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# ASBMB TODAY

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

## TRAUMA & RECOVERY



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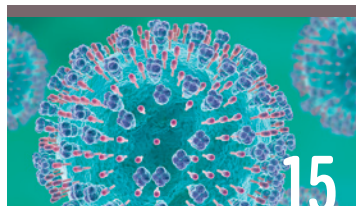
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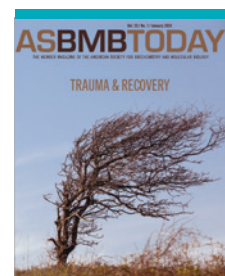
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# Thank you for surprising me

*By Comfort Dorn*

**M**y job is many things. As I edited this issue, it occurred to me that sometimes it's like a walk along a familiar trail.

I live near the Rock Creek Trail, which follows its namesake creek for about 18 miles from Washington, D.C., out to a man-made lake in suburban Maryland. It's not exactly a wilderness, but it's pleasantly woody. In the summer, it's shady and cool, and as I write this it's a riot of autumn color and crunchy leaves. By the time you read this, the trees will be bare.

I walk the local section of the trail often, especially early in the morning. And I have to confess that, when I walk, I usually focus on what's in my own head. The scenery is a backdrop to my thoughts. But, every once in a while, I'll spot something — a beautiful patch of tiny spring flowers, a tree newly fallen into the stream, a deer frozen in midstep — that brings me out of myself. And those moments of surprise and wonder make being on the trail worthwhile.

I've been doing this job for several years now, and parts of it are pretty predictable. But, every once in a while, I am surprised.

Back in September, I told a story here about getting mugged before my wedding — a trauma that stayed with me for a long

time — and I invited you to write about a trauma in your life. We live in a world filled with violence and pain, both physical and emotional, but I think many of us are reluctant to talk about it. My parents encouraged me to be cheerful and grateful — nobody likes a complainer. Maybe you got that from your parents too?

But, I've learned that there's healing power in sharing stories of pain and loss. Communities gather in grief, and this society is a community. So, I asked for stories. Honestly, I didn't know what to expect.

You caught me out like a deer on the trail.

The essays in these pages are brave and sad and beautiful. They are written by people who have survived trauma, who continue to live with trauma, who help others through trauma and who have unwittingly worsened another person's trauma.

I just want to say thank you to the writers who share their stories here. I hope you, our readers, will pause to read and think, and then join me in honoring their gift to us.

**Comfort Dorn** ([cdorn@asbmb.org](mailto:cdorn@asbmb.org)) is the managing editor of ASBMB Today.



## Sonenberg joins medical hall of fame

**Nahum Sonenberg**, chair in biochemistry at the Goodman Cancer Institute at McGill University in Montreal, is one of six scientists and physicians named this year to



SONENBERG

the Canadian Medical Hall of Fame.

In bestowing this honor, the Canadian Medical Association noted Sonenberg's discovery of eukaryotic initiation factor 4E, known as eIF4E. This protein recognizes the messenger RNA cap structure and helps the ribosome synthesize proteins. Many cancers overexpress eIF4E, which portends its use for diagnosing tumors and developing anticancer drug targets.

Sonenberg has authored more than 800 scientific studies, book chapters and reviews. His work has added to the understanding of viruses, cancer growth and development, memory, brain plasticity, spatial learning and autism spectrum disorders.

Born in a German displaced persons camp to parents who were Jewish Holocaust survivors from Poland, Sonenberg moved as a young boy with his family to Israel. There, he earned his Ph.D. in biochemistry from the Weizmann Institute of Science and went on to postdoctoral studies at the Roche Institute of Molecular Biology before joining the McGill faculty in 1979.

Sonenberg has earned a host of other awards including the 2018 Prix du Quebec, the 2014

Wolf Prize in Medicine, the 2013 McLaughlin Medal of the Royal Society of Canada, the 2011 Lewis Rosenstiel Award and the 2008 Canada Gairdner International Award.

## Hanna–Rose wins faculty mentoring award

**Wendy Hanna–Rose**, a professor of biochemistry and molecular biology at Pennsylvania State University, is one of two faculty members at the Eberly College of Science selected to receive the college's Distinguished Faculty Mentoring Award in 2023.

Hanna–Rose was nominated for her efforts to engage and mentor graduate students and faculty, especially those from marginalized communities, according to a PSU news article. The other award recipient is Runze Li, a professor of statistics.



HANNA–ROSE

With the aim of empowering women to create a better future for themselves, their colleagues, their students and Penn State, Hanna–Rose developed the Changing The Future leadership program. A total of 111 women from University Park colleges and other Penn State campuses have completed the program since it began in 2019 — 24 from Eberly College of Science. Many have gone on to leadership positions in their departments, institutes, centers and colleges.

Hanna–Rose also co-founded Leading for Advocacy and Action for a Diverse Leadership, a network of women faculty at Penn

State who advocate for equity and an improved climate for women and marginalized groups at the university.

In her lab, Hanna–Rose uses the nematode *Caenorhabditis elegans* to study how perturbations in the metabolic network result in physical and behavioral outcomes. Her research focuses on how loss of activity of certain enzymes involved in purine synthesis results in muscle ataxias, behavioral deficits and reproductive dysfunction and how manipulations of pathways for synthesis of the metabolite nicotinamide adenine dinucleotide result in specific sensory and developmental phenotypes.

Hanna–Rose received the 2018 Milton S. Eisenhower Award for Distinguished Teaching from Penn State, the 2014 Excellence in Teaching Award from the National Society of Leadership and Success and the 2007 C.I. Noll Award for Excellence in Teaching from the Eberly College of Science.

## Black appointed to research council

Gov. Ron DeSantis has appointed American Society for Biochemistry and Molecular Biology member **Stephen Black** and three other scientists to the Florida



BLACK

Biomedical Research Advisory Council. The council advises the surgeon general on the James and Esther King Biomedical Research Program, the Bankhead-Coley Cancer Research Program and the Live

## Petsko receives National Medal of Science

**P**resident Joe Biden awarded the National Medal of Science and the National Medal of Technology and Innovation in October to 20 Americans who have made exemplary achievements in science, technology and innovation to strengthen the nation's well-being. Among those awarded the National Medal of Science was **Gregory Petsko**, who has been an American Society for Biochemistry and Molecular Biology member since 1987.

The National Medal of Science is the nation's highest scientific honor. Since 1959, it has been bestowed on "individuals deserving of special recognition for their outstanding contributions in biology, computer sciences, education sciences, engineering, geosciences, mathematical and physical sciences, and social, behavioral, and economic sciences, in service to the nation."

Petsko is a professor of neurology at Brigham & Women's Hospital and Harvard Medical School. In his early career, Petsko's lab was dedicated to understanding enzymes' catalytic activity and structure. He and his colleague Dagmar Ringe made foundational discoveries in structural biology, including obtaining the first time-lapse images of the complete catalytic cycle of cytochrome P450 at an atomic resolution using low-temperature X-ray crystallography.

Since the early 2000s, Petsko's research has focused on finding treatments for neurodegenerative diseases such as Alzheimer's, Parkinson's and amyotrophic lateral sclerosis, or ALS. His team developed a gene therapy for the most common form of ALS. This gene therapy induces overexpression of the nonsense-mediated decay factor UPF1 and reduces neuronal toxicity in human cell culture and rodent models of ALS. In addition, Petsko and his colleague Scott Small have developed therapeutics for Alzheimer's and Parkinson's. All of these therapies will soon be tested in clinical trials.

His many awards include the Siddhu Award and the Martin J. Buerger Award from the American Crystallographic Association, the Pfizer Award in Enzyme Chemistry from the American Chemical Society, the Lynen Medal, the McKnight Endowment for Neuroscience Brain Disorders Award, a Guggenheim fellowship and the Max Planck Prize.

He is a member of the American Association for the Advancement of Science, the National Academy of Sciences, the National Academy of Medicine, the American Academy of Arts and Sciences and the American Philosophical Society. In addition, Petsko is a past president of the ASBMB and also of the International Union of Biochemistry and Molecular Biology.



RYAN K. MORRIS AND THE NATIONAL SCIENCE AND TECHNOLOGY MEDALS FOUNDATION

Gregory Petsko receives the National Medal of Science from President Joe Biden during a ceremony on Oct. 24.

Like Bella Pediatric Cancer Research Initiative. Black's duties will include discussing program priorities and goals as well as evaluating program initiatives.

Black is the associate dean for research at the Herbert Wertheim College of Medicine and the director of the Center for Translational Science at Florida International University. His research takes a translational and integrative approach to investigating the role of oxidative and nitrosative stress in the development of pulmonary hypertension, lung injury and stroke.

Over the past 20 years, Black has been awarded \$50 million in funding from the National Institutes of Health, the American Heart Association, the March of Dimes Foundation and the Leducq Foundation. He is funded by multiple NIH grants, including two P01 awards focused on ventilator-mediated lung injury and pulmonary vascular disease.

## Catterall wins lifetime achievement award

The International Union of Basic and Clinical Pharmacology honored **William Catterall** with its Lifetime Achievement Award in July at the



CATTERALL

World Congress of Pharmacology in Glasgow, Scotland. This award is given to an individual who has contributed significant and sustained work that advances and extends knowledge in pharmacology as well as the advancement of the union.

Catterall is a professor and the emeritus chair of pharmacology at the University of Washington. His lab focuses on the structural basis for

electrical signaling at the atomic level and diseases caused by the failure of electrical signaling.

He discovered the voltage-gated sodium and calcium channel proteins, which initiate electrical and chemical signaling in nerve and muscle cells. His recent work has led to a new understanding of inherited forms of periodic paralysis, epilepsy and autism that are caused by mutations in sodium and calcium channel genes.

Catterall has been a member of the American Society for Biochemistry and Molecular Biology since 1977. He served on the ASBMB Council from 1994 to 1997. He is a member of the National Academy of Sciences, National Academy of Medicine, Academia Europaea and the Royal Society. He has won many awards, including the Bristol–Myers Squibb Award for Distinguished Achievement in Neuroscience Research, the Gairdner International Award of Canada, the K.S. Cole Award of the Biophysical Society and the Robert Ruffolo Lifetime Achievement Award of the American Society for Pharmacology and Experimental Therapeutics.

## Lunenfeld–Tanenbaum names Gingras director

American Society for Biochemistry and Molecular Biology member **Anne-Claude Gingras** has been appointed the director of the Lunenfeld–Tanenbaum Research Institute as well as vice president of research.

Gingras is a senior investigator at the institute and a professor of molecular genetics at the University of Toronto. Her lab has expertise in mass spectrometry–based proteomics and develops tools to better understand how proteins associate with one another to perform their functions. Gingras recently implemented inno-

vative strategies for the interpretation of proximity-dependent biotinylation data that can reveal the organization of membraneless organelles inside cells.

Gingras has been a member of the ASBMB since 2009. She served as a deputy editor of the ASBMB journal *Molecular & Cellular Proteomics* from 2016 until this past August.

She has received many awards, including the Human Proteome Or-



GINGRAS

ganization Discovery in Proteomics Science Award, the MCP Lecture-ship Award, the Canadian National Proteomics Network–Tony Pawson Proteomics Award and the Charles W. Gowdey Distinguished Lecture Award. Gingras is a fellow of the Royal Society of Canada.

Gary Newton, president and CEO of Sinai Health, of which LTRI is a part, said, "Dr. Gingras' remarkable leadership transformed her research program at LTRI during the (COVID-19) pandemic, and under her stewardship, we will build on Sinai Health's excellent reputation of research and innovation both in the lab and at the bedside."

## Osheroff wins mentoring award

The Asia Pacific Medical Education Conference in May awarded American Society for Biochemistry and Molecular Biology member **Neil Osheroff** the Mentoring, Innovation and Leadership in Educational Scholarship Award.



OSHEROFF

## MEMBER UPDATE

The award was established in 2006 and recognizes international and local scholars of distinction in medical and health professions education. Osheroff accepted the award at the conference before his delivery of the keynote address.

Osheroff is a professor of biochemistry and medicine at Vanderbilt University. His lab is focused on

defining the function and biology of eukaryotic and prokaryotic type II topoisomerases. Ongoing studies examine the mechanism, active sites and structures of these enzymes as well as their interactions with anticancer and antibacterial drugs.

He is a fellow of the American Association for the Advancement of Science and a founding member of

Vanderbilt's Academy for Excellence in Education, which he directed from 2016 to 2020. He has been a medical student course director since 1990 and helped to redesign the school's curriculum in 2013. Outside of Vanderbilt, he is a member of the International Association of Medical Science Educators and currently serves as the immediate past president.

## IN MEMORIAM

### Akira and Hideko Kaji

Akira and Hideko Katayama Kaji, a husband-and-wife research team that helped decipher the genetic code, died just months apart earlier this year. They had been members of the American Society for Biochemistry and Molecular Biology for decades.

Hideko Katayama Kaji, a longtime professor of pharmacology at Thomas Jefferson University and an ASBMB member since 1968, died on Jan. 18. She was 91.

Akira Kaji, a longtime professor of microbiology at the University of Pennsylvania and a member of the ASBMB since 1966, died May 13. He was 93.

Working together, Akira and Hideko Kaji discovered that transfer RNA binds to ribosomes in the presence of messenger RNA to help facilitate translation — a key to Marshall Nirenberg winning a Nobel Prize in 1968 for “the genetic code and its function in protein synthesis.” In his Nobel speech, Nirenberg said the Kajis' findings provided the “clue to the solution” of how base composition within codons specifies each amino acid.

Akira Kaji was born on Jan. 13, 1930, in Tokyo. He earned a bachelor's degree at the University of Tokyo in 1953, then received a Fulbright Scholarship and earned his Ph.D. at the McCollum Pratt Institute of Johns Hopkins University in 1958. In 1963, he joined the faculty of what became the Perelman School of Medicine at UPenn. The next year, he became an associate professor, and in 1973, he became a full professor.

In the early days of molecular biology, Akira Kaji studied protein synthesis and earned a Guggenheim fellowship to support this work. He discovered that dedicated machinery was required to terminate translation and recycle ribosomes from mRNA and contributed to studies of tRNA binding to translation complexes and the functional outcomes. He obtained the first patent for the use of an antisense oligonucleotide for the control of Herpes virus pathological effects.

Hideko Kaji was also born in Tokyo, on Jan. 1, 1932. She earned a bachelor's degree at the Tokyo College of Pharmacy in 1954, a master's from the University of Nebraska in 1956 and a Ph.D. from Purdue University in 1958. She was a postdoc at Johns Hopkins School of Medicine and the Oak Ridge National Laboratory and later held positions at Vanderbilt University and the Institute for Cancer Research in Philadelphia, which later became the Fox Chase Cancer Center, before joining the faculty of Jefferson Medical College in 1976. She became a full professor of biochemistry and molecular pharmacology in 1983 and remained on the faculty for 45 years.

Hideko Kaji discovered specific tRNA binding to mRNA-ribosome complexes, N-terminal protein modification by arginine and ribosome recycling in eukaryotes, the last step of protein synthesis.

The Kajis both enjoyed swimming and snorkeling. Akira Kaji was an ice hockey player in his youth and later took up ice dancing.

They are survived by two sons, Kenneth Kaji and Eugene Kaji, and two daughters, Naomi Shodhan and Amy Kaji.







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# Summer science

2023 Undergraduate Research Award recipients tell us what they learned from their research projects on tuberculosis, cancer and more

*By Hailey Reiss*

**T**he American Society for Biochemistry and Molecular Biology Undergraduate Research Award grants \$1,000 to support each awardee's summer research project. This is one of several award and scholarship programs exclusively available to undergraduate students in the ASBMB Student Chapters program.

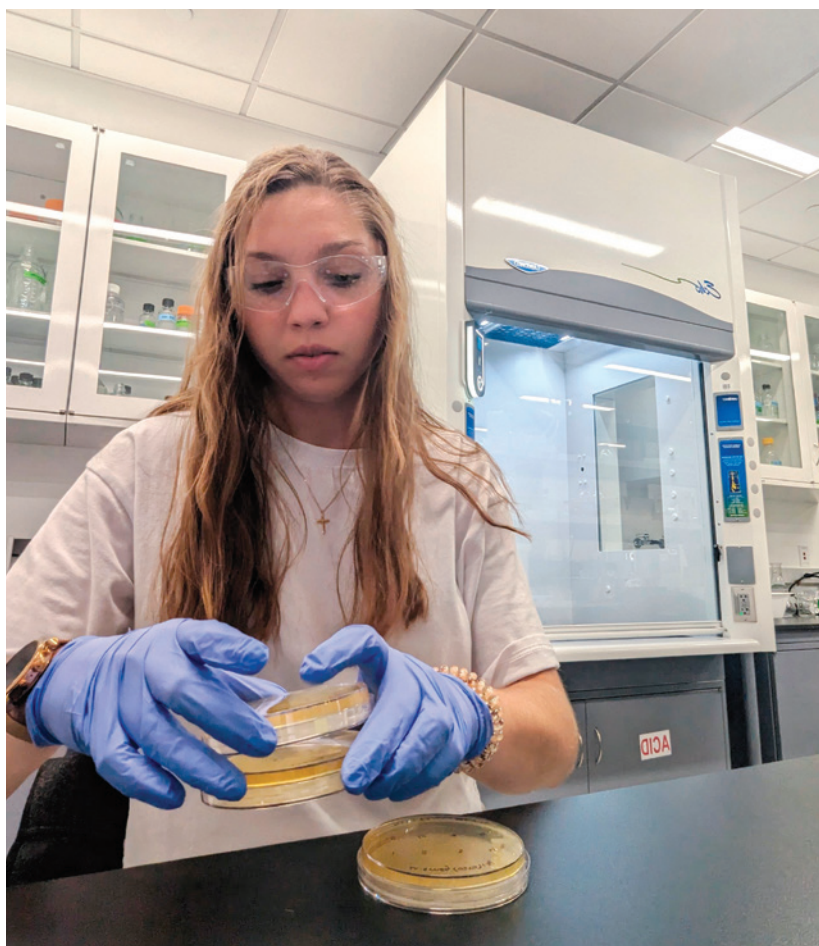
The deadline for the 2024 award is March 1. To apply, applicants submit a proposal outlining a research project, with specific goals, experimental details and methods, to be done in an ASBMB member's lab.

In 2023, a dozen undergraduates at colleges and universities around the country received these awards. Read on to learn a bit about them and their summer research results.

### **Allie Goss, Butler University**

I have been working to identify enzymes that are involved in metabolic processes essential for the persistence of, or reactivation from, latent tuberculosis infections. Latent TB, an infection that occurs when *Mycobacterium tuberculosis*, Mtb, enters a dormant growth state within a host, is incredibly difficult to recognize, diagnose and treat. Latent Mtb is generally drug-resistant and can evade the immune response.

By studying the enzymes involved both in persistence and in reactivation, this project aimed to pinpoint specific enzymes as future therapeutic targets for TB. This past summer, I was able to expand this research project to include mycobacterial gene knockdown



**Allie Goss conducted research in R. Jeremy Johnson's lab at Butler University to identify specific enzymes involved in metabolic processes that are essential for the persistence or reactivation of latent tuberculosis infections.**

using CRISPR interference.

Undergraduate research has given me confidence both in lab skills and as a scientist. I have learned to collaborate with other students, manage my time, plan a research project, write proposals and present at scientific meetings. I was also lucky to work in a lab with eight other undergraduate biochemistry students this summer. I loved being

able to surround myself with others passionate about similar topics.

I am in the process of applying to graduate schools where I hope to obtain a Ph.D. in biochemistry or molecular biology. I plan to continue conducting biomedical research in my future career and, one day, would love to be a professor where I can mentor undergraduate students in the field!

### Federica Bertolotti, Lake Forest College

My work in Shubhik DebBurman's lab consisted of gaining insight into synucleinopathies by studying the potential toxicity of the proteins  $\beta$ - and  $\gamma$ -Synuclein. Using our budding yeast model, I evaluated what drives the toxicity of  $\beta$ -synuclein mutants by evaluating if it's the loss of the original amino acid (V70, P123) or the gain of the mutant (70M, 123H), as well as introducing  $\alpha$ -synuclein mutation into  $\beta$ - and  $\gamma$ -Synuclein, and vice versa.

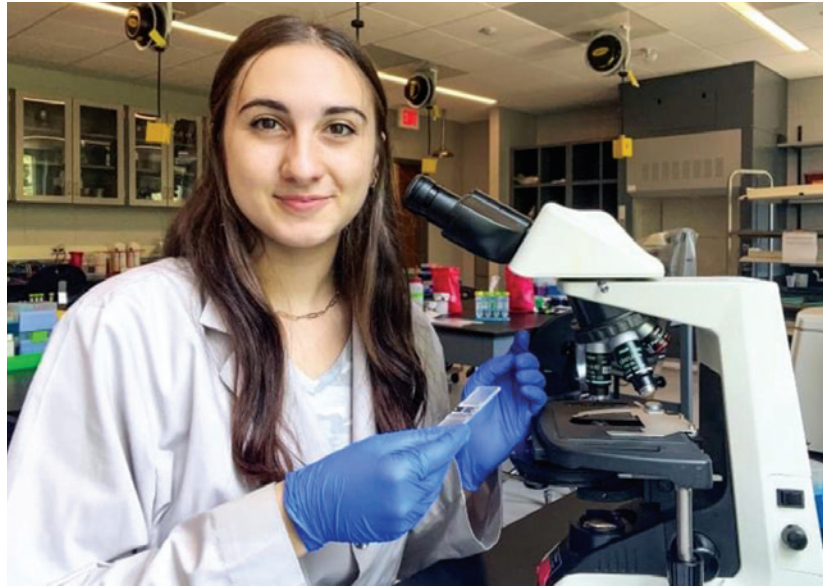
My research has reinforced the love I feel for science. I was able to grow both personally and professionally by combining my educational leadership experience with my passion for research. I had the opportunity to mentor three new members to the lab, which taught me the importance of patience and teamwork. The most remarkable achievement this summer was being able to mentor and share my project with these young members.

My goal is to pursue a Ph.D. in biochemistry and molecular biology. I'm interested in studying the neuronal mechanisms of toxicity of neurodegeneration, looking at both genetic and epigenetic contributors.

### Citlaly Hernandez, Montclair State University

Tuberculosis is one of the world's leading infectious diseases. In 2021, 1.6 million people died from tuberculosis around the world. The bacterium that causes tuberculosis is *Mycobacterium tuberculosis*.

One enzyme inside these bacteria is called IGPS, or MtIGPS. When MtIGPS interacts with its substrate, CdRP, it produces MtIGP, which is an intermediate in the production of tryptophan, an essential amino acid for tuberculosis to thrive. We study



Federica Bertolotti conducted research in Shubhik DebBurman's lab at Lake Forest College to study synucleinopathies using a budding yeast model.

MtIGPS to learn and understand how it operates and to potentially predict possible inhibitors that would interfere with the interaction between the MtIGPS and its substrate CdRP. I have studied the mutant MtIGPS enzymes N189D and N189L.

I plan to continue to examine the mutants and several other active site mutations in MtIGPS. I will continue to conduct experiments that will examine steady-state kinetics and pH profiles of the mutated enzyme alongside the natural enzyme. These findings will provide insight into substrate binding and help find inhibitors for MtIGPS.

I enjoyed having the opportunity to establish a stronger sense of community within our lab group. I was also able to refine my techniques used in the lab, which allowed me to be more proficient in experimental procedures and get more accurate results. Most importantly, I gained a more comprehensive understanding of the project's objectives and strengthened my ability to analyze data.

I plan to continue my academic career and pursue a master's in pharmaceutical biochemistry or a Ph.D. in biochemistry.

### Connor Holm, University of South Alabama

The ubiquitous bacterium *Pseudomonas aeruginosa*, or *P. aer*, is the most common cause of ventilator-associated pneumonia in intensive care unit patients. *P. aer* uses a type III secretion system to inject various combinations of exoenzymes, or Exo, U, S, T or Y into pulmonary microvascular endothelial cells, or PM-VECs, that line blood capillary walls and allow respiratory gas exchange. Of these, the presence of ExoY has been noted to block cell death during infection; while ExoS promoted cell death.

We hypothesized that when present, ExoY would counter the apoptotic effects of ExoS by blocking the activation of executioner caspase proteins 3/7. To quantify levels of apoptosis, caspase 3/7 was analyzed via flow cytometry using a fluorescent-labeled

# STUDENT CHAPTERS

inhibitor of caspases probe. The results from our experiments indicated that ExoY inhibits ExoS mediated caspase 3/7 activation in PMVECs within a *P. aer* infection model.

I loved finishing my first experiments and obtaining my first set of results. Although I hypothesized what the levels of caspase activation may have been, I truly did not know until that first experiment. Seeing that my research project clearly and significantly displayed a trend was simultaneously exciting and gratifying.

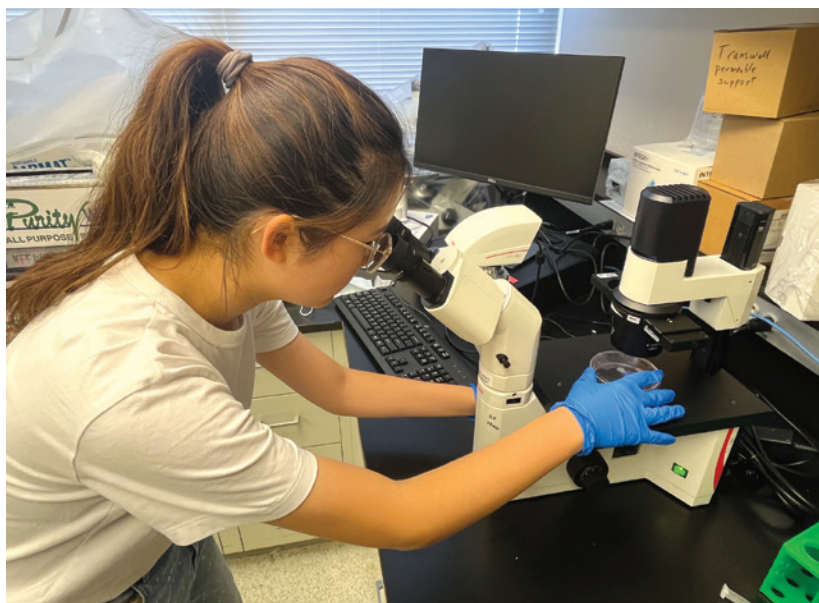
My current goal is to become a physician; I would like to enter a surgical specialty. I enjoy research and am considering pursuing an M.D./Ph.D. so that I can work on both fronts of the rapidly developing medical field.

## **John A. Mullins, Stephen F. Austin State University**

Serum albumin is an abundant, multifunctional protein present in the plasma of many organisms. Bioinformatics analysis of several orthologs of serum albumin, using an online program called STRING, revealed a consistent potential interaction with fetuin-A, another plasma protein that has established roles in type II diabetes and insulin resistance.

A potential physical interaction between the two proteins has been suggested but not yet experimentally investigated. Understanding the dynamics of the interaction between the two plasma proteins could have significant implications for the pathogenesis and treatment of various blood sugar disorders. Data from the experiments clearly indicated that human serum albumin and fetuin-A bound to each other.

The best part of the summer research was learning several new



**Suhjin Lee studied neuronal development and CtBP1 in the lab of Uthayashanker Ezekiel at Saint Louis University.**

biochemical methods, including Western blotting and chemiluminescence. I also enjoyed learning about surface plasmon resonance, which is a powerful tool used for detecting and characterizing protein–protein interactions.

My summer project has helped me gain experience in various areas of scientific research and it is helping me pursue my goal of obtaining a master's degree in biochemistry. I am interested in continuing research in the field of protein chemistry and proteomics.

## **Suhjin Lee, Saint Louis University**

Our project used isogenic cell lines to manipulate experiments that we had done in the past using Induced pluripotent stem cells, or iPSCs. The main project focuses on determining how C-terminal binding protein 1, or CtBP1, affects neuronal development and the Wnt pathway. The Wnt signaling plays a significant role in axon, dendrite and dendritic spine formation.

Our preliminary studies indi-

cated that when neural stem cells are differentiated into neurons, the addition of the Wnt inhibitor, XAV939, prevented neurite formation only in heterozygous mutant cells. These results suggested the CtBP1 allele dysregulates the Wnt pathway and thereby inhibits neuron differentiation.

I loved how I could devote myself to only research during the time I was in the lab. I was able to conduct all experiments that needed to be done in the appropriate time frame, and even after coming back from lab, I gave myself time to read papers and further establish our project.

I am interested in pursuing medicine while conducting research. I love how patient treatment can be directly translated to research. As my current research focuses on neuronal development, I would like to choose a specialty or research topic related to that field.

## **Phyllis Schram, Wesleyan University**

In the Alison O'Neil lab, I investigated the effects of the N53D

deamidation mimic on the structural properties and folding characteristics of superoxide dismutase 1, or SOD1. The interest in this specific protein is born out of its well-characterized relationship with amyotrophic lateral sclerosis, or ALS, a neurodegenerative disease that causes the progressive loss of motor functioning and death.

I learned three key findings from work I completed this summer: the N53D mimic causes SOD1 to display decreased thermostability, decreased instances of homodimerization and an increased propensity for aggregation.

Obtaining meaningful results was by far the most gratifying part of my summer research experience. Beginning to piece together the behavioral profile of this never-before-characterized mutated protein made my adult self as giddy as my child self was to discover that if a bubble is poked, it pops. The wonder of scientific discovery truly is timeless and to watch pieces of data align with each other to form the foundation of a connection between the pathophysiology of an incurable disease and one novel protein is thrilling.

I am very passionate about pursuing a career in health care, and I would ultimately like to end up obtaining an M.D. and working in rural settings, where I can hopefully serve as a provider of specialty medicine to those with traditionally little access.

### Tai Lon Tan, Wesleyan University

The mismatch repair (MMR) pathway is crucial in preserving the stability of the genome. Mutations in proteins involved in the MMR pathway are associated with cancer and reduced lifespans.

The Msh2–Msh6 heterodimer

is a postreplicative mismatch repair protein that recognizes and corrects DNA mismatches by functioning as a sliding clamp. Through the use of photocrosslinking methods, my project seeks to elucidate the orientation with which Msh2–Msh6 binds to DNA Holliday junctions, which are a DNA recombination pathway intermediate as well as the key residues involved in this interaction.

We have successfully crosslinked Msh2–Msh6 to different positions on the Holliday junction and continually improved the photocrosslinking protocol to obtain a higher yield of protein–DNA product. We have also expressed and purified various Msh2–Msh6 mutants that allow us to gain further insight into how different residues affect the protein–DNA binding interaction.

My research experience has taught me the importance of being adaptable and to troubleshoot and refine my approach when encountering problems that arise during research. The best part of this experience was getting to truly bond with my fellow lab mates and catching a glimpse of life as a Ph.D. student.

After graduating from Wesleyan University, I aim to pursue further training by completing graduate school and later becoming an academic postdoc.

### Grace Bennett, Georgia Southern University–Armstrong Campus

The majority of cancer deaths are related to metastasis. My project is broadly related to the identification of molecules that can be developed as drugs that specifically target cancer metastasis.

I was involved in studying how molecules bind to and inhibit a protein called PRL3, which has been shown to be involved in several biological pathways and cellular

### Apply for the Undergraduate Research Award

Applicants must be current ASBMB Student Chapter members completing a summer project in the lab of an ASBMB member. The 2024 deadline is March 1.

Learn more and apply here:  
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processes that are involved in metastasis. It is important to figure out exactly how a protein interacts with a potential drug so that we have information on how to further improve the molecule before developing it as a therapeutic.

The best part of my summer research experience was learning new techniques, especially those that are not covered in my classes. It is also very exciting when I get positive results!

I am still considering my career options. I am very passionate about women's health and would really love to go into an area that can allow me to study infertility. But my research in drug discovery and structural biology is also very interesting, and I am strongly considering continuing this kind of research.

### More recipients

Other 2023 Undergraduate Research Award recipients include Aidan Lynch, Rochester Institute of Technology; Isabella Holt, University of Tampa; and Raegan Wood, Utah Tech University.

**Hailey Reiss** ([hreiss@asbmb.org](mailto:hreiss@asbmb.org)) is the ASBMB's undergraduate education coordinator. She holds a B.S. with honors in immunology and infectious disease from Pennsylvania State University's Schreyer Honors College.



# A jellyfish model to study optogenetics

By *Adenike Shittu*

**B**ox jellyfish, an ancient invertebrate species, have evolved separately from vertebrate animals for over 500 million years. Unlike other jellyfish species, box jellyfish have well-developed eyes similar to those of vertebrates. These eyes have a light-sensitive protein receptor called rhodopsin that enables them to process visual cues such as twilight and color perception, which are essential for their survival.

Shino Inukai, Kota Katayama, Hideki Kandori and colleagues at the Nagoya Institute of Technology in Japan have found that the rhodopsin in jellyfish is similar to that in vertebrates. In a recent article published in the **Journal of Biological Chemistry**, they describe the structural similarities, photoreaction activity and highly developed visual function of rhodopsin in box jellyfish and vertebrates.

Box jellyfish have the only animal rhodopsin known to activate G<sub>s</sub> protein. G proteins are guanine nucleotide-binding proteins. They can transmit signals from receptors on the cell surface to the inside of the cell, where they regulate a wide range of cellular functions and processes. These include maintenance of cellular homeostasis, response to external stimuli, neurotransmission and sensory perception.

Box jellyfish's rhodopsin, or JelRh, is the only animal rhodopsin that researchers have shown to transduce the G protein signaling pathways. Because jellyfish rhodopsin can control the G



proteins' signaling pathway with light, it is a promising new optogenetics tool.

The authors used JelRh to study how G proteins regulate cyclic adenosine monophosphate induction, or cAMP, which is widely associated with biological processes such as circadian rhythms, cardiac function and behavioral control. In the words of the authors, "the development of jellyfish rhodopsin can be used as a tool to elucidate the molecular mechanisms of diseases caused by abnormal signal transduction through G<sub>s</sub> protein," which include nephrogenic diabetes insipidus and obesity.

While this study shows promising findings, the authors acknowledge certain limitations in this model. The authors' discovery of JelRh's distinctive hydrogen bonding network surrounding the retinal chromophore hints at intermediate structural variance in rhodopsin in other invertebrates and vertebrates.

Researchers have not yet characterized other essential defining factors of JelRh. Therefore, as a future work,

the authors propose to conduct site-directed mutation measurements to determine the key residues, in GPCR activation. Future structural studies will focus on the photoreaction of the active state to explore how JelRh triggers G<sub>s</sub> protein-mediated phototransduction cascade. Specifically, the spectroscopy-based structural study of photoreaction dynamics of G<sub>s</sub>-coupled animal rhodopsin will provide insights into the activation mechanism of G protein-coupled receptors.

Looking forward, the team proposes to clarify the light activation and signal transduction mechanisms of JelRh, the only animal rhodopsin that has been shown to transduce G<sub>s</sub> signal. Specifically, the aim is to decipher the molecular intricacies underlying the activation of G<sub>s</sub> protein.

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**Adenike Shittu** (shittuar@mail.uc.edu) is a biomedical research scientist who is passionate about science communication and an ASBMB Today contributing writer.



# Patients lose weight in trials of schizophrenia drug

By Oluwadamilola “Dami” Oke

There remains a significant need for new therapeutic options for the treatment of patients with, often debilitating, psychiatric disorders. Current therapies are frequently associated with side effects, including unexplained weight gain in about one-third of patients. Breakthroughs in brain research and the discovery of potential novel drug targets are leading to the development of a new generation of candidate therapies that are providing early signs of hope for these patients.

Hence, when Michal Tomaszewski, an associate principal scientist at Merck & Co., and his team learned from their colleagues that patients treated with an investigational antipsychotic medicine lost weight in a Phase 2a clinical trial, they knew they needed to better understand the mechanism of weight decline.

In their recent paper published in the **Journal of Lipid Research**, the researchers record the results of their investigation, which showed the antipsychotic drug, a phosphodiesterase-10A, or PDE10A, inhibitor, significantly reduced the amount of stored fat in both white and brown adipose tissue in mice.

“Studying this transition lets us better understand the effect of the PDE10A inhibitor treatment on metabolism,” Tomaszewski said.

When white adipose tissue exhibits increased vasculature and

metabolism, it is an indicator of its conversion into brown adipose tissue, or BAT. BAT cells burn up fat as heat energy, and increasing levels of these cells are often accompanied by weight loss. The researchers observed an increase in blood vessels and blood flow in white adipose tissue compared to a control.

“Specifically, the white adipose tissue showed enhanced blood vessel growth and increased consumption of fat for energy,” Tomaszewski said. “These changes were consistent with a transition to brown adipose tissue, which is known to be important in how we store and use energy, and therefore how we gain and lose weight.”

To see these effects, the researchers used magnetic resonance imaging in a novel way that helped them characterize the physiological changes in adipose tissue in response to the PDE10A inhibitor. They observed the transition of white adipose tissue into brown adipose tissue, which has higher energy metabolism. This explained the weight loss seen in PDE10A inhibitor-treated mice.

“This magnetic resonance imaging application provided detailed insights into metabolism and physiology not available using most other methods,” Tomaszewski said. “This technique may, in the future, be applied more broadly to evaluate the response of adipose tissue to additional experimental drug



candidates.”

Tomaszewski believes this work resulted in multiple benefits. “Although imaging of mice in vivo was the focus of the study and made it possible to visualize the changing nature of the adipose tissue,” he said, “we were also able to perform comprehensive validation using genetic and protein analysis, which all aligned to reinforce our conclusions.”

Tomaszewski said he is optimistic that the magnetic resonance imaging methods used in this work “can be scaled to evaluate similar metabolic changes in people.”

DOI: 10.1016/j.jlr.2023.100408

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# A tiny genetic tweak with big heart health implications

By Nipuna Weerasinghe

**H**eat disease remains a leading cause of death globally. A gene mutation found among members of the Amish community could pave the way for new treatments, a research team recently reported.

The scientists delved into plasma's depths to understand how a specific mutation of a gene involved in post-translational modification of proteins via covalently adding carbohydrates, a process known as glycosylation, can affect our plasma proteome, lipid levels and potentially heart health.

In a study recently published in the journal **Molecular & Cellular Proteomics**, Yunlong Zhao and a team of scientists from Regeneron Pharmaceuticals in New York and the University of Maryland focused on the B4GALT1 gene. This gene directs the synthesis of the enzyme beta-1,4-galactosyltransferase 1, or B4GALT1. This enzyme catalyzes the addition of β-galactose sugar to core N-glycan structures during stepwise protein glycosylation in the Golgi apparatus.

Specifically, the researchers were interested in a naturally occurring mutation of B4GALT1 called N352S. This variant is exceedingly rare in the general population (fewer than one in 10,000 people have it), but it is found in about 12% of individuals in the Lancaster County, Pennsylvania, Amish community. The N352S mutation correlates with lower cardiovascular disease levels. The research team aims to understand how this variant alters B4GALT1 activity and how this

affects levels of plasma glycoproteome and lipids, such as low-density lipoprotein cholesterol, which plays a role in atherosclerosis.

The team used plasma for a couple of reasons. "Plasma is an ideal starting point for our research. It can be directly drawn from individuals with this naturally occurring mutation and readily linked to other clinical indices," Zhao said. "But it's not just about convenience. Plasma contains proteins that regulate circulating lipid levels, making it relevant for their study."

The team used tandem mass tag, or TMT, labeling proteomic and glycoproteomic approaches to look at proteins and their glycosylation patterns in plasma samples. They found that the N352S mutation primarily influences glycosylation patterns of plasma proteins without significantly altering the expression levels of most identified proteins, except the ones involved in the coagulation and immune response pathways.

"We are still in the process of fully understanding how the initial action leads to the final outcome," Zhao said.

So, what does this mean for human health? The study highlights the potential of targeting glycosylation for treating heart diseases by regulating circulating lipid levels.

"While our findings are promising," Zhao said, "it's still too early to state that B4GALT1 could serve as a potential drug target, or that manipu-



lating glycosylation could be a valid approach to treating atherosclerosis and cardiovascular disease."

Zhao continued: "Currently, we are advancing our research through further validation studies using animal models and large-scale clinical sample analysis, aiming to confirm our initial findings and elucidate the underlying mechanisms, in collaboration with our partners. Our ultimate goal is to translate these findings into therapeutic value, but more research is needed before we can reach that point."

DOI: 10.1016/j.mcpro.2023.100595

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## From the journals

By Farah Aziz Annesha, Ken Farabaugh & Swarnali Roy

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

### Screening for drugs to treat heart disease

Heart disease is one of the leading causes of death globally. Cardiomyopathies — including those that lead to enlarged chambers of the heart, hypercontractility, hypocontractility

or arrhythmias — can lead to progressive heart failure and even sudden cardiac death.

One of the primary causes of these diseases is a mutation of one of several proteins, including actin, myosin or the actin- and myosin-binding protein cMyBP-C that modulates heart muscle contraction and relaxation.

Although several drugs recently have been developed to target myosin to promote improved cardiac function in a subset of cardiac disease patients, identifying small molecules that can

affect the interaction of cMyBP-C with actin and/or myosin is an additional promising approach for the treatment of cardiomyopathy.

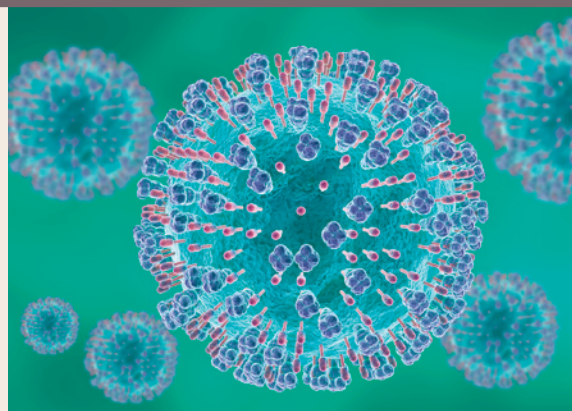
In their new study published in the **Journal of Biological Chemistry**, Thomas Bunch, Piyali Guhathakurta and colleagues at the Universities of Arizona and Minnesota, Minneapolis, used two complementary high-throughput screens to not only identify Food and Drug Administration-approved compounds that could bind directly

### M binds PS in RSV infection

Respiratory syncytial virus, or RSV, primarily affects infants and the elderly. Despite recently developed vaccines for adults and a monoclonal antibody treatment for infants, the burden of RSV infection remains a major unmet target for widespread and affordable antiviral therapy.

Similar to other viruses, RSV loads genomic RNA into filamentous particles and inserts them into the host cell membrane, and when the membrane is recycled by the cell the viral RNA and proteins are released. Viral matrix, or M, protein dimers are crucial for filament assembly, as are other minimal components known as P and FCT, but scientists don't yet know how these dimers or other viral glycoproteins specifically interact with the host membrane.

In a recent article in the **Journal of Biological Chemistry**, Jitendriya Swain and colleagues at the Institute of Research in Infectiology of Montpellier and University Paris–Saclay describe that the interaction between viral M protein dimers and lipid rafts in the host cell membrane is mediated by the negatively charged phospholipid phosphatidylserine, or PS. Using liposome sedimentation assays, they demonstrate that M alone could promote clustering of PS lipids, while other negatively charged lipids, such as phosphoinositol phosphates



KOMORI ET AL. MOP

The respiratory syncytial virus causes infections of the respiratory tract and lungs in newborns and young children.

and viral glycoproteins like FCT, were unnecessary for this binding. In fact, they found that FCT may actually block M binding to PS, leading to the hypothesis that M binding to PS occurs first, and FCT interaction with M likely occurs after this initial membrane-binding event.

These findings suggest that the RSV M protein dimers selectively bind PS lipids and induce PS clustering in the host membrane. As this clustering is also observed in other enveloped viruses that bud from the plasma membrane, it is possible that the M–PS interaction is a common feature of these viruses and could represent a druggable target to prevent viral infection.

DOI: 10.1016/j.jbc.2023.105323

— Ken Farabaugh

to cMyBP-C but also identify those compounds that modulated cMyBP-C function. They identified two compounds that preferentially bound unphosphorylated cMyBP-C (erythromycin estolate and erlotinib), suggesting they are worthy of further study.

These results indicate that several drugs already approved for use in humans could affect heart muscle regulation, although further optimization may be necessary to achieve sufficient dosing efficacy. The screening assays developed by the team could also be used to identify specific compounds that target cMyBP-C from a broader library. DOI: 10.1016/j.jbc.2023.105369

## New targets for a ubiquitination enzyme

Ubiquitination regulates various processes in cells, such as protein homeostasis and the removal of unwanted proteins. A trio of enzymes carries out this posttranslational modification: ubiquitin activating enzymes, or E1; ubiquitin-conjugating enzymes, or E2; and ubiquitin ligases, or E3. These enzymes attach a protein called ubiquitin to a target protein, labeling it for consequences such as protein degradation, change in protein activity or cellular localization. Dysregulation of ubiquitin-enzyme machinery is seen in many diseases including cancer.

Of the trio, the target proteins for E2 have been the most elusive; these enzymes have multiple targets and the enzyme-substrate interactions are transient. Zeliha Yalcin and colleagues at the Netherlands Cancer Institute discovered the protein targets for one particular E2 enzyme, UBE2D3, which has shown promiscuous activity in *in vitro* experiments in test tubes, but

researchers know less about what it does in organisms.

In a recent article in **Molecular & Cellular Proteomics**, the team reports they identified UBE2D3 substrates using a combination of proteomics techniques. They studied the effect of depleting UBE2D3 on the abundance and ubiquitination of proteins in the cell and found that several proteins involved in retinol metabolism or cell adhesion had higher or lower abundance, specifically CRABP1 and TSPAN8. Using a different technique, they also confirmed two protein substrates of UBE2D3 that are involved in regulating ribosome-associated protein quality control.

These results will inform future research on the cellular mechanisms of ubiquitination and cancer. DOI: 10.1016/j.mcpro.2023.100548

## Are smaller fat cells better for your health?

Obesity and obesity-related chronic diseases are major public health concerns. According to the Centers for Disease Control and Prevention, about 42% of adults and 20% of children in the U.S. are obese. Dysfunctional adipose tissue is a hallmark of obesity. The expansion of adipose tissue can be driven either by the increased size of existing adipocytes (hypertrophy) or by the formation of new adipocytes, or adipogenesis, through the differentiation of precursor cells (hyperplasia). Studies have shown that small adipocytes can impede obesity-associated metabolic disorders. Hyperplasia attempts to reduce adipose tissue remodeling, such as macrophage infiltration and chronic inflammation, caused by obesity-associated hypertrophy. Thus, researchers are becoming more

interested in studying adipogenesis for the benefit of metabolic health.

The alpha/beta-hydrolase domain, or ABHD, enzymes, a family of endocannabinoid-degrading enzymes, are important regulators of lipid metabolism and signal transduction. In a recent article published in the **Journal of Lipid Research**, Mary E. Seramur and a team at Wake Forest University explored the function of ABHD4, a lysophospholipase/phospholipase B enzyme in adipose tissue lipid biology. They used a novel Abhd4 knockout, or KO, pre-adipocyte cell model as well as adipocyte-specific and whole-body Abhd4 KO mice for their study.

Throughout nine days of adipocyte differentiation, the researchers observed increased adipogenesis and lipid accumulation in cells lacking ABHD4 by measuring the triacylglycerol, or TAG, mass, lipid droplets that are stored in cellular lipid droplets. They saw no difference in body weight, fat composition and metabolic outcome such as glucose tolerance in adipocyte-specific and whole-body Abhd4 KO mice. They also did not find any difference in bioactive lipids such as oleoylethanolamide that are responsible for lipolysis, a process that breaks down TAG in both kinds of mice.

The researchers are interested in studying the effect of ABHD4 and specific protein kinase interaction in regulating adipogenesis. DOI: 10.1016/j.jlr.2023.100405

## Protein ‘feet’ help DNA form loops

The three-dimensional spatio-temporal organization of DNA into open and closed chromatin and condensed chromosomes is paramount in regulating DNA replication and

repair and gene expression. The structural maintenance of chromosomes is mediated in part by the SMC protein family, including the cohesin protein complex and the cohesin-loading factor NIPBL.

One model of 3D genome organization involves the cohesin–NIPBL complex capturing DNA and extruding it in loops, but technical challenges in studying these dynamic complexes have made it hard to know how protein conformational changes mechanistically facilitate DNA looping.

In a recent paper in the **Journal of Biological Chemistry**, Parminder Kaur and colleagues at North Carolina State University describe how the cohesion–NIPBL complex maneuvers DNA using small protein protrusions. Their high-speed atomic force microscopy imaging in liquids shows that short protruding so-called “feet” from NIPBL and the cohesin complex subunit SA1 help facilitate loading of the cohesin–NIPBL complex onto DNA and DNA loop initiation independent of ATP hydrolysis.

These results show the unique power of HS-AFM in studying dynamic multi-subunit complexes, and specifically shed light on the mechanism, including distinct forward and reverse steps, by which individual subunits of the cohesion–NIPBL complex mediate DNA loop extrusion. Further investigation of this complex could solidify the roles of various protein subunits and domains in this process.

DOI: 10.1016/j.jbc.2023.105296

## Ultrasensitive tools detect extracellular vesicles

Extracellular vesicles, or EVs, are heterogeneous, phospholipid-rich particles secreted by cells that

## A new way to label proteins in the brain

Several methods exist to isolate and study proteins and their interactions; however, studying changes in proteins across different cell types in the brain can be a challenge because most brain cells do not survive the harsh isolation process.

TurboID is a new and efficient biotin ligase that can label proteins in cells within a radius of 10 nanometers. It is nontoxic and fast, generating labeling within 10 minutes instead of the 18 hours required by the biotin ligase BioID. With this powerful tool, researchers can analyze the global proteome within specific cell types in multicellular models, in both homeostatic and diseased states.

TurboID has been applied in proteomic studies of different cell types in animal models, although it is important to determine whether the protein profile captured by the TurboID method is indeed representative of the whole cell in both resting and perturbed states, can differentiate between cell types, and whether TurboID overexpression and biotin labeling of proteins affects cellular processes.

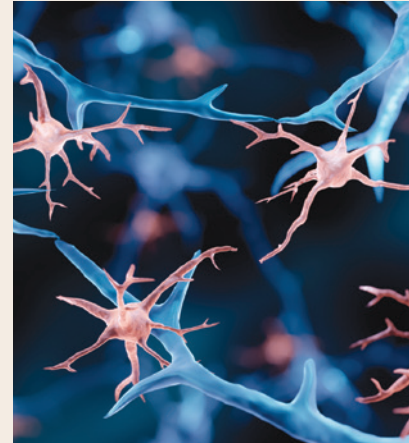
Sydney Sunna and colleagues at Emory University directed TurboID to label proteins in the cytosol of microglial and neuronal cells, using a nuclear export sequence. They hypothesized that TurboID can label enough proteins to distinguish between the cell types and that the labeled proteins include proteins known to respond to an inflammatory stimulus without toxicity.

In **Molecular & Cellular Proteomics**, they report TurboID can label more than 50% of the proteome in each cell type and identify several neuron-enriched and microglial-enriched proteins distinguishing the two cell types. Overexpression of TurboID did not impair metabolic function. This method can also capture changes in microglia in response to inflammation.

Many proteins identified by this method are implicated in neurodegenerative diseases such as Parkinson’s, Alzheimer’s and amyotrophic lateral sclerosis. Moreover, TurboID may be able to investigate the mislocalization of proteins from the nucleus to the cytosol, which is known to occur in these diseases. These in vitro studies lay the groundwork for ongoing and future applications of TurboID to explore responses of different brain cell types in mouse models of diseases involving neurodegeneration and inflammation.

DOI:10.1016/j.mcpro.2023.100546

— Farah Aziz Annesha



ARTUR PLAMCO

Glial cells (red) are immune cells of the central nervous system while neurons (grey) send and receive information between different areas of the brain, as well as between the brain, the spinal cord and the entire body.

carry biomolecules such as proteins, nucleic acids and metabolites. The discovery that EVs facilitate long-distance communication between cells has piqued researchers' interest. Both healthy and diseased cells secrete EVs, and their internal

contents change depending on the disease state. Thus, clinicians can use them to diagnose and monitor diseases including neurodegenerative conditions such as Parkinson's.

However, researchers have difficulty finding appropriate protein

biomarkers to selectively isolate cell-type-specific EVs due to the variety of internal and external proteins and differences in sizes as well as a low abundance of EVs in biofluids such as blood and cerebrospinal fluid.

In a recent article in **Molecular**

## What gene stresses endothelial cells?

Cholesterol homeostasis helps regulate cellular functions in mammals and plays a role in the human body's structure and metabolism. Understanding cholesterol biosynthesis is important in the context of its imperative role in maintaining a healthy lifestyle. Cholesterol biosynthesis determines cholesterol homeostasis and multiple regulatory mechanisms are in charge of controlling this process. Sterol regulatory element-binding protein 2, or SREBP2, is the prime transcriptional regulator of this complex process.

Cholesterol homeostasis and cellular immunity have a close relationship, regulated by SREBP, which researchers have not thoroughly explored in endothelial cells, or ECs. In diseases such as atherosclerosis, levels of SREBP2 and cholesterol in EC increase, making it more important to study their role in the inflammatory process.

In a recent article published in the **Journal of Lipid Research**, Joseph Wayne and researchers from the Yale University School of Medicine and the University of Arizona describe how SREBP2 significantly contributes to the overall EC inflammatory response. They also provide the first report of endogenous SREBP2 chromatin immunoprecipitation sequencing, or ChIP-seq, performed in human cells under inflammatory stress.

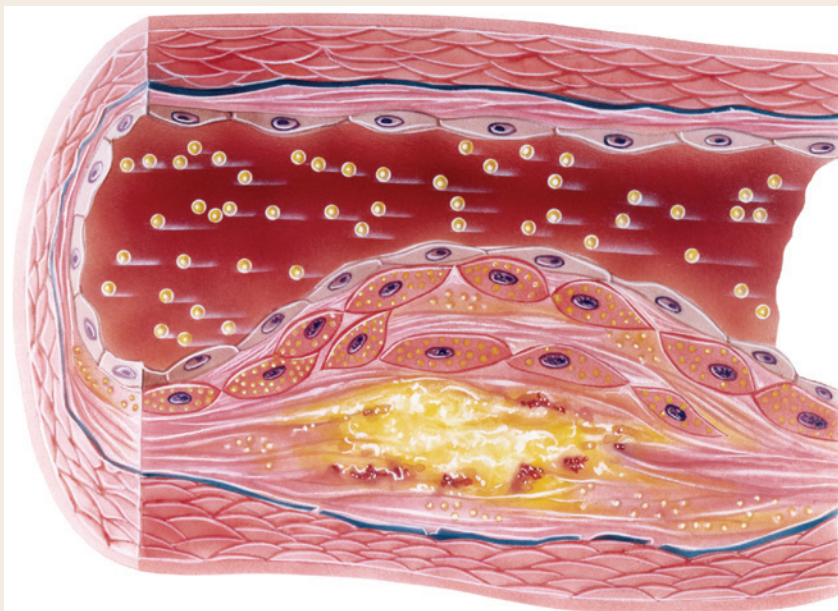
These researchers showed that loss of SREBP2 inhibits chemokines such as IL6, CXCL1 and CXCL8, which are important for recruitment and activation of leukocytes to the site of injury detected by ECs. SREBP2 knockdown did

not affect other classical nuclear factor kappa-light-chain-enhancer of activated B, or NF- $\kappa$ B, genes. This implies that SREBP2 controls a distinct pathway of the EC inflammatory phenotype. They treated the ECs with tumor necrosis factor alpha and performed ChIP-seq, which enabled them to identify two gene targets: class E basic helix-loop-helix protein 40, or BHLHE40, and Krueppel-like factor 6, or KLF6. These two genes are novel targets of SREBP2 binding, and loss of SREBP2 significantly weakened the expression of both. Of the two, KLF6 knockdown more significantly inhibited specific chemokine expression in ECs.

The authors are interested in exploring the role of SREBP2 in diseases such as atherosclerosis by studying the close connection between cholesterol homeostasis and inflammatory phenotypes in ECs.

DOI: 10.1016/j.jlr.2023.100411

—Swarnali Roy



**& Cellular Proteomics**, Adnan Shami-Shah and colleagues at Harvard Medical School report on ultrasensitive protein detection technologies that could help detect rare EVs. These include technologies with high sensitivity such as Luminex, best known for multiplexing 500 analytes that require a sub-microliter volume capable of detecting multiple surface proteins on EVs, and SOMAscan, which can quantitatively analyze 7,000 proteins concurrently with a high femtomolar sensitivity and a wide dynamic range.

Among other existing ultrasensitive technologies, Meso-Scale Discovery has a robust biofluids matrix tolerance with high detection sensitivity and specificity through its capacity to minimize autofluores-

cence background signal. Proximity extension assay can process 3,072 analytes and has high specificity due to a unique oligonucleotide hybridization step. Droplet-based EV analysis has a high sampling efficiency (about 20 million droplets per minute) and a limit of detection of 9 EVs/ $\mu\text{L}$ . Single-molecule array (Simoa for short) produces a localized signal to detect rare EV proteins and can switch from digital to analog reading within the same assay to detect varying abundance of EV subpopulations. Last but not least, molecular on-bead signal amplification for individual counting (MOSAIC for short) can detect rare EV proteins through sub-attomolar sensitivities and an enhanced noise-to-signal ratio.

DOI: 10.1016/j.mcpro.2023.100557

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## Upcoming ASBMB events and deadlines

### JANUARY

- 18 Discover BMB late-breaking abstract deadline
- 24 Lipid Research Division Seminar Series
- 31 Discover BMB early registration deadline

### FEBRUARY

#### Black History Month

- 3 The ASBMB Honor Society application deadline
- 3 Outstanding Chapter Award deadline
- 12 Discover BMB housing deadline

### MARCH

#### Women's History Month

- 1 Undergraduate Research Award deadline
- 1 Student Chapter Outreach Grant spring deadline
- 20 Discover BMB advance registration deadline
- 23–26 Discover BMB 2024 in San Antonio



# Meet Clare Bryant

This JBC associate editor explores fresh terrain — in her laboratory, on her bike and in her English garden

By Paula Amann

Clare Bryant remembers the moment she fell in love with research. As an undergraduate, she secured a summer job with a British Ministry of Defense team conducting biological research she is still not free to discuss. Yet, it was the science — not the secrecy — that electrified Bryant.

“Honestly, it was like somebody switched on a light,” she recalled. “It was just so exciting to be trying to work something out, something unknown.”

Bryant went on to finish her bachelor’s degree in biochemistry and physiology at the University of Southampton. Her father, a doctor, had encouraged her interest in medicine, but she opted to pursue veterinary studies at the University of London, where she also earned a doctorate.

She completed her postdoctoral studies with John Vane, a pharmacologist and Nobel laureate, pursuing a Wellcome fellowship based jointly at his William Harvey Research Institute at St. Bartholomew’s Hospital Medical College and at the Royal Veterinary

College, both in London.

Since 2013, Bryant has been a professor of innate immunity at the University of Cambridge in the United Kingdom, where she works with the departments of medicine and veterinary medicine. Her research collaborations are interdisciplinary and global, uniting scientists from Europe, Singapore, Australia and the United States in fields such as biology (immunology, structural biology, genetics, molecular biology and pharmacology), physics, mathematics and chemistry.

Bryant spoke with ASBMB Today about her research career and role as an associate editor at the Journal of Biological Chemistry. The interview has been edited for clarity and length.

## What sparked your interest in veterinary science and immunology?

**Bryant:** I live a kind of quasi-life as a scientist and vet. People in science don’t know I’m a vet, and vets don’t know I’m a scientist. I don’t really mind that: I feel blessed to be recognized in two fields as a very capable individual.

I decided to pursue a veterinary degree because it was what I had always wanted to do. Once I got into clinical work, though, I realized I couldn’t answer questions in sufficient detail to give me job satisfaction. So I pursued research.

I think my career would have been more straightforward if I had been a physician. To get funding to do medical research as a physician is without a doubt easier than it is to get it as a vet. Yet, I think my career would have

Outside of the laboratory, Clare Bryant enjoys cycling, running, gardening and theater.

COURTESY OF CLARE BRYANT



not been as diverse and interesting. By a really interesting series of happy accidents, I feel I've been lucky. I'm driven and very hardworking, but I do feel like I've had some good breaks along the way.

What I realized over my career is that I want answers. That's been what the whole of my career has focused on: asking what I consider to be interesting scientific questions and trying to find answers. I've meandered around, and my research was initially in pharmacology. But then I started to work on innate immune receptors. Pharmacology doesn't really do that, so I became rebranded as an innate immunologist. I consider myself a receptor biologist.

I'm really interested in fundamental mechanisms, in innate immunity — and in translating that into the clinic. I do a lot of work with industry for humans and human medicines, predominantly, but some animal medicines, too. I still do a little bit of clinical work.

### Tell me about your postdoc with Nobel laureate John Vane.

**Bryant:** He was amazing, the brightest person I've ever met. It was a fantastic education working in his institute. I learned so much about really smart people and about standards of professional behavior and scientific integrity.

I am obsessed with making sure my science is true. That means controls, careful experimental design and checking and cross-checking things. I'm very thorough, and sometimes that means I'm a bit slow to publish because I'm most concerned with making sure that our papers are scientifically solid. I am reluctant to rush things out to tell a good story unless I am sure the data is robust. This was a lesson I learned from John Vane, who

would always spot any tiny holes in my work and would send me back to the lab to do more experiments!

There was breathtakingly exciting science in his lab. We were studying cyclo-oxygenase. A novel form of it was discovered that was really important for inflammation. This then triggered a whole new program of pharmaceutical work on discovering new anti-inflammatory drugs. But, unfortunately, one of the new drugs wasn't just anti-inflammatory: It also predisposed older people to having heart attacks.

The moral of the story, at least for me, is that biology is rarely simple. It shows the importance of fundamental science to drug discovery but also to drug safety. In other words, when you discover a drug, that's not where it stops. This illustrates why you have to continue to work on the biology.

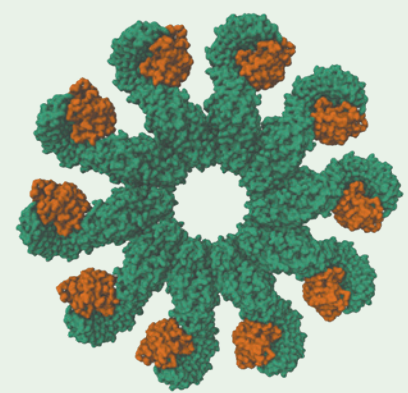
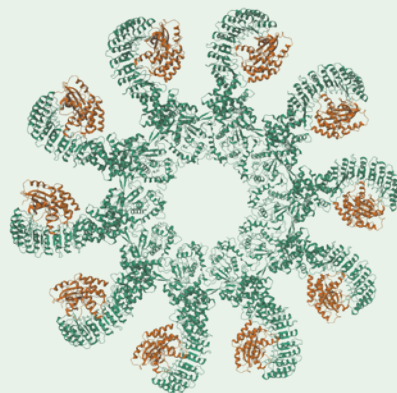
### What is it like doing research at Cambridge?

**Bryant:** I do a lot of collaborative work in Cambridge and internationally. In fact, I don't understand how anybody can do science without collaboration. For me, a lot of my research is with people in the physical sciences. The reason for that is, when I have a question to ask, there are various techniques we can use to answer the question. By working with people



Clare Bryant is a professor of innate immunity at the University of Cambridge. Bryant is involved with the Cambridge Science Festival, an annual event celebrating science, technology, engineering, art and math through workshops, tours, debates and more.

Clare Bryant studies how bacteria are detected by the host via pattern recognition receptors. One of these is the NLRP3 inflammasome, which is a multiprotein complex that plays a pivotal role in regulating the innate immune system and inflammatory signaling.



**“There are such big differences in the innate immune system between birds, different species of mammals and humans. This presents new ways of understanding and preventing zoonotic infections but also treating them.”**

— CLARE BRYANT

in the physical sciences, I am not limited to standard experimental approaches. We can create the solutions; we can create new techniques to answer questions, and that is really exciting.

Plus, I have the benefit of working with fantastic people in immunology, infectious diseases and clinical medicine. In my opinion, that's what makes Cambridge a great place to work.

### What are you working on right now?

**Bryant:** One of my projects is focused on understanding inflammasomes and cell death complexes — how they're structured and how they function. There's a second facet to the project, which I find super interesting as well — how they've changed through evolution in animals and the impacts of that on zoonotic infections. It's the pathogens that don't cause much disease in animals but do cause problems in people that I'm interested in. I've been doing this kind of research for years, but it's just gotten fashionable since the COVID-19 pandemic.

There are such big differences in the innate immune system between birds, different species of mammals and humans. This presents new ways of understanding and preventing zoonotic infections but also treating them.

### What is it like now being part of the JBC editorial team? What do you look for in a paper?

**Bryant:** When I was doing a postdoc in John Vane's lab, JBC was considered the best biochemical journal to publish in. I was super excited to get my first paper into JBC. It has stayed with me as the top biochemical journal, the pinnacle of bio-

chemistry, so I was very excited to be asked to be an associate editor.

A paper I'm reviewing must have an adequate number of repeats. Doing an experiment once is not enough. That's one thing that concerns me, because, in the rush to publish, the temptation is not to do enough experimental repeats, just to generate a good story, so your paper gets out as quickly as possible. I am even more concerned about problems like image manipulation, manufactured data and other types of fraud as I am not sure I will easily spot them and I am unsure of whether ChatGPT is going to be an issue or a benefit!

### How do you explain your research to the public?

**Bryant:** When I try to explain scientific research to somebody, I say that it's an evolving mystery. Each time we get an answer to something, and each time I get to understand a mechanism, that's really exciting.

Also, there's the potential to discover something that's going to change people's lives because you can make a drug or another therapeutic. So, it's about solving a mystery and generating a solution all in one.

### Do you have any hobbies?

**Bryant:** I love the theater, but I don't go very often. I'm an enthusiastic gardener, though. I grow all sorts of things, but I have a very traditional English garden with lots of flowers. I run and cycle. I'm also an embryonic mosaic artist; I find Roman and Greek art very beautiful.

---

**Paula Amann** is a former ASBMB science writer.





THEMATIC SERIES

## Recent Advances in tRNA Biology

Transfer RNAs do much more than link the nucleic acid-based genetic blueprint to the protein building blocks of life. Recent discoveries highlight many non canonical roles of tRNAs, from regulating translation speed to potential use as therapeutics for rare mutation-based diseases. Check out this thematic review series assembled by Associate Editor Karin Musier-Forsyth and guest editor Venkat Gopalan.

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# Discover BMB | 2024

American Society for Biochemistry and Molecular Biology

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**ASBMB HERBERT TABOR RESEARCH AWARD**

# Phillips turns parasite's metabolic weakness into hope for human health

By *Andrea S. Pereyra*

**M**uch like the parasitic life cycle we learn in microbiology classes, this year's Herbert Tabor Research Award also comes to a full circle.

The winner, Margaret “Meg” Phillips at the University of Texas Southwestern Medical School, studies which biochemical pathways are critical for parasitic protozoans to grow and survive and how to use this information to fight them.

“A substantial part of Dr. Phillips’ work has been on the synthesis and function of polyamines, a field pioneered by Herbert and Celia Tabor,” Anthony Pegg of Pennsylvania State University noted when supporting Phillips’ nomination for the award.

Phillips said that her father, a radiation oncologist, greatly influenced her career choice: “My father loved basic science research and always encouraged my siblings and me to go into science. I ultimately decided to orient myself toward biochemistry because it combined my two passions, biology and chemistry. I wanted to know everything about enzymes and study how they were regulated.”

After earning her bachelor's at the University of California, Davis, Phillips worked for two years at a company developing diagnostic kits to measure drug levels in biological fluids. “This was a great experience and made me realize that, if I wanted to lead my research agenda, I needed to get a Ph.D. Having this gap to think and reflect ... was very positive

## Fighting parasites one enzyme at a time

Together, *Trypanosoma brucei* (responsible for African trypanosomiasis) and *Plasmodium falciparum* (the causative agent of malaria) affect over 2 billion people worldwide. Research led by Margaret Phillips on the structure and function of critical enzymes in these parasites has paved the way for new treatments.

“By exploiting metabolic vulnerabilities of these parasites, Meg made high-impact discoveries on novel drug targets resulting in innovative chemical therapies,” Kim Orth of UTSW and the Howard Hughes Medical Institute explained in her letter nominating Phillips for the Tabor Award.

Phillips’ work on the regulatory mechanism of polyamine pathway enzymes S-adenosyl methionine decarboxylase and deoxyhypusine synthetase in *T. brucei* has been groundbreaking. “She found that both enzymes require oligomerization with inactive paralogs — pseudoenzymes — for activity, revealing a trypanosomatid-specific form of enzyme regulation,” Orth explained.

Michael Ferguson of the University of Dundee said Phillips’ work “is the stuff of legend ... Everyone should read it for sheer enjoyment.”

Phillips’ team has led the effort to target dihydroorotate dehydrogenase, a critical enzyme for pyrimidine biosynthesis in *Plasmodium*. They have generated “one of the best structure-based drug discovery opportunities — period,” Ferguson said.



MEG PHILLIPS

for me; my motivation and focus were higher than if I had just kept going through school without a pause,” she added.

She went on to earn her Ph.D. at the University of California, San Francisco, where she also completed postdoctoral training. She started her lab at UTSW in 1992.

Phillips said she enjoys that her research sits at the intersection of parasitology, biochemistry and chemistry and that it can make a tangible impact on people's lives. “The most

fun I had was getting an anti-malaria compound into clinical development. To see your science going from understanding enzyme structure to finding inhibitors to clinical trials is very rewarding,” she said.

### Andrea S. Pereyra

(pereyaa18@ecu.edu) is a postdoctoral scholar at the East Carolina Diabetes and Obesity Institute. She earned her M.D./Ph.D. at Universidad Nacional de La Plata in Buenos Aires. She is an ASBMB Today contributing writer.



**ASBMB MILDRED COHN YOUNG INVESTIGATOR AWARD**

# Ando's pioneering journey: From physics to structural enzymology

By *Nipuna Weerasinghe*

**N**ozomi Ando's academic voyage was not a straight path, but rather a winding exploration driven by curiosity.

The winner of the American Society for Biochemistry and Molecular Biology's 2023 Mildred Cohn Young Investigator Award, Ando is an associate professor at Cornell University's chemistry and chemical biology department. But she started as a physics major.

An undergraduate exposure at the Massachusetts Institute of Technology to polymer hydrogels used to study protein folding nudged Ando into the world of biophysics and biochemistry. "Proteins are really quite elegant, and biology is interesting," she said, recalling her initial intrigue. The transition wasn't merely a switch, she said. It was an "expansion — a broader lens to view the molecular dance" by which she was captivated.

Ando earned a Ph.D. in physics at Cornell. There she studied protein behavior under hydrostatic pressure, becoming an expert user of the synchrotron for X-ray scattering. Barbara Baird at Cornell nominated Ando for the award and cited that work. "This technology inspired the construction of new (National Science Foundation)-funded beamlines dedicated to the biology of the deep sea and early life at the Cornell High Energy Synchrotron Source — the first of its kind anywhere and in continuous use," Baird wrote.

During postdoctoral training in

## Illuminating the enzyme choreography

Nozomi Ando's research dives into the world of protein dynamics, aiming to elucidate protein function under allosteric interaction during catalysis and regulation.

A core part of her work focuses on developing methods to capture and interpret protein dynamics from diffuse X-ray scattering. By analyzing the scattering patterns, her lab can interpret how parts of a protein communicate with each other during biological processes. This

novel approach has unraveled subtle protein motions, even within a rigid crystal lattice.

Her lab also explores large-scale protein motions using solution scattering and single-particle cryoEM. These techniques complement the smaller-length scale studies done with diffuse scattering, presenting a comprehensive view of protein dynamics.

By understanding these intricate molecular dances, Ando's work aims to unveil the mechanistic principles underlying enzyme functionality, especially within the realm of metalloenzymes, setting a solid ground for future biochemical explorations.



NOZOMI ANDO

Catherine Drennan's lab at MIT, Ando delved further into biochemistry to grasp the mysteries of proteins, especially exotic metalloenzymes. Teaming up with JoAnne Stubbe's lab at MIT, she set out to "nail down the relationship between allosteric activity effectors ... and (ribonucleotide reductase) activity" and proved herself a leader, Drennan wrote.

Ando said the award resonates with her, as Cohn also started out with an interest in physics. "I am truly inspired by Dr. Cohn as she was a trailblazer in many aspects — as a woman in science, as a physical chemist who made an impact in biochemistry," she told the Cornell Chronicle.

Ando said her transition from a

"straight physicist" to making waves in chemistry has been thrilling and that the recognition by a biochemistry audience is an "amazing feeling."

Her lab seeks to answer outstanding questions about biochemistry through method development and physical techniques. Its melding disciplines not only satisfy Ando's intellectual curiosity but also contribute to the broader understanding of life's molecular basis.

**Nipuna Weerasinghe** (nipunawe@arizona.edu) holds a BS in chemistry from the University of Colombo, Sri Lanka, and a master's in chemistry from the University of Arizona. He is an ASBMB Today contributing writer.



## ASBMB RUTH KIRSCHSTEIN DIVERSITY IN SCIENCE AWARD

# Stoddard changes mentoring practices in academia

By *Adriana Bankston*

**S**hana Stoddard says her goals are to “train people to be mentors,” to change the way people in academia think about mentoring, to connect students with role models and to help all students feel like they belong.

To achieve these goals, she has developed toolkits — frameworks and strategies, essentially — to help academics become engaging mentors.

For this work, Stoddard will receive the American Society for Biochemistry and Molecular Biology’s 2024 Ruth Kirschstein Diversity in Science Award, which honors “an outstanding scientist who has shown a sustained commitment to breaking down local and/or systemic barriers against scientists and students from historically marginalized or excluded groups.”

Loretta Jackson–Hayes, professor and former chair of chemistry at Rhodes College, nominated Stoddard for the award, noting the impact of mentoring practices that support students from underrepresented backgrounds. “Dr. Stoddard is a difference maker regarding increasing participation of students from underrepresented groups in biomedical careers,” Jackson–Hayes wrote.

Improved mentoring to build a strong pipeline in academia requires a mindset change, Stoddard said.

“People want change but are not ready to act,” she said, stressing that universities need to “create a new space where everyone can have a pathway forward.”

## Threading two passions: Chemistry and teaching

Shana Stoddard’s lab works to develop peptide-based treatments for autoimmune disorders, including multiple sclerosis, lupus and primary membranous nephropathy. Her innovative research agenda attracts a wide range of underrepresented students to her lab.

Stoddard pursues her scientific and educational interests through her “Chemtutorials” project, which lets students learn about women and minorities in STEM, create practice problems and build mentoring relationships with professionals.

“Role models are important,” she said, “and we want students to see what they could become.”

Her vision of creating role models and mentors for underrepresented students is key to Stoddard’s work at Rhodes College, and she plans to integrate her two passions in her award lecture at Discover BMB 2024 in San Antonio in March. Her talk is titled “Believe without boundaries” — reflecting her conviction that STEM can change and that everyone belongs.



SHANA STODDARD

There are ways to make change without taking opportunity away from others, she added. “Creating change should not be perceived as a threat.”

Stoddard, an associate professor of chemistry, founded and leads the STEM Cohort Mentoring Program at Rhodes College, which centers Black and African American culture to meet the needs of students from historically underrepresented groups, helping them to complete science, technology, engineering and mathematics majors and go on to successful careers.

Stoddard completed undergraduate studies in chemistry at Prairie View A&M University and her Ph.D. in chemistry and biochemistry at the

University of Mississippi. She holds a master’s degree from Freed–Hardeman University in curriculum and instruction with an emphasis on special education. She was a postdoc in radiological sciences/diagnostic imaging at St. Jude Children’s Research Hospital and a Hearst Postdoctoral Teaching Fellow at Rhodes, threading her interests in science and teaching throughout her career.

### Adriana Bankston

([abankston81@gmail.com](mailto:abankston81@gmail.com)) is a senior fellow in science policy at the Federation of American Scientists and a strategic adviser at the Journal of Science Policy and Governance. She is an ASBMB Today contributing writer.



**ASBMB SUSTAINED LEADERSHIP AWARD**

# For Wolfson, every classroom is a laboratory

By Anna Hu

**“W**hy do we need to know this?” This inevitable question led Adele Wolfson to ponder what students really must know versus what is outdated or uninteresting. Asking herself, “Why am I asking my students to know this?” changed the way she taught.

“Little by little,” she said, “I stopped asking students to memorize anything.”

Figuring out how students learn became a major aspect of Wolfson’s work over her 32 years at Wellesley College. In addition to examining protein biochemistry and neuropeptidase functions, she became interested in pedagogy after realizing that lecturing is not as effective or inclusive as more active forms of learning. Taking advantage of the small class sizes at Wellesley, Wolfson began to test teaching methods such as small group work and inquiry-based labs.

“I thought of every class as a laboratory,” she said, “and I think my students weren’t always happy that I was doing that. But I was learning ... things that could be passed along to others.”

Wolfson has also played a major role in the American Society for Biochemistry and Molecular Biology’s education efforts. With Peter Kennelly, a professor at Virginia Tech, she led the creation of the ASBMB accreditation program, which now includes more than 100 undergraduate biochemistry programs. Accreditation looks at the

## Educating the educators

As Adele Wolfson’s research focus shifted to pedagogy, she decided to add some science to the art of teaching. She wanted to know how students brought knowledge, and how they forgot material when moving from one subject to another.

Wolfson looked at learning progressions to model the increasing depth of knowledge a student gains in a subject. With collaborators, she mapped “concept inventories,” tools to measure a student’s familiarity with a concept, to learning progressions within biochemistry and chemistry.

Concept inventories, which often take the form of multiple-choice assessments, can highlight misconceptions or gaps in understanding. In a recent paper co-authored with a student, Wolfson created a hypothetical learning progression in acid-base chemistry and then followed up with student interviews.

In her own classrooms, Wolfson has used case studies and active learning techniques to promote the transfer of knowledge between courses.



ADELE WOLFSON

whole academic program.

With Judy Voet, Wolfson co-organized the first satellite meeting on education at an ASBMB national conference, which was so popular they had to add parallel sessions at the last minute. The society now holds a biannual standalone education conference. Similarly, the women’s networking session Wolfson organized for many years became a place to raise important issues such as Title IX compliance.

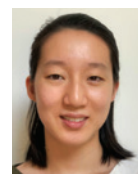
In nominating Wolfson for the ASBMB Sustained Leadership Award, Kennelly wrote, “(She) leads with a graceful firmness that amplifies the power of her intellect and manifests her granite-like self-assurance.”

Wellesley professor Mala Rad-

hakrishnan supported the nomination: “In addition to her active and explicit advocacy to catalyze increasingly diverse participation and success in her field, she also inspires women through simply being a role model herself.”

Wolfson still receives notes from former students, thanking her for encouraging them to see themselves as scientists. “It’s just great to see that everything is built on everything else,” she said.

**Anna Hu** (ahu4@wellesley.edu) earned her bachelor’s degree in biochemistry from Wellesley College and is now a research assistant at the Harvard School of Public Health. She is an ASBMB Today contributing writer.



## ASBMB WILLIAM C. ROSE AWARD FOR EXEMPLARY CONTRIBUTIONS TO EDUCATION

# Kennelly considers his fortune of three careers

By Hailey Reiss

**P**eter Kennelly has had three careers: as a researcher, an administrator and an educator.

“It’s so much fun to start a new career in your 50s in education,” Kennelly, a professor of biochemistry at the Virginia Polytechnic Institute and State University, said. “I’m 67 years old, and I smile at work. I consider myself lucky.”

Kennelly is the winner of the American Society for Biochemistry and Molecular Biology’s 2024 William C. Rose Award for Exemplary Contributions to Education.

Kennelly has been a member of the ASBMB since 1986. He served on both the Education and Professional Development Committee and Membership Committee for years, and he chaired each. He also has been a member of the Journal of Biological Chemistry’s editorial board.

He maintains his ties to the EPD and plays an important role in the education community today. He recently contributed to the Inclusive Community for the Assessment of Biochemistry and Molecular Learning.

Dennis R. Dean, a colleague at Virginia Tech, nominated Kennelly for the award. He credited Kennelly with “creating an inclusive and welcoming environment for our students.”

Kennelly contributed to the development of programs that are now pillars of the ASBMB education portfolio — the accreditation program

## Individuality as a superpower

Peter Kennelly, a department head twice over, said he hopes to encourage both students and educators to embrace a new mindset when it comes to learning — one that challenges the unconscious stereotype of what makes a successful student.

“Individuality is what makes for discovery, not IQ,” Kennelly said. He seeks to empower students and faculty members by emphasizing the value inherent in their unique perspectives, by asking questions others have not.

Kennelly also said he hopes to highlight the benefits of ASBMB membership and speak to the value of the accreditation program. He said he aims to encourage undergraduate students to become members of the ASBMB and upgrade their membership as they move on to the next step in their careers.

He added that the ASBMB can help to empower individuals, explaining that it is the volunteer efforts of individuals working in conjunction with the society that allows voices and ideas to be organized, amplified and connected.



PETER KENNELLY

and the ASBMB exam.

John T. Tansey of Otterbein University, in a letter of support, commended Kennelly for his “vision of what biochemistry education should be, and leading and organizing ASBMB to help make that vision a reality.”

In another letter of support, Paul Black of the University of Nebraska–Lincoln noted that Kennelly’s significant contributions to education were due in part to his “ability to provide leadership and develop teams of individuals with a common goal of biochemistry and molecular biology education excellence.”

While Kennelly may have provided

leadership to ASBMB’s educational efforts, he believes the Rose Award isn’t his alone. “I am the vessel for hundreds of people who have contributed to education along the way,” Kennelly said. “This is an award for the team, the colleagues, the folks who I’ve worked with over the years.”

Kennelly will give an award lecture at Discover BMB, the society’s annual meeting, in March in San Antonio.

**Hailey Reiss** ([hreiss@asbmb.org](mailto:hreiss@asbmb.org)) is the ASBMB’s undergraduate education coordinator. She holds a B.S. with honors in immunology and infectious disease from Pennsylvania State University’s Schreyer Honors College.



AVANTI AWARD IN LIPIDS

# Balla leaves no phosphoinositide unturned

By *Andrea S. Pereyra*

**A**n exquisite experimentalist, a creative thinker, a humble and honest man. This is how colleagues describe Tamas Balla, the 2023 recipient of the American Society for Biochemistry and Molecular Biology's Avanti Award in Lipids.

But the lipid world almost lost Balla to radiology. "During medical school in Hungary, I was attracted to physics and emerging imaging technologies," he said. In the early 1980s, with computerized tomography and magnetic resonance imaging rapidly evolving, the radiology field had plenty of both. Andras Spat, a physiologist, got Balla interested in research. "I would not be a scientist if it wasn't for him," Balla said. "He recruited me to his lab as a medical student and infected me with the research bug. He was an exceptional mentor who encouraged me to think about organ systems and molecular mechanisms."

Years later, Balla satisfied his fascination for technology and images at a microscopic scale. As head of the Section on Molecular Signal Transduction at the Eunice Kennedy Shriver National Institute of Child Health and Human Development, he has focused on phosphoinositide-mediated lipid signaling. Balla has purified, cloned and characterized key pathway enzymes, developed biosensors to visualize and track these lipids and repurposed molecular biology techniques to alter phosphoinositide levels artificially.

Julie Brill, Pietro De Camilli and

## Small lipids, big responsibilities

Phosphoinositides are phospholipids in eukaryotic membranes. When targeted by kinases and phosphatases, they produce essential signaling molecules. Although not abundant compared with other lipids, phosphoinositides and their derivatives play important roles in membrane dynamics during endo- and exocytosis, signal transduction from surface receptors, immune response and brain development and function.

Tamas Balla has studied phosphoinositide-based signaling from top to bottom. "He began studying inositol trisphosphate signaling downstream of angiotensin II receptors but quickly became interested in upstream metabolic steps in the pathway," nominators Julie Brill, Pietro De Camilli and Anirban Banerjee wrote.

Discussing the impact of Balla's research, Volker Haucke wrote, "(H)is groundbreaking studies on lipid kinases and phosphatases have paved the way for the development of vast biomedical applications."

Nevertheless, Balla cautions against forcing translational science at the expense of basic science in response to external pressure.

"While my focus was on enzymes, year after year, we made discoveries important to other fields like vesicular trafficking, Golgi function, viral replication, and neurodegenerative diseases," he said. "All this came to us without consciously trying to be translational. The practical application of your discoveries can be unpredictable. But if you follow your passion and do high-quality research, it will eventually come to you."

Balla's latest research focuses on the nuances of lipid compartmentalization within the cell. He recently reported a mechanism by which phosphoinositides and lipid transfer proteins cooperate to mediate nonvesicular lipid transfer between the plasma membrane and the endoplasmic reticulum.



TAMAS BALLA

Anirban Banerjee nominated Balla for the Avanti Award, noting his outstanding collegiality. "His generous sharing of these tools has pushed the field forward dramatically by enabling rapid progress on many fronts," they wrote.

Volker Haucke, winner of the 2017 Avanti Award, wrote, "Tamas Balla has pioneered the visualization and manipulation of signaling lipids in live cells, thereby enabling the transition

of the entire field from the biochemical era of the 20th century to modern cell and molecular biology."

**Andrea S. Pereyra** (pereyaa18@ecu.edu) is a postdoctoral scholar at the East Carolina Diabetes and Obesity Institute. She earned her M.D./Ph.D. at Universidad Nacional de La Plata in Buenos Aires. She is an ASBMB Today contributing writer.





## BERT AND NATALIE VALLEE AWARD IN BIOMEDICAL SCIENCE

# From virology to immunology, Wu focuses on structure

by Opeoluwa Iwaloye

At a 1987 scientific conference in Beijing, Hao Wu, then a medical student in Peking, heard the physicist and microbiologist Michael Rossmann deliver a talk on the crystal structure of human rhinovirus. “I was captivated by the potential of crystallography to solve large viral structures and answer complex biological questions,” Wu said.

Wu left medical school and the immunology lab she’d been working in. Instead, she earned a Ph.D. in biochemistry in Rossmann’s lab at Purdue University, where she worked on solving the structure of human parvovirus and cauliflower mosaic virus.

Although she transitioned into structural virology, Wu never truly left immunology behind; she studied the structure of the glycoprotein CD4 during her postdoctoral work. When she established her own laboratory, she focused on structures of signaling proteins in the pathway for the tumor necrosis factor receptor superfamily.

The shift from structural virology to structural immunology presented challenges, including the need to establish collaborations with biologists who were already engaged with others in the field. This transition coincided with a busy time in Wu’s personal life; she was a mother of two young children. Balancing her work in the lab with her responsibilities at home required careful time management.

“I had to categorize my tasks based on what I needed to do in the lab or not, get those tasks done and head

## Therapeutics: The future of structural biology

Hao Wu likens structural biology to molecular anatomy, with the potential to revolutionize immunology and therapeutics development. Throughout her career, she has tackled structures of signaling proteins in the pathway for the tumor necrosis factor receptor superfamily, the Toll-like receptor/interleukin-1 receptor superfamily, and inflammasomes, and increased understanding of their roles in innate immunity.

“The pathway I study is a major player in innate immunity and holds relevance for aging, neurodegeneration, and host innate immunity,” Wu said.

She emphasized the importance of understanding the signaling molecules in detail: “We must decipher their roles to strike a balance between necessary immune responses and harmful hyperactivation and inflammation.”

Wu’s vision for structural biology includes the ability to solve the structure of any cellular complex using cryo-electron microscopy. AlphaFold and other advanced technologies have revolutionized access to structural information, she noted; however, classical structural biologists must take the process a step further by harnessing artificial intelligence and biochemical tools to delve deeper into molecular assemblies.

home,” she said.

Wu now leads a structural and mechanistic immunology laboratory in the cellular and molecular medicine program at Boston Children’s Hospital and the biological chemistry and molecular pharmacology department at Harvard Medical School.

Timothy Springer, a professor at Harvard Medical School and Boston Children’s Hospital, nominated Wu for the American Society for Biochemistry and Molecular Biology’s 2024 Bert & Natalie Vallee Award in Biomedical Science for her accomplishments in basic biomedical research.



HAO WU

“Her studies not only provided important biological insights but also illustrated a new way of signal transduction by oligomerization as well as a new approach to study these complexes by a multitude of combined methods,” Springer wrote.

Wu advises early-career scientists, “Identify your goals, focus and pursue them relentlessly.”

### Opeoluwa Iwaloye

(opeoluwaiwaloye@ufl.edu) is a Ph.D. student at the University of Florida Biomedical Sciences Program studying the genetic and environmental determinants of Type 1 diabetes. She is an ASBMB Today contributing writer.



**EARL AND THRESSA STADTMAN DISTINGUISHED SCIENTIST AWARD**

# Stillman charts the path of genome replication

By Tian Yu

**B**ruce Stillman’s scientific journey began with an intense curiosity about the mysteries of DNA replication, especially in eukaryotes. “When I started my career,” he said, “we actually knew almost nothing about how the eukaryotic genome is inherited from one cell to the next.”

Stillman, winner of the American Society for Biochemistry and Molecular Biology’s 2024 Earl and Thressa Stadtman Distinguished Scientists Award, has explored adenovirus DNA replication and has done pioneering work on the simian virus 40, or SV40, replication system. High-impact discoveries under his guidance include replication protein A, proliferating cell nuclear antigen and replication factor C, which are significant pillars in genome stability research. His investigation into yeast chromosomal replication led to the discovery of the origin recognition complex, a critical initiator of DNA replication in eukaryotic cells.

Over the decades, Stillman’s dedication to basic research hasn’t wavered, despite challenges. “It’s very difficult to initiate new projects, especially on new species or changing systems like when we moved from adenovirus to SV40 virus, then to yeast to human, and now to other yeasts,” he said. “It’s very difficult to do that with (National Institutes of Health) funding because you really have to have a lot of preliminary results to get NIH funding.”

A key facilitator in navigating this challenging terrain was the Cold

## Diving deep into DNA replication

In his presentation at Discover BMB, the ASBMB’s annual meeting in San Antonio in March, Bruce Stillman will delve into DNA replication initiation, illuminating our understanding of cellular processes foundational to life.

“We’ve now gone from knowing virtually nothing to understanding the detailed biochemistry of the process and control of initiation of DNA replication,” Stillman said.

Focusing on the evolution and regulation of DNA replication in the cell-division cycle, Stillman will share comparisons among species, particularly in their replication origins.

He will address fundamental questions, from the mechanisms that determine replication origins in various species to understanding how replication interacts with other cellular processes. Only a small number of eukaryotes, such as the yeast *Saccharomyces cerevisiae*, have sequence-specific origins. All other eukaryotes — including fungi, plants, animals and humans — lack sequence-specific origins.

“The question then is how our origins are determined,” Stillman said. “So, we are now looking, performing evolutionary comparisons by comparing *Saccharomyces* to other yeasts and human cells. We include structural work, molecular biology and biochemistry to understand the subtle differences, principally to understand how the initiation of replication occurs in all eukaryotes.”



BRUCE STILLMAN

Spring Harbor Laboratory. Now, president and chief executive officer, Stillman arrived at the lab from Australia in 1979 for an independent postdoc.

“Cold Spring Harbor ... it’s one of the greatest intellectual environments in science,” he said. The lab’s private funding offered a launch pad, he said, allowing him to delve into uncharted territories.

The future study of DNA replication presents captivating challenges and opportunities, Stillman said. The intricate chromatin regulatory systems governing replication timing invite exploration, as does the enigma of replication localiza-

tion in species without sequence-specific origins. And Stillman has trained many others who continue the work.

In nominating Stillman for the Stadtman award, John Diffley of the Francis Crick Institute wrote, “Bruce was an early-career mentor of mine ... He is an outstanding scientist and an outstanding mentor.”

Tian Yu (yutian.home.office@gmail.com) is a molecular biologist and regulatory specialist. Her experience spans life science and medical device product development, along with quality management. She is an ASBMB Today contributing writer.



## WALTER A. SHAW YOUNG INVESTIGATOR AWARD IN LIPID RESEARCH

## In failure, Simcox finds a way to learn

By Poornima Sankar

When Judith Simcox was an undergraduate at Carroll College in Montana, she went to a lecture by the evolutionary biologist Gerald Shields on speciation, the process by which a new species emerges. In a conversation after the lecture, Shields was intrigued by Simcox's curiosity and depth of scientific thinking. He took her under his wing, funding her education and mentoring her to develop her scientific aptitude.

"That opened up a world of science for me, and there was no way I could repay him," Simcox said.

Shields' generosity provided a rare entry into the world of science. Ever since Simcox has been striving to pay it forward by building programs and working with scientific societies. As a graduate student, she helped develop the Native American Research Internship to encourage Indigenous young people to consider careers in basic science, a program that has impacted many lives. With the internship, about 49% of participants go on to graduate schools as opposed to 1% of Indigenous science students nationally.

Simcox is now an HHMI Freeman Hrabowski scholar and an assistant professor of biochemistry at the University of Wisconsin–Madison. Her lab studies plasma lipids that regulate metabolic disease and explores how these lipids function using lipidomics, genetics and cellular and molecular biology

## Lipids are more than fat reserves

Judith Simcox's interest in lipid metabolism was sparked by her family's long history of obesity and metabolic disease. Although sometimes dismissed as excess fat reserves, lipids are essential signaling molecules and mediators of tissue inflammation during disease.

"What's fascinating to me is that there are so many unknown lipids, and for the known lipids we still don't know their functions," Simcox said.

The Simcox lab is specifically interested in plasma lipids and how they regulate disease. She has spearheaded the use of artificial intelligence and machine learning in human population studies to predict lipid biomarkers in cardiovascular disease and how these vary in different populations, especially in Black and Chicano communities.

To answer functional questions, the lab uses mass spectrometry, radio isotope studies in mouse models and cell culture studies. Simcox is optimistic about the use of AI in basic sciences.

"But in the end," she said, "you have to back it up with molecular biology."



JUDITH SIMCOX

techniques. For this work, she won the American Society for Biochemistry and Molecular Biology's 2024 Walter A. Shaw Young Investigator Award in Lipids.

Simcox also works with the Society for the Advancement of Chicanos and Native Americans in Science, the American Indian Science and Engineering Society and other organizations, including the Native American Center for Health Professionals. She knows that with access to higher education can come the fear of failure and the fear of being noticed, especially when few people share your background.

Simcox said she wants to change this. She wants to create a space where Indigenous students don't feel a sense of otherness.

"It is really hard to fail when everybody's watching you," she said. "That makes it harder for people to be brave. But don't be afraid to fail; the most important lessons for my life have come from failure."

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THE ALICE AND C.C. WANG AWARD IN MOLECULAR PARASITOLOGY

# Roos' career pivot to maximize impact

By Marissa Locke Rottinghaus

Shortly before the pandemic, David S. Roos closed the doors to his research lab. Unlike most lab closings, however, this has increased his group's impact on science, as he has transitioned from studying parasitology to managing database resources full time.

Roos now leads a team of more than 50 staff, who work together like a well-oiled machine to keep multiple genomic databases up to date. For his body of work, Roos was named the winner of the American Society for Biochemistry and Molecular Biology's 2024 Alice and C.C. Wang Award in Molecular Parasitology.

Roos' group pioneered integrated databases resources, including the Eukaryotic Pathogen, Host & Vector Bioinformatics Resource Center VEu-PathDB.org, the Orthology Database OrthoMCL.org and the Clinical & Epidemiology Resource ClinEpiDB.org. These tools help to make large-scale data sets findable and accessible for thousands of investigators worldwide, Roos said.

"I've been a scientist for a long time," Roos said, "training scores of students and postdocs and publishing hundreds of papers — including some that have been cited thousands of times. However, our database resources are used by 50,000 unique users per month. I will never in my career publish a paper that is cited 50,000 times, let alone 50,000 times every month, year in and year out. It is particularly gratifying to see that these resources are equally useful to students and researchers all around the world."

## A 'crazy' organelle

In 1997, David S. Roos saw his work, earlier published in *Science*, prominently featured in a *New York Times* article about a newly discovered organelle in parasites that may lead to life-saving drugs against malaria and toxoplasmosis.

Roos and collaborators had identified the apicoplast, a vestigial plastid surrounded by four membranes with essential metabolic functions that evolved via secondary endosymbiosis in certain parasites.

"Imagine the ancestor of plants and algae eating a cyanobacterium, which gave rise to the chloroplast, surrounded by a double membrane," Roos said. "Now imagine that an ancestral parasite eats this alga and retains the algal plastid. This concept of secondary endosymbiosis sounds crazy, but it predicts that the organelle should be surrounded by four membranes, exactly as we see."

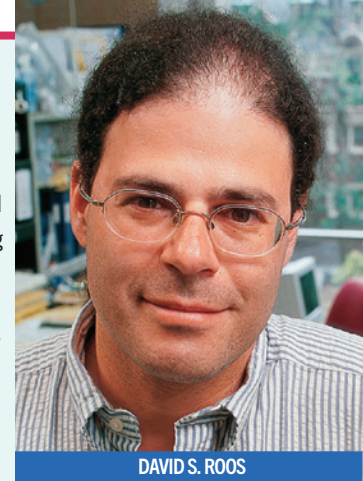
Roos also defined the motifs responsible for protein traffic to the new organelle and a complete metabolic pathway map, including numerous therapeutic targets.

"Computational integration of diverse datasets is increasingly the driver for experimentally testable hypotheses," Roos said. "And the tools we developed to ask our crazy questions — 'find plant genes in malaria parasites' — have proved to be readily generalizable to support other questions as well, yielding the database resources we now provide to the global community."

Though he's had a wide impact on the parasitology field, Roos did not begin his scientific career studying parasites. "I think of myself as an evolutionary cell biologist," he said.

Hoping to apply his skills to develop molecular tools enabling the genetic dissection of host-pathogen interactions, Roos became interested in molecular parasitology and was inspired by the enthusiastic support of C.C. Wang.

The Bay Area Parasitology meetings, often held in the Wang home, inspired Roos to establish his laboratory at the



DAVID ROOS

DAVID S. ROOS

University of Pennsylvania in 1989 to work on parasites, despite never having previously published in this field.

"C.C. was somebody who not only provided great encouragement to me but also highlighted that it was possible to do something new," Roos said.

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



# Community Day broadens impact of DiscoverBMB

ASBMB outreach committee organizes event to inspire local high school students

By Odaelys Pollard & Jelena Lucin

**“The value of engaging my students with a professional society was getting to see where and what their future could look like if they pursue research as a career option. Community Day was a great opportunity for them to see people who look like them doing science.”**

— TIM RENZ, FOSTER HIGH SCHOOL

Every year, the American Society for Biochemistry and Molecular Biology takes its annual meeting to a new city. In 2024, that city will be San Antonio. After the conference, we'll travel back to our homes and workplaces. But, how can we leave a lasting impact on the community where we've met? How can we share the joys of science, technology, engineering and mathematics with the upcoming generation of local scientists, especially those historically underrepresented in the field?

In planning for DiscoverBMB 2023 in Seattle, the ASBMB Science Outreach and Communication Committee set out to address these questions. The SOCC members have all engaged in community outreach, and we wanted to use our expertise to help local students and educators experience the society's annual conference. We hoped to give STEM-curious students, particularly those who are members of groups that are underrepresented in the sciences or from underresourced communities, an opportunity to experience real-life science. Out of this conversation came the idea for our first Community Day.

As we plan for Community Day 2024, we want to tell you how our first event came together — and how it will evolve for San Antonio. The goal was, and remains, to provide an inclusive and fun experience that exposes students to a scientific conference where they engage with scientists and learn about what career opportunities lie



Community Day high school participants and volunteers pose for a group photo at Discover BMB Seattle 2023.

ASBMB



A Seattle-area high school student holds a “Passport to Discovery” booklet, provided as part of Community Day.

ahead.

To achieve this goal, we needed to identify our audience, determine activities and connect with collaborators. Five months before Discover BMB 2023, planning was in full swing.

## Participants

We decided our target audience would be high school students aged 15-18 with at least half of these students coming from underresourced or underserved schools and communities. We used our network to contact organizations in Seattle that engage with high schools and nonprofits. One contact led to another, and we identified three partner groups: Foster High School, the Fred Hutchinson Cancer Center and the STEM Pathways Innovation Network.

When we asked the educators and mentors of each group about accommodations, needs and barriers to participation, they mentioned food — we were taking students away from school-provided lunches — and transportation — some students would need transportation to the conference.

A working group within our committee identified 15 ASBMB member volunteers and conference attendees to help with Community Day. We told them about our goals and needs, prepared them to engage with our chosen age group and equipped them with tools to help us run the activities.

## On the day

On March 28, SOCC members and staff welcomed students and their mentors at the front entrance of the Seattle Convention Center.

The 30 participants came from 11 cities in the Seattle area. The ASBMB funded their travel to and from the conference by public transit, charter bus or car. Many came from underresourced communities — between 60% and 70% of the students were from groups underrepresented in the sciences, and roughly 20% were from schools receiving federal funds to support low-income students’ education.

In a meeting room, we had opening remarks, introduced one another and provided lunch. Everyone received a personalized conference badge, a “Passport to Discovery” booklet to document their experience and a Community Day T-shirt. The organizers also wore the T-shirts.

## Science talks

A highlight of any conference is scientific talks, so we integrated the committee’s annual Science in a Flash flash talk competition into Community Day programming.

Parmvir Bahia, SOCC member and lead organizer and moderator of Science in a Flash, said, “This is a great opportunity for students to not only hear an accessible presentation of ongoing science work but also to participate in the judging of a winner that day.”

Excitement and a dash of anticipation were in the air as participants entered the bustling exhibit hall to hear and judge the flash talks. Equipped with a rubric, they voted for the most impactful talk, which received the Student Choice Award.

Regina Wu of Fred Hutchinson Cancer Research Center, said, “The students really loved being able to vote for the best flash talk. Having speakers from lots of different backgrounds was great.”

Amber Inwood, a mentor for the STEM Pathways Innovations Network, said, “The students seemed to rise to the occasion of being a judge because it gave them a sense that they belonged.”

This feedback reinforced our belief that we were providing an inclusive environment.

## Networking and engaging

We held a Meet a Scientist panel session to connect the students with eight scientists working in diverse fields and of diverse backgrounds, many of whom work in the Se-

attle area. Adriana Norris, an SOCC member, organized and moderated the session.

“A goal of this panel is to provide students with a chance to speak with scientists and ASBMB members of different career stages and backgrounds and ask them questions about their career paths,” Norris said. “We hope that students feel inspired and can see themselves in their personal journeys.”

After the event, Tim Renz of Foster High School said the winner of “the unofficial ‘tell me the best part of the day’ survey on the bus ride home was overwhelmingly the scientist panel.”

The panelists said they appreciated connecting with students who are preparing for the next steps in their academic journey; they were impressed by the students’ questions and offered their contact information to stay in touch afterward.

We also collaborated with three exhibitors — Echelon Biosciences, Gene Tools and Vector Builders — who showcased their innovative science and provided conference goodies.

## Interactive demos

Our committee came up with three hands-on activities for the students: “Escape the Cell,” a learning resource provided by RockEDU Online; a “Discover the Unknown” protein assay activity; and a “Who dun it?” forensic blood-typing activity from a kit provided by Edvotek.

“Escape the Cell” participants converted DNA to RNA to proteins using art supplies, emphasizing the central dogma of molecular biology: the theory of gene expression. This friendly competition required teamwork. We heard students say, “Oh let’s do it again, and I can escape faster next time.”

Conversations about what’s happening inside our cells contributed to memorable “aha moments” where students connected molecular processes to the biology of their own bodies. One student said they wore their protein bracelet home and used it to explain central dogma to their little sister, emphasizing the importance of understanding insulin.

The next station linked to the first as students worked to “Determine the Unknown” protein concentration using the Lowry protein assay method. Protein assays are widely used to determine, for example, the amount of protein in a person’s blood serum. SOCC member



Eight volunteers who work in various scientific fields met with Seattle-area high school students for the Meet a Scientist session during Community Day. The volunteers are, left to right, Taylor McGee, Olivia Miller, Nicole Marsh, Sarah John, Cholpsit (Ice) Kiattisewee, Pearl Magala, Iris Smith and Andrew Santiago-Frangos.

Michele Vitolo organized and led the workshop.

“Because these methods are used to investigate diseases or an individual’s health, we felt that it was a great link to showcase how basic scientific research applies to everyday life,” Vitolo said. “Students are able to visualize the presence and the amount of a protein in a sample through a change in color gradient and seemed to absolutely love learning and practicing to pipette — they couldn’t get enough of it.”

At our “Whodunit?” station, students became forensic scientists and analyzed blood samples at a faux crime scene. They used blood-surface antigens to determine the blood type of collected samples. SOCC member Mike Wolyniak organized and led the workshop.

“As a basic science researcher, I get excited about answering fundamental questions of life processes, especially when it leads to better ways to predict or prevent disease,” Wolyniak said. “This was a great way to share that excitement with students and apply their knowledge of biochemistry in a real-life scenario.”

Students and educators then browsed posters, engaged with exhibitors and participated in an ice cream social — a great addition to the day. As the afternoon ended, we said our goodbyes and asked all the students to fill out a post-event evaluation survey.

## Outcomes

As organizers, we aimed to learn whether we met our goals and how to plan for next year. Our pre- and postevent surveys showed how familiar the students were with career options in science and their perception of science and scientists. Students also shared their favorite part of the day and what changes they'd like to see in future events.

Our participants were already excited about science, we learned, but they lacked knowledge of career options and pathways. After the event, we saw a significant increase in how likely they were to pursue a science career.

Through an online open-response feedback form, we asked the educators and mentors what worked well, what was missing and what value they see in engaging their students with a professional society.

“Our students talked about feeling like real scientists and imagining what it would be like to be a graduate student or researcher attending the conference,” Regina Wu wrote. “They also felt like their opinion mattered especially because of the flash talks and being in the center of the conference hall for the career panel.”

## What did we learn?

Feedback from the educators and students has allowed us to optimize our planning for Community Day 2024.

### ■ Make more time for talking to scientists

Students wanted more time and less noise when talking with scientists, and they asked for more hands-on demonstrations and more time allocated to the demos. For the 2024 event, we hope to reserve a more intimate space for Meet a Scientist and offer more one-on-one mentoring. We'll structure the hands-on demonstrations to give everyone more time and space to engage.

### ■ Build out hands-on activities with a diversity and equity lens

Tim Renz told us, “Flip the crime scene scenarios into exoneration scenarios. We now have the technology to be able to exonerate people, especially Black and brown people, who have been wrongly convicted.” The SOCC aims to advocate for equitable and diverse outreach practices, and we plan to expand on this effort.

### ■ Add learning through poster sessions

Exploring the poster sessions was organic, and the students and educators enjoyed it. In the future, however, we hope to find more meaningful ways to engage. One

educator suggested a scavenger hunt so students could get to know some of the work and projects presented at the conference.

### ■ Ask about barriers to participation

Accommodating needs is important. We learned that some educators must identify their own substitute teachers and associated costs when they leave school for an event like Community Day. We didn't anticipate this barrier, but we adapted and we plan to ask about it in the future.

### ■ Engage Student Chapters and others as volunteers

In 2023, we asked a number of members to volunteer, especially in the Meet a Scientist panel, but the event was mostly committee driven. This year, we'd love to expand our collaborative efforts to include Student Chapters — the ASBMB members closest in age to our high school participants.

## Looking ahead

In addition to assessing feedback from our guests, the committee discussed how we thought the 2023 event went. We defined three takeaways for planning 2024:

- Engage conference attendees and build more connections with members about Community Day;
- Provide more representation for students from careers outside academia; and
- Reserve space that allows for more direct communication and engagement with students.

We hope to see you at our DiscoverBMB 2024 Community Day event in San Antonio. If you're interested in volunteering your time, please email [outreach@asbmb.org](mailto:outreach@asbmb.org) by February 23.

**Odaelys Pollard** ([opollard@bmcc.cuny.edu](mailto:opollard@bmcc.cuny.edu)) is the director of research programs at Borough of Manhattan Community College, City University of New York, and a member of the ASBMB Science Outreach and Communication Committee.



**Jelena Lucin** ([jlucin@asbmb.org](mailto:jlucin@asbmb.org)) is the ASBMB's outreach and education coordinator.





# Workshops and professional-development activities abound at Discover BMB 2024

By *Kirsten F. Block*

**T**he heartbeat of every scientific conference is professional development. From the myriad scientific sessions to learn about – and to present—the latest research in a given field of study to the countless opportunities to meet and network with current and future collaborators, indeed, every component of a conference can be viewed as one form of professional development or another.

Beyond the science and the networking, a full conference professional-development experience is rounded out with a plethora of workshops to meet the various interests and needs of attendees.

Largely driven by individual American Society for Biochemistry and Molecular Biology members who submitted workshop proposals and the work of various ASBMB committees, the workshop schedule for Discover BMB in San Antonio in March offers a broad array of content to support a range of career stages and concerns.

Every day of the meeting features different sessions and topics, but collectively they all can be distilled to a few central themes encountered time and again across one's career journey.

Whether you are looking to figure out that next career step or to be more effective in the career you already have, there's a workshop for you.

## Looking at the STEM ecosystem through a DEAI lens

**DEAI science engagement & communication mashup: Charades, storytelling and toolkit creation**

**Workshop leader: Paly Ghanekar, Cell Savvy Group**

Are you passionate about promoting diversity, equity, access and inclusion (DEAI) in science and looking for the tools and knowledge to do it effectively?

This dynamic and interactive session will enhance your understanding of DEAI in biochemistry and molecular biology while equipping you with vital science communication skills. Through a blend of engaging activities such as DEAI-themed charades, captivating interactive science storytelling and collaborative toolkit creation, you'll learn while also actively contributing to DEAI initiatives.

## Faculty development to intentionally serve Latino students

**Workshop leader: José A. Rodríguez-Martínez, University of Puerto Rico Río Piedras**

Want to learn how to better support Latino students and faculty at your institution? This session hosted by the ASBMB Public Affairs Advisory Committee and Maximizing Access Committee together with Excelencia in Education will explore equity-centered faculty development and examine how these efforts promote inclusive learning environments in which Latino students can thrive. A human spectrogram activity kicks off this interactive workshop and leads into facilitated discussions to learn what works and generate ideas and best practices.

## LGBTQ+ awareness training

**Workshop leaders: Representatives from Fiesta Youth, a local organization that serves LGBTQIA+ teens, young adults (through age 22) and their allies.**

In this exciting collaboration between Fiesta Youth and the ASBMB Maximizing Access Committee, attendees will learn from certified instructors on topics such as confronting implicit bias, stereotypes and preconceived ideas of the LGBTQIA+ community. With an emphasis on core vocabulary, current terminology, inclusive language, the process of coming out and how not to out people, this session aims to showcase what it means to be an ally in and outside the workplace and build safer communities.

### Navigating the academic job market as an LGBTQIA+ scientist: Challenges and opportunities

**Workshop leaders: Ben Myers, University of Utah, and Itay Budin, University of California, San Diego**

This session features a safe space to talk about the unique experience of navigating an academic job search as a member of the LGBTQIA+ community. Find camaraderie, explore the logistics of being out during the faculty search process, and get tips from two assistant professors with recent personal experience in the job market. In this highly interactive workshop, participants will learn how to recognize unconscious biases among faculty search committees and departmental hiring committees and develop strategies to manage and reduce them.

### Figuring out the career you want and how to get there

#### Beyond the Ph.D.: Demystifying career paths and opportunities for advanced degree holders in the natural sciences

**Workshop leader: DurreShahwar Muhammad, Rice University**

This workshop is a great way to start your career-exploration journey, particularly if you're an undergraduate who is on the fence about whether to pursue an advanced degree in STEM. Hear from a panel of scientists from different organizations and at career stages, and be introduced to the variety of career paths that can be obtained with a STEM Ph.D. Panelists represent just some of the many options available in academia, industry and government, so if you're not quite sure what sector is the best fit for your interests, this session's format of rotating roundtable discussions offers an opportunity to compare and contrast.

#### Twists, turns and Ph.D.: Navigating the realities of today's Ph.D. job market

**Workshop leader: Nathan Vanderford, University of Kentucky**

Perhaps you've attended career panels and narrowed down the type of career path you want to pursue, but now what? If you're not sure what to expect when you finish your Ph.D. and enter the job market, this highly relevant discussion on the realities of the Ph.D. job market may

be just the ticket. Join this session to learn strategies for preparing for the many possible jobs you can pursue and walk away with an action plan to set you up for job searching success.

#### Owning your career

**Workshop leader: Erica Gobrogge, Van Andel Institute**

It can be challenging to take charge of your career when life pulls you in so many different directions. It helps to take a step back and reflect on your career goals — and what you need to achieve those goals. This highly interactive workshop will provide practical and actionable strategies for setting and achieving long-term career goals, including how to identify short-term goals that support your long-term plans and how to advocate for your professional-development needs to achieve success.

#### Driving CAR statements into your résumé

**Workshop leader: Reinhart Reithmeier, University of Toronto**

If you're trying to catch the eye of a nonacademic employer, including challenge–action–result, or CAR, statements on your résumé is key. These statements highlight the challenges faced, actions used to address the problem and the measurable outcomes and solutions that resulted. During this interactive workshop, participants will work in groups to compose CAR statements that are relevant to Ph.D. studies by focusing on research, communication, teamwork and leadership.

#### From the bench to the ballot: How to run for office

**Workshop leader: Sarah Smaga, 314 Action**

Ever considered running for office or using your STEM background to influence change in your community? This session will help you translate your experience and passion into a position where you can make positive change. Learn from professional political staff as you practice identifying policymaking bodies relevant to issues you care about and crafting pitches to take into the community. Attendees will leave with a clear understanding of how to pursue an elected or appointed government position and ways to support STEM candidates running for office across the country.

### Unlocking your career success through networking and mentorship — a workshop for the BMB education community at all career levels

**Workshop leaders: Corina Maeder, Trinity University, and Maha Zewail-Foote, Southwestern University**

Ready to up your game when it comes to networking and mentorship? In this workshop, you'll learn about key elements for expanding your network and how to use your network effectively to advance your career goals. Find out why mentoring and networking can be especially critical for women and people of color, learn the key differences between networking and mentorship relationships and how to cultivate both, get practical strategies for finding potential mentors or mentees and share your own experiences in a safe and supportive space.

### Supporting education and training starts with supporting the professional development of educators and trainers

#### Active learning communities in biochemistry

**Workshop leaders: Bonnie Hall, Grand View University, and Michael Wolyniak, Hampden-Sydney College**

Consider this workshop a one-stop shop for those looking to incorporate active learning into their curricula but may not know where to start. Through a combination of short presentations and speed networking with leadership from six national networks focused on enhancing active learning experiences, attendees will identify strategies to adopt existing curricula from one or more of the participating communities into their classroom. Each participating community also offers opportunities to get involved in designing new curricula for broader use within that community. Find the right fit for your course!

### Designing writing assignments to improve student learning and simplify the feedback process for instructors

**Workshop leader: Karin Musier-Forsyth, The Ohio State University**

Are you frustrated about writing assignments? In this workshop, experts in writing and science will unlock the secret to designing writing assignments that make clear requests of graduate and undergraduate students and are



easy to evaluate. We'll focus on the "transparency in teaching and learning," or TILT, method for designing and assessing assignments. Plus, you'll have a chance to practice what you learn by working with other participants to design an effective writing assignment for a course you teach.

### Integrating inclusive, evidence-based practices into your training programs and mentorship to support career development

**Workshop leader: Cynthia Fuhrmann, University of Massachusetts Chan Medical School**

A lack of inclusive and equitable support for career development has been linked to the mental health crisis in graduate education and to the loss of individuals from historically marginalized groups from science. Let's explore strategies for training programs and faculty mentors to better support students and postdocs in their career exploration, career planning and use of individual development plans. We will also discuss evidence-based approaches — especially practices that enhance inclusivity and equity — being used in educational models that are part of the ASBMB-supported Professional Development Hub Collection "Foundations of Career Exploration for Ph.D. Scientists."

### Meeting students where they are: Inspiring curiosity and confidence in scientific literacy

**Workshop leader: Keith Miller, University of Mount Union**

One of the most daunting tasks for developing scientists is reading and communicating about primary scientific literature. In this interactive workshop, you will design effective scientific literature assignments and learn how scaffolding these assignments within a course and across a curriculum can help undergraduate and graduate students gain the ability to read, communicate and critique scientific papers. We'll emphasize opportunities that move students from passive to active engagement.

### Augmenting your scientific growth

#### Designing and conducting multidisciplinary studies on membrane protein structure and folding

**Workshop leader: Elka R. Georgieva, Texas Tech University**

Membrane proteins are a hot topic, but studying their structure and folding often requires a multidisciplinary approach. Hear about multidisciplinary and collaborative research successes from leading membrane protein scientists as you explore methods used to study membrane proteins, learn how to design studies that incorporate multiple techniques and get tips on establishing collaborations. This workshop aims to foster information exchange and cultivate collaboration among membrane protein researchers at any career stage.

#### Easing into BMB coding in your research or classroom

**Workshop leader: Paul Craig, Rochester Institute of Technology**

Simply being familiar with Microsoft Office and Google Drive is no longer enough for many of today's biochemistry and molecular biology positions. Emerging researchers need to be comfortable with coding and be able to effectively analyze complex sequences and numerical data sets. This workshop for coding newbies will introduce you to data analysis using Python in Jupyter Labs, a powerful yet easy-to-learn coding environment. Be sure to bring your laptop to code along with facilitators and other attendees.

### Exploring biomolecular structures with NCBI's iCn3D

**Workshop leader: Alexa M. Salsbury, National Institutes of Health, National Library of Medicine, National Center for Biotechnology Information**

Seeking biomolecular structure in your research? Come learn about iCn3D, a free web-based 3D structure viewer and interactive structural analysis software. During this workshop, you'll gain insights into various aspects of biomolecular structures and work in small groups to explore and solve a selected problem using iCn3D with guidance from National Center for Biotechnology Information experts. The workshop will focus on practical ways to apply NCBI's extensive resources for research and education.

### Success in scientific publishing

**Workshop leaders: Members of the ASBMB publications team**

This workshop is designed to give attendees an inside look at what goes into taking your research from idea to published manuscript. With expert advice on data acquisition and presentation, promoting your findings to the scientific community and writing your manuscript to make your story clear and compelling, this interactive workshop is meant to give authors a competitive advantage in today's publishing landscape while maintaining the integrity of the scientific record.

### Something for just about everyone

With the variety of topics covered in the workshops offered at Discover BMB, there is a relevant session for just about everyone. Now is the time to start planning your agenda so you don't miss out on these opportunities for growth. We hope you'll make time to take in one or more of the workshops or short courses while you're in San Antonio, and we can't wait to hear how these sessions enrich your meeting experience.

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**Kirsten F. Block** ([kblock@asbmb.org](mailto:kblock@asbmb.org)) is the ASBMB's director of education, professional development and outreach.



## ASBMB journal events

The American Society for Biochemistry and Molecular Biology's three journals — the Journal of Biological Chemistry, the Journal of Lipid Research and Molecular & Cellular Proteomics — are a big part of the society, so naturally they will be center stage at Discover BMB 2024, the ASBMB's annual meeting, March 23–26, in San Antonio. Here are short summaries of the activities the journals' editors have planned.

### Plenary session: Metabolism and disease

**Chair: Alex Toker, Beth Israel Deaconess Medical Center and Harvard Medical School**

The mechanisms of metabolism feature prominently in health and disease. Lydia Finley of Memorial Sloan Kettering Cancer Center will give a lecture during this plenary session examining emerging trends and insights into the metabolic pathways that make or break a cell's success. Finley's lab researches how changes in metabolite availability shape the chromatin landscape to influence gene expression programs that control cell survival, growth and differentiation.



LYDIA FINLEY

### Journal of Biological Chemistry symposium

**Chair: Philip A. Cole, Harvard University**

Since 1905, the JBC has stood as a leading outlet for scientists across disciplines to share mechanistic insights on the molecular and cellular basis of biological processes. Join JBC editors for a special symposium featuring the hottest topics at the forefront of the field today at this symposium chaired by JBC Associate Editor Phil A. Cole of Harvard University.

- Henrik G. Dohlman, University of North Carolina at Chapel Hill
- Brian D. Strahl, University of North Carolina at Chapel Hill
- Kirill Martemyanov, The Scripps Research Institute



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**Chair: Al Burlingame, University of California, San Francisco**

Join us for a special symposium organized by MCP Editor-in-Chief Al Burlingame of the University of California, San Francisco, on current issues in the development and applications of proteomics in basic and translational research. Explore cutting-edge techniques being used to profile bacterial proteomes, map excitable domains in neurons, understand antigen presentation and disentangle complex cell hierarchies.

- Miriam Abele, Technical University of Munich
- Matthew Rasband, Baylor College of Medicine
- Jennifer G. Abelin, Broad Institute of MIT and Harvard
- Erwin Schoof, Technical University of Denmark

### Lipidomics: A symposium by the Journal of Lipid Research

**Chair: Xianlin Han**

JLR Associate Editor Xianlin Han of the University of Texas Health Science Center at San Antonio will chair a symposium on lipidomics as a bridge to biological and medical research. Hear from five leading experts at the forefront of genomics, proteomics and lipidomics as they relate lipid metabolism and function to insights in cardiometabolic diseases, Alzheimer's and more.

- Peter Meikle, Baker Heart and Diabetes Institute
- Yu Xia, Tsinghua University
- David A. Ford, Saint Louis University Health Science Center
- Kim Ekroos, Lipidomics Consulting Ltd.
- Xianlin Han, University of Texas Health Science Center



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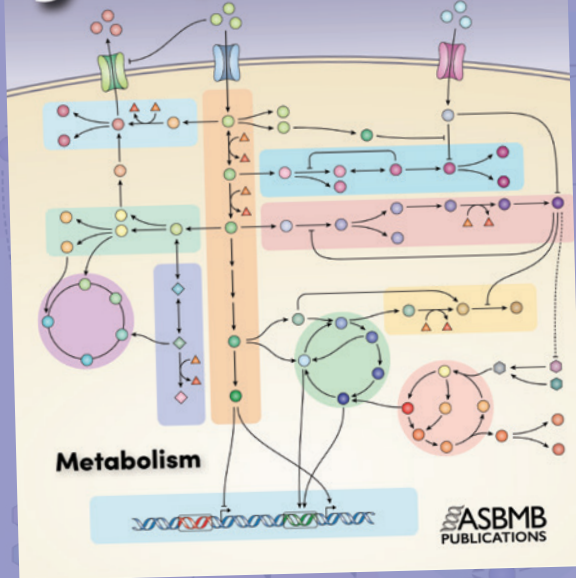
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# TRAUMA & RECOVERY





# Mental illness after the Ph.D.

By Reid Blanchett

**In academia ... my Ph.D. and education are recognized, but mental illness is absolutely taboo, and I occasionally find my fellow scientists throwing all logic and reason out the metaphorical window.**

I have a Ph.D. and a debilitating mental illness. Too many people are astonished by the first portion of the previous sentence in light of the second.

I am writing this from the psychiatric ward where I am being treated yet again. My experiments have been graciously frozen down by my lab, but deadlines loom as the scientific enterprise rolls on unforgivingly. It does not appear I will be meeting the National Institutes of Health fellowship deadline this cycle.

I was diagnosed in 2015 during my junior year of undergrad with major depressive disorder and generalized anxiety disorder, and I later acquired a bulimia diagnosis in graduate school. I came back from studying abroad and suddenly I was sick with no explanation other than I was at the right age. I would not have sought treatment as soon as I did had it not been for my academic adviser, who immediately whisked me into counseling and psychiatry when I came to her thinking that what I was going through would be just a blip in my otherwise stellar college career.

Graduate school was very rocky for me. I went straight from undergrad into graduate school with no abatement of symptoms. I switched from a traditional wet lab experience to bioinformatics for safety reasons, having never coded a line in my life. Two mentors and a failed comprehensive exam later, I settled into a fantastic lab with an amazing mentor who worked with me and my accommodations, and with her



COURTESY OF REID BLANCHETT

Reid Blanchett attends the Cherry Blossom Festival in Washington, D.C., in 2023.

support, I met all the requirements for the conferral of a Ph.D. while earning accolades along the way.

In the past eight years, I have gone through cognitive behavioral therapy, dialectal behavioral therapy, transcranial magnetic stimulation, eye-movement desensitization and reprocessing therapy, and I was recommended for electroconvulsive therapy, which was framed as my last hope.

In treatment, both now and in the past, some mental health professionals seem unable to reconcile the fact that I have as much or more education than they have. After months of sessions, one therapist told me she assumed my vehement insistence that I had earned a Ph.D. was a grandiose delusion and my prestigious postdoctoral research fellowship involving a T32 in cancer epigenetics was an internship I had inflated.

# TRAUMA & RECOVERY

COURTESY OF REID BLANCHETT



Reid Blanchett explores Prague, Czech Republic, after a conference in 2023.

Psychiatrists in inpatient psychiatric wards have pulled me aside to ask how someone so smart could “end up” in a place like this, grilled me on my research to check if I was lying, and told me that I was too smart to be in an inpatient ward with people whose lives were over and would amount to nothing.

I have never met another person in a Ph.D. program or with a doctorate in my hospitalizations, not to say there aren't any. Many people have degrees, including graduate degrees, so it is an incredibly unfair assessment by the people we count on to take care of our health. Many times I have met other people my age who have had their dreams derailed by their illnesses, having dropped out of their programs due to worsening symptoms. Mental illness doesn't discriminate but sometimes the providers do.

It's not much better in academia. There my Ph.D. and education are recognized, but mental illness is absolutely taboo, and I occasionally find my fellow scientists throwing all logic and reason out the metaphorical window. After I was involuntarily admitted during my graduate studies,

the renowned PI I was rotating with told me that if I just ate more protein none of this would have happened to me. Apparently, steak is the cure for treatment-resistant depression.

A few peers saw my medical and legally binding accommodations — such as having exams moved, more time for assignments and working from home — as excuses, and professors openly refused to make them on multiple occasions. One lab let me go after telling me that I had no hope of making it in science with such a severe illness.

In certain cases, I reported the awful things that were said to me but eventually gave up and just took them to heart when the administration told me, for example, that I was up against a tenured full professor and would never be believed.

I developed crippling imposter syndrome and convinced myself I deserved this treatment and that I wasn't worthy of really anything. Call it stubbornness or stupidity, but I kept going, running on the fumes of relentless determination to be a geneticist that I had held as a dream since the eighth grade when I met my

first Punnett square. I have also tried to channel this hurt into roles that put me in a position to advocate for those like me.

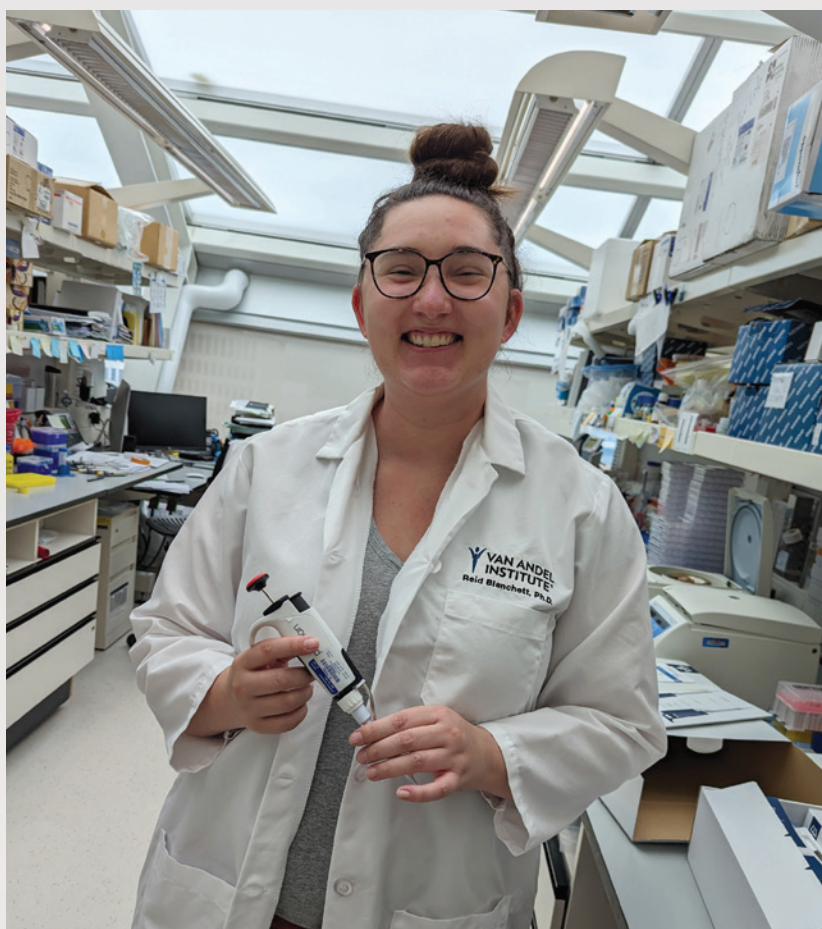
It has taken years to untangle my web of cognitive distortions aided by therapy, fantastic friends and devoted mentors. I am fortunate to work at my current institution, where empathy abounds and systematic changes are being proposed to our policies and training that advisers receive; these changes are based on feedback I have given and the navigation of my illnesses and treatments by the administration.

In no way am I saying that advisers should take on the role of mental health professionals, but flexibility and basic human kindness go so far. Systematic changes need to be made to the culture of science, how we train mentors to advise, and the biases we hold. It does not matter how many studies we publish about the mental health epidemic or our individual knowledge of the serotonin synthesis pathway if we don't remember that the numbers are real people who are in our labs and programs. You can't support me by being educated about the biology of my brain, but you can support me if you are educated about the functioning of my mind, the struggles I face, and taking the time to get to know me as a person.

It just doesn't feel like the two aspects of myself can coexist. I can either be a scientist or mentally ill, but never a scientist with a mental illness in the same space.

It is incredibly scary to out myself here, and the ramifications of my decision to write this may come back to bite me, but I have no one to look to. My career path is shifting as I again find myself unable to sustain research in a wet lab in my postdoc, and I don't know what to do. The decision about what happens to my future is

COURTESY OF REID BLANCHETT



Reid Blanchett tries on her very first lab coat as a new postdoc at the Van Andel Institute in Grand Rapids, Michigan, in 2023.

mine and mine alone, but I have no clue how far I can go.

I don't have role models to look to see how they have achieved their goals through their struggles, know what accommodations are even possible, or what types of fulfilling careers in science are out there for me. Shooting for the stars is an admirable dream but excludes the harsh realities of my limitations that I do need to acknowledge.

I know no one who has been in a psychiatric facility and is also a career scientist. So, I have written this hoping that I can be that for someone else.

My ultimate fear is that someone will read this and think to themselves "Why put in the effort?" There

are plenty of applicants or students who can work the 80-hour weeks with no accommodations or extra support. But we are worthy and can flourish too, and we have every right to be in the scientific space.

I can make an impact on the world with my science; I just need a little bit of flexibility. I know my story is not unique, but in sharing my experiences my goal is to help another scientist feel less alone, maybe help convince someone that they can indeed go to graduate school, or educate a PI on how to better support their postdocs.

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In no way am I saying that advisers should take on the role of mental health professionals, but flexibility and basic human kindness go so far. Systematic changes need to be made to the culture of science, how we train mentors to advise, and the biases we hold.

# I am a homicide survivor

By Katie Sandlin

**“ Never shall I forget that night  
... Never shall I forget those  
moments which murdered  
... my soul and turned my  
dreams to dust. Never shall  
I forget these things, even if  
I am condemned to live as  
long as God Himself. Never.”**

**ELIE WIESEL, “NIGHT”**

**O**n May 1, 2018, I woke up tired and hungry. I drove to the Texaco down the street to grab breakfast and enough rations to keep me hyped up on caffeine and junk food.

I was a student in the graduate school at The University of Alabama, and I'd stayed up late the night before, cramming for the integrated genomics final exam I had to take the next day. I was in for another marathon day of studying.

The sun shone brightly, quickly warming the humid air. Radio blaring, I danced around in the car, attempting to sing along with Bone Thugs-N-Harmony's "1st of the month." Only a few more days, and then I'd be free to do as I pleased with my summer. I was giddy with anticipation. Much of the remaining day was unremarkable. I studied as much as my brain could manage. I remember seeing something on Facebook about a homicide near my hometown, but they didn't share names or any details, so I didn't think much of it.

At around 10 p.m., I went to the kitchen to grab a quick snack. I walked down the hall and saw Trey, my roommate, sitting on the couch in the living room, playing Madden NFL on his Xbox. His cell phone rang, and I thought he said my name, but he waved me off.

I grabbed a bowl of cereal, and, not wanting to disturb Trey's call, I went back to my room to eat. A few minutes later, as I was carrying my dirty bowl to the kitchen sink,



**Katie Sandlin and her dad at her McNair Scholars' award ceremony.**

I apologized to Trey for interrupting his call. I said I could have sworn I'd heard him say my name.

A look of horror was on his face. It was as if he'd seen a ghost: his eyes wide open and back straight as a board. He told me it was my mom who called and patted his hand on the couch, gesturing for me to sit beside him.

"Your dad was working at a man's house ..."

He drew it out. His tension seemed to cause the "and" to hang in the air.

"Where is he?" I blurted out, hoping up to go wherever Dad was, to be with him in what I was assuming was a critical condition. "Where is he, Trey?"

My dad, Allen Clifford Sandlin, had been doing construction work at the home of Hernan Antonio "Tony"

Padilla. Tony was a relative newcomer to town and at the time the thought was maybe there'd been a fight and somehow my dad and Tony had been killed.

I began crying hysterically. I was on the floor in front of the couch, shaking the coffee table, causing the glass to bang around in its grooves. Stoic, Trey sat on the couch beside me and was silent.

I called my mom for more details and she reiterated what Trey had said.

Then I called my PI, Laura Reed. By now, it was past 11 p.m. and she still answered my call. Much like Trey had done, she was quiet and listened as I screamed and cried. The next morning, she texted to see what she could do for me.

I had no idea why I called her, but later I realized it was because she was my safe space. Her office was a place where I could be honest about my mental health struggles and where I could vent my frustrations. She believed in me before I could believe

in myself.

Laura's support kept me in graduate school, especially after Daddy died. I'm happy to report that I finished my master's. Over the past five years, I've juggled school, work and the criminal justice system.

Another homicide survivor once told me that, on the days when I feel like giving up, I need to remember that "I am my father's voice." I took that to heart. I never missed a court hearing, never didn't drop everything to drive an hour to the district attorney's office for a last-minute meeting, and never ever stopped being my dad's voice. It took five years and 11 days to finish the longest and hardest marathon I will ever run, but I can report that the perpetrators are now serving time in the state penitentiary.

The five people who murdered my father have all seen my face in court and heard about the pain they caused. A few cried, one stared through me as if he was annoyed he had to listen to me, and another yelled. No matter

what, I kept going back and being the voice to show that my dad once existed.

The detectives determined that the five assailants went to Tony's house to rob and kill him and my dad was a witness that had to be eliminated.

Through all the hearings and court procedures, my PI never once said a negative word about me being absent. When things got so bad I had to take a few days off, she left me a plant outside my door.

I would have quit graduate school if not for Laura, or rather, I would probably have been kicked out if I'd had almost anyone else as a PI. She now serves as the program director for the Genomics Education Partnership, where I work as the director of curriculum.

What Laura gave me can't be measured on a tenure and promotion list.

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**Katie Sandlin** (kmsandlin@ua.edu) is the director of curriculum for the Genomics Education Partnership based at the University of Alabama.



Katie Sandlin and her PI, Laura Reed, at Sandlin's master's graduation ceremony.

# I survived sudden cardiac death and 37 days in a coma

— then the hard part began

By Cass Condray

**I didn't come to understand the real cause of my cardiac arrest until I started working in a lab studying rare cardiac diseases. My PI was very curious about the details of my situation, which led me to become curious as well.**

I suffered a sudden cardiac arrest and seizures when I was home for winter break during my freshman year at Tulane University. I was 18 years old.

My family lives in a rural part of Oklahoma. My parents performed CPR on me for more than 15 minutes before an ambulance arrived. Paramedics shocked me with a defibrillator three times at my house and several more times in the emergency room. From there, I began the fight for my life.

After a 37-day fight in an induced coma, with two bouts of bacterial pneumonia, mismanaged seizures and recurrent infections, I woke up on Feb. 14, 2020. The day before I woke up, the neurologist on my team said there were “no purposeful signs of activity” and that he “saw no signs of me waking up” and weaned my phenobarbital dose down. I woke up the next morning.

I am transgender, and doctors initially blamed my cardiac arrest on the hormones I was taking. They did no additional testing. The actual cause of my cardiac arrest was not discovered until 3.5 years later when it was revealed I have a rare genetic disorder called arrhythmogenic right ventricular cardiomyopathy, or ARVC. This was evident in every EKG I had ever had and would have been obvious with genetic testing, but doctors at the time were fixated only on my gender identity and

looked no further.

I didn't come to understand the real cause of my cardiac arrest until I started working in a lab studying rare cardiac diseases. My PI was very curious about the details of my situation, which led me to become curious as well. I reached out to the Johns Hopkins cardiac genetics department, and the people there became very interested in my case. It's not every day that an 18-year-old has a cardiac arrest, survives a 37-day coma, and has no full cardiac diagnostic workup. This is just one example of my mentors being more than “just” scientists, but mentors to me as a whole person.

I immediately began my journey back to science. As soon as I regained my ability to see, I began reading a chapter a day of my biology textbook and doing a problem from my calculus textbook — relearning integrals and derivatives. Once I could afford it, I began taking classes again.

This is where I hit bumps in the road. I had gone through school with a different disability (ulcerative colitis, an autoimmune inflammatory condition of the digestive tract), but it didn't require accommodations from my university. I had never had to ask to have classroom or testing space made accessible so I could continue my education.

Now I had cortical blindness, which glasses could not correct. I needed image descriptions, tests with

larger fonts, an environment with reduced distractions and other reasonable accommodations, for which I applied. The process left something to be desired.

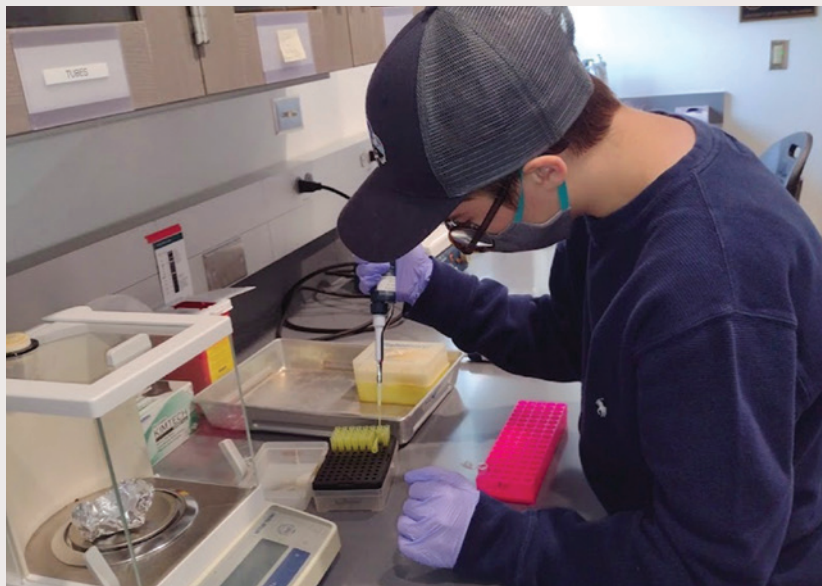
Professors denied my accommodations and asked invasive questions about the nature of my disability, such as “What is wrong with you?” or “What happened to you?” Some argued with me about the necessity of my accommodations. Once, when I asked for help in a chemistry lab, the professor told me: “People with your disability cannot do chemistry or biology. I recommend switching to statistics or math.” Someone at the disability office also suggested I consider a different career path.

I began thinking about transferring to another school. I was torn; I worked in a great lab and had a few incredibly supportive professors — but it ultimately was not worth the fight.

Although I miss my former lab dearly, I am so glad I transferred to the University of Oklahoma. The disability services are not perfect, but they’re leaps and bounds better. Support systems and resources are better, and professors are more than willing to work with me to achieve my academic goals. I am treated by professors with kindness and understanding. I don’t have to fight for my accommodations. And no one has told me to abandon my microbiology major.

I also have incredible mentors who are always there to support me. They lend an ear when I have had a day of being told people like me don’t belong in the sciences, and they offer advice about what to do next.

A mentor can be a guiding light in difficult times, especially for underrepresented minorities, whose lived experiences are shaped differ-



Cass Conray works in the lab at the University of Central Oklahoma.

ently than others.

One time, when I was continuously being denied accommodations, my PI was there for me. As we made our master mixes and did PCR for the day, I had a shoulder to lean on and got sound advice from someone who is familiar with the ins and outs of higher-level education and academia.

As someone who does not come from a family of researchers or academics, I found this immensely helpful. Many things are second nature and obvious to those who come from families with doctorates. I was totally unaware of those things and needed someone I could feel comfortable asking questions about these things.

My mentors are there for the good times, too. Whenever I have a success, like a grant or a scholarship, I let them know, and we celebrate (virtually, as we are at different institutions).

Institutions typically do not provide mentors with resources and funding to dedicate extra time and energy to support students like me. It comes out of their own time and

their own dime, which is unfortunate given the extreme benefits mentoring has on students.

Institutional support and funding for mentoring are critical to prevent underrepresented students or students who have experienced traumas from falling behind and falling out, as they deserve every chance to be included in the university space, just like every other student.

My mentors have been crucial in providing me with a phenomenal support system in academia and the sciences, and I would not be where I am today without them.

Today, I’m an intern at the National Institute of Diabetes and Digestive and Kidney Diseases, a National Science Foundation–Louis Stokes Alliances for Minority Participation fellow, and an aspiring scientist.

I know that when there is a hurdle or barrier in my way, I have mentors in my corner who I can rely on to support me.

---

**Cass Condray** (he/him) (cassidy.condray@gmail.com) is an undergraduate studying microbiology at the University of Oklahoma.

# Regurgitation to resilience: A family's hard-won miracle

By *Fatahiya Kashif*

**Each day felt like an uphill battle, yet there was an unseen force guiding us, a divine presence that carried us through the darkest nights.**

From the moment of her birth, there was something amiss with our daughter, Zehra.

Every time I fed her, she regurgitated milk through both her mouth and nostrils. The pediatric team assured us that since the child displayed a healthy pink color and regular breathing, there was no cause for alarm. My husband and I brought her home, but her condition persisted.

I had recently completed medical school, and my sister was interning in pediatrics at Holy Family Hospital in Rawalpindi. We began to suspect that Zehra might be suffering from a tracheoesophageal fistula. We arranged ear, nose and throat consultations, including direct and indirect laryngoscopy tests, but these yielded no conclusive findings. The regurgitation and coughing persisted; I had to keep a tissue box close by during every feeding.

My husband's service in the Pakistan military meant frequent relocations. We had to move more than 500 miles from Rawalpindi to Quetta when Zehra was less than a month old. Several days after our arrival, as I decorated the nursery walls for our one-year-old son, Zehra slept soundly. My husband returned from the office, yet she remained asleep. We thought this was typical. It was only later that we grew increasingly alarmed as she remained listless — breathing but unresponsive. We

rushed her to the hospital, where she was diagnosed with aspiration pneumonia.

## Living in the hospital

Zehra's illness persisted for one and a half months. The military hospital in Quetta placed her in a general nursery and provided me a room in the officers' block, albeit more than a mile away. The nearby officer's nursery was understaffed. Zehra's condition was too serious for her to stay with me. I had to leave my son at home in the care of an unhelpful assistant — his initial sacrifice for his younger sibling.

Whenever I was needed to care for Zehra, a nurse would send an ambulance for me. I would travel to my daughter's side, tend to her, return her to the nursery staff, wait for another ambulance and return to my room. This persisted for weeks; sometimes the ambulance was delayed, so I walked. Finally, the hospital arranged a bed for me near the nursery. It was a cramped, less-than-pristine ward, but for the sake of my daughter, I endured this for an additional week or so. When Zehra began to improve, I requested her transfer to the officer's block nursery. On her first night, she experienced a severe aspiration episode and was swiftly moved back to the general nursery.

Finally, when she had improved sufficiently, she was relocated back to the officer's block nursery, granting





**Baby Zehra in her crib at home in January 2000 after pulmonary artery surgery**

me some relief. A friend offered the use of her car and driver, allowing me to visit my home, refresh and spend quality time with my neglected son. I was overjoyed.

My son asked for a ride on his swing, and I happily obliged, spending time with him on the veranda. Quetta's prevalent cold winds, however, caused me to catch a cold, which I didn't notice at first. I took my son to the hospital to visit his sister; he was immensely happy. I was delighted to have both my children with me after such a prolonged separation, but I started to feel weak, feverish and tired. My friend, Mrs. Abbas, came to visit and alerted the doctor to my deteriorating condition. I was diagnosed with pneumonia.

At the same time, my son developed stomach upset and episodes of vomiting. Mrs. Abbas cared for both my children. We were all profoundly unwell. Desperate to go home with my children, I called my mother, hoping she would rush to our aid. However, she calmly reminded me that such hardships marked the beginning of life's challenges and encouraged me to seek solace in patience and prayer. Gradually, we all recuperated and returned home.

### Surgery and crisis

Zehra's regurgitation symptoms remained unresolved. We returned to Rawalpindi, where my sister, nearing the end of her internship, suspected Zehra might have an atrial or ventricular septal defect, leading to recurrent pneumonia. We implored the reluctant treating doctor to conduct an echocardiography test. The results confirmed Swiss cheese ventricular septal defects, or VSDs, in her heart. A pediatric cardiac surgeon explained to me about Eisenmenger syndrome in children with VSDs, a condition in which irregular blood flow causes the blood vessels in the lungs to narrow and stiffen, necessitating a pulmonary artery banding procedure.

Zehra was admitted to the Armed Forces Institute of Cardiology for the banding surgery. However, she wasn't completely free of infection, rendering her unfit for surgery. Meanwhile, my husband was deployed to a distant duty station, leaving me to care for both children in the hospital.

We were placed in a glass-walled room in a circular pediatric ward with the nursing station at its center. My playful son, Ashjay, now age two, was suffering from neglect, resulting in a poor appetite. Zehra's constant regurgitation meant we used a roll of

tissue paper daily. Passersby, peeking through the glass, would see Zehra coughing and regurgitating while Ashjay laughed and clapped. Somehow, I managed to maintain my sanity. Days turned into weeks, but Zehra's surgery remained postponed due to persistent respiratory tract infections.

Eventually, the medical team decided to keep her nil per os (nothing by mouth) to prevent aspiration and subsequent infections. It was agonizing to hear her cries for food. Her only solace was going to sleep with her thumb in her mouth. Finally, she improved enough for the surgery. I dressed her in tiny blue pajamas and took her to the operating room, where I saw a reassuring message on the wall: "If you are worried that your child's chest will be cut today, know that the same happened to Hazrat Muhammad (peace be upon him) during his childhood."

After the surgery, I found my tiny daughter hidden amidst a tangle of wires, IV lines, drains, and catheters. As days passed, my hope for her recovery persisted, but she continued to deteriorate. Her smiles disappeared, and she became weak, drowsy and pale — signs of a deeply ill child. Other children who had been sicker than Zehra began to improve after their surgeries and were discharged, but her condition worsened.

My son refused to eat properly and showed signs of failing health. On the eve of the new year, 2000, after putting my son to bed, I placed my daughter on the prayer mat before me. I wept and prayed fervently to God to spare her life and show mercy to my young son. The sounds of fireworks outside were drowned out by my distress and tears. That night, God answered my prayers, and from Jan. 1 onwards, Zehra began to improve. On Jan. 15, 2000, after a two-month



In 2000, after a winter marked by illness and surgery, followed by a fire that consumed their wooden hut in Quetta, Pakistan, the Kashif family emerged stronger than ever, the author said.

stay in the hospital, we were finally discharged.

## Foreign objects

The episodes of regurgitation and coughing persisted as a constant reminder of an underlying problem that still required diagnosis. We returned to Quetta after Zehra's surgery, and as she healed, we ventured back to Rawalpindi for further tests, including barium meal studies. These failed to yield any conclusive results, and her developmental milestones were notably delayed.

A new chapter began when it was time to introduce solids into her diet. Zehra started experiencing episodes that resembled choking, necessitating multiple hospital visits to remove foreign objects lodged in her esophagus. These ranged from mashed banana and tissue paper to beans, peas, corn, bread, buttons and even spiders. Despite our efforts to create a safe environment, she managed to find things to ingest. Each time, the foreign object had to be removed endoscopically, under general anesthesia, and each time, the doctors admonished me for my negligence. We restricted her diet to blends and

pastes, but her innate curiosity evaded our surveillance.

In one episode, my daughter observed some guests eating peanuts without offering any to her. Seizing an opportune moment, she discreetly retrieved a discarded peanut shell from the trash and proceeded to consume it. I happened to be in the kitchen, but I heard her distressed gasps and coughs. I was in the dark about what had triggered her discomfort. The coarse, spiky texture of the peanut shell had caused a significant obstruction in her throat.



As the younger sibling, Zehra held her brother, Ashjay, in deep admiration, earning her the endearing nickname "Action Replay" due to her tendency to emulate his every move.

In a state of urgency, we hurried to the military hospital, only to discover that our usual attending physician was absent, necessitating a referral to a civilian hospital. There, the staff attempted an endoscopy, but it yielded no results due to severe edema. Zehra was transferred back to the military hospital, where she spent a harrowing week in intensive care, unable to consume anything other than intravenous fluids. Witnessing her struggle with sustenance and seeing my son's lack of appetite, I, too, began to forgo my meals.

## More surgery and a stone

Finally, the hospital provided us with air tickets to transport Zehra to the military hospital at Rawalpindi. I boarded the plane with both of my children; upon landing, an ambulance and my father were waiting. After entrusting my son to my parents' care, I accompanied my daughter in the ambulance to the pediatric ward. On that same day, we were scheduled for a procedure in the operating theater.

We were met with disarray. No one was there to receive us, indicat-



**As a child, Zehra was ever in pursuit of understanding and exploring her surroundings. During one adventure, her insatiable curiosity led to a scraped knee.**

ing a severe lapse in coordination. Helplessly, I sat in the reception area of the operating theater until an elderly couple, at the hospital for the birth of their grandchild, noticed my distress. They offered us a ride back to the ward and took it upon themselves to report the coordination issues to the nursing staff. The following day, doctors performed an endoscopy, revealing a grey peanut hull that had been lodged in Zehra's esophagus for the past nine days.

The definitive diagnosis finally arrived when she swallowed a small stone at the age of two. The doctor who performed that endoscopy confirmed the presence of a stricture in the lower third of her esophagus.

We consulted a thoracic surgeon who recommended major surgery. He said he would need to cut both her chest and abdomen to remove the lower third of her esophagus along with the lower esophageal sphincter, and then anastomose the stomach as a tube to the remaining esophagus. I declined and insisted on dilatations. The surgeon doubted the effectiveness of dilating congenital strictures.

This marked the beginning of a lengthy journey filled with esophageal dilatations, choking episodes,

cardiac issues and follow-ups. We used to mash and blend every food item for her, from bananas to bread. There were foods that she could not consume, even when mashed, such as potato chips and corn. When the time came for Zehra to start school, it posed a challenge. Ensuring she didn't try to consume regular food there was no easy task, and I had to delay her schooling until she could swallow these foods.

My son's appetite began to improve at the age of eight, and my daughter's esophagus had dilated sufficiently for her to eat like a normal child by the time she was five (although some foods still trigger symptoms). Today, we are proud parents of two responsible adults, a testament to the miracles that God can bestow upon those who endure the trials of life with patience and faith.

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**As an adult, the author said, Zehra possesses a compassionate heart and a great love for nature. In this image, she cradles an orphan kitten that she rescued.**

# Capsized

Excerpts from a short memoir of a life upturned

By *Andrea Lius*

Maybe the path to healing is to build bridges and break down walls, instead of the other way around.

### A ship in a bottle

I had a seemingly perfect childhood. I was raised a very much loved and spoiled only child. My dad had always been healthy. He kept up with his routine medical check-ups. For a couple of years before I moved away for college, I even convinced both him and my mom to adopt a mostly vegetarian diet.

One weekend in December while I was away at school, my dad fell ill. He spent a few nights in the hospital and showed signs of recovery. However, in the next couple of days, his condition took an abrupt turn for the absolute worse. My mom told me I should come home, and my heart sank.

The night before my flight home, I dreamed I was in an open field playing catch with my dad and one of my college friends.

The next morning, I woke up to a string of texts from my mom: “He’s not better or worse than yesterday ... But it’s not looking good ... Fly safe; see you soon.”

When I got off my first flight, I received another update: “He lost consciousness ... We had to hook him onto the ventilator.”

I tried to reach my mom on FaceTime, but the spotty connection at my boarding gate prevented video connection from either side.

“You can talk. He can hear you,” an unfamiliar voice came through the other line. It was his doctor.

I took a deep breath and fought to

hold back my tears. “It’s OK, Dad. I promise we’ll be OK,” I said into the phone.

Then I hung up and boarded my connecting flight. I knew I was saying goodbye, and it took all my strength and courage. I wonder if he knew, too.

### Capsized

I left just a few days after my dad was cremated. “Go back to school,” my mom said. “Focus on your future. I’ll take care of things here.”

After several weeks, my mom’s promise to take care of herself and things back home had lapsed into demands for me to help her find the quickest, least messy and most painless way to end her life.

My mom told me multiple times that all she wanted was to be reunited with my dad. And that I was not a good enough reason to live. For her sake and mine, for as long as I could, I clung to the belief that she didn’t mean any of the things she’d told me. That she didn’t mean to hurt me. That she was just in pain.

But after a while, doubt began to creep in. I couldn’t help but wonder if she had meant the things she said. Maybe I truly didn’t matter, and she regretted spending so much time raising me instead of enjoying life with my dad. Maybe she was right that the only way for her to be happy again was if she wasn’t here with me.

Nearly two years after my dad passed away, I was getting ready

to start medical school. Despite the tension in my relationship with my mom, I decided to go home that summer to see her and my grandma. My mom had converted my childhood bedroom into a storage space, so she and I shared her bedroom. A couple of nights after I had just arrived, she abruptly got off the bed and switched the light on.

“Let’s end it all tonight. You and me together, right now,” she said, holding a bottle of painkillers.

“I don’t have to leave you. Who cares about medical school? Who cares about your future? He’s not here anymore.”

Tears streamed down my cheeks, but I had no words. My mom said nothing more, and I pretended to fall back asleep.

The next morning, I rescheduled my return flight and packed my travel documents into my gym bag. When my mom dropped me off at the gym that afternoon, I kissed her on the cheek and told her that I’d see her later.

I was saying goodbye, and it took all my strength and courage. I wonder if she knew, too.

As soon as her car disappeared from view, I called a cab and headed straight for the airport. My chest tightened at the thought of never seeing her again. I felt dizzy from the anxiety and guilt. I closed my eyes and focused all my attention on the sound of raindrops all the way to the airport. When I turned off my phone right before takeoff, I imagined the worst-case scenario of leaving without saying goodbye.

### Floating adrift

I went two whole years without speaking to my mom. I cut off all ties



with everyone from my past. I deleted all my social media platforms. I changed my phone number and email address. I burned a lot of bridges and fell out with all my friends.

I withdrew my admission offer to medical school. I decided to work for a few years to support myself, save some money and clear my head. I managed to land a position in a laboratory at a small biotech startup. The company was later acquired by a pharmaceutical giant. Many of my colleagues lost their jobs, but I was offered a position to lead a different project in another department.

The contract stated that if I agreed to stay for at least five more years, I would be on track for promotion to a managerial role and obtain sponsorship for permanent residency. I was still planning on going to medical school then, so I was inclined to say no. Yet, even though I had saved some money and prepared my application packet for submission, the offer was difficult to turn down.

One morning, I went on a coffee run with the lead scientist from the disbanded project, who had worked with me closely, and asked her what she thought. She asked me if I truly wanted her honest opinion and then said,

“Have you ever thought about getting a Ph.D.? I think you would be a great fit.”

Instead of helping me narrow down my choices, she gave me a new alternative. Funnily enough, she was the third person to have suggested graduate school to me, so I took some time to seriously consider her advice.

I took an unpaid position in a research lab to gain some experience and used the money I had saved for medical school on my living expenses. I got accepted into graduate school that year.

### Searched and rescued

I rediscovered my sense of purpose and self-worth in graduate school. I chose a Ph.D. adviser who turned

out to be not only brilliant but also incredibly supportive. One day, while we were chatting over coffee, I opened up and shared my family history.

“That must be really difficult. I’m so sorry that you had to go through that. No one should,” he said.

My adviser’s nonjudgmental, even empathetic reaction had a tremendous impact on me, especially as he was also raised in an Asian household, where family values and respect for the elder are upheld without question or dispute.

Maybe the path to healing is to build bridges and break down walls, instead of the other way around, I thought.

At the end of my second year of graduate school, I started seeing a therapist. At our initial appointment, when she asked me about my family, I told her that my dad passed away, but it felt like I had lost both my parents simultaneously. I explained to her that I had recently made new friends, but I was scared that I would find some way to sabotage our friendship because of my trauma.

“I want to get better for them. And for me too, I guess,” I said.

She proceeded to tell me something that still helps me through my toughest times: “You have no control over the things that happened to you in the past. But you have the power to decide how much they define your future.”

Last year, I passed my Ph.D. candidacy exam with flying colors. Just a few months ago, I overcame my fear of public speaking and gave my first talk at a national conference, where my friends and adviser sat in the front row. They nodded and

smiled all the way through my talk. When I finished, they were the ones who applauded first and the loudest.

## Safely ashore

Over the years, my mom and I have made multiple attempts to mend our relationship and failed. Ever since she suggested that we commit suicide together, I refused to fly home to visit her. Whenever she came out to visit me, we ended up in a fight that led to me storming out of my apartment, spending the remainder of her visit at a friend’s house and not speaking to her for another six months.

Last summer, we had our first honest, heartfelt conversation in a long time that didn’t end in an explosive fight. “You left me, Mom,” I told her. “I know I was the one who ran away. And I know it was hard for you to lose Dad, but I lost him too, and I needed you. You chose not to be there for me. You left me.”

My mom is nearly a whole head shorter than me, but I felt small as I buried my head in her shoulder. She apologized for the hurtful things she had said and reassured me that she loved me. All the while, we both acknowledged that it doesn’t undo or erase the things that had happened in the past.

“Let’s start afresh,” I said. She gave me a long, tight hug, and for the first time in years, I didn’t flinch.

## Epilogue

Just a year later, my mom was diagnosed with ovarian cancer. The tumor fully distended her belly, making it appear as if she was at least seven months pregnant. When she started feeling full and breathless despite only eating a few bites of food, she finally decided to see a doctor.

“I really thought I was just getting

fat,” she said, laughing, when she called me to break the news.

I bought a ticket home the next day so I could come to her first appointment with the oncologist. Her scans and the size of the tumor suggested that her disease was in a late stage. Her oncologist initially thought her tumor was inoperable and that we might have to start with chemotherapy, but he ordered a biopsy just to be sure.

That night, after dinner, I sat down with my mom to talk.

“I need to say something difficult,” I mumbled. “When you kept telling me that you don’t want to live anymore, I tried to imagine life without you to prepare myself. I’ve said goodbye to you so many times in my head. But that doesn’t make this any easier. I wanted to take the chance to say goodbye. I never got to with Dad, and it still haunts me to this day. I love you, Mom. I’m sorry that I left when you needed me. I hope I’m making you and Dad proud.”

The biopsy revealed that my mom had a very rare subtype of ovarian cancer. The size of her tumor turned out not to reflect the number of cancer cells. The day after her biopsy, the surgical oncologist resected my mom’s tumor, ovaries and some neighboring organs. The next morning, my mom was back on her feet. A couple of days after that, she was discharged from the hospital. She never ended up needing chemotherapy. It was nothing short of a miracle.

My story about grief, loss and heartbreak turned into one about strength, forgiveness and love.

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**Andrea Lius** is a Ph.D. candidate at the University of Washington. This is an abridged version of a longer story published under a pseudonym.

# Coming home twice

By Blaise J. Arena

**For those who did not come of age in the 1960s, it is hard to imagine the social and political turmoil of that time.**

**M**y friend Johnny was made for the U.S. Army. The toughness, the discipline, the camaraderie and the patriotism. Johnny enlisted right after high school. After boot camp, he found himself in Vietnam with an infantry unit, right where he wanted to be. This was 1967 and war was raging there and at home.

For those who did not come of age in the 1960s, it is hard to imagine the social and political turmoil of that time. There was violence in the streets, bombings and protests against the war. Young men, boys really, were being drafted and sent 12,000 miles away to fight. Many were terribly injured; others came home in body bags.

I don't know what Johnny experienced in the war; he didn't talk much about it. I saw a photo of him manning a machine gun at some rice paddy outpost, surrounded by sandbags. Years later he said the first time he killed someone he vomited. Most guys did.

Maybe he vomited more than once. Johnny was big and talked tough and was tough — not afraid of any fight. But, he was also soft-hearted and sensitive. Over the many years I knew him, he often showed feelings for the underdog; he wore the robe of protector, never the bully.

The war was a mystical, abstract thing for me and my other friends; it existed only on television or in our minds. It was a concept. We could not imagine what it was like to be under fire in a Vietnam jungle. I doubt that we ever really tried to

COURTESY OF LESLEY A. GRODNER



**A snapshot of the author's friend and Vietnam War veteran Johnny in the late 1990s.**

imagine it. It would have been just too far from our easy lives in college or at home on our leafy Chicago street.

After his first deployment in Vietnam, Johnny returned home for a brief R&R. His mother, a big, always-cheerful woman, organized a coming home party with beer and soft drinks, chips and pizza in their living room. Neighbors and friends came, and most of Johnny's seven brothers were there. It was fun, and all went well until the end of the evening when, after most of the partyers had gone home, my three best friends and I talked with Johnny.

Although he was a little older than us, we were in college. That, I suppose, made us think we were more enlightened (sophomoric). The war had been a frequent topic of our late-night discussions, so we could

# TRAUMA & RECOVERY

not resist engaging Johnny in such a discussion — our first such discussion with someone who had actually been in Vietnam. There's no other way to say it — the four of us ganged up on him. We assaulted him with our Vietnam debate weaponry: "It's a civil war. We don't belong there." "The South Vietnamese government is corrupt." "The draft is illegitimate."

If Johnny was even aware of these antiwar arguments, he didn't care. He just wanted to fight for his country. We pummeled him, four on one, until finally after an hour of this and too much alcohol, he began to cry. Weeping and yelling at us, he stormed out the front door into the night.

Johnny's mother rushed onto the front porch and called after him, begging him to come back. He disappeared. His mother glared at us — a very rare thing, I don't remember what she said, but it was clear she was terribly hurt for her son.

My three friends and I were instantly transformed from "intellectually sophisticated" college boys to small, foolish kids. The party ended; we left. We were ashamed and admonished each other for hurting a friend. As I recall, Johnny returned sometime late the next day. His mother was much relieved. A day or two later, Johnny returned to Vietnam to finish his tour of duty.

I think we apologized to Johnny's mother and, when he returned, to him. Honestly, I'm not sure, but I have never forgotten that night. I have always had many friends, and I put a high value on friendship. This experience was painful for me, and Johnny. But it reinforced in me what the deal in friendship is: You give your friends a break, especially when they need you.

Johnny survived Vietnam, came back home and went to college. After graduation, he left Chicago for a

series of jobs in the petroleum services industry, traveling around the world. Eventually, he got married. About 25 years later, Johnny and I suffered through near-simultaneous divorces. Each of us was forced to leave our home and family. It was a miserable time. In early winter, we both returned to the haven of our childhood homes on that same Chicago street to find comfort from family and old friends.

During this time, Johnny and I reconnected. We'd take weekly freezing nighttime walks to some neighborhood tavern to drown our sorrows and talk about our misery. He was hurt; so was I. We never talked about his coming home party in 1967. Now I wish we had.

Those dark winter months formed the basis for a renewed and enduring friendship that lasted for another 13 years, until he died suddenly at home, and alone, of a heart attack.

I hope that I helped Johnny get through some of his misery. Maybe I made up a little for treating him

so badly about Vietnam years ago. I know he helped me.

## Learning about Vietnam

Many years after Johnny's coming home party, and a few years after his death, I gradually became interested in Vietnam. I wanted to understand the war. Not the battles necessarily, although some were crucial, but rather the origins of American involvement and decisions made by U.S. leaders — as well as the motivations of the North Vietnamese. American involvement began when the French abandoned their colony there in 1954, after a humiliating defeat by the North Vietnamese revolutionary army.

I began a long effort to learn and understand. I read many books (scholarly historical accounts and novels), watched documentaries and movies — and frequented some of Chicago's Vietnamese restaurants.

And I did learn. But more importantly, as I immersed myself into this study, my interest broadened to Vietnam the country and the Vietnamese



Blaise J. Arena and his wife, Kathryn, traveled to Vietnam and other nearby locations in early 2023. Here they're in Cambodia at the Angkor Wat temple complex, which is thought to be the largest religious structure in the world.

COURTESY OF BLAISE J. ARENA



COURTESY OF BLAISE J. ARENA



Blaise and Kathryn Arena enjoyed plenty of local cuisine on their trip. Here they're at a roadside restaurant in Hue, Vietnam.

people. Along this 20-year journey, I often thought of Johnny and others I had known who were in the war. I was able to better visualize what things were like for them.

During this period, I had the good fortune to have a young chemical engineer from a Vietnam petrochemical company seconded to the company I worked for. I was assigned to be his manager. This gave me a chance to get to know someone from Vietnam. I made the most of it, and the experience strengthened my interest in his country.

A few years later an opportunity arose to join a tour group to Vietnam. My wife, Kathryn, and I signed up immediately. After two years of cancellations because of the COVID-19 pandemic, we finally made the trip in January 2023. We spent three weeks traveling from Hanoi in the far north to Ho Chi Minh City (formerly Saigon) in the far south, and other cities and villages in between, including Phnom Phen, Cambodia. Interactions with local people were always pleasant and friendly. The natural wonders of

Vietnam were spectacular.

We took every opportunity to wander and mingle. The Vietnam of today is a very different place than it was in 1967. The big cities are modern, with giant sky scrapers. But in rural areas the people live a more modest existence. Rice is still the major export crop. I saw new infrastructure construction everywhere. New roads,

bridges and factories. I was left with the impression that Vietnam is a happening place, on the move.

There was a quiet man in our group named Larry who had served in Vietnam with the U.S. Army in 1968. He was seriously wounded by a land mine. After a year in Army hospitals and many surgeries, he said, doctors were able to save his right arm and shoulder. Although with limited use of his arm, he was in one piece. Today he owns a horse farm in Wisconsin.

This was Larry's second return visit to Vietnam. He told me that he found it cathartic. It helped him to forgive and forget. But many of his brothers in arms refused to go back, even with his encouragement. During our trip, Larry was able to return to the site of his battle injury. Talking with him certainly enhanced our experience. Vietnam is now real to me.

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COURTESY OF BLAISE J. ARENA

While in northeast Vietnam, Blaise and Kathryn Arena visited Hạ Long Bay, which features towering limestone islands that are crested with tropical rainforests.

# Work–life balance is preventative care

*By Frances Smith*

**It dawned on me that what started as an invisible mental imbalance, left untreated, had turned into physical complications.**

In 2020, I took a seven-hour drive through New England, returning home from my second wedding that year as the maid of honor. It was a lovely experience, but I was ready to get the year's stresses in the rearview mirror. I had written three fellowship applications, muscled through rejections, published my first review and, of course, navigated a pandemic.

This drive wasn't mountainous, hilly at best. But as the elevation changed, my ears popped. My left ear popped back to normal only seconds later, but the right ear ended up taking months to recover. It was uncomfortable, stunted my hearing to half of what it should be and left me very irritable. Establishing care at an ear, nose and throat specialist required first a referral from a general practitioner and then a several-week wait for an appointment.

At the appointment, it was bitter-sweet to hear that all of my diagnostic tests came back normal; of course, I wasn't wishing for something to be seriously wrong, but I was hoping for answers. I was discouraged that even a seasoned and highly rated doctor couldn't offer a solution. He was heading out of the exam room when I joked that since I worked in the sciences, I knew that not everything comes with a clear answer.

He was halfway out the door when it clicked for him. He turned back and asked how much stress my job put me through. I mean, how

do you even quantify what a Ph.D. student goes through? The physical stress of countless hours bent over an electrophoresis cassette, keeping arms outstretched to pipette in the tissue culture hood, poor back and neck posture from writing and reading at the nonergonomic desk setups at a university. The mental stress of planning committee meetings and troubleshooting experimental plans and proposals and even the anxiety of bringing up troubling results to your mentor.

My ENT then took a glance at my teeth. Yep, he saw signs of overnight teeth grinding due to stress. Earlier that year, my dentist prescribed me a fitted mouthguard to prevent overnight stress-related jaw clenching. What's covered on a student insurance plan is a grievance to discuss another time. Suffice it to say that I couldn't fit a custom mouthguard into my budget, so I did what I thought was the next best thing. I walked into Walmart and bought a \$0.97 mouthguard from the sports section. It was the type of mouthguard that you heat up and mold to your mouth, and I thought that it must be the same thing a dentist can offer, just without the in-office price.

This was not the quick fix I thought it would be; my ENT said the nonorthodontic mouthguard probably was poorly fitted for sleep and was displacing my jaw. This displacement had caused negative pressure to build up in my ear canals,

explaining why they popped so easily on my drive and why the right one was unable to un-pop.

I threw out the mouthguard that night when I got home. My right ear eventually returned to normal without me realizing it. While I was relieved to have an easy solution, I felt frustrated that it took many doctor visits, several months and a school-zone speeding ticket when I was sure I would be late for my first ENT appointment.

Long story short, work-related stressors caused me to grind my teeth at night. I tried a quick-fix option of sleeping with a cheap mouthguard that ended up causing ear pain. It takes two sentences to explain but had manifested over years. It dawned on me that what started as an invisible mental imbalance, left untreated, had turned into physical complications.

## Finding balance

I've tried to combat work-related anxieties by ensuring a work life—balance. On weekdays leaving the lab, I lock my computer in my desk so that I am sure not to do work at home in the evenings. I get to be present in afterschool activities and invest in who I am as a person outside of being a student scientist. I have occasionally broken this rule when preparing for a presentation or working on a manuscript, and I'm sure I'll break it often when I begin writing my thesis. However, I try to minimize the amount of home time that's stolen by work time.

If you sleep and work for eight hours each, that only leaves you eight hours in the day to be yourself. These hours are taken up by getting yourself ready in the mornings, commuting, eating dinner and taking care of pets or children. So, how much of your day is left to cater to you?

I've helped myself decompress in three ways.

### 1. Allow time to prepare.

If your day is so taxing that it leaves you drained and unable to make decisions, the result is choice paralysis. This used to happen to me at home all the time, and I ended up feeling ill-prepared.

To combat choice paralysis at home, I do my best to prepare for my week. This means using one weekend day to meal prep breakfasts, lunches and dinners and to lay out my outfits for the whole week. While it feels like it takes a lot of time to do these tasks all at once, I save considerable time when I value it most.

This trickles into what I do in the lab. I strategically plan cell treatments, media changes and biochemical assays to define what tasks must be done on which days. To avoid boredom, I invested in a planner I really love and I decorate the pages randomly with stickers or drawings to keep things fresh.

### 2. Work in a comfortable place.

I allow myself to work remotely when possible. I have chronic back pain, and work is easier in my home office where I have a more comfortable setup than the standard university desk. Most of my work is done benchside, but the other portion involves emailing and writing and reading papers. My boss and I both know that the second type of work can be done just as well while curled up with my cat. Not everyone has such a cool boss, so personal challenges may be associated with work—life balancing. But, even small changes can counter stress accumulation.

### 3. Treat yourself well.

I make it a priority to listen to my body and mind. If I feel uninspired or exasperated, I take guilt-free screen time or coffee breaks. There is an ebb and flow to what I realistically can



Frances Smith regularly does some self-care by snuggling up with furry residents at a cat café.

accomplish in one day; just as there are days that I can't look at a to-do list, there are an equal number of days that I finish it (and then some).

These shifts have not been easy to implement. I have a fellowship award through the American Heart Association, and I am expected to meet certain experimental endpoints. I've often wondered if I can afford the work—life balance I desire. However, through practice, I have become confident in my ability to manage time effectively. And truly, I should be striving to be a great individual, not just a great scientist.

My commitment to these three rules isn't perfect. Continual and hard-to-manage stress in my final year of the Ph.D. program led to a flare-up of mononucleosis. Imagine my surprise at becoming reacquainted with that bug almost a decade after I was first infected.

I'll sign off by saying that I have absolutely no data supporting the claims of my title, but it's an opinion that I humbly think is hard to disagree with.

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# Fostering mental health in faculty and students

By Corbin J. Standley

**The good news is that there are steps all of us can take to ensure we and those around us are prioritizing wellness and looking out for one another.**

When you lose a loved one, people often say, “It gets better.” It’s been nearly 14 years since I lost my brother, David, to suicide. I don’t know if I can say it gets better, but it does get easier.

That day in June of 2010 profoundly changed my life. In the years since, I’ve graduated high school, earned bachelor’s and master’s degrees, and recently completed my Ph.D. in ecological-community psychology at Michigan State University. Beyond this academic achievement, however, my doctoral degree represents a culmination of loss, grief, healing and resilience.

More than that, my degree represents a convergence of identities. Who I am as a suicide loss survivor and who I am as a professional inform one another. My experiences around mental health and suicide loss add authenticity to my work, and my work in turn gives purpose to my grief. Professionally, I describe my work as turning research and data into action to create change. Personally, this work has allowed me to transform loss into action to save lives.

### **Mental health and wellness in graduate school**

Through this work, I’ve also learned a lot about how to help those who might be struggling. A key part of that is raising awareness about suicide and its prevention. Particularly

in graduate education, both faculty and students face a lot of pressure. The nature of science often requires failed experiments and competing deadlines, on top of the financial stressors and our personal lives.

In recent years, several articles have been written about the mental health of graduate students in the U.S. For example, in one meta-analysis, authors found that 24% of Ph.D. students exhibited clinically significant symptoms of depression while 17% exhibited symptoms of anxiety, suggesting significantly higher rates of these symptoms among Ph.D. students compared to other young adults. These challenges can be especially salient for first-generation and minoritized students who often feel isolated and may experience toxic or harmful work environments.

### **Supporting someone you are worried about**

All this information can seem overwhelming. The good news is that there are steps all of us can take to ensure we and those around us are prioritizing wellness and looking out for one another.

**Know the risk factors.** These characteristics or conditions that increase the chance that a person may try to take their own life, in general, fall into three categories: health, environmental and historical. Examples of potential risk factors are chronic

physical and mental health conditions, substance use issues, prolonged stress at home or at work, stressful life events and historical trauma or abuse.

**Look out for warning signs.** Things to look out for when you are concerned that a person may be at risk for suicide are typically exhibited in a person's talk, behavior and mood. For example, someone may talk about feeling like a burden to others, they may give away prized possessions or withdraw from activities they typically enjoy, or they may be irritable or depressed more than usual. There is no certain combination of risk factors or warning signs over a certain period to look out for. Rather, it is important to trust your gut and, if you're concerned about someone, reach out and have a conversation.

**Reach out.** If you're concerned about someone, have a real, honest conversation with that person. Talk to them in private. Have a conversation after class or during office hours, or maybe grab a coffee. Transparency is important for building trust, so let a student or colleague know if you're a mandated reporter for your university or college. Next, listen to their story without judgment and let them know you care about them. Simply saying, "Hey, I've noticed you've been less engaged in class lately and I'm concerned. How are you doing?" can be incredibly powerful and affirming. If you are concerned that they may be suicidal, ask directly if they are thinking about suicide. This can be a challenging question to ask, but it lets them know that you've noticed, that you care and that you're a safe person to talk to about it. Research shows that asking directly about suicide does not increase the risk but actually provides relief for someone who may be struggling.



**Connect them to resources.** If they need additional support, encourage them to seek treatment or contact their doctor or therapist, or university resources. In this conversation, your role is not to fix the situation but to be there to listen, and to offer support and resources. If the person has said they're considering suicide, take them seriously, stay with them and call the 988 Suicide and Crisis Lifeline or text TALK to 741-741 to reach the Crisis Text Line. Both lines are answered by trained professionals who can guide a caller through the necessary steps.

### Prevention and wellness resources

For those not in immediate crisis, when connecting students or colleagues to resources, a great place to start is on your own campus. Use campus resources such as counseling and psychological services centers, health center deans and academic advisors. Many campuses also have student organizations (such as JED Campus) that help build community and foster mental health. You

**Research shows that asking directly about suicide does not increase the risk but actually provides relief for someone who may be struggling.**

## Supporting graduate students

Here are five simple strategies faculty members can all use to support and affirm grad students and foster wellness:

### 1. Support a culture of collaboration over competition:

Encourage grad students to separate their work from their own self-worth and model effective strategies for managing imposter syndrome that is manifested by doubting one's skills or accomplishments despite success, or an internalized fear of being exposed as a fraud. In turn, this encourages us to celebrate others' successes rather than viewing them as personal failures.

**2. Model work–life balance:** Encourage boundary setting, establish reasonable time off and leave policies, be thoughtful about familial and caregiving obligations, and actively encourage students to take time off periodically.

**3. Frame and handle rejection constructively:** Teach strategies such as having a support network, regular physical activity, returning to and reaffirming their own beliefs and values, and continuous self-reflection. This also includes offering constructive criticism and thoughtful suggestions for improvement. For manuscript rejections, this might include outlining a process for reading feedback, taking a couple of days to process feelings and reactions, and then developing a step-by-step plan for tackling the recommendations.

**4. Encourage inquiry:** Foster an environment in which students feel comfortable asking questions or seeking advice or support when needed. Creating open lines of communication can help students feel seen and heard.

**5. Lead with kindness:** In mentorship, in peer review and in day-to-day interactions, kindness goes a long way, and modeling this can be impactful for students. Our goal in this work is to collaborate on worthy contributions to scientific literature, and we hope to improve society in the process.

can also bring a program to campus (such as It's Real: College Students and Mental Health) or share mental health campaign messages (such as videos and resources from the Seize the Awkward campaign).

Another resource is the American Foundation for Suicide Prevention's Interactive Screening Program, or ISP, available for colleges and universities. ISP's customized platform provides a safe and confidential way to take a brief screening for stress, depression and other mental health conditions, and receive a personal response from a program counselor within available mental health services.

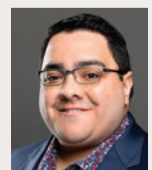
If you or someone you know is in crisis, call the Suicide & Crisis Lifeline at 988 or text the Crisis Text Line at 741-741.

## Conclusion

In my own life, the personal and the professional have merged to create a fulfilling and purposeful career focused on using science to create change and save lives.

We go into academia to make a difference — to use our knowledge and skills to contribute to science and build a better society. To do that effectively, we must prioritize our own well-being and that of our colleagues and students. By supporting those around us and leading with kindness, we can lead with our humanity in that pursuit and, in so doing, create better science.

**Corbin J. Standley** (cstandley@afsp.org) is the director of impact communication and continuous improvement at the American Foundation for Suicide Prevention. His work focuses on using data and research to inform programs, systems, and policy changes to prevent suicide.



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## Dates to know

**Jan. 18:** Late-breaking abstract deadline

**Jan. 31:** Early-registration deadline

**Feb. 12:** Housing deadline



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