alcohol consumption and anxiety in humans. Furthermore, these proteins may serve as biomarkers to detect abnormal PKCε activity in diseases like cancer and Alzheimer's, paving the way for new therapeutic avenues.
DOI: 10.1016/j.mcpro.2023.100522

A mechanistic pathway of the pathophysiology of NASH

Oxidized cholesterol metabolites known as oxysterols are involved in various biological processes including hepatic cholesterol metabolism and bile acid synthesis. Hydroxylation of oxysterols by the enzyme CYP7B1 facilitates their conversion to bile acids in hepatocytes. Babies born without enough CYP7B1 activity often develop liver failure. Previous reports have associated the accumulation of free cholesterol and its metabolites with mitochondrial dysfunction and hepatocyte apoptosis often seen in nonalcoholic steatohepatitis, or NASH, but researchers do not yet fully understand the underlying mechanism.

Kei Minowa of Virginia Commonwealth University and Juntendo University, Japan, and a research team studied the role of mitochondrial cholesterol metabolism in the pathophysiology of NASH and published their findings in the **Journal of Lipid Research**.

The researchers fed three kinds of diet — normal, Western and high cholesterol — to mice genetically altered to lack CYP7B1. They analyzed the mice's levels of serum and liver cholesterol metabolites and hepatic gene expressions. The researchers saw the development of insulin resistance and accumulation of oxysterols in mice on the Western diet but not in mice on the normal or high cholesterol diet. This study indicates that an insulin resistance–mediated pathway mediates the accumulation of toxic cholesterol metabolites in hepatocyte mitochondria, driving hepatocellular damage in nonalcoholic fatty liver diseases.
DOI: 10.1016/j.jlr.2023.100363

Mechanisms of chemotherapy cytotoxicity and resistance

Scientists recently found that aldehyde dehydrogenase 1 family member L2, or ALDH1L2, is a key enzyme in folate-mediated one-carbon metabolism, which is essential for basic cellular homeostasis as well as the enhanced proliferation commonly seen in cancer, via production of the cofactor tetrahydrofolate and the energy carrier nicotinamide adenine dinucleotide phosphate hydrogen, or NADPH. Although researchers know little about its potential roles in pathology, ALDH1L2 is overexpressed in many cancers and may contribute to the proliferation of cancer cells. Scientists are still investigating how ALDH1L2 could promote cancer cell metabolism, proliferation and metastasis.

In their new study published in the **Journal of Biological Chemistry**, Chaoqun Li, Peng Teng, Zhaohui Huang and colleagues at the Wuxi Cancer Institute in Jiangsu, China, investigated the role of ALDH1L2 in colorectal cancer treated with 5-fluorouracil, a chemotherapeutic agent. They used mass spectrometry to show that ALDH1L2 is acetylated at a specific lysine residue and that this posttranslational modification, which could be removed by the protein NAD^+-dependent deacetylase sirtuin-3, or SIRT3, abolishes enzymatic activity. They also found that 5-fluorouracil treatment decreased SIRT3 expression in cells, suggesting SIRT3 is a previously unknown target for this drug and that its cytotoxicity could be mediated by inhibition of SIRT3- and ALDH1L2-regulated metabolism and disturbance of cellular redox balance.

These data identify a novel pathway of 5-fluorouracil activity, further illuminating its mechanism of action and mechanisms by which cancer cells might develop resistance to this drug. It remains to be seen whether combining 5-fluorouracil with a SIRT3 inhibitor could overcome this chemoresistance.
DOI: 10.1016/j.jbc.2023.105090

A novel therapeutic target for heart failure

A patient with heart failure with preserved ejection fraction, or HFpEF, shows symptoms of heart failure but 50% or more of the blood in the left ventricle is still pushed out with each heartbeat. Many HFpEF patients have comorbidities associated with metabolic syndrome or MetS. Scientists have proposed that inflammation associated with MetS promotes ventricular tissue remodeling, leading to heart failure.

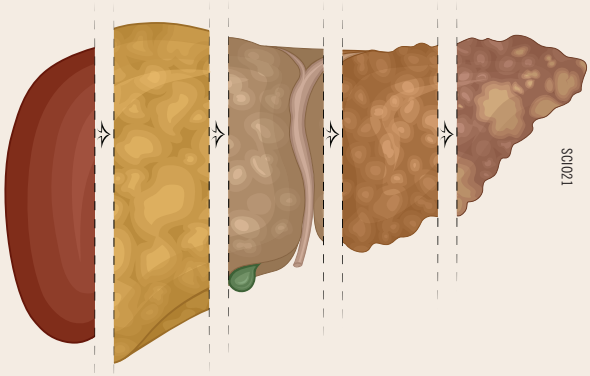
Researchers have reported that a receptor for fatty acids, free fatty acid receptor 4, or Ffar4, reduces

A safer combination therapy for liver disease

Over 90 million Americans suffer from nonalcoholic fatty liver disease, or NAFLD, which can progress to the inflammatory condition nonalcoholic steatohepatitis, or NASH. The enzyme acetyl CoA carboxylase, or ACC, catalyzes lipogenesis and regulates fatty acid oxidation, so inhibiting ACC is an attractive therapeutic target for these disorders. However, treating NASH with ACC inhibitors can alter the levels of lipoproteins such as apoB-low density lipoprotein, or LDL, and triglyceride, or TG, content in plasma.

Mohamad Dandan and a team from the University of California, Berkeley, and Gilead Sciences USA conducted a safety and efficacy trial in adults aged 18–75 to study how certain drugs affect lipid metabolism in NASH. The researchers investigated the effects of an ACC inhibitor drug called firsocostat on production rates of plasma LDL-apoB in NASH and described their findings in a recent paper in the **Journal of Lipid Research**.

The team performed metabolic labeling with water containing deuterium in place of hydrogen and analyzed lipoprotein complex enrichments in NASH patients for 12 weeks. In patients treated with firsocostat, the plasma TG levels and lipoprotein clearance kinetics increased without a significant increase in apoB concentrations. The rise in plasma TG and apoB-containing lipoprotein levels was only seen in NASH patients with cirrhotic conditions.



The stages in the progression of liver disease are, from left to right, healthy liver, fatty liver, fibrosis, cirrhosis and cancer.

The researchers looked at whether a lipid-lowering drug, fenofibrate, could mitigate these side effects of firsocostat. They treated 29 NASH patients with both fenofibrate and firsocostat. After 12 weeks, it appeared that fenofibrate could prevent changes in the lipid turnover and apoB-LDL kinetics associated with firsocostat.

Altered TG levels and lipoprotein metabolism correlate with a higher risk of atherogenesis and cardiovascular diseases, so these results suggest that combining firsocostat and fenofibrate for NASH treatment could lessen undesirable consequences and risks. Further studies and clinical trials are needed to substantiate these results.

DOI: 10.1016/j.jlr.2023.100339

—**Preeti Karwal**

metabolic dysfunction and resolves inflammation. In a recent paper in the **Journal of Lipid Research**, Naixin Zhang of the University of Minnesota and a team from UMN and Penn State proposed that Ffar4 could reduce ventricular remodeling associated with HFpEF.

The researchers fed a high-fat/high-sucrose diet to mice genetically altered to lack Ffar4, or Ffar4KO mice, to induce an HFpEF–MetS phenotype. This diet worsened diastolic function in male Ffar4KO mice, but the Ffar4KO females became obese with no ventricular remodeling compared to unaltered mice. Ffar4KO male mice showed an altered balance of inflammatory mediators called oxylipins with a lower level of an anti-inflammatory oxylipin and a higher proinflammatory oxylipin than unaltered mice.

This suggests that preventing HFpEF remodeling by modulating oxylipin levels and consequent attenuation of inflammation might underlie Ffar4's cardioprotective role. The authors suggest that Ffar4 agonists could be used to treat cardiometabolic diseases such as HFpEF.

DOI: 10.1016/j.jlr.2023.100374

Perspectives in ECM research

The extracellular matrix, or ECM, forms the structural framework of multicellular organisms and functions as a signaling platform that influences processes such as proliferation, survival and differentiation. Imbalances in ECM production, degradation and remodeling can

lead to disorders such as muscular dystrophy, fibrosis and cancer.

A recent special issue of the journal **Molecular & Cellular Proteomics** highlights accomplishments in ECM research over the past decade and looks at future research. Alexandra Naba of the University of Illinois at Chicago writes in her review that an improved understanding of the biochemical properties of ECM proteins has led researchers to develop strategies such as bottom-up proteomics to decode the compositional complexity of the ECM of tissues.

Researchers have also improved sample preparation and identification methods; these include enrichment strategies, such as solubility-based fractionation, developed to analyze the ECM composition in various tissues. Tandem-mass labels and peptide fractionation methods such as high-pH reversed-phase liquid chromatography have also been improved to identify and measure ECM proteins.

Researchers postulate that ECM proteomics is ready for a next chapter and clinical applications. Through proteomic profiling, researchers can better understand the ECM physiology and uncover proteins playing functional roles in disease etiology, which could serve as diagnostic biomarkers and therapeutic targets.

DOI: 10.1016/j.mcpro.2023.100528

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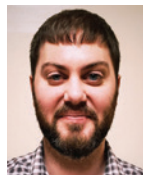

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Preeti Karwal (preeti.karwal@utoronto.ca) is a biomedical researcher with 15 years of experience in academics. She teaches at the Department of Biology of the University of Toronto, Canada.

THE POLICY & FUNDING ISSUE

To learn about a variety of U.S. government grants, look for "Funding Opportunities" on pages 29, 31, 34, 37, 39.

Advocating for change in science

ASBMB trainees harness their training and experience to reshape policy

By Paula Amann

In his job at a pharmaceutical firm, Daniel Wilson works on using adenoviruses and adeno-associated viruses to deliver gene therapies. On weekends, he crafts episodes of "Debunk the Funk with Dr. Wilson," a YouTube series aimed at refuting myths about vaccines.

For his series, Wilson draws on his experience in the first Advocacy Training Program in 2018. The ATP, an externship of the American Society for Biochemistry and Molecular Biology, educates participants about government and public affairs and offers guidance on persuasive writing and speaking. The program engages young scientists in advocacy to drive positive change in science policy.

Wilson's videos offer fact-packed slide talks and interviews to quash public health myths. Recent episodes touch on such claims as DNA contamination of mRNA vaccines and childhood vaccine links to autism.

"Your work has been a port in the storm of misinformation," a fan named David wrote on the site.

Wilson began his show in 2020, inspired in part by his past internet forays. In his early teens, he drifted online, drawn by claims of 9/11 plots and pseudoscience, "sucked into misinformation and conspiracy theories," he said.

High school and college biology teachers gave him a fresh frame of reference. "I discovered how incredible the scientific community is and how powerful the scientific method can be," Wilson said.

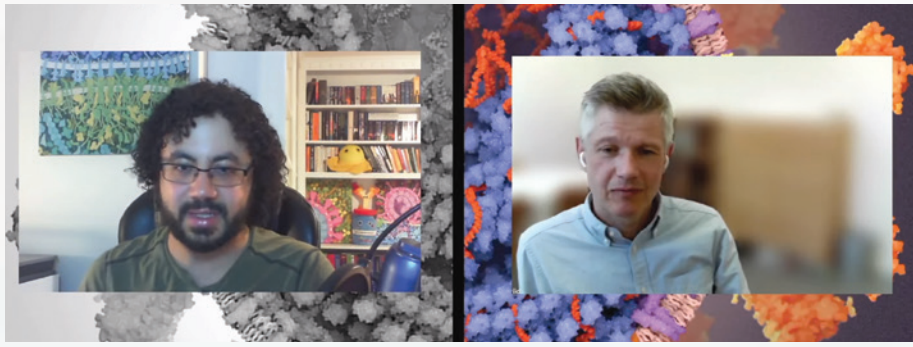
He decided the internet could be a tool for changing minds. "Debunk the Funk," which has some 32,000 subscribers, became his fulcrum for change.

"I try to use what I learned in the ATP to deliver a concise and effective message," Wilson said.

For the ASBMB public affairs staff who oversee the ATP, the program dovetails with their strategic goals of engagement and partnerships.

"We see that as part of our responsibility to our members," said Sarina Neote, director of public affairs. "Scientists can be a force for change within their states and local communities."

The ASBMB's Advocacy Training Program engages young scientists in advocacy to drive positive change in science policy.



YOUTUBE

In a June episode of "Debunk the Funk with Dr. Wilson" titled "Vaccines don't cause autism (duh)," ATP alumnus Daniel Wilson, at left, talks to Danish scientist Anders Hviid of the Statens Serum Institut.

COURTESY OF BAILEY WEATHERBEE

Bailey Weatherbee, center, who was an ATP delegate in 2018, and Kerri Evelyn Harris, right, meet with U.S. Rep. Alexandria Ocasio-Cortez (D-N.Y.).

Zarina Akbary, an alumna of the 2019 cohort, admits she once found advocacy intimidating. Now a Ph.D. candidate in biology at New York University, Akbary was an undergraduate when she was in ATP, surrounded by grad students. "I was a baby in the group," she said.

She compares ATP's effect on her advocacy skills to the energy that kick-starts a biochemical reaction.

"It really lowers the activation energy for doing advocacy," Akbary said. "It reduces the barriers to making an impact."

Building on skills, experience

Scientists bring special strengths to advocacy, observes Raechel McKinley, ASBMB science policy manager, and an ATP coordinator for the past two years.

"The fact that they're all data driven, making sure that all their points are backed by evidence … that's one of the strengths that scientists bring to the policy space," McKinley said.

The ATP builds on participants' knowledge and experience. Through online lectures, breakout discussion groups and individual projects, they gain information and basic skills for driving change.

Trainees learn about the federal agencies that fund research and the federal policies that govern it, the congressional budget process and policy at the state level. Program organizers strengthened this portion of the ATP for the 2023 session.

"We made a big effort to add more material, so that people have a common understanding of U.S. government policy and politics," Neote said.

Bailey Weatherbee liked the way her 2018 ATP training parsed the process for research grants from federal sources such as the National Science Foundation and the National Institutes of Health.

"It's easy to talk about all the things that you want to change," Weatherbee said. "It's more difficult to know where you go to do that."

ATP folds in practical assignments such as crafting a succinct research description, or "elevator pitch," and a publishable op-ed.

For the trainees, the biggest challenge is often finding the right tools to realize the policy changes they seek, McKinley said. She uses words like "attainable" and "sustainable" to describe the optimal projects.

"We want all of the delegates to get something tangible out of this," McKinley said. "In a sense, we have to help them find the right scale for change."

Dan Pham, a former ASBMB science policy manager, helped launch the program in 2018. The ATP's founders called its trainees "delegates" to signal the importance of their role in promoting science on federal, state and local stages.

"We wanted to convey to participants that they were more than interns," said Pham, now a director at the Milken Institute Center for

Strategic Philanthropy, "that they were representing something — firstly ASBMB but also their ideas and needs."

Simplifying the science message

Biochemistry students are trained to convey complexity, but effective advocacy calls for the opposite mindset, ATP leaders and alumni say. Pham touts the practical value of a succinct message.

"For politicians, currency is time: If you have 30 seconds in the elevator, you have to get to the point," he said. "We've been trained to do the exact opposite."

Weatherbee worked with Pham as a delegate. Five years after ATP, she remains committed to raising her voice for science.

"It's so important for scientists to be advocates because we tend to historically silo ourselves away from the rest of society in a way that I think has been damaging," she said. "I think we're seeing that in the spread of misinformation now, in the response to vaccinations and COVID-19."

She credits ATP with helping her hone her communication skills for public debates on science-linked issues.

"When it comes to advocacy, you cannot be wishy-washy," Weatherbee said. "You have to be very strong in your positions … and I think a lot of times, scientists are nervous to be definitive in their positions, because we are trained not to be."

Weatherbee views the ATP as a singular opportunity.

"There are not a lot of programs out there to give scientists the skills to engage effectively," she said. "The ATP is one of the first and remains one of the only ones that prioritize that."

Marvin "Cortez" Bowlin is a University of Alabama grad student and a 2022 ATP delegate. Five years earlier, he had helped organize a nonpartisan March for Science in Birmingham — a chance to practice advocacy with municipal leaders.

Bowlin said the ATP taught him better ways to approach power brokers.

"The first was to be more diplomatic," he said. "Don't just lay the sins of the world at someone's feet and say, 'This is your problem, pick it up and deal with it.'"

ATP leaders coached him to offer solutions, he said. "Instead of just pointing out a problem, tell them, 'I've already done a little bit of legwork; here's an option you can take.'"

Nudging the sciences toward reform

In spring 2022, postdoctoral researcher Lien Nguyen first dipped her toes into advocacy. Brigham and Women's Hospital in Boston, where she works, is affiliated with Harvard Medical School.

Nguyen had recently become co-chair of the advocacy committee for her hospital's postdoctoral fellows association, and she found her ATP project close at hand.

She and other association leaders learned that Harvard was giving its postdocs a raise of $10,000 at a time when postdocs at her hospital received salaries that started at about $55,000 and were 6% to 10.4% less than those at Harvard.

Nguyen turned to the skills she had learned in her graduate training.

"As a scientist, I love data," she said. "We decided to collect data from the postdoc community."

The committee surveyed the hospital's 800 postdocs, drawing 300 responses.

"The first and foremost concern

Biochemistry students are trained to convey complexity, but effective advocacy calls for the opposite mindset, ATP leaders and alumni say.

Marvin "Cortez" Bowlin, a 2022 ATP delegate, formed an advocacy board with his fellow University of Alabama grad students and persuaded the administration to give them a $3,000 raise.

COURTESY OF MARVIN BOWLIN

ASBMB

Lien Nguyen, a postdoctoral researcher at Brigham and Women's Hospital in Boston, gave two presentations at Discover BMB, the ASBMB's 2023 annual meeting in Seattle. One was about her drug screening and development research, and the other was on her advocacy efforts.

was salary," she said. "Almost all respondents said salary was a huge problem for them because of the high cost of living and the fact that other institutions were raising salaries."

Nguyen doubted that she and her allies could increase pay for postdocs, who represented a small fraction of some 21,000 employees in the hospital system. Yet, she said her advocacy training proved useful in framing the issues to sway those in power.

"We learned about the policy makers and stakeholders — and how to craft a message that will be convincing to them," Nguyen recalled of her ATP sessions.

In June, after a year of advocacy and negotiations, the postdocs won a substantial raise and mandated performance reviews to help them with career planning and professional development. By October 2024, a postdoc at BWH will make a minimum of $68,000.

"The hospital has been listening and has been very cooperative," Nguyen said. "I can actually make a difference, I've learned from the past year."

As for Bowlin, he and his fellow biomedical grad students advocated for the University of Alabama to raise their annual stipends of $30,000 or less — well below the cost of living in Birmingham. They formed a student advocacy board in the spring of 2022. By October, their paychecks reflected the change they helped bring about: a raise of $3,000, the first salary increase in three years.

"I don't care what your background is; the ATP has something for you to learn," Bowlin said. "There is a support system that you will find that will reach far beyond what you would normally expect to find in a free program."

Sometimes, advocacy takes the shape of the written word. For Roxanne Evande, a 2022 ATP paper on NSF research funding decisions became an article in SciTech Forefront in June 2023.

Evande argued that some traditional criteria for proposals are ripe for change. Applicants may not have extensive research experience because they were working their way through school, for instance.

"As a federally funded agency, the NSF should be implementing measures to ensure equity in its fellowship awards," Evande wrote.

Finding the right tools for change

In science as in advocacy, Chelsea Rand–Fleming, a 2022 ATP alumna, is drawn to pathways.

As Rand–Fleming wraps up a Ph.D. at Auburn University, she is studying methyl-coenzyme M reductase, an enzyme involved in the final step for forming methane and in the first step in oxidizing this greenhouse gas.

"If we can figure out all the ins

and outs of this enzyme, then maybe, instead of producing methane, we can use this process … to actually consume methane," she said.

Her ATP project explored a pathway leading from education to employment. Rand–Fleming comes from a family of veterans, including both parents and her husband. Despite their skills and experience, many vets struggle to find jobs as civilians.

With that in mind, Rand–Fleming worked with leaders at Auburn to start a regional pipeline linking students who are U.S. veterans to jobs in science, technology, engineering and medicine.

"I realize how few scientists actually look like me or come from backgrounds like me," she said. "I just want to be somebody who helps somebody else's steps align so that they can actually get to this point as well."

She documented her project in a study published in the Journal of Science Policy and Governance. "It was actually my first publication ever," Rand–Fleming said, "so that was very rewarding."

Pursuing change, reshaping careers

For some delegates, the ATP has fueled dreams of a career in public policy or rerouted their professional path.

"I had never thought about the fact that I could be an advocate as a career until I did the Advocacy Training Program," said Shannon Kozlovich, a veteran of the 2018 cohort.

Kozlovich entered community college at 28, as a single mother, with an eye on nursing. A professor who saw her talent urged her to pursue research.

Chemical chirality (handedness) riveted Kozlovich. She earned a bachelor's degree in chemistry at Whitworth University and a Ph.D. in pharmacological science at Washington State University. Her doctoral thesis on a chiral carcinogen linked to tobacco propelled her into the world of antitobacco public health advocacy.

Today, Kozlovich works two jobs that add up to a full-time career in public policy. At the Cedars–Sinai Cancer Research Center for Health Equity, she's a project director and scientist. She directs a grant aimed at reducing tobacco-linked health disparities among LGBTQIA+ Californians.

Kozlovich is also the founder and CEO of a consulting firm that works to improve LGBTQIA+ health equity by reducing the burden of tobacco-related disease. She's a lifelong activist and reports that ATP still informs her work.

"For anyone who's even remotely interested in biochemistry, or molecular biology, I always tell them to get involved with ASBMB as early as possible," Kozlovich said, "because the organization not only has the Advocacy Training Program, but it has so many resources for networking."

Justin Wang, a grad student at Scripps Research in La Jolla, California, was mulling career options when he joined this year's ATP.

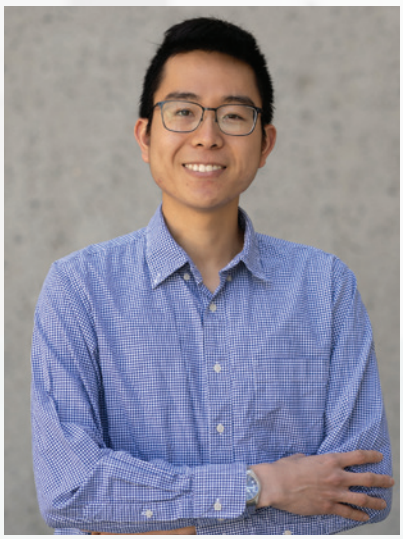
"Now that I'm wrapping up my Ph.D. and thinking about the next steps, I came across science policy as a potential option for a career," he said. "The program itself is fantastic in giving people the knowledge and skills to tackle the issues they are passionate about."

Lien Nguyen's work with the hospital postdoctoral association raised her awareness of workplace justice.

"There is an enormous power imbalance between PIs and postdocs," she said. "Sometimes there are

COURTESY OF CHELSEA RAND–FLEMING

Chelsea Rand–Fleming, a grad student, worked with leaders at Auburn University to start a pipeline linking students who are also U.S. veterans with STEM job opportunities.



Justin Wang, a grad student at Scripps Research in La Jolla, California, organized a campus town hall on student well-being and mental health as part of his ATP project.

Mallory Smith participated in the ASBMB's 2018 Capitol Hill Day as a Ph.D. student, then worked as a science policy manager for the society from 2022 to 2023.

harassment issues, which have a huge impact on the people who are experiencing or witnessing these behaviors."

She is also thinking more broadly about other issues, including the high cost of life-saving drugs such as the monoclonal antibodies used to treat asthma, arthritis, breast cancer and macular degeneration.

"If the public pays for the research that brings about those treatments, why should the medications be so expensive?" Nguyen asked.

Emerging leaders in science advocacy

When Wang isn't documenting functions of transfer RNA synthetase — an enzyme that loads amino acids onto its nucleic acid target — he is pondering the psychological impact of high-stakes research. A career in research rides on uncertain laboratory outcomes, and some grad students, Wang believes, collect unmanageable stress along with their data.

"This hyper-competitive environment might be very beneficial for pushing innovation, but it also puts a lot of pressure on the people involved," he said. "Some people are able to do very well and thrive, but others fall behind, and it can be pretty rough."

As part of his ATP project, Wang organized a campus town hall on student well-being and mental health. In conjunction with the event, he developed a survey of graduate students, adapting resources from other institutions.

Wang hopes the survey data will help guide institutional leaders to shape programs in mentorship, community building or access to mental health care that will help address the problems he's seen on campus.

"As I finish up, I want to leave behind structures that can carry on this work long after I'm gone, so that students can continue to benefit from a focus on mental health and well-being," Wang wrote in an email.

He based his ATP project at his

ASBMB

Sarina Neote, left, is the ASBMB's director of public affairs and Raechel McKinley, right, is the science policy manager.

COURTESY OF DAN PHAM

Dan Pham, 2018 ATP delegates Aria Byrd and Shannon Kozlovich, and Emory University professor Anita Corbett pause to take a selfie during the 2019 ASBMB annual meeting.

> **"There's a huge realization that misconceptions in science can lead to death. It's up to scientists to stand behind the data and scientific process."**
>
> **DAN PHAM**

own institution, but Wang now has a more ambitious vision of advocacy and what he might accomplish.

"I've never, in my life considered reaching out to, say, a congressperson or somebody at the federal level of government and just asking them directly for more money for this program," Wang said. "The ATP really gave me the confidence to start thinking that it's very possible to do these things: Even as an individual, you can try to make these bigger moves."

In the years ahead, the ASBMB may look to program alumni to act as allies in debates over the public role of science. At the local level, ATP trainees can step forward and speak out on emerging policy issues. And on the national stage, they are poised to join an older generation of science advocates in debates yet to come.

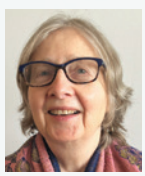
Former ASBMB science policy manager Mallory Smith believes the ATP is creating a community of advocates. "We have an army of people trained in advocacy that are ready to speak up," she said.

Dan Pham believes the stakes are more than academic. Public health may depend on trained experts who can step up with data when false claims, like those debunked on Wilson's show, jam the internet.

"As we've learned through COVID-19, there's a huge realization that misconceptions in science can lead to death," Pham said. "It's up to scientists to stand behind the data and scientific process."

The ASBMB's public policy team, Sarina Neote, director of public affairs, and Raechel McKinley, science policy manager, along with former public affairs manager Dan Pham and former science policy manager Mallory Smith contributed their expertise to this story.

Paula Amann is a former ASBMB science writer.



Meet Ann West

Once an admitted rookie at advocacy, she's now the chair of the ASBMB Public Affairs Advisory Committee

By Sarina Neote

Ann West is a professor of chemistry and biochemistry and the associate vice president for research and partnerships at the University of Oklahoma.

She's also the new chair of the American Society for Biochemistry and Molecular Biology's Public Affairs Advisory Committee.

ASBMB Today talked to West about her advocacy experience and reasons for getting involved as she embarks on her two-year term.

The interview has been condensed and edited for style and clarity.

What do you think is important for ASBMB members to know about the PAAC?

First, I think that we work very hard in representing the ASBMB.

We have a fantastic 18-member group, some of whom have been recently recruited. We discuss a lot of broad topics, we hear different opinions, and we often can come to a consensus statement that we think best represents the interests of the society. That's not always an easy thing to do.

I hope that everyone on the PAAC feels like they have a forum for expressing views and for contributing to our public-facing documents, whether it's a response to an agency call for information or interacting with various funding agencies on issues where we're able to contribute.

I really hope that our members feel they have a voice and can express their opinions.

Why do you think it's important for scientists to advocate?

Advocating is so much more important since COVID-19, honestly, because the amount of misinformation and disinformation that we all encountered was really concerning. I think that we owe it to society — in light of the federal funding that we receive — to do our best to communicate that science should be trusted. That's an important aspect of being on the PAAC: trying to communicate with not just the membership but with the general public.

Did you have any experience with advocating before joining the PAAC?

I was a complete rookie. It was not something that was at the forefront of my mind. However, I am fairly service-minded and want to give back to both my profession and a great society like the ASBMB. So, no, I had no experience to lean on. But once I knew more, then I became interested.

What scared you about policy and advocacy?

I think, inherently, I have an introverted personality. And I was worried it was going to be too public-facing.

"I think that we owe it to society — in light of the federal funding that we receive — to do our best to communicate that science should be trusted." — Ann West

But, you know, it really has not turned out to be what I feared.

I came to politics, in general, I would say late in life, in part because I didn't become a naturalized citizen until about five years ago. I tended to avoid political discussions or arguments. I didn't necessarily follow a lot of what was going on in Washington, D.C. I felt like I didn't have that experience or understanding of all the things that go on in our nation's capital.

Now, of course, being a faculty member depends on federal research funding. I did want to know how our lawmakers are involved in making decisions, especially at appropria-

tions time when budgets are being considered. And I was interested in how our federal granting agencies both received funding and allocated funding within agencies such as the National Institutes of Health and the National Science Foundation.

I became more and more and more interested, as a faculty member, because it's part of our livelihood.

How was your first in-person Capitol Hill Day in May?

I loved the experience. I loved the vibrancy of being in the Capitol Hill area and the bustling hallways of the congressional offices. Growing up in the Northeast, I'd been to Washington, D.C., a number of times but never in the halls of Congress. It was really kind of a thrill.

I was really impressed by the receptiveness of the congressional leaders we met with. I'm not sure that all of our messages were heard, but at least we were able to have a voice. And that was very rewarding.

Any final thoughts to share?

I realized, through the years, that we're not always training the students in our laboratory to go on to do the same thing that we do. It's been really great and refreshing to see what the younger generation is looking toward — with a science background but putting it to a different use in the area of science advocacy. If that's what you're interested in, you should definitely pursue it.

Also, you don't have to make the decision to be an advocate at age 20. You can decide like me, a little bit older, that this is something that I can engage in and give back to a science community that nurtured my career — and hopefully be effective.

COURTESY OF ANN WEST

Ann West and PAAC member Mary Lipton visit congressional offices during the ASBMB's 2023 Hill Day.

Sarina Neote (sneote@asbmb.org) is the ASBMB's director of public affairs.

FUNDING OPPORTUNITIES

U.S. Department of Agriculture

The USDA has a series of programs offered through the National Institute of Food and Agriculture specifically to help minority serving institutions strengthen research capacity, increase student recruitment and retention and conduct outreach to diverse communities. For example, the 1890 Land-Grant Institutions Programs support historically Black universities and the Tribal College Research Grant Program helps 1994 Land-Grants become centers of scientific inquiry and learning for remote and rural reservation communities. Learn more at nifa.usda.gov/topics/minority-serving-institutions. — *Sarina Neote*

Helping you get back to work

How the NIH and Society of Women Engineers support scientists after a career break

By Marissa Locke Rottinghaus

When Ellie Rahbar's first child was born earlier than expected in 2019, the new mother struggled to keep up with the challenges of caring for an infant and running a growing research laboratory at Wake Forest University School of Medicine.

"After I had my daughter, experienced long waitlists for childcare and had two students ready to graduate, time was no longer on my side," Rahbar said. "I realized I needed some help."

She applied for supplemental funding from the National Institutes of Health with the hope of being able to hire an extra set of hands.

More than 40% of women drop out of science after taking a break from work to fulfill caregiving or childcare duties. This statistic has caused some women, like Rahbar, to believe that taking time off from work to care for a child or loved one would derail their career.

Government agencies, professional associations and companies have noticed this inequity, and many are working to help trained professionals, regardless of gender or age, get back into the science, technology, engineering and mathematics workforce after a break. They've created programs and set aside funds for people to return to work after planned or unplanned career interruptions.

Back in 2019, Rahbar applied for

XENIA TIGNO

and received a continuity supplement from the NIH to bolster her existing K25 award. "I used my supplement to temporarily hire a technician who made sure we didn't lose momentum and productivity in the lab," she said.

The contributions of her lab technician, Rahbar said, "helped maintain a sense of normality in the lab."

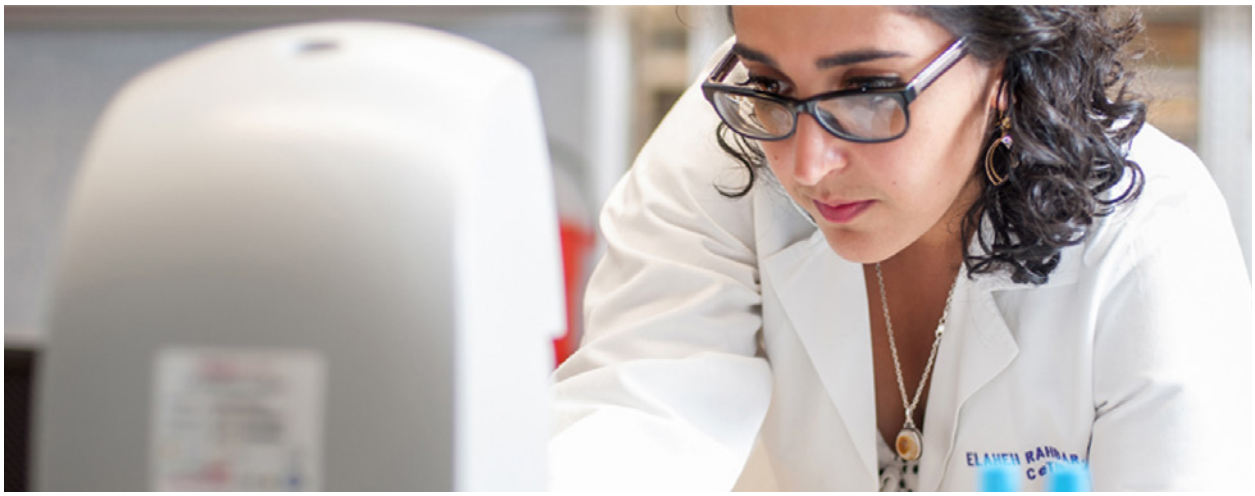
According to Xenia Tigno, associate director for careers at the NIH Office of Research on Women's Health, the NIH created these and career reentry supplements to promote stability and help researchers return to the lab after a break in research activity due to childbirth, adoption, caregiving, sexual harassment and more. Recently, the NIH began offering retraining and retooling supplements as well that support protected time for already funded early or midcareer candidates to gain new skills and explore a new research area. The supplements provide awardees with approximately $50,000.

When everything came together, Rahbar said she thought, "'Wow, I actually really needed this.' It really helped ease my guilt for being away from the lab … (and) benefited both my students and me."

Today, Rahbar is an associate professor and has mentored multiple Ph.D. students. She secured her first R01 grant in 2022 and is on her way to acquiring her second.

Tigno said that the NIH plans to expand its programs to allow women time and resources to explore careers outside of academia, at places such as drug companies and publishing houses, after a career break.

JENNIFER SCOTT



COURTESY OF ELLIE RAHBAR

Ellie Rahbar received a continuity supplement from the NIH to keep her lab running after her daughter was born.

The Society of Women Engineers partners with iRelaunch, a company that does career reentry consulting, training and events to help women resume mid- to high-level careers after taking extended leave. Together, they launched the STEM Reentry Taskforce.

"We help employers realize that we need to bring folks back to work," said Jennifer Scott, the society's executive vice president of strategic partnerships and events. "There's a huge pool of talent out there, especially in STEM, and we don't want to let those brain trusts disappear."

So far, the effort has produced career-reentry programs at more than 40 tech and engineering organizations worldwide. Scott said these programs have an 85% conversion rate to full-time and have been so successful that participating employers now rely on them to fill vacancies in their offices.

"These programs are for folks that are most likely being pushed out of the process because of artificial intelligence screening," Scott said. "Their résumés are being scanned, and recruiters and talent sources aren't even seeing them due to the gaps in their career."

Scott said the task force has been vocal about its efforts.

"We are talking about it on (Capitol) Hill and in the news," she said. "Our goal is to not have any shame attached to it, and that has been a transition that I've started seeing in the public."

Rahbar, who said her NIH supplement was instrumental in propelling her academic career to where it is today, also cited the need to "collectively change the stigma associated with accepting help."

"Because you are making a smart choice (to ask for help), does not mean that you are incompetent," she said. "In fact, it means the complete opposite: You care so much about your work that you will do anything to succeed without driving your own mental and physical health to an unhealthy limit."

Marissa Locke Rottinghaus (mlocke@asbmb.org) is the ASBMB's science writer.

FUNDING OPPORTUNITIES

National Science Foundation

The NSF supports research, through its Directorate for Biological Sciences, that advances the frontiers of biological knowledge. The directorate funds, among other things, research traineeships, research experiences for undergraduates and infrastructure grants to advance biology and biotechnology. Learn more about the directorate at nsf.gov/bio/about.jsp. — *Sarina Neote*

The inside scoop on NSF fellowships

NSF program directors share how grad students and postdocs can secure coveted funds

By Marissa Locke Rottinghaus

ASBMB Today spoke with the National Science Foundation's Jong-on Hahm, program director of graduate education, and Manju Hingorani, program director of molecular & cellular biosciences, about funding opportunities for graduate students and postdocs and how to make an application stand out.

The interview has been edited for length, clarity and style.

JONG-ON HAHM

MANJU HINGORANI

Q: Tell me about NSF funding opportunities for graduate students and who is eligible.

Hahm: For undergrad and graduate students, we have the NSF Graduate Research Fellowships Program (GRFP). It is one of NSF's first programs and will turn 75 in a couple of years. The program is intended to recruit, recognize and support outstanding students who will make contributions to science, technology, engineering and mathematics or STEM education. We offer around 500 fellowships per year, but we receive up to 14,000 applications. It is very competitive. But, we strongly encourage students to apply because you just never know.

We like to joke at NSF that we have really strong FOMO (fear of missing out) on funding a great student. We don't want to miss any possible great candidates. Please apply and don't take yourself out of the running. We don't want outstanding students missing out on funding because they don't know about the program. So, next year, we're going to significantly increase our outreach.

We really encourage undergraduate seniors to apply because that's when we would like to recruit them into science. Graduate students can apply as well if they are at the beginning of the first or second year of any graduate program. It is very important that they have not had more than one academic year in a graduate degree program of any kind, such as a master's degree, Ph.D., M.D., etc.

Q: Is there any supplemental funding available to NSF GRFP awardees?

Hahm: Yes, we have very generous supplements for students who have already been awarded the NSF GRFP. The amount awarded for these supplements is up to $55,000. They are the Persons with Disabilities, Career–Life Balance and INTERN supplemental funding opportunities.

The Persons with Disabilities supplement is for those who might need a little more support in the lab to accomplish their research goals.

The Career–Life Balance supplement is for awardees that need to take time off of their work in the lab due to childbirth, caregiving, etc. This award allows the principal investigator to hire a technician to keep the student's research going while they are away.

The INTERN supplement allows awardees to pursue a nonacademic internship for up to six months. Students with INTERN supplements are

doing really cool things. For example, some are working at Google, museums, nonprofits and more. We don't want people using this supplement to extend your fellowship.

It is important to note that it is the principal investigator who gets and applies for all supplemental awards.

Q: What advice do you have for students applying to the NSF GRFP?

Hahm: We strongly suggest that the applicants look over the application thoroughly, start early and practice. Don't wait because there are a lot of fine details with the formatting that have to be just right.

Please be very careful and cautious with the kind of research that is eligible for support. Especially in biology, there are constraints. NSF does not support clinical or clinically relevant research. We've tried not to have a lot of overlap with the kind of research funded by the National Institutes of Health.

Remember, NSF and NIH are different agencies, and we have different goals that we're trying to reach. We often see a lot of applications that look like they are derived from an NIH grant from the student's adviser. We do not want to see that. Follow the requirements to the letter and check out the FAQs and our webinars.

Hingorani: To provide a little bit more context, the clear red line for what is not eligible for funding is any clinical, clinically relevant, drug screening or drug-discovery project. But, there are gray zones as well. So, students must make a good justification for using what might be a disease model system for foundational research. The application must examine basic research questions. But, if for some reason you're working in a cancer cell line or disease model system, make sure that you can very strongly and clearly justify why you're working with that model disease to solve a fundamental scientific question.

ASBMB

Manju Hingorani gives a presentation on National Science Foundation funding priorities for grad students and postdocs at Discover BMB, the ASBMB's annual meeting in Seattle.

Q: Tell me about NSF funding opportunities for postdoctoral fellows.

Hingorani: NSF offers Postdoctoral Research Fellowships in Biology, and the goal of these fellowships is to support independent research of recent Ph.D. graduates. We want to support their independent careers and make sure that the next generation is diverse in identity and research areas. The fellowships support both postdoctoral research and training.

The fellowships fall into three main competitive areas: Broadening Participation of Groups Underrepresented in Biology; Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes; and Plant Genome.

The first competitive area is focused on broadening participation in science. The goal of the proposal must be to increase the diversity in science, and the activities must be aimed at diversifying the scientists who participate in biology at the postdoctoral level.

The other two areas are focused on scientific research. The Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes competitive area examines complex, cross-disciplinary questions. These proposals should aim to create theories or models that have predictive capability and use computational, experimental and/or theoretical approaches. These projects often span biological hierarchical scales from molecules to ecosystems. The bottom line is: These are complex projects, not proposals looking at just one narrow question.

The third competitive area is through the Plant Genome Research Program. This area focuses on understanding the structure and function of plant genomes. A lot of these projects involve generating and integrating large-scale data to better understand and develop economically important plants or develop tools and technologies. They also often focus on

economically important crops such as soybeans, rice, etc.

For the PRFB, there aren't any specific supplemental funding opportunities. This is due to the fact that the fellowship is given directly to the fellow and does not pass through an institution. That said, the fellowship is pretty open when it comes to the fellow's desired professional development and training. So, if there is an internship that they want built into their training with a company or government agency, that is certainly a possibility. There is a research allowance that comes with each fellowship in the amount of $20,000, and this research allowance can be used to support such training and professional development.

Applicants can submit only one fellowship application per fiscal year and may apply in no more than two successive years for all postdoctoral fellowships.

Q: What advice do you have for postdocs applying for these fellowships?

Hingorani: For postdoctoral programs, you can communicate with the program directors who are listed as points of contact with the program by email. Make sure your application asks important questions that are relevant to the Biological Sciences Directorate.

The goal of these fellowships is to allow postdocs to have independence. So, you really have to seize that opportunity and propose some very exciting, novel research. Don't be afraid of asking complex questions and let your excitement show in these applications.

Marissa Locke Rottinghaus (mlocke@asbmb.org) is the ASBMB's science writer.

FUNDING OPPORTUNITIES

National Institute of Aging

The NIA is part of the National Institutes of Health. The NIA supplement awards program supports emerging researchers who foster and expand the research capabilities and knowledge of trainee candidates in diverse aging research areas. Two notable supplements are NIA's diversity supplement and reentry and re-integration supplement program. Note that eligible parent grants are not limited to NIA grants. Learn more at grants.nih.gov/grants/guide/pa-files/PA-23-189.html.

— Sarina Neote

ASBMB pushes federal agencies to help students struggling with loan debt

The society states that increasing student debt and financial strain are hurting the U.S. research enterprise and federal agencies must do more to ease this burden.

By Sarina Neote

The next generation of scientists faces struggles that include financial instability, increasing job competitiveness and public scrutiny of science — all of which dissuade individuals from pursuing graduate or postdoctoral degrees or running academic labs. The American Society for Biochemistry and Molecular Biology's public affairs department and Public Affairs Advisory Committee are pushing federal agencies, including the Department of Education, to do more to support students.

Emily Pitsch, a biochemistry Ph.D. candidate at the University of Utah is the early-career representative on the ASBMB's PAAC. "With inflation and sky-rocketing rent prices, buying food and paying rent have been the greatest financial stressors for me and my peers," Pitsch said. "Before COVID-19, rent and food were affordable enough that I was not absolutely strapped for money, but now I am not only living paycheck-to-paycheck but spending my savings each month just to pay for essentials."

The Biden administration and some members of Congress are pushing for policy solutions to alleviate the financial stressors of higher education. The ASBMB has endorsed several bills and made policy recommendations to federal agencies that would help students.

Congressional efforts

Two bills have been introduced in the House of Representatives: the Relieving Economic Strain to Enhance American Resilience and Competitiveness in Higher Education and Research, or RESEARCHER, Act and the Lower Obstacles to Achievement Now, or LOAN, Act. If passed, these bills would address financial obstacles to academic success for students pursuing higher education degrees.

Pitsch pointed out that graduate students and postdoctoral researchers commit for many years to positions that pay only stipends.

"A lot can happen that is out of their control," she said. "With little to no financial cushion, other expenses, such as new tires for your car or a visit to the emergency room, can really add insult to injury ... It's difficult to spend six or so years making very little

money, earn your Ph.D. and then spend several more years making little money and feeling overworked and underpaid."

Rep. Jennifer McClellan, D-Va., introduced the RESEARCHER Act to the House in early June to address problems such as this. This bill would direct the White House Office of Science and Technology Policy to develop a set of policy guidelines for federal research agencies to address the financial instability of graduate and postdoctoral researchers and require federal agencies to implement these policies. In addition, this bill would allow the National Science Foundation to award grants focused on collecting data on this issue.

Tom Kimbis is the executive director of the National Postdoctoral Association, which supports the bill. "The nation is increasingly aware of the financial burdens facing postdoctoral scholars, many of whom receive insufficient compensation and no access to retirement plans while facing staggering housing and family costs," he said. "This untenable situation is exacerbated when starting postdoctoral work saddled with years of student loans."

Almost 95% of postdocs reported in an NPA survey that their salaries negatively affected their professional or personal lives.

"Increased cost of living, low research stipends and a lack of comprehensive benefits pose serious financial hurdles to our nation's graduate and postdoctoral researchers, particularly those from low-income families," McClellan said in a press release. "We must address these issues to continue building a robust STEM workforce, fulfill the legislative priorities set forth in the CHIPS (Creating Helpful Incentives to Produce Semiconductors) and Science Act and support America's global competitiveness."

The LOAN Act targets student loans by doubling the Pell Grant amount (a needs-based grant program for low-income undergraduate students), improving the Public Service Loan Forgiveness Program (this program allows certain not-for-profit and government employees to cancel their student loans after 10 years of on-time payments) and lowering interest rates. This bill aims to make educational loans cheaper and easier to pay off.

The ASBMB wrote in a position statement last year when the LOAN Act was introduced, "Student loan debt disproportionally burdens women and people of color." The statement asserts that this legislation "will expand access to higher education and make it easier for people from lower socioeconomic backgrounds to pursue careers in the biomedical sciences. The ASBMB is committed to increasing the number of historically excluded scientists in the fields of biochemistry and molecular biology."

Recommendations to the Department of Education

In July, the ASBMB submitted public testimony calling for the Department of Education to remedy the significant financial stress student loans place on the next generation of scientists and to explore and expand student loan forgiveness and repayment programs. Specifically, the society recommended that the Department of Education:

1. Rectify the disproportionate impact of student loans on historically marginalized groups.

2. Expand student loan forgiveness and repayment programs associated with public service, such as the National Institutes of Health loan repayment program.

3. Allow postdoctoral scholars to defer student loan payments across the board.

The Department of Education is developing strategies to alleviate the burden of student loans after the Supreme Court blocked the Biden–Harris three-part student debt relief plan, announced in August 2022. This plan included:

1. Final extension of the student loan repayment pause.

2. Providing targeted debt relief to low- and middle-income families by providing up to $20,000 in relief to Pell Grant recipients and up to $10,000 in relief to non-Pell Grant recipients.

3. Making the student loan system more manageable for current and future borrowers by:

- **a.** Requiring borrowers to pay no more than 5% of their discretionary income monthly on undergraduate loans.
- **b.** Raising the amount of income that is considered nondiscretionary and, therefore, is protected from repayment.
- **c.** Forgiving loan balances after 10 years of payments (instead of 20 years) for borrowers with loan balances of $12,000 or less.
- **d.** Covering the borrower's unpaid monthly interest so no borrower's loan balance will grow as long as they make their monthly payments.

The justices ruled, 6–3, against the plan. Chief Justice John Roberts wrote for the conservative majority that the government needed direct authorization from Congress to proceed with such a plan.

"The question here is not whether something should be done; it is who has the authority to do it," Roberts wrote.

Despite this significant setback, the Biden–Harris administration intends to pursue other avenues of providing student loan relief to millions of Americans.

"I believe that the Court's decision to strike down our student debt relief plan is wrong," Biden wrote June 30 in a response to the decision. "But I will stop at nothing to find other ways to deliver relief to hard-working middle-class families."

The ASBMB will continue to press policymakers to enact solutions that will not only alleviate the financial burden of pursuing higher degrees but will also alleviate job competitiveness that is straining the research enterprise.

"What was once a very tight, but livable stipend is quickly approaching unrealistic to live off," Pitsch said. "But the money issue is not unique to early-career scientists. The competitiveness of federal grants is only increasing, and that is a big deterrent for graduate students and postdocs to continue in academic research."

Pitsch said high quality, competitive research must be balanced against providing so little money that great scientists are pushed out. "If the U.S. believes that science is a priority and wants to remain competitive in the global research enterprise, I think federal appropriations need to reflect that so young scientists are attracted to and retained in academic research."

Sarina Neote (sneote@asbmb.org) is the ASBMB's director of public affairs.

FUNDING OPPORTUNITIES

National Library of Medicine

The NLM offers numerous grants related to fundamental research in biomedical informatics and data science. For example, it has an exploratory/developmental research grant program that supports early and conceptual work and feasibility in tests in biomedical informatics. Learn more at nlm.nih.gov/ep/Grants.html.

— Sarina Neote

NIH diversity supplements offer a pathway to independence

By Raechel McKinley

Science thrives when diverse minds work together. However, diversity in the biomedical research workforce lags behind U.S. demographics. African Americans, Native Americans and people identifying as Latinx make up roughly 37% of the population but remain underrepresented in science, technology, engineering and mathematics, representing only 16% of STEM doctoral degree holders.

To add to those disparities, retention of these groups dwindles further up the career pipeline, with a corresponding loss of diverse talent, especially in academic research.

The National Institutes of Health began providing diversity supplements in 1989 with the goal of increasing funding rates to historically excluded racial groups and increasing diversity in the biomedical science workforce. These supplements now help individuals from underrepresented racial groups, women and individuals with disabilities persist in the biomedical science workforce.

Unlike many diversity-related funding mechanisms at the NIH, diversity supplements can fund scholars across career stages from high school students to junior faculty members, and they are reviewed by program officers, rather than subjected to the review process used for other funding mechanisms.

A November 2022 seminar on diversity supplements hosted by Marie A. Bernard, chief officer of scientific workforce diversity at the NIH, highlighted programs of the National Institute of Neurological Disorders and Stroke and the National Institute on Aging. NINDS representatives said graduate students and postdocs who received the supplements from 2017 to 2019 had better rates in fellowship and career development awards than those who did not.

MARIE A. BERNARD

"NIH has long offered the opportunity for diversity supplements to enhance the involvement of researchers from diverse backgrounds, including those from groups underrepresented in biomedical and behavioral research," Bernard said.

However, she added, the funding mechanism is underutilized.

"I would encourage every scientist with NIH funding to consider adding members to the research team via a diversity supplement," she said, "as the data show that diverse perspectives contribute to creativity and innovation in science."

Successful but not used

The American Society of Biochemistry and Molecular Biology's Public Affairs Advisory Committee meets annually with federal agencies. In their 2023 meeting, PAAC members heard the same message from many institutes: Diversity supplements are underutilized.

Shantá Hinton, a member of the PAAC and a professor of biology at the College of William & Mary, said of the supplements, "The majority of the scientific community are not aware that they exist, do not understand the broad usage of these supplements and/or do not understand the mechanisms to apply for them."

A 2021 study by researchers at Yale University analyzed the use of diversity supplements on the NIH's most common investigator-initiated grant mechanism, the R01, and found that from 2005 to 2020, while the number of diversity supplements on R01s increased, only 4.5% of active R01 awards received one of these supplements.

PAAC members also learned in their meetings that each NIH institute runs the program differently. To shine a light on these differences,

SHANTÁ HINTON

ASBMB public affairs staff conducted a deeper dive into the data.

An ASBMB issue brief

The ASBMB public affairs staff released an issue brief in September that analyzed the unique attributes of each diversity supplement program. They found that the institutes administering the most supplements shared the following conditions: The supplements were supported and structured as a scholar program, the institutes offered additional programming such as workshops, and the institutes required applications for early-career awards such as postdoctoral fellowship or career development grant awards.

In the analysis, four institutes stood out: the National Institute of General Medical Sciences, the National Institute of Neurological Diseases and Stroke, the National Institute on Drug Abuse and the National Cancer Institute.

NINDS hosts a biweekly podcast called Building Up the Nerve to guide trainees through the grant-writing process. NIDA hosts a two-day grant application and professional development workshop for those receiving supplements. Both NIGMS and NIA require individual development plans for supplement applications.

Conversely, institutes that issued fewer diversity supplements did not provide any additional programming or require submissions for future funding. One of those is the National Institute of Allergy and Infectious Diseases. In the brief, the ASBMB urged the NIAID to partner with NIGMS and NINDS to restructure its programs with the goal of increasing interest and boosting the number of awardees.

The society suggested that the NIH harmonize its diversity supplement programs by urging all participating institutes to adopt the requirements of those issuing the greatest number of diversity supplements.

The brief also recommended that Congress allocate more funding for diversity supplements, specifically for NIGMS and NINDS.

To read the entire issue brief, National Institute of Health Diversity Supplements: Pathway to Independence, go to asbmb.org/advocacy.

Raechel McKinley (rmckinley@asbmb.org) is the ASBMB's science policy manager.

The ASBMB public affairs staff released an issue brief in September that analyzed the unique attributes of each diversity supplement program.

FUNDING OPPORTUNITIES

Department of Energy

The DOE funds over 6,000 scientists through its Basic Energy Sciences program, which supports basic research to lay the foundations for new energy technologies. The DOE also has an Early Career Research Program for outstanding scientists just starting out. Learn more at energy.gov/science/bes/basic-energy-sciences. — *Sarina Neote*

'The implosion of the large laboratory business model'

NIGMS Director Jon Lorsch talks about current challenges researchers are facing, what the agency is doing to help early-career scientists and the future of academic labs

By Marissa Locke Rottinghaus

As director of the National Institute of General Medical Sciences, Jon Lorsch oversees a $3 billion budget that supports almost 5,000 researchers, many of whom are members of the American Society for Biochemistry and Molecular Biology.

For many years, in fact, Lorsch was an ASBMB member. Before being tapped by the National Institutes of Health, he was on the faculty at the Johns Hopkins University School of Medicine, where he ran a lab focused on RNA biology. He continues to work on the molecular mechanisms of protein synthesis as a senior investigator at the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

Lorsch spoke with ASBMB Today about the most pressing challenges scientists are facing today, with particular emphasis on how they're being asked to do more with less funding and what can be done to make the field more diverse and inclusive for the next generation of scientists.

The interview has been edited for length, clarity and style.

NATIONAL INSTITUTES OF HEALTH

JON LORSCH

Q: What do you think federally funded scientists need to be thinking about right now?

Lorsch: I believe two of the biggest challenges the community is facing right now are inflation and the cost of training. The inflation of goods and services is having a significant impact on the scientific community. In addition, the cost of lab trainees such as postdocs is on the rise.

In academic science, we need to separate the research workforce from the pool of students and postdocs receiving training and professional development by working in labs. In terms of salaries, graduate students receive a degree, and we need to remember that the degree has monetary value. On the other hand, a postdoc position used to be the gateway to an academic job. That is no longer the case because most postdocs do not end up as faculty in academia.

In addition, many industry jobs no longer require postdoctoral positions. We know that there is a very large opportunity cost for completing a postdoc. Donna Ginther, distinguished professor of economics at the University of Kansas, did a lot of research on this topic and actually calculated how costly a postdoc can be to many early-career scientists if they do not end up taking a job that required a postdoc. This cost includes lost wages, benefits, retirement savings, career progression, etc. Principal investigators need to realize that postdocs are not cheap labor.

I also think the size of labs has gotten way too big. Scientists need to contemplate what is the most efficient lab size and reconsider how we perceive success. In my opinion, success should not be equated with having a 25-person lab. I believe having a smaller lab is more efficient and productive because we can provide better training to our Ph.D. students and postdocs and more direct input into and oversight of the research.

Overall, my interpretation of what many are referring to as the "postdoc crisis" is that it is the long-predicted implosion of the large laboratory business model, in which trainees are used as low-cost labor.

Q: What is NIGMS doing to help address some of these challenges?

Lorsch: The MIRA program is one of our flagship initiatives, and we are trying to use it to address several challenges in the current research model. To address inflation, we are trying to increase the median and mode of MIRA funding to $300,000 of direct costs, which would be more than current NIGMS R01 funding and would help offset some of the losses to inflation that have taken place recently.

In addition, we are working to get early-career investigators funded earlier. Early-stage investigators, ESIs, receiving MIRA grants are, on average, getting funded a year or more sooner than ESIs funded by NIGMS R01s. We would like to see them funded even earlier through MIRA, but for this to happen they have to apply as soon as they start their independent positions. We are trying to get the message out to department chairs and others that they should be advising their new hires working in NIGMS' mission areas to apply for MIRA as soon as they arrive rather than waiting until they have preliminary data or publications from their labs.

Another important aspect of MIRA is that it gives researchers the flexibility to follow new ideas or observations as they arise, rather than being bound to predetermined specific aims the way they are with R01s. This flexibility reflects how science actually works and how discoveries get made.

Q: What do ASBMB members need to know about diversity, equity, inclusion and accessibility efforts at NIGMS?

Lorsch: We have a number of programs for undergrads — like MARC and U-RISE — and for graduate students — like G-RISE and IMSD.

To support the postdoc-to-PI transition, we began the MOSAIC program, which is a K99/R00 award. We began MOSAIC at NIGMS, but now many NIH institutes participate. Through this program, we have also set up mentoring centers with scientific societies, of which ASBMB has been a big part.

Kenny Gibbs runs the MOSAIC program and has been to meetings with scholars at the mentoring centers who have told him that, before they received a MOSAIC award, they were on the verge of dropping out of academia. Now, they actually have academic positions as independent investigators. So, as Kenny says, MOSAIC is doing something important.

In addition, we are about to launch the ARC program. This program will provide Ph.D.-to-postdoc transition support in the form of a F99/K00 award. We really try to target these transition points because that is where we lose so many scientists and so much diversity.

Another thing we are focusing on at NIGMS is building clinician scientist training programs such as M.D./Ph.D. training. The Medical Scientist Training Program is a great program, but the grants usually only go to the top 25 research institutions in terms of NIH funding. To broaden access to clinical scientist training, we recently launched a second program, similar to the MSTP, with eligibility limited to historically Black colleges and universities, tribal colleges and universities and institutions in IDeA states called Leading Equity and Diversity in the Medical Scientist Training Program, LEAD MSTP.

We want to recognize and support folks who are doing DEIA work, and we realize that this takes time away from their research. So, we created the NIH UNITE ReWARD R01 grant, which supports independent researchers who have made significant contributions to DEIA and who currently do not have a major NIH grant.

Finally, we want to expand our shared technology resources program at the national and regional levels with the R24 program. This program allows better access to high-end instruments for researchers across the country, regardless of the institution they are from. With this shared resource model, not every institution has to buy and maintain its own cryo-electron microscope or NMR spectrometer.

Q: What advice do you have for early-career scientists?

Lorsch: My advice for early-career investigators is to shift the balance in your labs toward longer-term employees. I think having one or two graduate students and postdocs, a staff scientist and a technician is a great investment to train the next generation but also contribute to the sustainability of your lab and the research enterprise. This kind of model creates long-term, sustainable jobs for Ph.D. scientists who don't necessarily want to be independent investigators.

And of course, apply for funding right away. There are tons of great programs out there.

Marissa Locke Rottinghaus (mlocke@asbmb.org) is the ASBMB's science writer.

How public policy work amplifies our impact

By Oluwadamilola "Dami" Oke

When I started my doctoral program, I had a clear sense of how my research would contribute to the advancement of science in the medical community. However, I did not know that getting involved with public policy and advocacy efforts would broaden my impact. I hope that sharing my experience will increase awareness of how interwoven policy is into the fabric of advancing science and how we as scientists can augment the impact of our research through advocacy and outreach.

Yvette Seger is the director of strategic scientific program advancement, director of science policy, and deputy director of the Office of Public Affairs at the Federation of American Societies for Experimental Biology. She earned a Ph.D. in genetics from Stony Brook University, working at Cold Spring Harbor Laboratory, and has since been involved in science policy in the private and public sectors.

"Some scientists misconstrue advocacy as lobbying or an unnecessary distraction from research, while others might assume engaging in advocacy requires travel to Washington, D.C.," Seger said. "In fact, a lot of advocacy happens in your home state because elected officials are ultimately accountable to those who elected them — that's where the votes are."

COURTESY OF DAMI OKE

Dami Oke visits an office on Capitol Hill.

My introduction to science advocacy came through the Society of Women Engineers Capitol Hill Day in 2022. I joined a group of scientists and engineers to advocate for legislation affecting girls' and women's education and careers in science, technology, engineering and mathematics.

My next effort, funded by my Ph.D. adviser, was participation in the Public Policy Institute organized by the American Institute for Medical and Biomedical Engineering. This is where I met Seger. She and others shared their experiences and thoughts on the role of public policy in advancing science.

"Every scientist can advocate for increased research funding," Seger said.

Researchers in academia know that insufficient funding can slow or stifle their progress. Public policies directly influence funding, and who better to share the news about advances in science than the researchers who have firsthand knowledge of the work they do and the funding they need?

Doubling the National Institutes of Health budget, workforce policies that support early-career researchers, and training NIH grant reviewers to reduce implicit bias are just a few of the policies that have been directly impacted by science advocacy, Seger said.

I also learned about the benefits of talking to policymakers about your work and journey as a scientist as a Society of Women Engineers congressional advocate this year.

COURTESY OF YVETTE SEGER

Yvette Seger has been involved in science policy in the private and public sectors and currently holds several policy-related positions at the Federation of American Societies for Experimental Biology.

After visiting the office of Senator Chris Van Hollen, D-Md., we received correspondence that the office will cosponsor the STEM ReSTART Act, which supports underrepresented populations rejoining the STEM workforce.

If we limit our activities to the classroom and the lab, we miss opportunities to engage the public in our work and remind nonscientists of the potential of research.

"Recognize that there is more to a career in science than just doing the science," Seger said. "You need to understand policy at the university level to be good at your job. But scientists also need to know how they are funded. You don't have to get involved in politics, but you do have to understand that for federal funding there are rules — those rules come into play from Congress, and their opinions could affect funding."

You can find an advocacy toolkit and information about the Advocacy Training Program, Capitol Hill Day and outreach programs at asbmb.org.

Oluwadamilola "Dami" Oke (okeo@gwu.edu) is a Ph.D. candidate of biomedical engineering at the George Washington University with an interest in communication and outreach for science advancement. She is an ASBMB Today contributing writer.

Upcoming ASBMB events and deadlines

NOVEMBER

1	**ASBMB Virtual Career Expo**
2–3	**Serine proteases conference**
28	Student Chapter renewal deadline
30	Discover BMB abstract and travel award submission deadline

DECEMBER

1	Discover BMB T-shirt competition begins
14	Discover BMB late-breaking abstract submission site opens
31	**Renew your ASBMB membership!**

JANUARY

18	Discover BMB late-breaking abstract deadline
24	Discover BMB early registration deadline

ASBMB

SAN ANTONIO | MARCH 23–26

Discover BMB | 2024

American Society for Biochemistry and Molecular Biology

Greetings from San Antonio!

What do you know about San Antonio?

You probably know it's the site of the Alamo, and you might have seen photos of the lovely River Walk. But what else?

When the editors of ASBMB Today were brainstorming ways to get folks excited about the setting for Discover BMB 2024, scheduled for March 23–26 in San Antonio, we decided the best way to tell you about this city would be to invite ASBMB members who live there to introduce themselves and share their impressions and experiences.

We wrote to our members in San Antonio (except the undergraduates — you'll hear from them later) and received the following essays in response. They come from a wide variety of perspectives: graduate students and senior PIs, San Antonio natives and newcomers to the city. And whether it's the food, the sights, the history, the diversity or the science, these folks really love San Antonio.

We think you will too — and we look forward to seeing you there.

— Comfort Dorn

San Antonio, my new home

A scientist reflects on her family's pandemic-era move to Texas and recommends things to see and do while you're in town for Discover BMB

By Audrey Lamb

In February 2020, I traveled to San Antonio to interview to be the chair of the Chemistry Department at the University of Texas at San Antonio. The following week, I served on a National Science Foundation review panel that hurriedly went remote. And then the world shut down for the pandemic.

As I was trying to figure out how to teach my active-learning Biochemistry 2 class remotely, I was negotiating a new position in a city I had only visited for business purposes (to give seminars, attend conferences and the like).

When the world started to reopen in late May, I packed up my husband and two teenage kids, and we drove two days from our home in Kansas to San Antonio to pick out a house. In July, we moved. And in August, I started my new role as chair.

All that is to say that my family didn't get to investigate our new city the way most people do.

We spent that first year, all four of us, in our new house. I ventured to work the most, but my kids did that entire year of high school remotely.

In fact, when my parents came to visit in August 2021, they said, "Show us the city!" and I said, "I can show you my lab/office and the H-E-B" (the grocery store). Incidentally, my new lab is very nice, and my parents oohed and aahed appreciatively; UTSA has great laboratory facilities.

Three years later, I am finally using the free time that comes with being a department chair (<clears throat>) to discover all that San Antonio has to offer. Here are some things that I have learned:

1. San Antonio in summer is hot. This summer, we broke the record for the number of days over 100 degrees (60 and counting). San Antonio in March is beautiful — you are in for a treat!

2. San Antonio has a unique culinary culture. It's a mix of Texas and Mexican that is not well approximated by "Tex-Mex." While here, I suggest the breakfast tacos, kolaches and some authentic Texas barbecue.

COURTESY OF AUDREY LAMB

The obligatory Alamo photo with the out-of-towners (Audrey Lamb's parents).

3. Go to the Alamo. I had visited San Antonio several times before for conferences within walking distance of the Alamo but had never been to it until I moved here. I have since been several times (it is where you take out-of-towners). You should know that the Alamo isn't a big investment. It is a short walk from the convention center and free, but you need a ticket (order ahead online), and you can see the whole thing in under an hour (or in 15 minutes if you are being pulled along by teenagers). So, just go — get your bit of history and feel proud for doing something cultural.

4. More missions. The city of San Antonio has a National Historic Park that is also a World Heritage Site: the San Antonio Missions. If you are interested in the history of the area and want a less touristy atmosphere, these are the places to go! There is a trail that connects the Alamo

with the four missions: Concepcion, San Jose, San Juan and Espada, each about 2.5 miles apart.

5. Lace up. If you are thinking of exploring outside of downtown, Texas has fantastic state parks. When my family and I needed to get out of our house during the pandemic, we would make a reservation and spend a day hiking. We especially recommend Lost Maples and Enchanted Rock.

6. Showtime. My family loves the theatre. I recommend both the Classic and the Public Theatres. One of our favorite experiences has been seeing the Classic Theatre production of "As You Like It" (Shakespeare) in the outdoor amphitheater at the San Antonio Botanical Gardens. The gardens are a magnificent destination in their own right, too, and you can get there from the conference location on VIVA, San Antonio's VIA culture bus route, which also stops at the zoo, the Japanese Tea Garden, The San Antonio Museum of Art and the Witte Museum. All are worth a visit.

San Antonio has a lot to offer! I hope to see you at the ASBMB annual meeting here in my new home city.

COURTESY OF AUDREY LAMB

Audrey Lamb with her family at Monkey Rock in Lost Maples State Natural Area in Vanderpool, Texas and a member of the ASBMB Council.

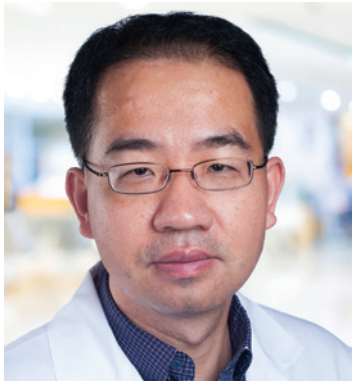
Audrey Lamb (audrey.lamb@utsa.edu) is a professor of biochemistry at the University of Texas at San Antonio.

A good place to live and study cancer

After completing my postdoctoral training at the University of California, San Diego, I received an attractive offer to work in San Antonio. I am now an associate professor in the molecular medicine department at the University of Texas Health Science Center at San Antonio.

Dynamic control of enhancer repertoires drives stage-specific transcription during tissue development and disease progression. My lab's overall objective is to gain a fundamental understanding of the regulations of enhancer dynamics in response to signaling and their effects on gene regulation, leading to innovative approaches to prevent and treat enhancer-related diseases, especially cancers.

I wanted to work in this city for several reasons. First, Texas offers substantial startup funding for researchers across various disciplines to study cancer. As a new principal investigator who recently concluded postdoctoral training and was recruited as a tenure-track faculty member, I received a $2 million startup grant from the Cancer Prevention and Research Institute of Texas, known as CPRIT. Also, San Antonio is a military city, and many people choose to stay after retiring. This ensures abundant clinical resources for researching aging and cancer.



Jason Liu

San Antonio also has historical significance and is a vibrant tourist destination, with attractions such as the River Walk and the Alamo. As the seventh-largest city

in the U.S., San Antonio offers the advantages of a major urban center while providing a high quality of life due to its affordability and favorable traffic conditions.

My wife is also a PI, researching neuronal diseases. She and I have been immensely content working and living in San Antonio since we moved here from San Diego. Our two young daughters find a lot of fun things to do in this city. Besides working hard in the lab, we often take our daughters out to eat good food, visit the attractions and play at the SeaWorld or Six Flags amusement parks on weekends.

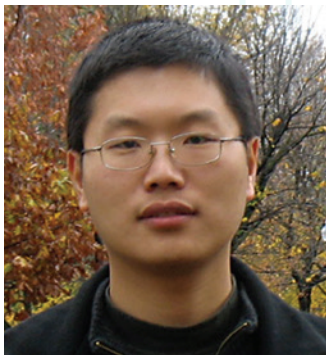
— Jason Liu

A city that values biochemistry

I earned my B.S. and Ph.D. from Peking University, China, and received postdoctoral training at Yale University. I am now an assistant professor in the biochemistry and structural biology department and at the Greehey Children's Cancer Research Institute at the University of Texas Health Science Center at San Antonio.

Breast cancer genes 1 and 2, known as BRCA1/2, produce proteins that help repair damaged DNA, and it is well known that mutations in these genes can lead to cancer. My laboratory purifies full-length BRCA1/2 complexes and reconstitutes their biochemical reactions to investigate the BRCA1/2 tumor suppressor networks in related biological processes and the molecular mechanisms underlying their pathogenic mutations. We aim to provide the foundation and impetus for developing new therapeutic regimens.

Four years ago, I decided to relocate to San Antonio to kickstart my career, a choice heavily influenced by the collegial atmosphere at UTHSCSA. What stood out most was the administration's genuine appreciation for foundational biochemical studies.



Weixing Zhao

San Antonio has been a joy to live in, with its seamless mix of tradition and modernity. The city boasts a rich heritage influenced by Mexican, Spanish and Native American cultures, not to mention its delectable food. I particularly love the authentic Tex-Mex dishes, the vibrant markets of El Mercado and the tranquil strolls along the River Walk. San Antonio is a truly enchanting place. Most importantly, its friendly vibe and affordable cost of living make me feel secure and confident in raising a family here.

— Weixing Zhao

A place for growth and collaboration

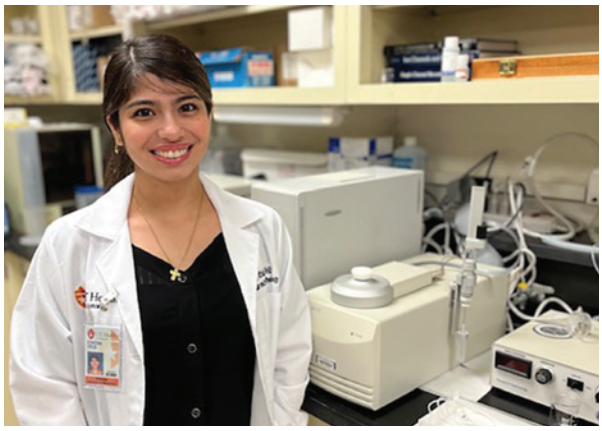
I am a senior research assistant at the University of Texas Health Science Center at San Antonio. I grew up in Houston, and I am the first in my family to attend college; I earned a Bachelor of Science in biochemistry at the University of Texas at San Antonio, the city's largest university with more than 34,000 students.

I am a biochemist for the physiology department, and we study ion channels using biophysical approaches such as isothermal titration calorimetry to help determine binding affinity and biomolecular interactions of any two molecules in a label-free environment by measuring thermodynamic parameters including affinity, stoichiometry, enthalpy and entropy. Working in the lab is exciting and suspenseful — every day I do different tasks and experiments, and their results are often unpredictable. For instance, we believed that phosphorylation would disrupt the high affinity of the protein complex and block the binding site to prevent it from interacting with other

molecules; much to our surprise, we detected binding of the protein complex in a calcium-free environment. This was very exciting.

With its interconnected universities, San Antonio has great opportunities for growth. There are lots of collaborations through health care and among universities. At UT Health, which is in the heart of San Antonio's medical center, students can shadow and work with certified professionals in hospitals, and doctors paired with researchers help treat patients at Mays Cancer Center with cutting-edge technology and research. So far, I have collaborated with students from the University of Texas and the University of the Incarnate Word. San Antonio also offers academic and industry opportunities.

Besides career options, San Antonio has beautiful and relaxing scenery composed of hills, nice skies and trees. There is so much to do in the city, such as Six Flags Fiesta Texas, shopping at the Shops at La Cantera (an open-air mall), dining in at various restaurants and unique and fun night spots including Top Golf and JazzTX.



CRYSTAL ARCHER

Cynthia Veliz works in a lab in the physiology department at the University of Texas Health Science Center at San Antonio.

— Cynthia Veliz

Warm people — and a light show

COURTESY OF LETICIA RODRIGUES

Leticia Rodrigues visits the Japanese Tea Garden in San Antonio.

On a school break in late December a few years ago, I took a 10-day solo road trip around Texas big cities, spending a day or two in each place — that's when I fell in love with San Antonio. I ended up moving to the U.S. from Brazil, and San Antonio has been my home for the past two years.

San Antonio is filled with warm people — the sun, for sure, has an influence on that — and is a big city with small-town vibes. One of the good surprises of the city — besides the good tacos — is The Saga, a video light display shown six nights a week at the main plaza that tells the city's history in a nice graphic and artistic way.

Here, too, I found my passion for cancer biology. I majored in biotechnology for my undergraduate degree and postbaccalaureate in Brazil, and since then I've gained experience in a variety of scientific areas. In Brazil I worked in three labs, studying bee brain development, phytopharmacos and vaccine development. In the U.S., I've worked on cardiovascular diseases and cancer.

Since moving to San Antonio, I have worked as a research assistant with Jason Liu at the University of

Texas Health Science Center at San Antonio, where we aim to decipher the role of intrinsically disordered regions, or IDRs, which are often found in transcription proteins and are known by their ability to phase separate.

In the lab, we are working to understand how multivalent interactions between IDRs mediate the enhancer assembly during normal hormone signaling or when containing a pathogenic mutation. We have focused on the androgen receptor and estrogen receptor alpha, which are known to influence the development and growth of many human cancers.

— Leticia Rodrigues

Beauty at a geographic intersection

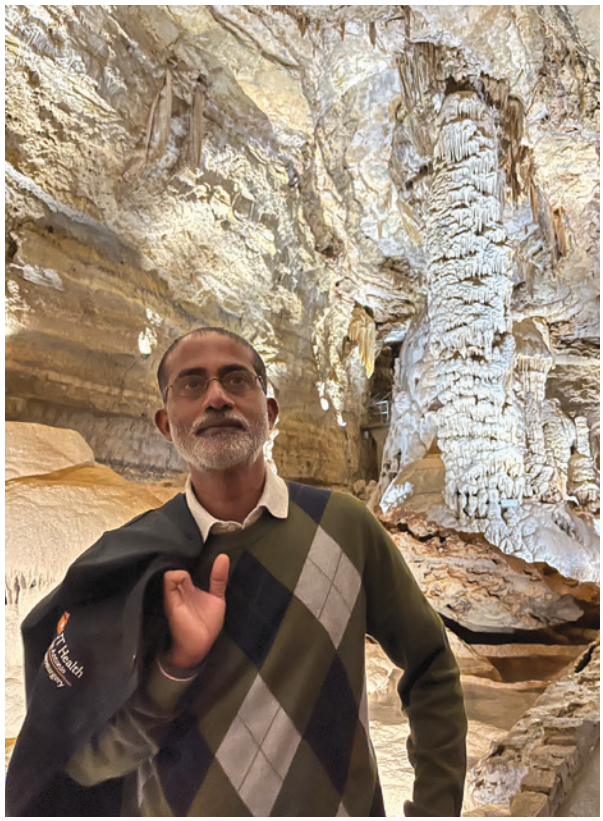
I am a recent transplant to San Antonio, having moved here from Dallas, where I was a professor of radiation oncology at the University of Texas Southwestern Medical Center. In 2019, I was recruited by the University of Texas Health Science Center at San Antonio, where I am a professor of neurosurgery and biochemistry and molecular biology and vice chair (research) of neurosurgery.

My lab is housed in the South Texas Research Facility within the sprawling Medical District, which includes other research institutions, hospitals and the Veterans Affairs Medical Center. My lab works on DNA double-strand break repair mechanisms with the translational objective of targeting DNA repair pathways to augment glioblastoma therapy.

I decided to move here primarily because UT Health San Antonio recently recruited several outstanding DNA repair researchers; the university is poised to become a world-class genome stability research hub. In my few years here, I have enjoyed working on collaborative projects with some of the best minds in DNA repair.

I also enjoy working here because the center is bounded on one side by nature preserves and trails — watching deer meandering outside your lab as evening falls is simply priceless. San Antonio is a green and charming city with a distinct culture of its own, and the vibe here is laid-back and friendly. It also doesn't hurt that here you can find some of the most authentic Mexican cuisine outside of Mexico.

When I moved to San Antonio, I was perplexed by the three different nightly weather forecasts on the local TV channel. I learned later that the city lies at the intersection of several distinct geographic areas, all undeniably beautiful. Drive an hour north, and you will find yourself amongst the incredibly green rolling hills of Texas wine country. Drive a couple of hours south, and you will hit the pristine beaches of the Gulf Coast. Drive a few hours west, and you will find yourself mesmerized by the stark beauty of the desert landscape. Drive east … well, I've never driven east — that would just take me back to Dallas.



BIPASHA MUKHERJEE

Sandeep Burma hikes in the Natural Bridge Caverns not far from San Antonio.

— Sandeep Burma

'Nowhere else I'd rather be!'

When I was growing up, I loved going to San Antonio Spurs basketball games and watching everyone cheer for the star players Tony Parker, Manu Ginobili and Tim Duncan. The Spurs have been NBA champions five times in the last 24 years — and we treat every home game as if it were the championships. This feeling of unity and a sense of community is one of my favorite things about the city.

I'm a San Antonio native and a second-year Ph.D. student at the University of Texas Health Science Center San Antonio, or UTHSCSA. One of my favorite things about going to school here is engaging in the wide breadth of research that takes place. My dissertation work focuses on characterizing the interactions between the main driver of prostate cancer, the androgen receptor and its cofactors. However, labs around campus are performing groundbreaking research in other cancers, neuroscience, immunology and vaccines, aging, pharmacology and drug design — imagine any biomedical topic, and someone at UTHSCSA is probably studying it or something related.

This theme of diversity doesn't end in the lab, though. San Antonio has a rich history and uniquely diverse culture that can be rivaled by only a handful of cities around the world. You can grab kolaches (Central European sweet breads) for breakfast, take a stroll by the River Walk, visit a breathtakingly beautiful art exhibit and end the night at a live jazz club, all in one day.

HUMBERTO SUAREZ

Madisyn Johnson is a Ph.D. student at the University of Texas Health Science Center San Antonio.

San Antonio offers endless beauty and culture, and the myriad experiences available here are a testament to that. I feel exceedingly fortunate to have grown up in such a vibrant, lively city, and there is nowhere else I'd rather be!

— Madisyn Johnson

Building the first cryo-EM facility in South Texas

I hail from Beijing, where I received my Ph.D. in cryo-electron microscopy. After a postdoc at Florida State University, I came to the University of Texas Health Science Center at San Antonio in late December 2021.

I serve as a research assistant professor and manager of the UTHSCSA cryo-EM facility. It is the first such facility in South Texas, and I have been involved in building it from the ground up. In early 2022, I assembled the $3 million microscope together with the field engineer from Thermo Fisher and set up the computing infrastructure needed to operate the micro-

COURTESY OF LIJIA JIA

Lijia Jia worked with an engineer from ThermoFisher to assemble a $3 million microscope.

scope and process data. I have been the liaison between the Thermo Fisher and UTHSCSA facilities teams during set-up and troubleshooting. The cryo-EM facility was slated to go online in May 2022 to members of the broader UTHSCSA community. I am assisting investigators with sample preparation and data collection; I consult with them regarding data processing and assist with training. I will also be responsible for day-to-day operations and maintenance of the microscope.

Besides my day-to-day research work, since moving here I have been discovering San Antonio, a vibrant city with notable attractions including the Alamo, the River Walk and the San Antonio Missions National Historical Park. My favorite of these is the River Walk, built along the San Antonio River and surrounded by green trees and flowers. I like to stroll along the walkway with my friends and enjoy the magnificent river views and beautiful architecture. There are also many restaurants, cafés, bars and shops along the river that I can enjoy dining, drinking and shopping; all in this one area. It is really a perfect place to relax and enjoy your life.

— Lijia Jia

A warm city of warm hearts

On Veteran's Day 2022, soon after moving to San Antonio from Ohio to start my new job at the University of Texas Health Science Center, I was enjoying the relatively warmer weather, whereas most people around me were bundled up in heavy clothes. Having quickly learned that the whole city was well connected by public transportation, I was riding a bus when a septuagenarian offered me a big jacket "to beat the cold weather." I explained that I had just traveled from a cooler place, but such an offer of help touched my heart.

A city is the collective impressions of its people, and I have found San Antonio to be very diverse and vibrant as well as welcoming and helpful. The weather is warm throughout the year, especially in July and August, with just a dash of coolness from December to February. Despite the heat, the city bubbles with energy and weekends are packed with colorful social events such as a special "fiesta" every April to commemorate the valor of heroes of the Battle of the Alamo.

I work at the structural biology core of UTHSCSA. I prepare purified proteins in bulk amounts from different sources and put them into pipelines for downstream processes. Researchers subject each protein to structural studies by X-ray crystallography, nuclear magnetic resonance or cryo-electron microscopy to assess its function under normal physiological state and determine why it may become the causative agent of a disease or use it to find potential drug candidates to alleviate the disease.

Seema Nath

It won't be an exaggeration to mention that health science–related research is one of the main themes of research all across Texas. In addition to UTHSCSA, major research centers in San Antonio include the Texas Biomedical Research Institute, the Southwest Research Institute and the University of Texas at San Antonio. UT San Antonio conducts a wide variety of diverse research activities, whereas the rest of the centers focus on exploring the underlying causes of diseases and measures to give people a better life by developing more effective medicines.

— Seema Nath

Welcoming vibes for all

I am a Ph.D. student at the University of Texas Health Science Center at San Antonio. I am from the beautiful country of Nepal, home to Mount Everest, and I did my undergraduate and master's in microbiology in Nepal before coming to San Antonio in 2018 to pursue my doctorate.

Our research group under the supervision of Thomas Boyer focuses on understanding how uterine fibroids (or leiomyomas) arise and how they can be treated nonsurgically. My research specifically concentrates on deciphering the molecular mechanisms by which a myometrial stem cell responsible for forming and maintaining the smooth muscles of the uterine wall changes itself into a tumor-initiating stem cell believed to be the origin of these benign yet highly pathologic tumors.

Coming from a small country with a diverse culture, I love San Antonio for its welcoming vibes for people from all around the world in a truly multicultural setting. There's a good chance that you'll find your local restaurant around San Antonio, no matter which corner of the world you come from. I enjoy Nepalese food at Himalayan Kitchen and highly recommend others to try this once.

But there is much more to this city. There are plenty of famous tourist spots and museums to spend a day in while there are local hiking trails and parks to spend an evening. One of my favorites is the Japanese Tea Garden, which appeals to me with its beauty alongside its ancient touch and peacefulness despite being in the middle of the city.

COURTESY OF SUBASH KHADKA

Subash Khadka and his wife, Sunita Khatri, enjoy a River Walk gondola ride.

Finally, there is good news for science lovers too. The bioscience industry of San Antonio is in its exponential growth phase while other big Texas cities are approaching saturation.

— Subash Khadka

'The perfect place to do science'

I have always been passionate about nature and its perfect synchrony and balance. When I was 6 years old, I received a mini microscope, as a Christmas gift; that changed my view of the world and defined my professional path. Seeing particles that were invisible to human eyes led me to an interesting observation: Every macro structure also exists in the microenvironment, and both exist in similar systems.

I completed my Ph.D. in biochemistry at the University of Sao Paulo, Brazil. In 2021, I moved to San Antonio with my family to join Audrey Lamb's lab as a postdoctoral research fellow in the chemistry department at the University of Texas at San Antonio. Our lab studies the metallophore biosynthetic pathway, including an enzyme that generates nicotianamine, a natural product that sequesters iron from the environment. I am particularly interested in how to use nicotianamine to increase iron composition in food crops and make plants hardier to climate change. Nicotianamine also has properties that make it a potential therapeutic for Alzheimer's disease, hypertension and coronavirus infections.

When I learned we would be moving from Brazil to San Antonio, I started working to improve my English. Soon after we arrived, I was shopping for canned beans in Walmart, and I had my conversation memorized to make sure I'd do great with my English pronunciation. I asked the man at customer service, "Excuse me, sir, would you show me where I can find the canned beans?" I was

surprised when the attendant answered in Spanish, and I quickly let my guard down since Spanish is close to my native language — Portuguese. We had a nice conversation.

On that day, I figured out that the street language in San Antonio isn't just English, but Spanish, Tagalog, Arabic, Chinese (both Mandarin and Cantonese), Vietnamese, Hindi, German, Portuguese, Korean, Italian and so on. This mixed soup of languages and cultures makes San Antonio an amazing, special city. With its strong universities, beautiful sights and welcoming people, it's the perfect place to do science.

— Thiago Pasin

COURTESY OF THIAGO PASIN

Thiago Pasin and his family take a boat tour of the San Antonio River at the city's River Walk.

A city with plentiful research support

COURTESY OF ZOE HOFFPAUIR

Zoe Hoffpauir, a postdoc at UT San Antonio, and her young son make family memories in San Antonio.

I am a postdoctoral researcher in Audrey Lamb's lab at the University of Texas at San Antonio. I study essential bacterial enzymes that perform amazing chemistry. My work informs the design of novel antibiotics to address the threat of antibiotic resistance.

I was born and raised in southeast Texas. After receiving my Ph.D. from the University of Texas Medical Branch in Galveston, I made the move to central Texas for my postdoc. I have worked and lived in San Antonio for about a year, and I love everything this great city has to offer.

UTSA was proud to be designated an R1 institution in 2022. To maintain this honor, the university offers postdocs, graduate students and faculty lots of support for their research. The university has a variety of facilities that help me accelerate my biochemical research, including the Center for Innovative Drug Discovery and the pharmacology, mass spectroscopy, nuclear magnetic resonance and microscopy cores.

Outside the lab, San Antonio has something to offer people of all ages. When I was a child, my family would visit the city and I have fond memories of our time on the historic River Walk. I am now a parent of a young child and a resident of this amazing city, so I enjoy taking my son to the Witte Museum, the San Antonio Zoo and the San Antonio Aquarium for him to make fond family memories of his own.

— Zoe Hoffpauir

Ticks, blood and unexpected connections

A story of science in San Antonio

By Robert Renthal

Considering the mild climate and relaxed, multicultural lifestyle, it's not surprising that San Antonio's population has doubled to nearly 1.5 million since 1975, the year I arrived as an assistant professor of biochemistry at the University of Texas at San Antonio.

San Antonio is the seventh largest city in the U.S. in terms of population, but it has a relatively small surrounding metropolitan area, which means research collaborations here occur over longer distances than in more densely populated regions. In my early days in San Antonio, I had to drive 90 miles to Austen Riggs' lab at UT Austin to do amino acid analyses, and I flew to Walter Stoeckenius' lab in San Francisco to do laser spectroscopy. I mailed membrane samples to Juan Yguerabide in San Diego for fluorescence depolarization measurements.

Incidentally, Juan grew up in Laredo, southwest of San Antonio, and he told me how important South Texas higher education was for starting him off on his scientific career, which led from physics to biophysics to membrane biochemistry. His experience underscores the significant role of universities in developing human potential in disadvantaged areas.

Today, San Antonio has a highly active network of researchers and research facilities at UTSA and the University of Texas Health Science Center, or UT Health, along with the Southwest Research Institute, the Texas Biomedical Research Institute and Brooke Army Medical Center.

Lately, I've turned my attention to insect and tick biochemistry, making use of our first-rate mass spectrometry facilities at UTSA and UT Health. In one study of the cuticular lipids of the lone star tick, I found low ratios of sphingomyelin to phosphatidylcholine, or SM to PC, less than 1-to-5. I obtained the ticks from a U.S. Department of Agriculture Agricultural Research Service lab in nearby Kerrville, where they had been fed exclusively on bovine blood.

Curious about the lipid composition of bovine blood, I ran across a 1960 paper, in Volume 1 of the Journal of Lipid Research, by Don Hanahan, whom I knew when he was in San Antonio as chair of the UT Health biochemistry department during the 1970s and 1980s. Don reported that all the choline in bovine erythrocytes was on SM, resulting in blood with a high SM to PC ratio of 1-to-1. Lone star ticks must have very active choline transfer pathways to decrease their high SM levels when feeding on cattle, which might be a future target for the control of this pest. I'm sure Don would have been delighted to hear about an unexpected connection to his early lipid work.

Robert Renthal studies Amblyomma americanum, the lone star ixodid, or hard tick, so-called for its lone star marking located centrally on its dorsal surface.

By the way, you don't need to worry about ticks in San Antonio if you stay near the convention center. But if you hike through the Hill Country north of the city, looking for wildflowers or birds, consider wearing permethrin-treated clothes. As early as mid-March, I've seen lone star ticks crawling around near my house, searching for a blood meal.

Robert Renthal (robert.renthal@utsa.edu) is a professor of biochemistry at the University of Texas at San Antonio.

10 tips to get you through your Ph.D. program

By Danielle Guarracino

Graduate school can be a grueling, sometimes thankless endeavor with a tremendous, career-determining goal. The pressure to succeed, get your project to work, get enough sleep and find all of the free pizza can be overwhelming, so it helps to have a support network and advice from experienced former grad students. All of us who have survived graduate school and come out the other end with a Ph.D. share a bond. In that spirit, here's some advice that I hope will help you get through. In no particular order:

COURTESY OF DANIELLE GUARRACINO

Danielle Guarracino and her husband, Arjel Bautista, in the lab on the day of her thesis defense in 2008.

1) You are your own best advocate.

You know yourself best. Your very busy principal investigator may not be as attuned to your progress as you are. Keep pushing yourself forward — your results, possible publications and any opportunity that comes your way for conference travel, funds and the like.

When it comes to your mental health and life balance, you need to advocate for that, as well. Believe in yourself.

2) Difficulty is opportunity.

Albert Einstein said, "In the middle of difficulty lies opportunity." Your science will fail. In all projects, unexpected results and things not going as planned are part of the process. We all know the effort and care we put into our projects and how frustrating and demoralizing it feels when something new doesn't work out. However, with failure comes a fresh start, a new chance.

Take each setback as an opportunity to spin your wheels, think a bit further, and, often, you will come to some new discovery. When you're failing, it's hard to hold onto such advice. My mother once sent me a pick-me-up card with Einstein's quote, and she wrote, "Remember this as you go through procedure after procedure — never giving up. It's a tough journey but one, we doubt, you'll ever be regretful for — continue and may successes come to you and your project — in small doses or big ones."

3) Don't take it personally.

You're a cog in a very large wheel that involves your university, your PI, your department colleagues and possibly other departments or schools, a funding agency and your field as a whole. Whether your project works according to plan, stagnates, opens different doors or fails is mostly a matter of chance

and the science itself. Your hard work may feel like it never pays off, but that is just part of the process of working toward a goal.

Your self-worth is more important than your project. Whether you achieve 20 publications or one, whether everything works immediately for you or you slog through years of turmoil, it has nothing to do with how great a scientist you are. You are there, you are achieving your goal of working towards a Ph.D. and you are worthy of being celebrated.

4) Find outlets.

You may not feel like you have time for hobbies or much of a life outside the lab, but sometimes taking time away helps you make more sense of your project or clear your brain — or just improves your wellness, mental health and relaxation. It can be as small as getting together with friends for a game night or learning to cook a new dish or as large as joining a sports team, class, group or musical endeavor. Looking forward to an activity that taps into the other parts of your identity can help you feel more confident and energized for your tasks in the lab. You can connect with yourself and maybe discover new avenues of creativity.

5) Imposter syndrome is real …

With all of the internal and external stress of graduate school, with so much riding on an unpredictable project, we all sometimes feel like we don't belong. Fellow grad students likely share but may not show these feelings, so it's easy to feel you made a mistake or don't fit in. You may have thoughts like "everyone else is better than me" and "I have no business going for a Ph.D. — who do I think I am?"

First, you are not alone. Just about every grad student goes through some version of this, even the most apparently successful ones. When you put a lot of effort into something that has a very slow payoff, it can be easy to feel you are the problem. You are not. Simply being there, surviving, pursuing and committing means you belong. You've come this far; as you continue, have faith in yourself.

6) … but know your limits.

Whether it's sleeping in on a Saturday (even when your PI demands you be in the lab), going home to eat dinner and watch TV instead of heading back to the lab one night, or using whatever vacation time you're given, every high-achieving, Ph.D.-pursuing student reaches a point where they realize they need to find a boundary. Your mental health and wellness are key to your success.

And you might realize that graduate school is no longer for you — not as a form of imposter syndrome but truly, on a deep level, you do not want to continue. My PI once told me that part of graduate education is knowing when a project needs to be abandoned. Knowing if you need to abandon the program is also key.

7) Grad school, like life, is not a silo.

Find support and appreciate your support people. When my physical and mental health deteriorated in graduate school, I knew I needed to pursue not just medical testing for my myriad gastrointestinal issues but also counseling. This is not a defeat. We all need support, in some form, and when pushing yourself through graduate school you may need extra support. Counseling empowered me, and I was able to complete my time on a high note.

Look for the unsung heroes within your department — from the facilities managers to the office staff — the people who quietly make everything run smoothly but are often overlooked.

I'm only 5 feet tall. One day a building carpenter noticed I was perched precariously on a wobbly stool to run a flash column in my hood. He built me a sturdy box to stand on (which I passed on to my vertically challenged lab mates upon my graduation). I will never forget his kindness and initiative. Sometimes, the little things keep you going.

8) Slow and steady wins the race.

Good things truly do come to those who wait. Pursuing a Ph.D. is a marathon, not a sprint. Some projects take years to come to fruition, and each year can merge into the next until you feel like it will never end. Perseverance is key, and you will be tested. Even the most prolific, high-achieving graduate students take years to reach the prize. Each person's story is as unique as is their project; do not fall into despair comparing yourself to others — you will get there in your time.

9) Find the free food.

Most Ph.D. students are paid a stipend, but life can be expensive. A perk of graduate programs is the opportunity to meet high-level speakers and attend workshops and networking events. These often include free food. Whether it's an all-day conference with breakfast, lunch, dinner and coffee breaks or a one-off free lunch with the speaker, graduate school will feed you if you

put in a bit of effort.

I once saw a fellow grad student stuff his pants pockets, jacket and backpack full of free cans of soda at an event; in the end, he was so heavily laden I'm not sure how he climbed the stairs back to the lab. My record was four straight days of free pizza from a marathon of talks and meetings. Most event organizers know: If you feed them, they will come.

10) Make the most of the time, and keep an open mind.

Grad school is just one snippet of your life. Someday you'll look back at all you accomplished and the people you bonded with. You'll think fondly of eating takeout in the lab spaces at night, waiting for your cells to grow. The first time I stayed late in the lab, I felt like I'd joined some nerdy fraternity. We talked all night about science and our lives.

I finally felt like I found a home as a graduate student. Over the years, I met people I was inspired by — like the postdoc who became a professor at a small primarily undergraduate college, which I then realized was my aspiration — and some I've come to love.

My husband of 11 years worked at the bench across from mine, and his desk was feet behind mine in our office. Through graduate school, we bonded, laughed, argued, competed for our PI's approval, cried, cheered each other up and, in the end, became the best of friends while falling in love. We come from different parts of the country, different backgrounds, different races and different experiences, and yet grad school was our union, the level playing field where we flourished and became close.

I think I succeeded in my Ph.D., both academically and personally, by keeping an open mind. So, go forward and be true to yourself. Remember, those of us who have been through it are here for you every step of the way.

Danielle Guarracino (guarracd@tcnj.edu) is a professor of chemistry at the College of New Jersey and a member of the ASBMB Today editorial advisory board.

What we lost: Two early-career researchers share their pandemic experiences

By Anand Kumar Sharma & Tina Dahlby

The COVID-19 pandemic continues to affect the scientific community with delays in research that are especially challenging for early-career researchers and that may have an impact on their careers.

Pandemic-related disruptions and delays in the delivery of reagents and instruments also continue to impede research. Experimental biologists and physiologists who rely on intercontinental or international shipments of reagents have been particularly affected by supply-chain disruptions.

The process of generating genetic animal models can take months or years, so animal physiologists have suffered delays in their research projects.

Here, we share with you our continuing stories — we know they are two among many — and advocate for a policy that accounts for the time lost by early-career scientists.

Anand: Stymied and stranded

When I joined the Eidgenössische Technische Hochschule Zürich in May 2019 as a postdoc in adipose physiology and metabolism, I quickly got to work refining our hypothesis. I was looking to uncover alternative mechanisms of heat generation in the adipose tissue that help to maintain body temperature during shifting outdoor temperatures. We soon realized that to validate our hypothesis, we needed to genetically modify mice in several ways.

We did not want to change the whole-body physiology of experimental mice as it would lead to unrelated effects. Instead, we aimed to target adipose tissue that too in a way that we can alter the particular gene once the mice are grown up (using a so-called ERT-Cre-LoxP system). To achieve this, we needed two mouse models for which we contacted a pioneering lab at Harvard in November 2019. By January 2020, we had completed all necessary paperwork, including a material transfer agreement, setting the stage for delivery of two genetically altered lines in February or March 2020.

These mice were not delivered until September 2020, setting us back about nine months. Other COVID-19-related delays, burnout and logistical restrictions within the animal facility further impeded our progress.

It took us nearly two years to get our first experimental mice. Our most complex mouse model harbored targeted mutations in four different genes. Producing a mouse with a single targeted mutation typically requires about six months. Adding more mutations exponentially increases the complexity and time. And during the early COVID-19 wave, we had to euthanize experimental mice that had been on a high-fat diet for months.

In another layer of complexity, I found myself stranded on a different continent.

In February 2020, I went to India to visit my family. A month later, as countries around the world enforced prolonged nationwide lockdowns and travel restrictions intensified, I was unable to return to work for several months. This led to significant setbacks in my research.

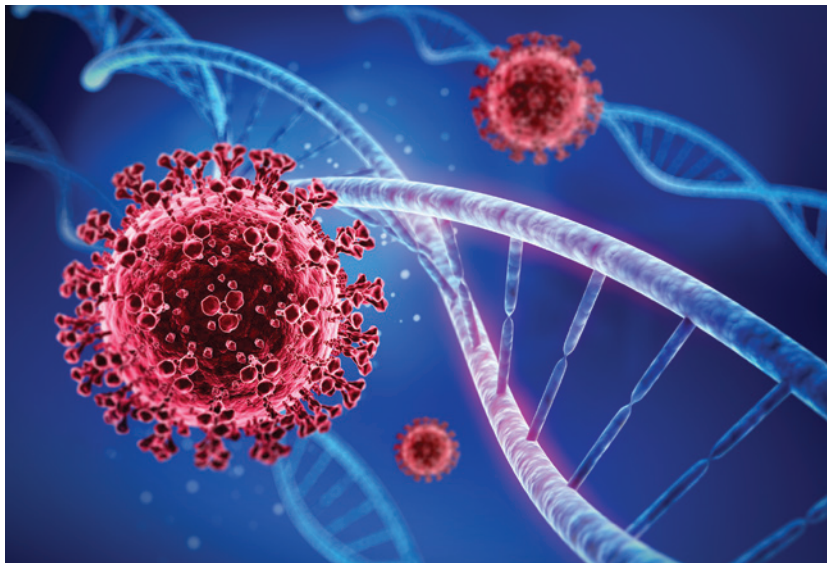
In Switzerland, non-EU postdocs are restricted to annual contracts, requiring annual permit renewals. Just before I left, I had signed a new contract, and while I was in India, my residence permit expired.

I tried to work remotely — writing grants, meeting online with collaboration partners, co-authoring a review and conducting literature surveys that helped refine my hypothesis. However, the lack of tangible progress greatly impeded the advancement of my ongoing projects.

Tina: Stymied and sick

My COVID-19 experience has been an emotional roller-coaster with a mental, physical and emotional toll.

I came to work at the Eidgenös-



sische Technische Hochschule Zürich in June 2020 as a postdoc in adipose tissue physiology and metabolism. I was healthy and had a thriving life. One fine morning in April 2022, I developed a sore throat and a persistent cough. I tested positive for COVID-19.

My illness followed a normal trajectory, and, in a week or so, I felt better. My life was getting back on track when three weeks later I felt another wave of fatigue and I had difficulty breathing. These symptoms came and went, but I could not return to normal life.

Persistent viral load had been reported in some people, so my doctors repeated the test, but the nasal and throat samples were negative for COVID-19. I continued to feel weak and fatigued.

After a few months, the doctors determined that, although my respiratory tract was free of the virus, SARS-CoV-2 had been hiding out in my lungs. Meanwhile, I had endured months of COVID-associated pneumonia. Without being able to move, eat or breathe properly, I was hospitalized in a deteriorated state.

As a young, otherwise healthy woman without any known underlying conditions, I did not expect the infection to be so severe. I lost six months of valuable work time to illness, hospitalization, treatment and recovery.

After my physical recovery, brain fog and issues with memory and concentration remained, even to this day, and had a negative impact on my research. I received tremendous private and professional support, but the added mental strain was substantial.

The value of support

We know we are not alone in these struggles. Many scientists have experienced similar or even worse situations. We have learned the immense importance of having an unswerving mentor, a supportive institution and an understanding civil society. Throughout those challenging months, our supervisor, Christian Wolfrum, stood by us. Recognizing our circumstances, ETH Zürich continued to pay our salaries. The local government authorized Anand's return to Switzerland although embassies were not operating normally. All this support kept us motivated, and we are filled with gratitude. We are determined to bounce back with vigor and passion.

However, we must acknowledge and honor other scientists who were victims of pandemic circumstances. To prevent them from facing penalties that result from situations beyond their control, we believe institutions and recruiters must establish a formal process that takes into account the research time that was lost and recognizes the subjective impact of the pandemic on so many individual careers.

We propose a framework that mirrors existing parenthood breaks. All academic recruiters should provide an option to record career breaks and their respective impacts. The COVID-19 pandemic affected the career trajectories of many researchers who were in crucial stages of their academic lives. This empathetic and justified measure would benefit them.

The existing evaluation system fails to acknowledge other forms of career breaks (personal health, volunteering to do meaningful humanitarian work or loss of a close family member) and their impacts. We believe that introducing such an option would also allow academic leaders to acknowledge genuine effort, even in the absence of tangible output.

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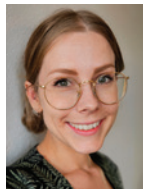

Research administration: A career path uniquely fitted for Ph.D.s

By Nathan L. Vanderford

As I was finishing graduate school, I became overwhelmed by the seemingly never-ending nature of research, so I decided that I didn't want to continue to work in a lab. Instead, I wanted to use my scientific knowledge to help manage the research being done by others. That career field is called research administration. After nearly 15 years in the field, I have determined that it's a perfect fit for Ph.D.s. who want to keep up with advances in science while moving the scientific enterprise forward through administration.

What is research administration, you ask? Great question. I didn't know about this field as a graduate student and postdoc, so don't stress if you are in the same boat. Big picture: Research administrators are liaisons among researchers, funding agencies, institutional leadership and external partners to ensure the smooth operation of the research enterprise.

Research administration careers are found in every facet of research. The job areas include:

- **Grant development or management:** Individuals in this area may identify funding opportunities, develop grant proposals, manage grant budgets or help researchers submit grants to funding agencies.
- **Research compliance:** Compliance officers work to ensure that research projects follow ethical standards, regulatory requirements and institutional policies. They help researchers gain approval for research involving human or animal subjects, and they then monitor that research.
- **Research operations management:** These individuals oversee and facilitate the day-to-day operations of research, especially at the level of departments or centers. Job functions may include managing and allocating resources, managing staff or addressing logistical issues.
- **Technology transfer:** These specialists help to commercialize research discoveries. This can include managing intellectual property, negotiating licensing agreements and facilitating collaborations with external entities.

This is not an exhaustive list, but I hope it gives you a general understanding of the research administration field. One important point is that individuals can move between research administration areas fairly easily. For example, I have worked in grant development/management and research operations over the years. To learn more about these types of jobs, I suggest you conduct some informational interviews with Ph.D.-level research administrators.

You can also check out organizations such as the National Council of University Research Administrators and the Society of Research Administrators International. They provide many educational opportunities to learn more about the field and invaluable opportunities to network with research administrators from around the world.

A terminal degree is not required and perhaps not even preferred for these types of jobs — so why are Ph.D.s the perfect fit for research administration jobs? Another great question. Ph.D.s bring unique and valuable skills to the table. They understand how research is done, can speak and understand the scientific language, understand research ethics and integrity, and have high-level problem-solving and critical-thinking skills. Coming into the field with these skills sets Ph.D.s apart from those who have not been graduate students in a lab.

In summary, many research administration jobs exist that uniquely match the skills possessed by Ph.D.s. So, if you are passionate about both science and administration, research administration may offer a dynamic and rewarding career path for you.

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