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ASBMB TODAY

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

THE PRIDE ISSUE

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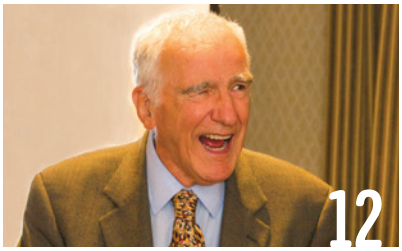

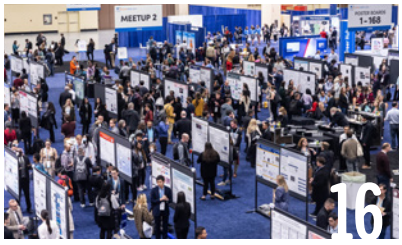

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ASBMB TODAY
THE MEMBER MAGAZINE OF THE AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

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Science will suffer

By Comfort Dorn

> **"We are constantly told that we are bringing politics into science or creating identity politics. Our identity is not political; our identity is politicized. Who we are is a matter of debate because people want to debate our rights."**
>
> **ALFREDO CARPINETI, PRIDE IN STEM**

When the ASBMB Today staff started thinking about a feature article to anchor our first Pride Issue, we zeroed in on the recent crop of laws targeting LGBTQIA+ rights. We wondered if these laws were having an impact on the career decisions of our members. How were universities and other institutions responding to this flurry of legislation? If a scientist or a member of their family was in the targeted community, would they avoid working in states that had passed or were considering these laws?

It seemed straightforward. We have members all over the country — some in leadership positions at universities in affected states. I figured we could just have a writer call them up and get the scoop.

But people did not want to talk. Or if they did, they didn't want to be named. I was told by a number of members — including straight, cis-gender scientists living and working in states unaffected by the new laws — that the subject was toxic or radioactive. These folks are afraid of losing their jobs.

The politicians who put those laws on the books have done more than restrict drag shows and penalize trans kids and their families. They have created a climate of fear, and even the most powerful faculty members in the bluest of states do not feel safe.

I'm so grateful to the people who went on the record. Standing up in this climate is risky. And we are less likely to speak up on issues we think don't directly affect us or the people around us. Many in the LGBTQIA+ community choose to stay quiet about their identities, so it might be hard to tell if state politics are influencing the next move of someone in your lab.

Importantly, as talented researchers choose to settle in states where they feel safer, the divide between have and have-not universities will only widen. And science will suffer.

Comfort Dorn (cdorn@asbmb.org) is the managing editor of ASBMB Today. Follow her on Twitter @cdorn56.

HHMI pathogen awards for Orth, Tu, van der Donk

The Howard Hughes Medical Institute has announced that ASBMB members **Kim Orth, Benjamin Tu** and **Wilfred van der Donk** are among the 70 researchers who will receive awards as part of the HHMI's Emerging Pathogens Initiative. These awards fund research to prepare for infectious diseases that could threaten human health.

Orth will receive $7 million over three years to work with a team of four assistant professors to identify fast-evolving virulence factors from clinically relevant pathogens. Tu and his team will receive $9.5 million over three years to research natural products that could be used to fight emerging pathogens. van der Donk and his team will receive $9.5 million over three years to research the avian and human antibody response to emerging influenza viruses.

ORTH

Orth is a professor of molecular biology and biochemistry at the University of Texas Southwestern Medical Center. Her lab focuses on the basic biochemical mechanisms that underlie bacterial infections with a focus on how bacteria such as Vibrio parahaemolyticus hijack and deregulate cellular signaling. Orth was elected to the National Academy of Sciences in 2020. She is an ASBMB fellow and won the 2019 ASBMB-Merck Award and the Society's 2012 Young Investigator Award.

Tu is a professor of biochemistry at the University of Texas Southwestern. His lab investigates how cellular processes such as cell growth and division, transcription, translation, mitochondrial homeostasis and autophagy coordinate the metabolic state of the cell. He was recently awarded the Edith and Peter O'Donnell Award by the Texas Academy of Medicine, Engineering Science & Technology. Tu is a co-chair of the 2024 ASBMB annual meeting, Discover BMB, to be held in San Antonio, Texas.

TU

van der Donk is a professor of chemistry at the University of Illinois Urbana-Champaign. His lab uses synthetic organic chemistry and molecular biology to study enzymatic transformations with implications for the environment and pharmaceuticals. van der Donk was recently elected to the National Academy of Sciences. He served as a co-chair of the 2018 ASBMB annual meeting.

VAN DER DONK

HHMI is committing $100 million to this initiative to support basic research targeted at preparedness for emerging pathogens.

Boal receives SBIC award

Amie Boal, a professor at the Pennsylvania State University Eberly College of Science, has won the 2022 Early Career Award from the Society for Biological Inorganic Chemistry, SBIC. She is the third woman to receive this award in its 16-year history.

Boal and her research group study the structural differences among members of large metalloenzyme superfamilies with similar features but diverse reactions or cofactors. The team seeks to pinpoint key structural characteristics, reprogram enzymes for new functions, and learn more about the adaptive advantages of their metallocofactors or assembly pathways.

Before joining the Pennsylvania State faculty a decade ago, Boal did postdoctoral studies at Northwestern University. She earned her Ph.D. at the California Institute of Technology.

BOAL

The SBIC Early Career Award includes a $2,000 prize. Boal will present her award lecture at the biennial International Conference on Biological Inorganic Chemistry in July in Adelaide, Australia.

Inventors name Watterson a fellow

Daniel Martin Watterson, a professor at Northwestern University with 39 patents to his name was named a 2022 fellow of the National Academy of Inventors.

Watterson earned his Ph.D. from Emory University, was a postdoctoral fellow in bioorganic chemistry at Duke University and has held faculty positions at Rockefeller University and Vanderbilt University. He is best known for clarifying signal transduction pathways in eukaryotic cells that play roles in health resilience and disease susceptibility. Understanding these pathways could point the way

WATTERSON

Six ASBMB members elected to NAM

The National Academy of Medicine has elected 100 new members, including six members of the American Society for Biochemistry and Molecular Biology. These exceptional scholars have demonstrated outstanding professional achievement and commitment to service. The ASBMB members among the honorees are Craig Blackstone, Namandjé Bumpus, Peter Glazer, Laura Kiessling, Lisa Monteggia and Yang Shi.

Craig Blackstone, chief of the movement disorders division in the neurology department at Massachusetts General Hospital and professor of neurology at Harvard Medical School, was recognized for identifying the cellular pathogenic mechanisms underlying hereditary spastic paraplegia and providing insight into the basic biology of the endoplasmic reticulum.

Namandjé Bumpus, chief scientist at the U.S. Food and Drug Administration and a professor of pharmacology at Johns Hopkins University School of Medicine, was recognized for foundational work in drug metabolism and antiviral pharmacology as well as translating fundamental drug metabolism studies to the prediction of patient drug responses.

Peter Glazer, professor and chair of therapeutic radiology at Yale School of Medicine, was recognized for discovering that tumor hypoxia causes genetic instability and IDH1 mutations suppress DNA repair in cancers, which cause vulnerability to radiation and PARP inhibitors. Glazer has developed novel drugs for cancer and gene editing, which has led to multiple cancer clinical trials.

Laura Kiessling, professor of chemistry at the Massachusetts Institute of Technology, was recognized for fundamental discoveries of protein–glycan interactions pertinent to immunity, inflammation, host–microbe interactions and human development.

Lisa Monteggia, professor of pharmacology at Vanderbilt University, was recognized for contributions to the neurobiology of emotion, pioneering work identifying a causal link between neurotrophin signaling and antidepressant action, and contributions to understanding the synaptic plasticity mechanisms underlying the therapeutic effects of psychiatric treatments.

Yang Shi, professor and director of epigenetics at Oxford University and a member of the Ludwig Institute for Cancer Research, was recognized for the groundbreaking discovery that histone methylation is reversible and the discovery of the first histone demethylase.

to new therapeutic approaches in tumor biology, intestinal disorders and neurological diseases such as Alzheimer's and neuropsychiatric disorders.

Watterson is also a co-discoverer of the calcium-binding messenger protein calmodulin. His research now focuses on optimizing three small molecules that are in clinical trials for neurological disorders and preclinical development of a novel candidate for use to treat depression. The molecules could also see potential use for tissue barrier dysfunctions in gastrointestinal and pulmonary disorders.

The NIA 2022 fellows were scheduled to be officially inducted June 27 at the 12th annual meeting of the academy in Washington, D.C.

Dikić receives Louis–Jeantet Prize

Ivan Dikić, director of the Institute of Biochemistry II at Goethe University Frankfurt, Germany, is a recipient of the 2023 Louis–Jeantet Prize for Medicine.

Dikić shares the prize with Brenda Schulman, director of the Max Planck Institute of Biochemistry in Germany. Their complementary research has expanded knowledge of ubiquitin and its role in protein homeostasis.

DIKIĆ

Born in what is now Croatia, Dikić studied medicine at the University of Zagreb and earned his doctorate from New York University. He launched his first research team at the Ludwig Institute for Cancer Research in Uppsala before becoming a professor of biochemistry at Goethe University Frankfurt. Since 2009, Dikić has directed the Institute of Biochemistry II. From 2009 to 2013, he was the founding director of the Buchmann Institute for Molecular Life Sciences. In 2018, Dikić was named a Fellow of the Max Planck Institute of Biophysics.

The Louis–Jeantet Prize recognizes scientists who conduct biomedical research in one of the member states of the Council of Europe. Recipients will be honored at the Louis–Jeantet Symposium.

Kiessling honored by ACS

The American Chemical Society presented Laura Kiessling with the Ronald Breslow Award for Achievement in Biomimetic Chemistry. Kiessling was honored for developing innovative glycoprotein biomimetics that has shed light on bacterial and human signaling pathways, which have propelled therapeutic advances.

Kiessling is a professor of chemistry at the Massachusetts Institute of Technology. Her lab uses chemical biology to elucidate the biological roles of carbohydrates such as glycoproteins that make up mucus and the cell surface carbohydrate coats of bacteria, with applications in manufacturing and medicine.

KIESSLING

Kiessling received her Sc.B. degree in chemistry from MIT and then earned a Ph.D. in chemistry at Yale University. She was an American Cancer Society postdoctoral fellow at the California Institute of Technology. After serving as a faculty member at the University of Wisconsin–Madison, she joined MIT in 2017. Recently, Kiessling was awarded the Royal Society of Chemistry's Centenary Prize and was elected to the National Institute of Medicine.

Tolbert wins ISAR Diversity Speaker Award

The International Society for Antiviral Research presented Blanton Tolbert with its 2023 Diversity Speaker Award, which highlights outstanding scientists and leaders in antiviral research who are members of historically underrepresented groups.

Tolbert is a professor of chemistry at Case Western Reserve University. His lab studies the molecular mechanisms of RNA virus replication using nuclear magnetic resonance and other biophysical methods.

TOLBERT

In addition to his research, Tolbert is an advocate for diversity, equity and inclusion. He has most recently served as the vice dean for DEI excellence and as the associate director for DEI at the Case Comprehensive Cancer Center. He was named inaugural vice president of science leadership and culture at the Howard Hughes Medical Institute, tasked with directing the HHMI Center for the Advancement of Science Leadership and Culture, which launched in November.

Past recipients of the ISAR diversity award include ASBMB member Craig Cameron. Tolbert was recognized and presented his research at the 36th International Conference

on Antiviral Research held March 13–17 in Lyon, France.

Bahar leads center at Stony Brook

Ivet Bahar took the helm in January as director of the Louis and Beatrice Laufer Center at Stony Brook University, a hub for research in physical and quantitative biology, advancing biology, biophysics and medicine.

Bahar's recent studies examine host-targeted repurposable drugs against coronavirus disease 2019, COVID-19, monoamine transporters and evaluation of missense variants in DNA.

A native of Istanbul, Bahar earned her master's degree in chemical engineering from Bogazici University there and her doctorate in chemistry at Istanbul Technical University. Before this appointment, she was a distinguished professor of computational and systems biology at the University of Pittsburgh. Earlier, she served as the founding director of the Center for Computational Biology and Bioinformatics at Pittsburgh's School of Medicine.

BAHAR

Bahar follows founding director, Ken Dill, who led the Laufer Center for its first 12 years.

Alrubaye honored for advising, teaching

Adnan Alrubaye, an assistant professor of poultry science and associate director of the cell and molecular biology graduate program at the University of Arkansas, has received several honors recently for his work with students.

The University of Arkansas agriculture division presented Alrubaye with the Jack G. Justus Award for Teaching Excellence, given to teachers who use novel and innovative methods to advance student learning; the Academic Advising Council honored him with the Silo-Busting Advising Award for his efforts to create cross-collaboration networking opportunities in the cell and molecular biology program; and he was named February Cordes Chair of the Wally Cordes Teaching and Faculty and Support Center in recognition of his student-centered teaching excellence.

ALRUBAYE

As a poultry microbiologist, Alrubaye studies the cause of and ways to mitigate bacterial chondronecrosis with osteomyelitis in broiler chickens. His lab recently published an article on the use of nanobiotics in chicken feed.

Alrubaye earned a master's degree in secondary education and a Ph.D. in cell and molecular biology at the University of Arkansas. He also earned a master's degree in microbiology from the University of Baghdad.

Tate appointed chair

Ed Tate has been named to the new position of chair in chemical biology at Imperial College London. In this role, he will foster new talent, enable new research directions and strengthen industry relationships.

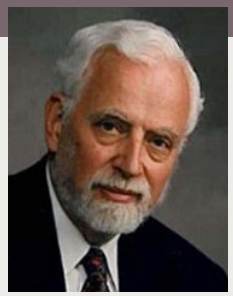
Tate has been a professor at Imperial since 2014 and a satellite group leader at the Francis Crick Institute since 2017. His research interests lie at the intersection of organic chemistry, biology and medicine. Tate's lab uses medicinal chemistry and chemical synthesis to find therapeutics for infectious diseases, cancer and more.

A fellow of both the Royal Society of Chemistry and the Royal Society of Biology, Tate has received the Wain Medal Lecture and Prize, President and Rector's Award for Excellence in Research Supervision, Norman Heatley Award, Cancer Research U.K. Program Foundation Award, Sir David Cooksey Translation Prize and the RSC Corday–Morgan Prize.

TATE

This new chair position was endowed by the international biopharma firm GSK, whose parent company, Glaxo, founded a chemistry chair at Imperial in 1992.

Bernard W. Agranoff



Bernard (Bernie) W. Agranoff, a professor of biological chemistry and renowned neuroscientist, died on October 21, 2022, in Ann Arbor, Michigan. He was 96, and he had been a member of the ASBMB since 1959.

Agranoff was born on June 26, 1926. He attended Cass Technical High School in Detroit, and in 1944, at age 18, he enrolled in the Navy Premedical Officer Training Program. He was assigned to the University of Michigan, where he completed a degree in chemistry in two years and then matriculated to Wayne State University in Detroit where he earned his medical degree in 1950. Agranoff completed his postdoctoral training mentored by Francis Schmitt at the Massachusetts Institute of Technology, a founder of the field of neuroscience.

In 1952, after completing his Navy tour of duty, Agranoff joined the Section of Lipid Chemistry at the National Institute of Neurological Disorders and Stroke in the National Institutes of Health. Nine years later, he transitioned to the University of Michigan Department of Biological Chemistry and Mental Health Research Institute to study the biochemistry of learning and memory.

In a 1962 paper in the journal Science, Agranoff demonstrated that new protein synthesis is needed for goldfish memory, but not learning, by giving intracranial injections of puromycin and tritium-labeled leucine to goldfish trained to avoid electric shocks. In 1964, he published a PNAS paper using similar methods to show that the formation of long-term but not short-term memory requires protein synthesis.

Agranoff served as president of the American Society for Neurochemistry and was a fellow of the American Association for the Advancement of Science and the American Academy of Arts and Sciences. He received the University of Michigan Lifetime Achievement Award in Medical Education.

Agranoff and his wife Raquel (Ricky) shared a passion for food that inspired a 2008 Gastronomica article explaining the brain health benefits of eating unsaturated fatty acids from fish.

Ricky Agranoff died in 2020. Bernard Agranoff is survived by his two sons, William and Adam Agranoff, and their families.

— Christopher D. Radka

Renato Baserga

Renato Baserga, a cancer researcher who authored more than 500 scientific studies, died on March 5 in Philadelphia. He was 97.

Baserga joined the American Society of Biological Chemists, the forerunner of the American Society for Biochemistry and Molecular Biology, in 1968. In the 1980s, he served on the editorial board of the Journal of Biological Chemistry.

Born April 11, 1925, in Meda, Italy, Baserga earned his medical degree at the University of Milan, completing his residency in pathology in 1951. He immigrated to Chicago, where he was a medical intern at Columbus Hospital and did a second pathology residency at St. Luke's Hospital.

Baserga practiced and taught pathologist at Northwestern University Medical School before moving east to serve as a professor of pathology at Temple University School of Medicine, where he twice served as chair of the department. In 1991, he became a professor of microbiology and immunology at Thomas Jefferson University, where he was deputy director of the Kimmel Cancer Center from 1991 to 2004 and later its interim director. He retired in 2012 at age 88.

Andrea Morrione, a researcher at Temple University, worked with Baserga on his later studies exploring the role of growth factors and growth factor receptors in cancer. Baserga and others confirmed the role of insulin-like growth factor receptor, or IGF-IR, in transformation and pioneered the use of antisense oligonucleotides to target oncogenes, Morrione said. This work led to clinical studies validating the receptor as a target in cancer treatment.

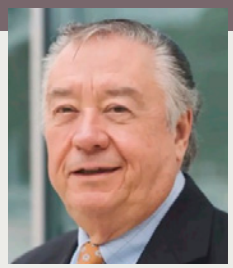
Earlier in his career, Baserga carried out groundbreaking research on the use of radioisotopes for the study of life processes, Morrione said. He also contributed to knowledge about the basic mechanisms behind cell proliferation.

Beyond science, Baserga had a passion for opera and classical music. With his wife, Beverly Lange, he was a long-time supporter of Opera Philadelphia and New York's Metropolitan Opera.

Baserga's daughter Janice Baserga, a veterinarian, died in 2016. He is survived by Lange, a pediatric oncologist; his daughter Susan Baserga, also a biochemist, and her husband, Peter Glazer, both ASBMB members; son-in-law Jeffrey Milburn; and grandsons, Samuel Glazer and Andrew and Forrest Milburn.

— Paula Amann

Marc G. Caron



Marc G. Caron, a longtime professor at Duke University Medical Center and a pioneer in G-protein coupled receptor research, died April 25, 2022, the ASBMB learned recently. He was 75.

Caron was born July 26, 1946 in St-Cyrille de L'islet, Quebec. He completed undergraduate studies at Laval University, Quebec, and earned a Ph.D. in biochemistry from the University of Miami. After postdoctoral training at Duke University Medical Center, he began his independent career in 1975 at Laval University and two years later returned to Duke.

Caron worked in G protein-coupled receptors, or GPCRs, and neurotransmitter transporters. He developed techniques for GPCR purification and visualization, then moved into studying accessory proteins that modulate receptor function. He helped discover how receptor signaling is regulated by kinases and arrestins, and identified one of the first examples of GPCR signaling mediated by a G protein rather than arrestin. His lab then pivoted to study selective signaling, using allosteric modulators to activate certain signaling outcomes while blocking others.

A Howard Hughes Medical Institute investigator from 1992 to 2004, Caron was a member of the American Academy of Arts and Sciences and a fellow of the American Association for the Advancement of Science. He received the 2005 Julius Axelrod Award in Pharmacology and the 2018 Goodman and Gilman Award in Receptor Pharmacology, both from American Society for Pharmacology and Experimental Therapeutics, and was named an ASPET fellow in 2020.

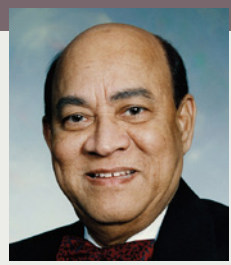
With his wife, Pauline, Caron settled in Hillsborough, North Carolina, where the forests reminded him of Canada. His daughter, Kathleen M. Caron, wrote in a remembrance in the journal Neuron that Caron's "daily nurturing" of the trees was echoed in the lab, where he mentored his students and took great care of his postdocs.

Duke professor Kafui Dzirasa recalled in the same remembrance how Caron supported his career. "He didn't want anyone to ruin the little sapling that he had spent so much time nurturing."

Pauline Caron died in 2018. Marc Caron is survived by daughters, Kathleen Caron and Melissa Caron Grahn, and son, Nelson Caron; a brother and four sisters; and many grandchildren.

— Meg Taylor

Krishnamurti Dakshinamurti



Krishnamurti Dakshinamurti, a human rights advocate and a prolific biochemist, died Oct. 13, 2022. He was 94 and had been an ASBMB membe since 1971.

Dakshinamurti was born in Vellore, India, on May 20, 1928, when the country was under British rule. His father's service in the British Army during World War I inspired Dakshinamurti to pursue peace, first through student activism in the 1940s and later by founding the Mahatma Gandhi Centre of Canada to promote nonviolence and human rights.

Dakshinamurti earned his Ph.D. in 1957 from the University of Manitoba of Winnipeg. He was a postdoc at the University of Illinois and the Massachusetts Institute of Technology, then served as associate director of a hospital research institute in Pennsylvania before returning to the University of Manitoba where he became a professor of biochemistry in 1965. He retired as an emeritus professor in 1998, but continued writing and researching into his 90s.

Dakshinamurti's early studies focused primarily on pyridoxine and biotin deficiency diseases. He studied carbohydrate metabolism, lipogenesis and vitamins, and used methods such as fluorometry and rat models to investigate the effects of biotin deficiency on the physiology and pharmacology of whole organisms. One of his last papers was about therapeutic potential in several vitamins to prevent and treat metabolic syndrome, a risk factor for Type 2 diabetes.

Dakshinamurti served as co-director and later senior adviser to the Centre for Health Policy Issues at the St. Boniface Hospital Research Centre and belonged to many Winnipeg committees and cultural organizations. In 2020, he was named to the Order of Manitoba for his achievements in biochemistry.

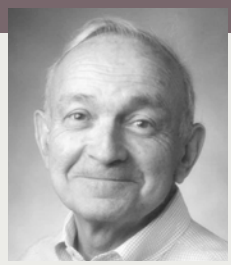
Dakshinamurti founded the Gandhi Center in 2007 and also founded the Dakshinamurti Academy of Hindu Studies at Winnipeg's Hindu Temple, the largest collection of literature on Hinduism in Western Canada.

According to his family obituary, Dakshinamurti loved logical arguments in politics and science, Shakespeare, symphonic music and Sanskrit poetry.

He is survived by Ganga Dakshinamurti, his wife of 61 years, as well as two daughters and a brother.

— Inayah Entzminger

Peter Geiduschek



Peter Geiduschek, a pioneering researcher in DNA structure and gene expression at the University of California, San Diego, and a member of the ASBMB since 1963; died April 8, 2022, just shy of his 94th birthday, the ASBMB learned recently.

Geiduschek was born on April 11, 1928, in Vienna. In 1939, after the Nazis annexed Austria, he was among the Jewish children transported to safety in England. There he earned his school certificate before rejoining his parents who had fled to New York. He completed his undergraduate degree in chemistry at Columbia University and earned his Ph.D. in physical chemistry at Harvard University.

After serving two years in the U.S. Army at the biochemistry department of Walter Reed Hospital in Washington, D.C., and working for the Committee on Biophysics at the University of Chicago for a decade, he joined the faculty at the University of California, San Diego, in 1970, where he remained until his retirement in 2014.

Geiduschek's research focused on genetic and transcriptional regulation in phages, yeast and archaea. He made seminal contributions to the field's understanding of the physical properties of DNA. Specifically, he was the first to show that DNA denaturation is reversible and he coined the term "chaotropic," which is used today to describe how salts can destabilize DNA and its hydrogen bonds by displacing water. In addition, his findings helped elucidate how viruses take over host machinery. Geiduschek also made major discoveries on RNA polymerases and the mechanisms of transfer RNA synthesis.

He was an elected member of the National Academy of Sciences and the American Academy of Arts and Sciences and a fellow of the American Association for the Advancement of Science and the American Academy of Microbiology.

In Geiduschek's UC San Diego obituary, James T. Kadonaga wrote: "(W)ith his wit, charm and warm and caring personality, he was a much-loved colleague. We thus honor and will fondly remember a remarkable and singular individual who has provided much of the basic knowledge of DNA and gene expression that we enjoy today and significantly and selflessly contributed to the establishment of UC San Diego as one of the premier research universities in the world."

— Marissa Locke Rottinghaus

Gerold Grodsky

Gerold Grodsky, a retired professor of biochemistry, biophysics and medicine at the University of California, San Francisco, died Dec. 29, 2022, in San Francisco. He was 95, and he had been a member of the ASBMB since 1961.

A native of St. Louis, Missouri, Grodsky was born on Jan. 18, 1927. His father ran a soft-drink bottling business, which, according to a family obituary, sparked Grodsky's early interest in chemistry. At 17, he began naval officer training at the University of Illinois, where he graduated summa cum laude in chemistry as a Navy ensign and also earned a master's degree. He received his Ph.D. in biochemistry at the University of California, Berkeley, where he met his future wife, Kayla Deane Wolfe. They were together until she died in 2003.

As a postdoctoral fellow at Cambridge University, Grodsky grew interested in diabetes research. He studied bilirubin metabolism as a researcher at the University of California, San Francisco and then joined the school's metabolic unit, later known as the UCSF Diabetes Center. There, he pivoted to the study of insulin.

In the 1960s, Grodsky developed the first precipitating radioimmunoassay for insulin, which enabled accurate measurement of insulin in biological fluids and tissues. His studies pioneered the description of the fast and slow phases of insulin release and the hypothesis that insulin is stored in compartments of differing availability. His work on rapid insulin release helped inform algorithms for the artificial pancreas and fast-absorbing insulin preparations.

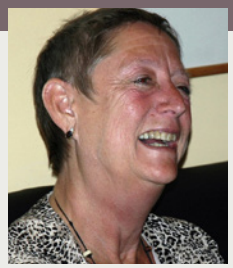
Grodsky was the founding editor of two diabetes journals. He received the Rumbough Science Award from the Juvenile Diabetes Research Foundation, the Paul Lacy Memorial Lecture Award from the International Pancreas and Islet Transplant Association and UCSF's Lifetime Achievement Award. In 1993, the Juvenile Diabetes Research Foundation established the Gerold and Kayla Grodsky Basic Research Scientist Award. In 2010, UCSF created the Gerold Grodsky, Ph.D. Chair in Diabetes Research.

Grodsky retired in 1990 but continued consulting at the UCSF Diabetes Center. His hobbies included collecting antique black powder rifles and sailing, tennis and fishing trips with family.

Grodsky's daughter Jamie died in 2010. He is survived by his companion, Roberta Sherman; daughter Andrea Huber and her husband; four grandchildren; and two great-grandchildren.

— Paula Amann

Christine Guthrie



Christine Guthrie, a pioneer in RNA biology and a leader in the pre-mRNA splicing field, died July 1, 2022 from breast cancer; she was 77. A member of the American Society for Biochemistry and Molecular Biology for almost 40 years, Guthrie received the 2011 ASBMB–Merck Award.

Born in Brooklyn, New York, on April 27, 1945, Guthrie received an undergraduate degree from the University of Michigan in 1966. She joined Masayasu Nomura's laboratory at the University of Wisconsin–Madison and earned her Ph.D. in 1970, exploring the importance of temperature-dependent RNA conformational rearrangement in ribosome assembly. After postdoctoral training at the Max Planck Institute in Germany, she worked with Bill McClain on bacteriophage T4 tRNA biosynthesis at the University of Wisconsin–Madison.

Guthrie was the first woman professor and the seventh faculty member to join the University of California, San Francisco's, new biophysics and biochemistry department in 1973. She became a research professor of genetics and remained at UCSF until her retirement in 2014.

After working on the folding of newly synthesized tRNAs and their maturation for some years, Guthrie was captivated by the discovery of RNA splicing in mammals and worked with her group to identify yeast versions of the small nuclear RNAs, or snRNAs, that are essential for mammalian splicing. Her lab identified the critical snRNA components of the yeast spliceosome and showed the conservation of the splicing machinery from yeast to eukaryotic cells.

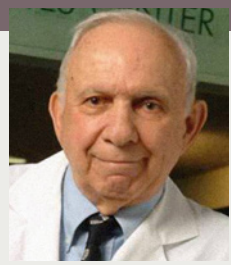
According to a retrospective in Science, Guthrie was a trailblazer who "energized the entire RNA community with her keen mind and fortitude." She was instrumental in recruiting faculty and developing Tetrad, one of the nation's top biomedical science graduate programs, at UCSF.

A founding member of the RNA Society, Guthrie was elected to the National Academy of Sciences in 1993. She received the Women in Cell Biology Senior Career Recognition Award in 1998 and the RNA Society Lifetime Achievement Award in 2006.

Guthrie is survived by her husband, John Abelson, a professor emeritus at UCSF.

— Swarnali Roy

Simeon G. Margolis



Simeon G. (Moan) Margolis, an endocrinologist and educator and a member of the ASBMB since 1974, died May 16, 2022, the ASBMB learned recently; he was 91.

Margolis was born March 29, 1931, in Johnstown, Pennsylvania, to Edward Margolis, a watch repairman, and Bella Margolis, a homemaker. He received a full scholarship to Johns Hopkins University, where he earned his bachelor's degree and M.D.; served as an intern, resident and chief resident; and then earned a Ph.D. in biochemistry. During his time as a premed student at JHU, Margolis played both baseball and basketball, and he set the single-game basketball scoring record, which he still holds today.

At a party in his hometown when he was a young teenager, Margolis met Mary Alice Kahl. They married after his first year of medical school and were together until she died in 2011.

For more than 50 years, Margolis was a faculty member at JHU. He became director of the endocrinology and metabolism division four years after receiving his doctorate, leading the division until 1981 and then again from 1984 to 1990. He served twice as an associate dean, once for academic affairs and later for faculty affairs.

Margolis' research focused on cholesterol, diabetes and heart disease. He was also a devoted physician and professor. He worked to control diabetes and prevent coronary heart disease in patients, and he taught both medical students and his fellow physicians about controlling serum lipids and lipoproteins.

In the interest of providing accurate medical information, Margolis served as an editor for JHU's "Heath After 50" newsletter, contributed medical columns to the Baltimore Sun and Yahoo! Health, edited books and wrote pamphlets.

In 2016, a former medical student established the Charles C. Homcy and Simeon Margolis professorship at the JHU School of Medicine.

Margolis is survived by three daughters, Amy Hardin, Karen Griswold, and Susan Margolis, and six grandchildren.

— Marissa Locke Rottinghaus

Donald Voet

Donald Voet, an emeritus associate professor of chemistry at the University of Pennsylvania, died April 11 in Kennett Square, Pennsylvania. With his wife, Judith Voet, he served as editor-in-chief of the journal Biochemical and Molecular Biology Education from 2000 to 2014. They co-wrote two college-level textbooks, "Biochemistry" and "Fundamentals of Biochemistry: Life at the Molecular Level."

Donald Voet was born Nov. 29, 1938, in Amsterdam to Andries and Henrietta Hannah Voet. The family came to the U.S. in 1939, a year before Nazi forces occupied the Netherlands. Voet earned a bachelor's degree in chemistry at the California Institute of Technology and a doctorate in chemistry at Harvard University. After postdoctoral research in Alexander Rich's lab at the Massachusetts Institute of Technology, Voet joined the University of Pennsylvania chemistry faculty.

Voet used X-ray crystallography to describe how structure informs the function of biological molecules. He studied yeast inorganic pyrophosphatase, the enzyme that catalyzes the hydrolysis of inorganic pyrophosphate to phosphate, a key step in building polypeptides and polynucleotides.

Voet's lab also studied granulocyte–macrophage colony-stimulating factor, a cytokine involved in the production, growth and activity of granulocytes and macrophages. This cytokine could one day play a role in treating immunosuppressive conditions such as AIDS and the aftereffects of cancer chemotherapy.

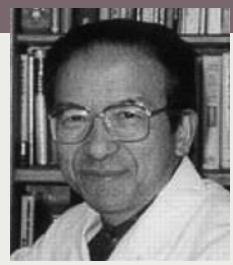
For many years, Don and Judy Voet served as judges in the Undergraduate Poster Competition at ASBMB annual meetings. In 2012, they received the ASBMB Award for Exemplary Contributions to Education.

Voet loved scuba diving, swimming, hiking and skiing. He climbed Mt. Rainier, Mt. Whitney and to the Mt. Everest base camp, along with many mountain trails across the U.S. He traveled to all seven continents, including Antarctica.

Voet is survived by Judith, his wife of 58 years; children, Wendy and Doug Voet; son-in-law, Lex; daughter-in-law, Sue; grandchildren Maya, Lizzie, Leo and Cora; brother, Martin; sister Loesje; and extended family in the United States, Israel and the Netherlands. His sister Marion predeceased him

— Paula Amann

Isao Yamazaki



Isao Yamazaki, a research scientist at Hokkaido University and an emeritus member of the ASBMB, died on August 19, 2022, at age 97.

Yamazaki was born September 1, 1924, in Otaru City, Hokkaido, Japan. He obtained his bachelor's degree in 1948 at Hokkaido University and his doctorate in 1958. His graduate research focused on peroxidase reactions.

After serving for two years on the faculty at Tohoku University, Yamazaki pursued a postdoctoral fellowship in 1959 in the Department of Biochemistry at the University of Oregon Medical School where he began his work on free radicals with Howard Mason. He returned to Japan and Tohoku University in 1961, and he served concurrently in the Applied Electrical Research Laboratory at Hokkaido University. He pursued groundbreaking research on enzyme reactions, electrons and reactive oxygen species for 34 years.

Yamazaki's work on free radicals was honored and highlighted in a 2010 Journal of Biological Chemistry Classics article by Nicole Kresge, Robert Simoni and Robert Hill, a longtime biochemistry faculty member at Duke University.

Hill and his coauthors wrote that both papers covered in the Classics article "not only demonstrated the excellent correlation of the free radical signals with the proposed reaction kinetics but also confirmed Leonor Michaelis' theory that the two-step oxidation of organic compounds involves a chemical radical."

After retiring from Hokkaido University in 1988, Yamazaki became a visiting professor at Utah State University, Logan, where he continued to do research.

Yamazaki received many honors including being elected an honorary member of the American Society of Biological Chemists in 1983. After his scientific career, he pursued research on Buddhism and published a book titled "The Origin of Buddhism, Its Wisdom and Faith."

— Marissa Locke Rottinghaus

John H. Exton: A cell signaling pioneer

By Roger J. Colbran, Jackie D. Corbin & Alan D. Cherrington

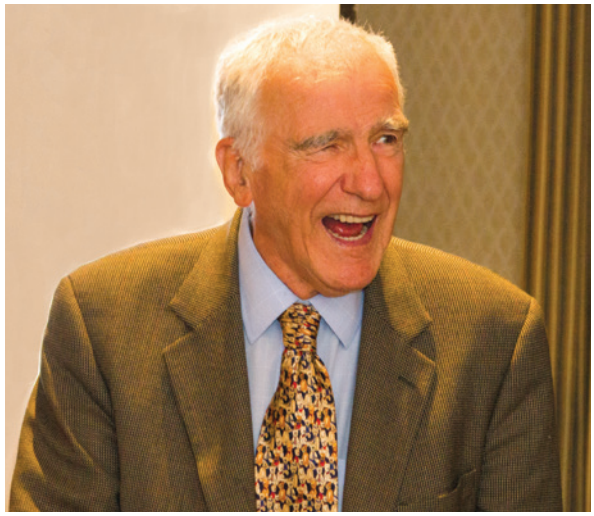
The cell signaling community lost one of the giants in the field when John H. Exton died on December 18. He was 89.

After immigrating to the U.S. from New Zealand in 1963, John spent his entire scientific career at Vanderbilt University in Nashville, Tennessee, where he was a distinguished member of the faculty for almost six decades, including 36 years, from 1968 to 2004, as an investigator of the Howard Hughes Medical Institute. He also was an associate editor and editorial board member for the Journal of Biological Chemistry (JBC) and was a member of the American Society for Biochemistry and Molecular Biology from 1970 until his death.

John was born in Auckland, New Zealand, on August 29, 1933, and retained a love of his home country throughout his life. He received a bachelor of medical science degree from the University of Otago in Dunedin, New Zealand. While he was there, he published his first research paper on the breakdown of pyrimidines in 1956. After completing an internship in medicine, he pursued a Ph.D. in biochemistry in Dunedin, studying the metabolism of isolated liver cells with Norman Edson, formerly the first Ph.D. student of Hans Krebs.

John declined a United Kingdom Commonwealth Scholarship to attend Trinity College at Oxford University, instead joining the physiology department (now the molecular physiology and biophysics department) at Vanderbilt. He and his wife, Janet, traveled to the U.S. by ship across the Pacific, through the Panama Canal to Port Everglades in Florida, and then by train to Nashville — younger readers may have difficulty comprehending this arduous journey.

At Vanderbilt, John was mentored by Charles "Rollo" Park and Earl Sutherland, who would later win the Nobel Prize for Physiology or Medicine in 1971. John rose rapidly through the academic ranks, from instructor in 1964 to assistant professor in 1966, associate professor in 1968, and full professor in 1970. He was awarded emeritus status in 2019 and was regularly present on campus until the COVID-19 pandemic disrupted all our lives.



ASBMB

John Exton was an associate editor and editorial board member for the Journal of Biological Chemistry and an ASBMB member from 1970 until his death.

A distinguished career

John's research provided fundamental insights into the mechanisms by which hormones control cellular physiology. He initially studied the control of gluconeogenesis by epinephrine, particularly via cyclic adenosine monophosphate, or AMP, signaling. He discovered that several other hormone receptors acted independently of cyclic AMP to increase intracellular calcium ion concentrations. Further work showed that these hormones worked by activating certain phospholipase C enzymes to induce the calcium increase. In a breakthrough study, his lab identified novel heterotrimeric guanosine-5'-triphosphate, or GTP, -binding proteins that regulate phospholipase C. In a later project, John discovered that small GTP-binding proteins activated another type of phospholipase (D) that had different roles in cell signaling.

John's work was published in over 360 scientific articles, including several with over 1,000 citations each, and he gave more than 340 seminars and presentations at scientific meetings and other institutions throughout the world. His contributions were recognized with many awards, including the Lilly Award and an Established Investigator Award from the American Diabetes Association, the Earl Sutherland Award and Stanley Cohen Award from Vanderbilt, and a Doctor Honoris Causa from the Autonomous University of Barcelona. John was named a fellow of the American Association for the Advancement of Science and an inaugural fellow of the American Physiological Society. In 2001, he was elected to the National Academy of Sciences of the United States.

John will be remembered as a respected teacher and colleague at Vanderbilt. He ran one of the university's larger research groups, and his notable contributions included training numerous postdoctoral fellows and students who went on to successful independent careers.

Nashville memories

Together, the three of us were John Exton's colleagues at Vanderbilt for a total of over 100 years. We remember him as a raconteur with a keen sense of humor and one of us christened him the "King of Puns."

John and Janet were known for hosting costume parties in their younger days. On one notable occasion, they dressed up as the pope and a nun and then realized they needed to run to the grocery store to pick up some last-minute supplies, much to the amusement of the cashiers.

Joe Provost, a postdoc in the 1990s who is now a professor at the University of San Diego, recalls that John's lab included at least 12 postdocs, a graduate student, two

ASBMB

ASBMB

John Exton and Thomas C. Vanaman, also a Journal of Biological Chemistry associate editor, are pictured at a 2011 celebration of Herb Tabor, longtime JBC editor-in-chief.

or more technicians, a lab manager, a lab secretary, and a JBC assistant. They all called him "The Chief," and he was a demanding but caring mentor. He loved a joke and visiting with his personnel, but he made it clear they had to be productive, including working in the lab on Saturdays, no question, just as he did.

Two days after another postdoc, Rafat Siddiqui, arrived in Nashville from Pakistan, John and Janet turned up on his new doorstep with a truckload of furniture and other household goods. Siddiqui, now a Virginia State University professor, said the Extons spent the entire day helping him buy and transport everything else he needed to establish residence in a strange land. No doubt John and Janet remembered their own arrival in Nashville after the grueling journey from New Zealand.

Other postdocs remember being starstruck as they poured drinks and served food to Nobel laureates and other leaders in the signaling field at a party at John's house in association with an international meeting held in Nashville.

Journal duties

John was a pillar of the broader scientific community and served in significant editorial roles with multiple society journals. He was an associate editor for the American Journal of Physiology from 1984 to 1991,

John Exton shares a laugh at a meeting of JBC associate editors with Judith Bond, a former president of the society.

and, perhaps most significantly, was an associate editor for the JBC for a quarter of a century, from 1988 to 2013.

Barbara Gordon, the recently retired executive director of the ASBMB, found it hard to concentrate when sitting next to John at associate editor meetings because he always provided a running commentary on the proceedings. She said he never failed to write and deliver a poem or a limerick at the end of each meeting to convey his thoughts on the topics and ideas that had been discussed.

Gordon also recalls that John helped brainstorm marketing slogans for the ASBMB and its journals. One of her favorites, printed on a T-shirt that was given to new JBC editorial board members at their orientation, featured the words "I'm doing hard labor because of Herb Tabor," accompanied by a portrait of the great long-term editor-in-chief himself.

The current JBC editor-in-chief, Alex Toker, remembers John as "a scholar, a gentleman, and wonderfully eccentric."

John was productive throughout his long and illustrious career. He taught us much about cellular signaling. He took his role as an educator seriously, demanding a lot from his students but giving a lot back in return. At the same time, he protected the standards of the JBC for a quarter of a century.

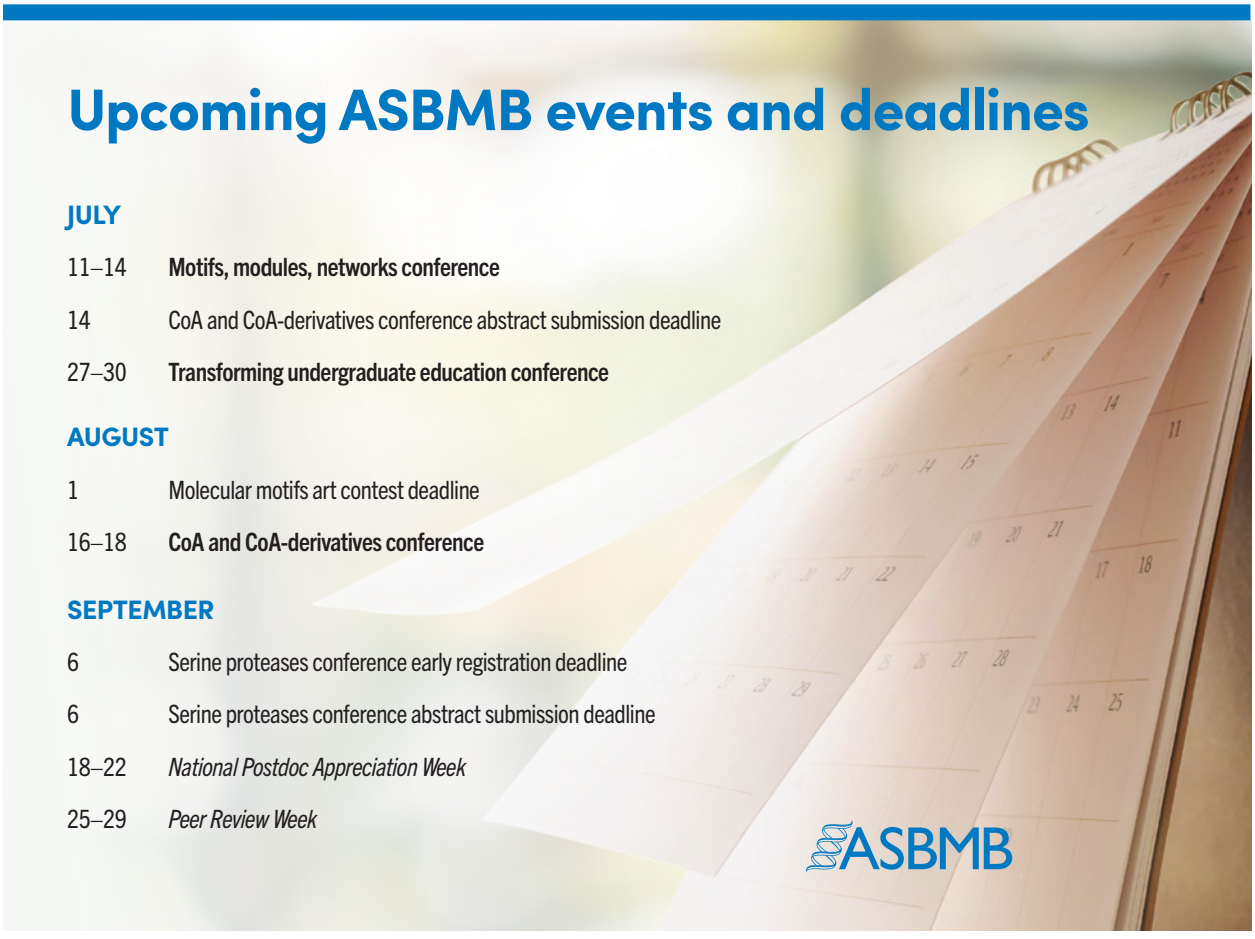
Despite his professional commitments, John was a devoted husband and father. His sense of humor was unique and well-known to all. He will be missed, but generations of young scientists still benefit from his career and tutelage.

John is survived by Janet, his wife of 65 years; son Richard and wife Maralie, and sons Peter and Stephen; and grandchildren, Richard Jr., Lyndon, Emma, and Leighton Belmont.

Roger J. Colbran (roger.colbran@vanderbilt.edu) is a professor and vice chair of molecular physiology and biophysics at Vanderbilt University.

Jackie D. Corbin (jackie.corbin@vanderbilt.edu) is a professor emeritus of molecular physiology and biophysics at Vanderbilt University.

Alan D. Cherrington (alan.cherrington@vanderbilt.edu) is a molecular physiology and biophysics professor and holds a chair in diabetes research at Vanderbilt University.



Discover BMB 2024 co-chairs and symposia

Discover BMB 2024, the annual meeting of the American Society for Biochemistry and Molecular Biology, is scheduled to take place March 23–26, at the Henry B. Gonzalez Convention Center, in San Antonio.

The 2024 meeting co-chairs are **Vanina Zaremberg**, professor and associate head of graduate programs in the biological sciences, University of Calgary, and **Benjamin Tu**, professor of biochemistry at the University of Texas Southwestern Medical Center.

Here are the symposia themes and organizers:

Microbial signaling, communication and metabolism
Peter Chien, University of Massachusetts, Amherst
Jade Wang, University of Wisconsin, Madison

Cool and novel enzymes
Shelley Copley, University of Colorado, Boulder
Hung-wen (Ben) Liu, University of Texas at Austin

RNA biology
Katrin Karbstein, University of Florida, Scripps Biomedical Research
Jeremy Wilusz, Baylor College of Medicine

New frontiers in structural biology
Jose Rodriguez, University of California, Los Angeles
Hosea Nelson, California Institute of Technology

Advances in natural product biochemistry and biotechnology
Yi Tang, University of California, Los Angeles
Katherine Ryan, University of British Columbia

Redox and metals in biology
Siavash Kurdistani, University of California, Los Angeles
Gina DeNicola, Moffitt Cancer Center

Membrane contact sites
Chris Beh, Simon Fraser University
Jen Liou, University of Texas Southwestern Medical Center

Lipid metabolism
Maria Fedorova, Dresden University of Technology
Neale Ridgway, Dalhousie University

Signaling mechanisms in the nucleus
Glen Liszczak, University of Texas Southwestern Medical Center
Aaron Johnson, University of Colorado Anschutz Medical Campus

Mitochondria, peroxisomes and chloroplast metabolism
Pere Puigserver, Harvard Medical School
Greg Moorhead, University of Calgary

Maximizing Access Committee
Sonia Flores, University of Colorado School of Medicine
Johnathan Kelber, Baylor University
Kayunta Johnson–Winters, University of Texas–Arlington
Karla Neugebauer, Yale School of Medicine

Education and professional development
Saumya Ramanathan, Arizona State University

American Society for Biochemistry and Molecular Biology
Discover BMB | 2024
SAN ANTONIO | MARCH 23–26

Discover BMB

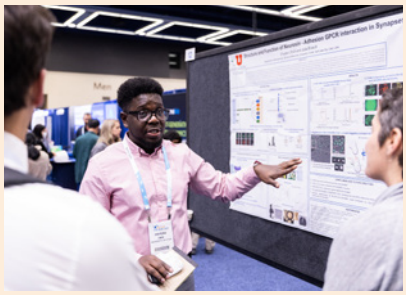
The American Society for Biochemistry and Molecular Biology hosted Discover BMB, the society's first stand-alone meeting in many years, March 25–28 at the Seattle Convention Center. The consensus: Good times and good science were enjoyed by all.

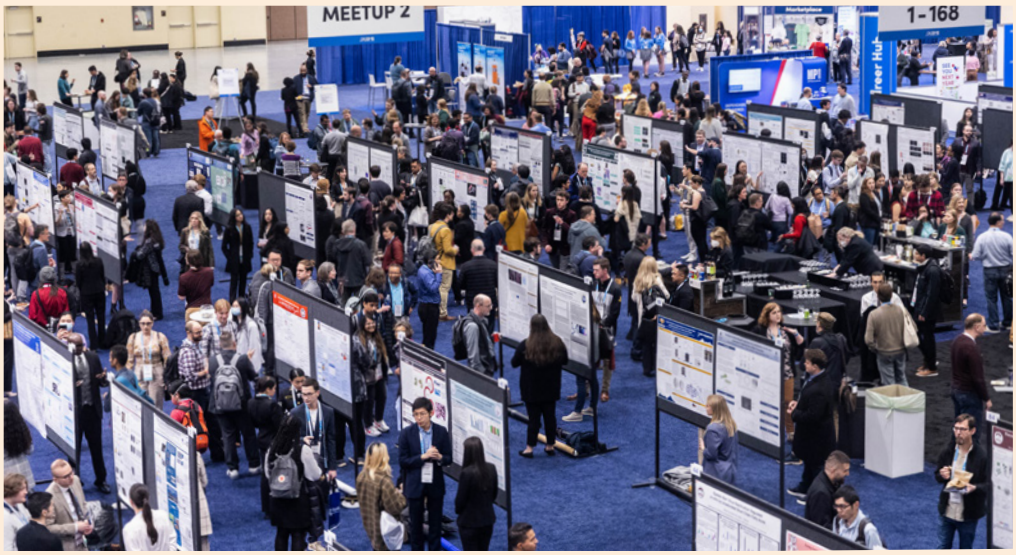
ABOVE: Odaelys Pollard and Melissa Rowland–Goldsmith of the ASBMB Science Outreach and Communication Committee lead a hands-on activity during Community Day, a pilot event designed to engage local high school students with real life science and expose them to BMB career paths.

LEFT: Squire Booker of Pennsylvania State University received both the ASBMB Ruth Kirschstein Diversity in Science Award and the ASBMB–Merck Award.

BELOW: Daily poster sessions in the exhibit hall drew enthusiastic crowds.

BELOW LEFT: Onyeka Obidi of the University of Utah presents his poster on structure and mechanism of neurexin-adhesion GPCR interactions in neuronal synapses.





Seattle Scenes

RIGHT: Susan Forsburg, at right, a 2023 ASBMB fellow, converses with other attendees in the exhibit hall.

MIDDLE RIGHT: At the Seattle Aquarium, networking reception attendees got to know each other while exploring hands-on exhibits of marine life.

BOTTOM RIGHT: ASBMB President Ann Stock of Rutgers University, Meetings Committee Chair Vahe Bandarian of the University of Utah and past President Toni Antalis of the University of Maryland attend the networking reception at the Seattle Aquarium.

BOTTOM LEFT: Discover BMB co-chairs Karen Allen of Boston University and Craig Cameron of the University of North Carolina enjoy a moment onstage.

BELOW: ASBMB Maximizing Access Committee members Allison Augustus-Wallace (center) and Kayunta Johnson-Winters (right) participate in a roundtable discussion.

How SARS-CoV-2 evades our defenses

By Aswathy N. Rai

Pathogens that invade humans confront many host mechanisms that prevent infection and its spread. The complement system is an integral part of the innate immune system, the body's first line of defense against pathogens.

The complement system surveys, tags and clears pathogens using a tightly controlled network of approximately 35 plasma- and membrane-bound proteins activated by the classical pathway, the alternative pathway or the lectin pathway. Each of these complement pathways has unique mechanisms that help the system clear an array of pathogens and cellular debris.

On the other side of the arms race, pathogens that infect humans have evolved strategies to escape the complement system. SARS-CoV-2, the causative agent of COVID-19, is no different.

Clinical studies show that in severe cases of COVID-19, the SARS-CoV-2 infection triggers hyperactivation of the complement system. However, scientists do not yet understand the mechanism by which SARS-CoV-2 evades the system.

Surajit Ganguly's research at Jamia Hamdard in India focuses on understanding how pathogens modulate the functions of neurons via interactions between the nervous and immune systems. During the COVID-19 pandemic, the Ganguly lab focused on identifying mechanisms by which SARS-CoV-2 evades the immune system.

"India went into total lockdown … from the middle of March 2020, and being shunned out of the lab is the last thing a neuroscientist wants," Ganguly said. "So using bioinformatics skills was the best option my team was left with during the height of the pandemic."

In a recent article in the **Journal of Biological Chemistry**, the team provides preliminary evidence that SARS-CoV-2 bypasses the activated complement system using molecular mimicry in which the ORF8 viral protein mimics a human complement protein, Factor I, or FI.

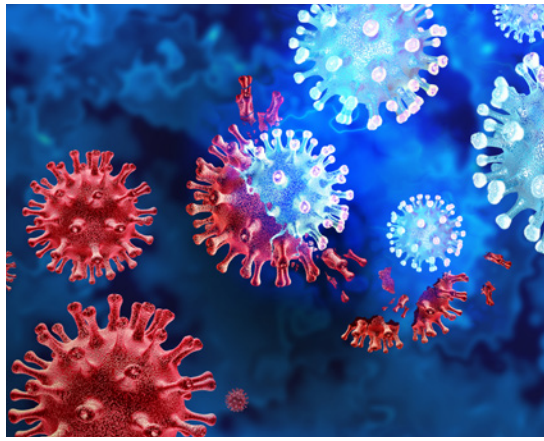
During a coronavirus outbreak in 2003, Ganguly was at the National Institutes of Health in Maryland, he said.

"I vaguely remembered talking to one virologist during that time, who said the disappearance of SARS-CoV coincided with a major mutation on the sequence that produced the viral accessory protein known as ORF8," he said.

Relying on that information, Ganguly extracted the first published protein sequence of ORF8 from SARS-CoV-2 and started looking for a match in the human protein data bank.

The team found that the SARS-CoV-2 ORF8 protein had sequence similarities to FI, suggesting the two proteins could have a common interacting factor in the host cells, the C3b protein. The C3b protein is a component of the alternative pathway, or AP, and of the activated form of Factor C3 complement protein. Tagging of pathogens by C3b, also called opsonization, marks them for destruction by phagocytic cells.

The FI protein cleaves peptide bonds in C3b protein and downregulates the complement activation pathways to avoid destruction of host cells. FI binds C3b to prevent hyperactivation of the AP by cleaving C3b into smaller peptides.



The SARS-CoV-2 virus can evade the complement system by molecular mimicry.

Using a combination of in silico protein docking analysis, coimmunoprecipitations, AP C3-convertase and cofactor assays, the Ganguly lab's study shows that the SARS-CoV-2 ORF8 protein binds to complement C3/C3b, preventing the binding to other cofactors required for activation and regulation of the AP pathway.

"We have highlighted a moonlighting function of the SARS-CoV-2 encoding ORF8 protein," Ganguly said. "Targeting ORF8 could be a strategy to help our immune system overpower the infectivity of the virus."

DOI: 10.1016/j.jbc.2023.102930

Aswathy N. Rai (aswathy.rai@msstate.edu) is an assistant clinical professor and undergraduate coordinator at Mississippi State University's department of biochemistry, molecular biology, entomology and plant pathology. Follow her on Twitter: @AswathyRai

The 'Rapunzel' virus: An evolutionary oddity

Extremely long tail provides window into how bacteria-infecting viruses assemble

By Marissa Locke Rottinghaus

A recent study in the **Journal of Biological Chemistry** has revealed the secret behind an evolutionary marvel: a bacteriophage with an extremely long tail. This extraordinary tail is part of a bacteriophage that lives in hot springs.

Emily Agnello, a graduate student at the University of Massachusetts Chan Medical School, is the lead author on the study. "Bacteriophages, or phages for short, are everywhere that bacteria are, including the dirt and water around you and in your own body's microbial ecosystem as well," she said.

Brian Kelch, an associate professor of biochemistry and molecular biotechnology at UMass Chan, supervised the work.

Phages consist of a tail attached to a spiky protein shell that contains their DNA.

Phage tails, like human hair, vary in length and style; some are long and bouncy, others are short and stiff. While most phages have short, microscopic tails, the "Rapunzel bacteriophage" P74-26 has a tail 10 times longer than most. The Rapunzel moniker is derived from the fairy tale about a girl with extremely long hair.

Phage tails are important for puncturing bacteria, which are coated in a dense, viscous substance. P74-26's long tail allows it to invade and infect the toughest bacteria. Not only does P74-26 have an extremely long tail, but it is also the most stable phage. Researchers have been studying P74-26 to find out why and how it can exist in such extreme environments.

"Each phage tail is made up of many small building blocks that come together to form a long tube," Agnello said. "Our research finds that these building blocks can change shape, or conformation, as they come together.

"This shape-changing behavior is important in allowing the building blocks to fit together and form the correct structure of the tail tube."

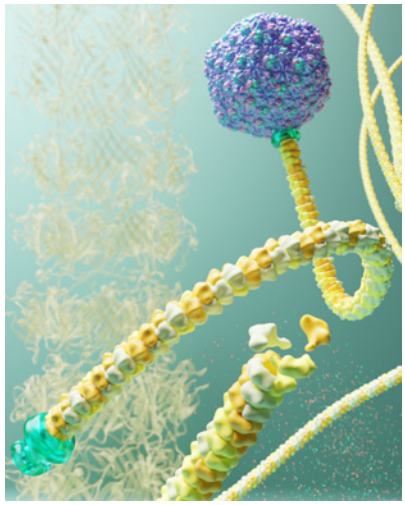
The researchers found that the building blocks of the tail lean on each other to stabilize themselves.

The team used cryo-electron microscopy, which "allows us to take thousands of images and short movies at a very high magnification," Agnello explained. "By taking lots of pictures of the phage's tail tubes and stacking them together, we were able to figure out exactly how the building blocks fit together."

They found P74-26 uses a ball-and-socket mechanism to stabilize itself. In addition, the tail is formed from vertically stacking rings of molecules that make a hollow canal.

"I like to think about these phage building blocks as kind of like Legos," Kelch said. "The Lego has studs on one side and the holes or sockets on the other."

Phages occupy almost every corner of the globe and are important to industries such as health care, environmental conservation and food safety.



LEONORA MARTINEZ-NUNEZ

The tail of the phage P74-26 is 10 times longer than most other phage tails — nearly 1 micrometer long, which is about the width of some spiders' silk.

"Bacteriophages are gaining ever-growing interest as an alternative to antibiotics for treating bacterial infections," Agnello said. "By studying phage assembly, we can better understand how these viruses interact with bacteria, which could lead to the development of more effective phage-based therapies."

DOI: 10.1016/j.jbc.2023.103021

Marissa Locke Rottinghaus (mlocke@asbmb.org) is the science and policy communications specialist for the ASBMB.

Clues to oocyte development

By Arti Dumbrepatil

In a female germ cell, also known as an oocyte, maturation is orchestrated by such biological processes as chromosome segregation, mRNA decay and metabolic changes. Defects in any one of these processes can lead to infertility, meiotic defects and/or embryonic arrest. Successful oocyte maturation requires interplay between translation and degradation of key proteins involved in germ cell division. To advance reproductive medicine, researchers need to understand the mechanisms from oocyte to mature egg.

To help unravel these mechanisms, a team of researchers led by Hongzheng Sun and Guanyi Sun of the Nanjing Medical University in China carried out proteomic profiling of mouse oocytes at three developmental stages, identifying functions of critical proteins and pathways for maturation. This study was published in the journal **Molecular & Cellular Proteomics**.

"Simply put, we interpreted the maturation process of mouse oocytes with proteomics and discovered signaling pathways and functional proteins that regulate oocyte maturation," Hongzheng Sun said. "Our data serves as an important resource on the dynamic biological processes occurring in oocyte proteome and provides knowledge to better understand the molecular mechanisms during female germ cell development."

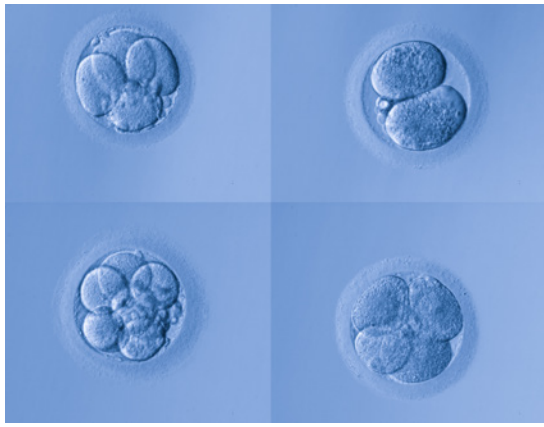
Using eggs taken from artificially superovulated mice, the researchers analyzed the oocytes' maturation with optimized liquid chromatography with tandem mass spectrometry. They identified 4,694 proteins and found that 634 of them changed significantly across multiple developmental stages. The team also studied the functions of critical proteins and metabolic pathways for oocyte maturation. These include increased levels of proteins related to cell cycle regulation, a decline in histone acetylation accompanied by an increase in deacetylases, maternal mRNA decay with upregulation of exoribonucleases, and protein degradation with active ubiquitinoylation in mouse oocytes.

Although the study was conducted in maturing oocytes, it has limitations. "We have used siRNA interference to investigate the function of key proteins and can limit the knockdown efficiency, leading to incomplete elimination of the target protein," Sun said.

Also, the individual proteins they studied are upregulated mainly during maturation, while proteins with reduced expression important for oocyte development need further characterization.

The researchers are excited about their results and plan to pursue studies in two directions. "Firstly, we want to continue to mine proteins from the current proteomic profiling data set and continue to study their functions in oocyte maturation," Sun said. "Secondly, we want to collaborate with clinicians to screen for genetic mutations causing infertility in women."

With such proteomic data sets, researchers can establish screens to detect human oocyte abnormalities. For example, if an abnormally expressed protein blocks oocyte maturation, then researchers can study the defects to determine whether they are caused by specific gene mutations.



This study not only has helped to advance knowledge of oocyte development but also has affected the lead researcher's personal health goals.

"While studying reproduction biology we observed that obesity negatively impacts male and female reproduction systems," Sun said. "When I learned about this, I started running to maintain a healthy weight. My research made me realize the importance of good health."

DOI: 10.1016/j.mcpro.2022.100481

Arti Dumbrepatil (artidumbre@gmail.com) is a freelance science writer and communicator. With her academic training plus expertise in science communication, she transforms complex, jargon-filled science into enjoyable and comprehensible content. Follow her on Twitter: @rtisciwrites.

New snapshots of RNA travels

By Ankita Arora

High-density lipoprotein, or HDL, is a lipid and protein particle that carries cholesterol from the blood to the liver, where it is broken down and cleared from the body. Due to HDL's role in this removal, the cholesterol attached to it is sometimes called good cholesterol.

However, cholesterol is only one of the many types of cargo transported by HDL particles. They also carry small extracellular RNAs that circulate in the blood from one destination to the next.

To investigate the movement of RNA from a cell to the lipoprotein carrier, researchers have had to isolate the RNA from the cell or the carrier and then perform quantitative polymerase chain reaction. This takes a lot of time and typically gives a low yield. Many processing steps increase sample loss and may isolate certain types of RNA selectively, thus hindering our understanding of extracellular RNA transport facilitated by HDLs.

In a recently published **Journal of Lipid Research** article, Kasey C. Vickers and his team at the Vanderbilt University Medical Center describe how they established a new method using SYTO RNASelect — a dye that specifically labels RNA — to quantify RNA in lipoprotein carriers.

The dye penetrates lipids and doesn't light up or fluoresce until it's bound to the RNA. Hence, SYTO RNASelect allows a researcher to observe RNAs in their natural state — you don't need to isolate RNA or disrupt the lipid carrier to get the information you want.

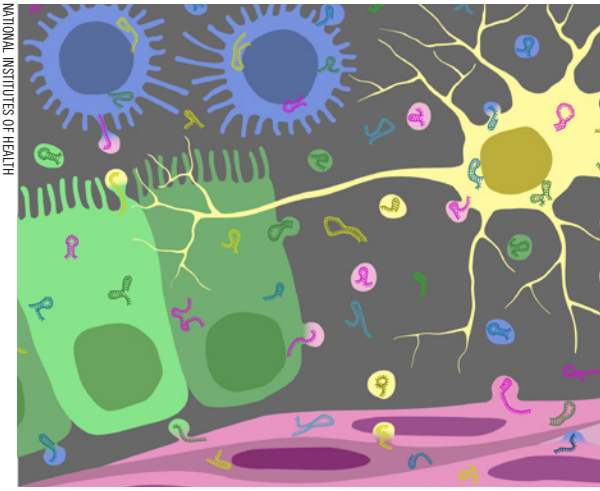
In addition, with the SYTO dye, a researcher can look at the total flux of extracellular RNAs instead of picking a few candidate RNAs based on prior knowledge. "That's a key advance in the field, as it has allowed us to make observations that we previously couldn't see," Vickers said.

Previous studies by this lab and others have indicated that macrophages, a type of immune cell, secrete RNAs that then tag along with HDLs for a ride. However, there's been no prior evidence that the reverse flow is plausible — that HDLs also could deliver RNA to the macrophages. But using SYTO RNASelect dye, the team was able to visualize RNA transfer from HDLs to the macrophages for the first time.

Use of the dye opened doors to understanding how the flow of extracellular RNAs is altered in disease states. The study showed that HDL derived from patients with familial hypercholesterolemia, or FH, can accept more RNA from the macrophages than HDLs from healthy patients. However, the researchers have yet to understand the mechanism behind the increase in RNA loading of FH-derived HDLs.

"While this study is based on tissue culture, we are now expanding the use of labeled lipoproteins to animal models of atherosclerosis," Vickers said.

Another application of this technology could be in RNA-based therapeutics. A clinician could label the nanoparticles delivering an RNA drug and then follow it to see where the drug is going and how quickly it is cleared out of the kidney.



NATIONAL INSTITUTES OF HEALTH

RNA (structured squiggles) mediates cell-to-cell communications between neurons (yellow), macrophages (blue) and epithelial cells (green). Scientists once thought RNA existed only within cells but now know it can be exported from cells and play a role in extracellular communication.

Vickers hopes scientists will apply this reagent to other extracellular RNA carriers such as microvesicles and exosomes.

"The biggest antagonism the field of extracellular RNAs has faced is that the levels of circulating RNA are too low to make a meaningful contribution to cellular physiology," he said. "But what we're seeing with the use of this reagent is that there's a huge discrepancy between the levels of naturally circulating RNA and what we observe by isolating RNA."

DOI: 10.1016/j.jlr.2023.100328

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From the journals

By Paula Amann, Ken Farabaugh & Anna Hu

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

Targeting activity to distinct organelles

The small guanine triphosphate hydrolase, or GTPase, Rab7 can act as a molecular on/off switch controlled by the guanine nucleotide exchange factor Mon1–Ccz1 complex, or MC1. Rab7 activation by MC1 is a key step when small membrane-bound organelles, namely endosomes and autophagosomes, fuse with the lysosome to recycle their cargo. However, scientists do not know how MC1 activity is targeted to distinct cellular compartments such as endosomes.

In a recent study in the **Journal of Biological Chemistry**, Eric Herrmann and colleagues at the Universities of Münster and Osnabrück in Germany showed that MC1 is recruited collectively to endosomes by interaction with negatively charged membranes as a result of phosphatidyl phosphate or membranes that have defects in lipid packing caused by inclusion of unsaturated phospholipids and also by interaction with recruiter proteins, including endosomal marker proteins Vps21 and Ypt10. The authors also found that the amphipathic helix in the MC1 complex that recognizes lipid-packing defects is conserved in a thermophilic fungus and in yeast and may represent a novel sensor in other species.

These findings identify specific features of both proteins and lipids that target MC1 to endosomes and autophagosomes and may be adapted to recognize the molecular basis for targeting to other cellular compartments and activation in different functional contexts.
DOI: 10.1016/j.jbc.2023.102915

Reducing false positives in mass spec

When it comes to understanding the proteome — an organism's complete collection of proteins — mass spectrometry is increasingly effective at using properties such as charge and mass to identify the presence of proteins, peptides and lipids. But while the sensitivity and accuracy of mass spectrometers have improved, researchers still find false positives when identifying proteins in large sets of proteomics data. To counter this, they employ database search algorithms to identify the false positives, resulting in a false discovery rate, or FDR, metric that tells them what percentage of their matches are actually null.

Matthew The and a team at the Technical University of Munich have developed an improved FDR algorithm for protein groups, which are notoriously difficult to analyze because proteins originating from the same gene share certain structures. They describe their work in a recent paper in the journal **Molecular & Cellular Proteomics.**

Even with large data sets, their approach, called the Picked Protein Group FDR method, produces accurate FDR estimates for protein groups. They tested the method against 29 human tissues and found more protein groups than MaxQuant, a standard software. The method also identified 18,000 protein groups with a low 1% false discovery rate in a large human proteome data set. The authors have turned their algorithm into a software tool compatible with MaxQuant and are providing access to fellow proteomics scientists.
DOI: 10.1016/j.mcpro.2022.100437

How two drugs break down cholesterol

Avoiding atherosclerosis, the buildup of fatty plaque along inner artery walls, requires efficient routing of cholesterol for the breakdown in the liver, a process known as reverse cholesterol transport. High-density lipoprotein, or HDL, cholesterol helps rid the bloodstream of the low-density lipoprotein, or LDL, cholesterol that heightens the risk of heart attack or stroke.

Yet, scientists still do not fully grasp how two cholesterol ester transfer proteins, or CETP, inhibitors, dalcetrapib and anacetrapib, help drive cholesterol to the liver, splitting it into HDL particles. Early clinical trials failed to show promise, but a recent trial found that anacetrapib lowered cardiovascular events by 9%.

Mathieu Brodeur and David Rhainds of the Montreal Heart Institute and a team of scientists in Canada and Switzerland looked at how CETP inhibitors effect HDL in rabbits and humans. Their study appeared in the **Journal of Lipid Research**.

In rabbits already getting

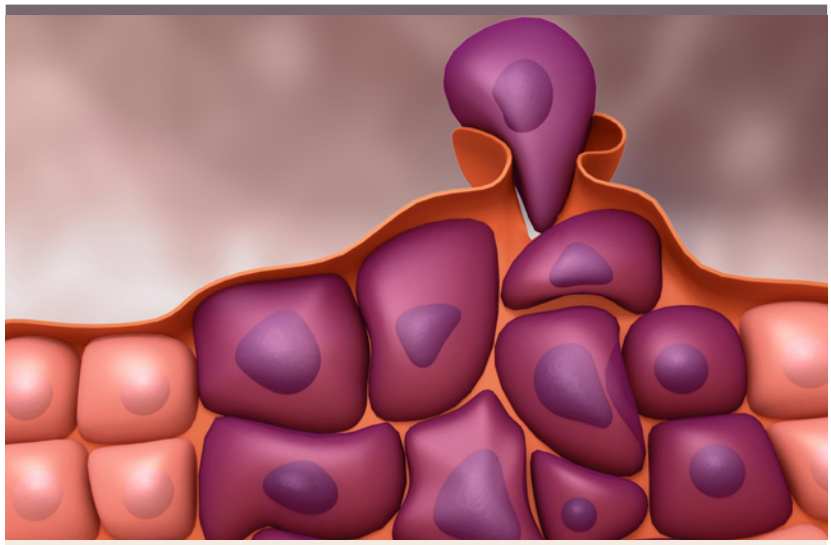
atorvastatin, a drug commonly used to treat high cholesterol and triglycerides, the inhibitors raised levels of HDL. In the human subjects, dalcetrapib boosted concentrations of large HDL particles and apolipoprotein (apo) B–depleted plasma apo E. This eventually produced apo E-containing HDL without apo A-I.

The research suggests that the LDL receptor may be vital to the breakdown of these complex molecules. Specifically, CETPi spurs the production of large apo E-containing HDL byproducts, without apo A-I. The resulting particles may play a key role in reverse cholesterol transport, without CETP involvement, in the transfer of HDL to apo B–bearing lipoproteins.
DOI:10.1016/j.jlr.2022.100316

A real-time single-cell metabolic reporter

Hypoxia-inducible factor 1-alpha, or HIF-1α, is a transcription factor that, in addition to mediating a cell's response to lack of oxygen, is known to regulate metabolic changes in immune cells. HIF-1α is activated in response to bacterial infection in cancer and in cardiovascular disease. However, despite the relevance of single-cell dynamics in metabolic control, researchers know little about the single-cell dynamics of HIF-1α, in part because they lack real-time reporter systems.

In their recent paper published in the **Journal of Biological Chemistry**, Stevan Jeknić and colleagues at Stanford University describe how they optimized a fluorescent reporter of HIF-1α activity that could be coupled with live-cell microscopy and showed that individual macrophage cells could vary HIF-1α activity in



Molecular glue to prevent metastasis

While treatments for gastric cancer have improved significantly, this cancer remains among those with the highest rates of morbidity and mortality. A key reason for poor survival is metastasis, facilitated in part by epithelial-to-mesenchymal transition, or EMT, of cancer cells, which allows them to lose their adhesion to other cells and migrate, invading other parts of the body.

One drug that has shown promise in treating this cancer is the aryl sulfonamide indisulam, which promotes degradation of the RNA-binding protein RBM39 by acting as a molecular glue to enhance its binding to ubiquitin ligase receptor DCAF15 and inhibit cancer cell proliferation; however, scientists do not yet know whether indisulam has any effect on cancer cell migration.

Jiaqi Lu and colleagues at Soochow University in Jiangsu, China, recently demonstrated that indisulam treatment decreased expression of the EMT marker N-cadherin. They describe this work in an article in the **Journal of Biological Chemistry**. Using bioinformatics and biochemical approaches, they also found that indisulam promoted the interaction of N-cadherin's transcription factor ZEB1 with DCAF15, thereby preventing the expression of N-cadherin. Cell-based experiments and analysis of patient samples indicated that high ZEB1 expression correlated with reduced survival, and the authors showed that treatment of gastric tumor samples with indisulam significantly reduced ZEB1 levels.

These findings suggest that indisulam could prevent migration of gastric cancer cells and that its function as a molecular glue regulates at least two cancer processes, proliferation and metastasis, through two distinct signaling molecules.
DOI: 10.1016/j.jbc.2023.103025

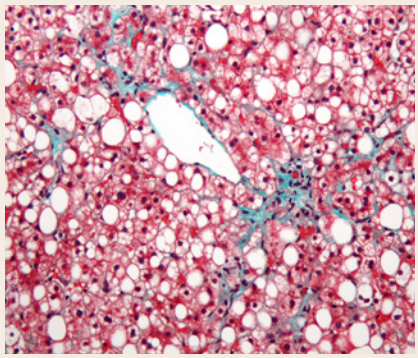
— Ken Farabaugh

Linking a STEAP-3 boost to liver disease

Roughly one-quarter of the world's adults suffer from nonalcoholic fatty liver disease, or NAFLD. This condition, which can progress from a simple fatty liver to severe scarring, or cirrhosis, and even liver cancer, does not yet have a cure.

However, recent studies suggest some molecular targets for future medications. Take the metalloreductase called six-transmembrane epithelial antigen of prostate 3, also known as STEAP3. This protein plays an outsized role in biological processes from cell division to inflammation and cell death — as well as liver diseases.

Recently, Ting Ding, Siping Chen and Wenchang Xiao, along with a team from Huanggang Central Hospital in China, discovered that STEAP3 increases in NAFLD. Their study in the **Journal of Lipid Research** suggests how this ubiquitous protein may influence the trajectory of the disease and how future investigators might design an effective drug to counter it.



NEPHRON/WIKIMEDIA COMMONS

Macrovesicular steatosis is a lipid accumulation so large it distorts the cell's nucleus. In this stained micrograph of nonalcoholic fatty liver disease, the prominent macrovesicular steatosis is white, mild fibrosis is green and hepatocytes are stained red.

First, the scientists found that STEAP3 levels rise in lipid-rich hepatocytes, or liver cells, from an obese mouse model or NAFLD tissue. They further determined that STEAP3 promotes lipid buildup in hepatocytes.

Comparing knockout mice (missing the STEAP3 gene) with a wild-type control group, the team learned that the absence of STEAP3 led to lower body weights, fasting blood glucose and serum insulin levels — plus better glucose tolerance. These results emerged after 24 weeks of a high-fat diet for both groups of mice. Assays confirmed that the absence of the STEAP3 inhibits formation of glucose.

The mice without STEAP3 also tested lower for several key health measures, from liver weight to total cholesterol. Taken together, these results showed that the absence of STEAP3 diminished NAFLD in the mice. In this way, the study offers a crucial, novel finding: STEAP proteins help govern the development of NAFLD.

In addition, the team's experiments suggested that STEAP3 interacts with transforming growth factor beta-activated kinase 1, or TAK1, along the mitogen-activated protein kinase, or MAPK, signaling pathway in hepatocytes.

DOI: 10.1016/j.jlr.2022.100318

— Paula Amann

response to local inhibition of prolyl hydroxylase, or PHD, a metabolic flux marker. They also demonstrated that HIF-1α responses oscillate irregularly in response to interferon-gamma, which induces metabolic change. Using mathematical modeling, the authors found that high HIF-1α activity correlated with reduced flux through the carboxylic acid cycle and an increase in the NAD^+/NADH ratio, suggesting a cell might sense PHD inhibition and activate HIF-1α to decrease aerobic respiration.

This study not only reports a new tool that can be used to examine single-cell HIF-1α activity in real time but also cuts through the signal noise of cell populations to show that activation of HIF-1α could theoretically encode metabolic information in individual cells.

DOI: 10.1016/j.jbc.2023.104599

With O-glycopeptides, two methods are better than one

Glycosylation is essential for determining proteins' structure and function as well as their stability, protein interactions and more. Thus, this enzymatic reaction in which a sugar molecule is added to a protein can affect the stability, antigenicity and activity of recombinant therapeutic proteins significantly and is of interest to the pharmaceutical industry.

Two types of glycopeptides, N-linked and O-linked, commonly are characterized through mass spectrometry. Of these, O-glycosylation is more difficult to identify because there is no consensus sequence other than that glycosylation can occur only at serine and threonine residues. Adam Pap of the Eotvos

Lorand Research Network and a team in Hungary compared four analytic software packages for O-glycosylation. In a recent paper in the journal **Molecular & Cellular Proteomics**, they write that the results showed more variation than previously expected.

The researchers compiled a selective data set of human urinary glycoproteins and ran it through three search engines (Byonic, Protein Prospector and O-Pair) and an MS-Filter program. The false identification rate was higher than they expected, highlighting the limits of the methodology. Based on these results, the authors recommend pairing two fragmentation methods (higher energy collision dissociation and electron-transfer higher energy collision dissociation) when analyzing O-glycosylation data. They provide specific recommendations for improving the existing software to enhance their analysis.

DOI: 10.1016/j.mcpro.2022.100439

Seeking diagnostics for rare birth condition

In a hospital delivery room, parents are preparing to welcome their new baby. However, the infant emerges with taut, scaly skin and turned-out lips and eyelids. The medical team diagnoses a genetic disease: autosomal recessive congenital ichthyosis, or "collodion baby."

Infants with this condition are at higher risk of microbial infections, fluid loss, electrolyte imbalance and pneumonia, among other complications. Physicians cannot yet predict whether the disease will be self-healing and vanish within the first year of life or lead to lifelong itchy skin and other symptoms.

Now researchers in Japan have

How Alzheimer's affects brain glycosylation

Alzheimer's disease is the most common neurodegenerative disorder worldwide, and we do not have a cure. Researchers recently have increased studies of the role of posttranslational protein modifications such as glycosylation — the enzymatic addition of a sugar, also known as a glycan, to a protein. Glycosylation is also one of the protein modifications implicated in Alzheimer's.

In a recent paper in the journal **Molecular & Cellular Proteomics**, Suttipong Suttapitugsakul, Kathrin Stavenhagen and a team from Harvard Medical School report that they found several stage-specific differences in glycosylation when they used qualitative glycoproteomics to analyze human brain tissue across the clinical spectrum of Alzheimer's disease.

The researchers focused on N-glycosylation, wherein the glycan is attached to a protein at a nitrogen atom, often in asparagine amino acids. After collecting proteins from 30 brain tissue samples, they identified more than 300 glycoproteins, most of which were shared among the three groups they tested: symptomatic Alzheimer's, asymptomatic Alzheimer's and healthy brains.

They observed differences in the frequency of specific types of glycosylation, such as fucosylation and galactosylation wherein fucose and galactose sugar molecules respectively are added. These glycosylation types were less frequent in asymptomatic and

symptomatic Alzheimer's brains relative to healthy ones. They also found differences in levels of bisection and number of antennae, both variations related to addition of N-acetylglucosamine to N-glycans.

This study is the first to look at N-glycosylation on a large scale, with 580 N-linked sites found across the 2,035 glycopeptides identified across all samples. The human brain contains about 1,900 glycoforms (glycoproteins and other associated molecules), making it challenging to encapsulate fully.

These researchers have expanded knowledge in this area and shown the importance of studying the role N-glycosylation plays in the progression of Alzheimer's disease.

DOI: 10.1016/j.mcpro.2022.100433

— Anna Hu

fresh findings that could point the way toward making that prediction and helping parents plan the best care for their child.

The case studies reported in the **Journal of Lipid Research** by Takuya Takeichi of the dermatology department of the Nagoya University Graduate School of Medicine and colleagues involved two self-healing patients from different families — one infant with no family history of similar disease and one 11-year-old with a family history of skin disorders.

The researchers found through genetic sequencing that both children had mutations in the CYP4F22 gene. The team then focused on a group of lipids, the ceramides, which play crucial roles in the outer layer of human skin, the stratum corneum.

The researchers used a special tape to take skin samples from the children, the infant's parents and people without the condition. Through a lipid analysis, the team found lower levels of acylceramides in the children than in the parents and others without the condition.

In the future, the scientists concluded, noninvasive lipid tests and genetic testing in combination could provide parents and health care providers with vital information for treatment plans.

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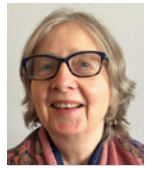

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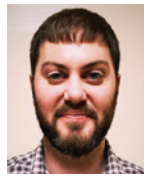

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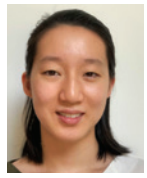



THE
PRIDE
ISSUE

State laws change the landscape for LGBTQIA+ scientists

By Paula Amann

Like migrating birds that follow landmarks and terrain, academic researchers take cues from their environment as they chart a career. For LGBTQIA+ job seekers, the political climate of a state increasingly affects its draw as a career destination.

Passage of the Parental Rights in Education Act in March 2022 pitched the state of Florida into the media spotlight. Widely dubbed "Don't Say Gay," the law banned teaching about sexual orientation and gender identity in grades K–3. The measure also mandated age or developmentally appropriate teaching on these topics for older students, "in accordance with state standards," leaving murky the question of how the state's schools would treat LGBTQIA+ parents and youth.

Tracking this political news was Sarah L. Eddy, a tenured associate professor in the biological sciences department at Florida International University in Miami. Eddy was not a parent but had cause for concern as a scholar who was directing three research projects on equity and diversity in education, with a focus on LGBTQIA+ people.

"Seeing that bill come up was one of the warning signs," said Eddy, who is nonbinary and uses the pronouns they and their. "That made me realize that, if I wanted to … not feel trapped, then I needed to look for jobs."

Eddy's FIU colleagues had backed their research interests, but Eddy knew the department's protection had its limits. "My chair and everyone has been really supportive, and they have no power to stop repercussions if they come down from the state," Eddy said when interviewed in April. "If the laws of the state change, they have to enforce them: That threat makes me feel really exposed, even if they say they have my back."

Eddy began applying to other positions around the country. That search led them to a prospective job at the University of Minnesota, Twin Cities, where

ASBMB

Sarah L. Eddy, then an associate professor at Florida International University, discusses their study of queer identity erasure in biology courses during a panel discussion on cultural humility in science education at Discover BMB on March 28 in Seattle.

JONATHAN LEUNG

Emiliano Brini, an assistant professor of physical and computational chemistry, works in the Scientific Computing and Visualization Laboratory at the Rochester Institute of Technology.

the process put them at ease. "One of the things I noticed in the interview is that people used my pronouns naturally and that felt really good," Eddy said.

Like migrating birds that follow landmarks and terrain, academic researchers like Eddy take cues from their environment as they chart a career. Today, the factors steering job moves may extend beyond the allure of a hiring institution, ties to family and friends, or the charms of college towns. For LGBTQIA+ job seekers, the political climate of a state increasingly affects its draw as a career destination.

When Emiliano Brini, a physical and computational chemist, set out to find his first tenure-track post in 2021, his criteria included a culture friendly to LGBTQIA+ people. As an Italian resident of the United States, he was looking to put down roots in his adopted country following stints as a postdoctoral fellow and research scientist at Stony Brook University in New York. Now, location mattered.

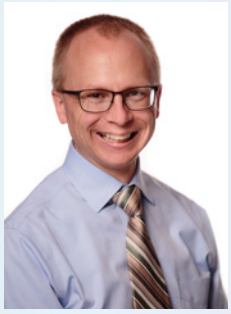
"I always say you can find good science and good colleagues, but you need to live in this place," Brini said, referring to any U.S. state he would consider. "When I was looking for a job, I had very strict geographic restrictions."

Brini limited his search to the Northeast and Mid-Atlantic U.S., along with California and Washington state. As a gay man, he was unwilling to deal with a hostile social environment on top of the rigors of starting a lab. He took a job as assistant professor at the Rochester Institute of Technology.

"Being in tenure track is hard enough," said Brini, whose research uses physics-based simulations to study biologically relevant projects related to drug design. "I don't need to worry about the political climate."

Shifts in the political landscape

T.J. Ronningen, chair of Out to Innovate — a professional network of LGBTQIA+ students and professionals in science, technology, engineering and mathematics — has heard similar concerns from his members about new legislation in a growing number of states.



T.J. RONNINGEN

Texas Gov. Greg Abbott drew national attention in February 2022 when he ordered child abuse investigations of any parents whose transgender children were receiving gender-affirming care. Florida Gov. Ron DeSantis moved this spring to expand the "Don't Say Gay" law to grades K-12.

As the year began, governors in Utah and South Dakota on Jan. 28 and Feb. 13, respectively, signed laws

banning gender-affirming medical care for transgender patients under the age of 18. On March 16, Florida's board of medicine, which is appointed by the governor, banned the use of all puberty blockers, hormone therapies and gender-affirming surgeries for young people under 18, regardless of parental approval for such care. At least 16 other states have banned gender-affirming health care, largely in the South and Midwest.

"The climate and laws are shaping people's decisions about where they would be willing to work," Ronningen said. "We are hearing from members that they are concerned about these trends."

Ronningen views these recent measures as a throwback to the late 1990s and early 2000s when legislation hostile to his community also helped shape where people lived in the United States.

That era saw the LGBTQIA+ community both moving forward and sliding back in legal rights. In a 1996 decision, Romer v. Evans, the U.S. Supreme Court struck down an amendment to Colorado's constitution that denied to gays and lesbians protection against discrimination. Yet, later that year, President Clinton signed into law the Defense of Marriage Act, which defined marriage as between a man and a woman and let states refuse to recognize same-sex marriages performed in other states.

With Lawrence v. Texas in 2003, the U.S. Supreme Court struck down laws against adult nonprocreative sex, known as sodomy laws, as unconstitutional. In 2004, Massachusetts was the first state to legalize same-sex marriage, followed, over the next six years, by New Hampshire, Vermont, Connecticut, Iowa and Washington, D.C. However, LGBTQIA+ rights regressed in 2008, when Proposition 8 outlawed same-sex marriage in California.

Marriage equality became the law of the land nationwide after the Supreme Court's Obergefell v. Hodges decision in 2015, but Ronningen saw the impact of the state legislation that preceded that case.

"A patchwork of laws across the country creates a disinclination to move to certain areas," he said, noting the nation's uneven legal framework then and now.

> **"The climate and laws are shaping people's decisions about where they would be willing to work."**
>
> **T.J. RONNINGEN**

When the résumé meets the region

Like many early-career researchers, John Schmidt occasionally checks job listings in his field. Schmidt has worked as a teaching professor of biology and biochemistry at Villanova University for the past eight years. He and his husband enjoy their life together in nearby Philadelphia.

JOHN SCHMIDT

However, it would take more than

COURTESY INAYAH ENTZMINGER

Inayah Entzminger is a doctoral student in biochemistry at Hunter College in New York.

better pay or a better-equipped lab for him to leave his position. For one thing, his husband does occasional drag performances. In early March, drag shows were banned outright in Tennessee, though the law faces legal challenges, and legislatures in at least nine states from Arizona to Texas have sought to restrict the shows.

"I see lots of opportunities in locations where I would be a good candidate, but I automatically rule them out because of the political climate," Schmidt said. "Even if the university is great, I don't want to live in an unwelcoming community."

Schmidt's outlook matches that of many young professionals in the business world, according to Jane Barry–Moran, managing director of research and programming with Out Leadership, which seeks to develop LGBTQIA+ and ally leaders at businesses worldwide. Her group commissioned a 2019 study that examined relocation of LGBTQIA+ young professionals.

"What we found is that 36% of young LGBTQ+ talent would be willing to move to a more inclusive place; 31% would be willing to take a pay cut to make that relocation possible," Barry–Moran said. What's more, 24% of the LGBTQIA+ workers surveyed had already moved to a more hospitable city.

> **"What we found is that 36% of young LGBTQ+ talent would be willing to move to a more inclusive place; 31% would be willing to take a pay cut to make that relocation possible."**
>
> **JANE BARRY–MORAN**

A separate study by Abbie Goldberg, co-sponsored by Clark University and the Williams Institute on Sexual Orientation and Gender Identity Law and Public Policy at the University of California, Los Angeles, explored the impact of Florida's "Don't Say Gay" law on LGBTQIA+ parents in the state.

Released in January 2023, Goldberg's survey found that 88% of parents surveyed in the law's aftermath were very or somewhat worried about its impact on their children and families. Some of their children had suffered harassment and bullying at school; some children were afraid to mention their parents' or their own gender identities and had fears about living in Florida. Looking ahead, 56% of the parents surveyed were weighing a move out of state, and 16.5% had taken steps to do so, such as seeking jobs elsewhere.

Young adults in the science pipeline who are planning parenthood could make political climate part of their calculus for postdoctoral plans. Inayah Entzminger is a nonbinary bisexual who uses the pronoun they and is working toward a biochemistry doctorate at Hunter College in New York. When they contemplate their future, they picture an accepting place to start a family.

"When I'm searching for a career, I'm going to be looking to raise children," Entzminger said. "The U.S. has lots of science hubs, but I will be choosing an area that does not have anti-trans laws, that doesn't have 'don't say gay' laws."

To help people like Entzminger and companies make informed decisions, Out Leadership teamed up with the Williams Institute to survey the business climate for LGBTQIA+ professionals in the 50 U.S. states. The June 2022 survey attempts to gauge how friendly to LGBTQIA+ people states are, based on three sets of criteria: personal protective and nondiscrimination laws, youth and family support, and work-related discrimination and protections.

The worst ratings went to South Carolina, joined in ascending order by Oklahoma, Tennessee, South Dakota and Arkansas. Alabama ranked 43 out of 50, Texas ranked 42, and Florida ranked 31.

Northeastern states topped the

ratings list, with the No. 1 slot going to New York, where Brini, the Italian chemist who did his postdoc at Stony Brook University, settled in 2021. He enjoys the large, active LGBTQIA+ community in what he calls his "very welcoming" adopted hometown of Rochester. "My partner and I live in a neighborhood where most houses fly rainbow flags and have BLM (Black Lives Matter) signs," Brini wrote in an email.

That kind of community appeals to Entzminger as a graduate student who hopes to conduct research while raising a family. "It's all about being around people who are there for you," they said. "I could not be a scientist in a place where I feel unsafe."

For Aflah Hanafiah, location may be even more fraught. A sixth-year graduate student in biochemistry at Pennsylvania State University, Hanafiah is passionate about the protein regulators of cytokinesis, which are widespread proteins that modulate histones and help shape chromosomes in a wide array of living things.

Hanafiah brings a broad range of identities to her work in science. "I am trans, I am a woman, a noncitizen of the U.S.A. and a nonwhite student," she said. "There's a lot of challenges that come with who you are."

Born and raised in Malaysia, Hanafiah came to the United States nearly a decade ago, drawn by her adoptive country's strong science research and relative freedom. "One of the reasons I wanted to pursue education and other opportunities outside my home country is the very hostile climate in Malaysia" toward trans people, she said.

Yet, as she looks beyond graduate school, Hanafiah knows she will have to choose carefully where to launch her career. Her boyfriend has proposed Texas as a destination, spurring what she calls "very, very difficult" conversations about a safe place for her to settle.

COURTESY SONIA FLORES

Sonia Flores chairs the Maximizing Access Committee of ASBMB. She is also vice chair for diversity and justice in the department of medicine and associate program director for diversity of the pulmonary fellowship at the University of Colorado School of Medicine.

Texas, as noted earlier, has some anti-trans policies. What's more, Equality Texas, a LGBTQIA+ rights group, reported 18 murders of transgender people in 2020 in Texas, second only to Florida, with 20 such murders, according to the group.

Unsettling choices: To leave or to stay

Sonia Flores, chair of the Maximizing Access Committee for the American Society for Biochemistry and Molecular Biology, said she sees legislation now targeting the LGBTQIA+ community, combined with anti-abortion laws, having an impact both in the states in question and in neighboring ones.

"This is resulting in a brain drain from a lot of these states," Flores said.

As the vice chair for diversity and justice in the department of medicine and associate program director for diversity of the pulmonary fellowship at the University of Colorado School of Medicine, Flores is witnessing the effects firsthand.

"We're getting an influx of people seeking jobs here," she said. "They're saying, 'I don't want to live in Texas or another state like that.'"

Flores said she believes the anti-LGBTQIA+ measures flowing out of state legislatures are related to "anti-science sentiment" that appears to lead lawmakers toward "creating policies out of thin air without any basis in fact or evidence."

Last year, Alabama passed one of the most far-reaching anti-LGBTQIA+ measures in the country, according to the Human Rights Campaign, an LGBTQIA+ advocacy group. The law, signed by Gov. Kay Ivey in June 2022, makes it a crime to provide gender-affirming medical care to transgender youth and bars transgender students from using a bathroom matching their gender identity. It also limits what teachers can tell their students about gender identity and sexual orientation. Further, it requires school leaders to inform a student's parents if the student identifies as LGBTQIA+.

In January, Constanza Cortes left her job as an assistant professor at the University of Alabama at Birmingham for a similar post at the University of Southern California.

"I can tell you when some of those bills were passed, that's when I went on the job market," Cortes said. "I am not part of this (LGBTQIA+) community, but many of my friends are."

For Cortes and other early-career faculty, it was not simply a question of their own comfort in a fraught political climate. "I was asking, what would this mean for my career and for the careers of my trainees, the people in my lab?" Cortes said.

Andrew Hollenbach is a professor at Louisiana State University.

> "In a climate where the company may not feel free to oppose legislation, it can still choose to create an internal climate that makes (clear) their support for affected employees."
>
> T.J. RONNINGEN

She and her Alabama colleagues soon got an answer when they faced obstacles in recruiting new employees to the campus. "I can say that many of my colleagues and I were struggling to fill positions," Cortes said. "This was at every level."

As to her new home state, Cortes waxed enthusiastic in an email sent in early April. A region known to be welcoming to LGBTQIA+ people also seems to be a better environment for her as a Latina immigrant.

"The culture of inclusivity here in Southern California is quite palpable and can be seen, heard and experienced just by stepping outside," Cortes wrote. "It is a great fit for me professionally and personally, as I do not feel I have to limit who I am or the way I express myself here."

Down on the Gulf Coast, Andrew Hollenbach is a professor of genetics and co-director of the Basic Sciences Curriculum for the School of Medicine at Louisiana State University. His adopted home state ranks No. 45 on the Out Leadership business climate survey.

Yet, as an out gay professional, Hollenbach has found a supportive community in New Orleans. "I'm in a deep blue bubble in a deep red state," Hollenbach said, alluding to his state's partisan divide. "At LSU, I've had 4,000% support from the administration."

He and his colleagues teach their institution's medical students to serve an increasingly diverse patient population, including the LGBTQIA+ community.

"Everyone at LSU is so dedicated to giving students the education they need to treat whoever walks into the clinic," Hollenbach said, "regardless of their background or what underrepresented population they may be part of."

Hollenbach, a native Pennsylvanian, now is rooted in Louisiana. He cannot imagine leaving, even if

Two senior faculty members at state universities in the South said they share concerns about recent legislation but asked not to be named. One noted that not only LGBTQIA+ issues but diversity, equity and inclusion efforts on campus and faculty tenure have been targeted by lawmakers in their state.

shifting political winds there bring anti-LGBTQIA+ measures — unless he had to care for his elderly mother back in his home state.

"I am too vested in fighting this," he said of the movement to roll back legal rights. "New Orleans is my home; I would retire before I would relocate."

Making an institutional impact

Bioscientists who work in industry, and the companies they serve, have their own choices as they confront anti-LGBTQIA+ state laws. Out to Innovate's Ronningen believes corporate policies also can have an impact on morale for LGBTQIA+ employees, no matter what political environment lies outside the office suites.

"In a climate where the company may not feel free to oppose legislation, it can still choose to create an internal climate that makes (clear) their support for affected employees," Ronningen said.

For companies and for academic institutions, he said, internal measures can mitigate political climate change. "Private companies and universities still have a lot of flexibility, because they can carve out their own policies."

Of 10 biotech companies contacted for this story, none agreed to take questions about their policies in support of LGBTQIA+ employees or about their public stands on legislation that impacts these staff members. However, two companies, Genentech and Eli Lilly and Company, each sent a statement detailing relevant programs and policies.

"Genentech has long supported LGBTQIA+ rights within and beyond our walls — from being one of the first companies to extend benefits coverage to employees' same-sex domestic partners in 1994 to last year becoming a corporate sponsor of Victory Fund and Victory Institute," the Genentech statement reads in part. "We strongly oppose discrimination of any kind against LGBTQIA+ people or any obstruction of their access to healthcare. We have also signed on to the Human Rights Campaign's Business Statement Against Anti-LGBTQ State Legislation."

The Victory Fund raises money for LGBTQIA+ political candidates in the United States. An allied group, the Victory Institute, provides leadership development, training and meetings to boost the number, diversity and success of openly LGBTQIA+ elected and appointed officials.

Signed by over 300 companies, the HRC Business Statement reads in part, "We are deeply concerned by the bills being introduced in state houses across the country that single out LGBTQ individuals — many specifically targeting transgender youth — for exclusion or differential treatment. … These bills would harm our team members and their families, stripping them of opportunities and making them feel unwelcome and at risk in their own communities."

Over at Eli Lilly, the company supports a reverse mentoring program by LGBTQIA+ employees for Lilly managers. Each manager meets at least four times with two mentors and learns about their life experience.

"One of the measures of success of this program is that the program continues to thrive after more than 10 years — Lilly employees continue to want to serve as mentors or participate as mentees," a Lilly spokesperson wrote in an email. "In fact, there is already a wait list of people who want to be mentored in 2023."

She noted that many members of Lilly's senior leadership team,

including Dave Ricks, the company's chair and CEO, have taken part in the learning program. In 2022, 25 Lilly managers were mentees.

As for academia, willingness to speak up on legislative issues seems to depend on location. Two senior faculty members at state universities in the South said they share concerns about recent legislation but asked not to be named. One noted that not only LGBTQIA+ issues but diversity, equity and inclusion efforts on campus and faculty tenure have been targeted by lawmakers in their state. The other said senior scientists at academic institutions in five states in the country's South and heartland have told him that job seekers are reluctant to consider their universities.

"There are some states that folks aren't even willing to look into moving to," he said, noting those states include his own.

Ronningen would like to hear academic leaders and scientific groups speak out.

"There's a concern that the voices of scientists and medical providers are being ignored," he said. "If institutions — departments or scientific societies — can use their power and bring that forward in (legislative) hearings, there is research to support better answers than are being offered in this anti-LGBTQ legislation."

How the society takes a stand

Ann Stock, president of the ASBMB, said the society is committed to diversity, including LGBTQIA+ scientists. "We are very much aligned with supporting a diverse group of scientists," Stock said, citing the ASBMB's official stand on diversity. "Inclusivity and opportunity for all is really important to us."

The ASBMB's public affairs team avoids weighing in on state laws, but the organization's national stands sometimes have state impact, according to Raechel McKinley, an ASBMB science policy manager.

Among recent policy stands with implications for anti-LGBTQIA+ measures, McKinley said her team noticed that the National Science Foundation failed to include the LGBTQIA+ community in its biennial reports on diversity in science, technology, engineering and medicine. The ASBMB has urged the NSF to include this category in the next report, and the agency recently stated it will include experimental questions pertaining to biological sex at birth, sexual orientation and gender identity in the next NSF Survey of Earned Doctorates.

A similar report by the National Institutes of Health included LGBTQIA+ people. "When they did collect data on LGBTQ+ people," McKinley said, "they found that they were likely to suffer sexual harassment, but we wouldn't be able to collect that data if they weren't included."

COURTESY ANN STOCK

ANN STOCK

The ASBMB also has called for more inclusive enforcement of Title IX, the law barring gender discrimination in U.S. education, including at federally funded universities. The society sent a letter urging this change on Sept. 12 to the Office for Civil Rights at the U.S. Department of Education.

"We're advocating for new rule making that will expand the coverage of Title IX to the LGBTQ+ community," McKinley said. "This is another way that we're indirectly fighting what's happening at the state level."

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RAECHEL McKINLEY

(For an extended interview with Raechel McKinley, turn to page 40.)

As chair of the Maximizing Access Committee, Flores is among the ASBMB leaders spearheading diversity efforts. She urged non-LGBTQIA+ researchers to make their voices heard.

"Even though we are trained to keep our heads down, go to the lab and do our work, the social context affects us," she said. "As scientists, we should be vocal."

A law affecting one segment of the population may fuel legislative moves on other issues of concern to all who work in the sciences, she suggested.

"You can start with 'Don't Say Gay,' and it can move very quickly," Flores said. "It can start small and move up the chain and have a very significant impact on the research that you do, and that's why we should all care."

Flores speaks from experience. A few years ago, she was offered the post of chief diversity officer at a Florida university. Gov. Ron DeSantis, who last year championed the "Don't Say Gay" measure for Florida public schools, early this year moved to defund diversity, equity and inclusion programs in universities across the state.

"If I had gone there, I would be without a job," Flores said.

At the Alabama State Capitol, lawmakers passed legislation in 2022 that makes it a crime to provide gender-affirming medical care, bars transgender students from using a bathroom matching their gender identity and limits what teachers can tell their students about gender identity and sexual orientation.

Scientific, economic fallout projected

Historically, biomedical research in the United States, both corporate and academic, has clustered in the Northeast Corridor and along the West Coast. Funding reports from the NIH illustrate the geographic science gap. Some observers suggest that anti-LGBTQIA+ measures, along with anti-abortion laws, could heighten those disparities.

"There's not a uniform distribution of scientific research, as evidenced by NIH funding per state and pharmaceutical and biotech investment per state," Stock said. "I'm afraid this may exacerbate that situation."

Stock likened the potential impact of anti-LGBTQIA+ laws to that of anti-abortion legislation that followed the U.S. Supreme Court's decision of June 2022 in Dobbs v. Jackson overturning abortion rights.

"It seems that there are strong parallels with the anti-abortion legislation that is likely influencing the geographic choices made by postdocs and young academics," Stock said.

The research community's reaction to both kinds of laws could intensify regional divides, she suggested.

"It is likely that employees will vote with their feet, and while certainly understandable, this exacerbates the problem, removing

voices of opposition to the legislation and reducing the number of people in the community who are supportive of LGBTQ and women's rights over their own bodies."

Having spent three years in Alabama, Cortes also worries that the uneven distribution of research grants nationwide will get worse amid the growing political divide. "That's going to create even more disparities," she said. "My concern is that legislation like this (Alabama's anti-LGBTQIA+ law) will keep highly successful researchers from applying."

Flores underscored the economic contribution of science hubs to surrounding communities — and the potential economic loss if large numbers of scientists relocate away from these geographic areas.

"When you look at a university or research center, they're injecting a lot of money into the local economy," she said. "That's a huge economic impact that hasn't been considered when passing these draconian laws."

For instance, Sarah Eddy decided to leave Florida. At summer's end, they will begin a new phase in their career as a tenured associate professor in the biology teaching and learning department at the University of Minnesota.

When Eddy settles into their new professional home this fall, they will bring several research grants, totaling some $1 million, to Minneapolis–St. Paul. These grants, arguably, represent research staff, salaries and concomitant consumer spending that otherwise would have contributed to the municipal and state coffers of Miami and Florida, respectively.

Before deciding on the move to the Twin Cities, Eddy already knew from research and conversations with former residents that they would be trading a hostile political climate in Florida for a friendlier one in the Upper Midwest. A new development in March confirmed Eddy's resolve to relocate northward.

"After I accepted the job, Minnesota declared itself a sanctuary state for those seeking gender-affirming care," they said. "That was a huge affirmation that I made a good choice."

Back in Rochester, Brini is charting his next research projects on the thermodynamic properties of protein–protein interactions, the solvation of organic druglike molecules and more. He seeks to set the stage for development of new medications against viruses, bacterial infections and even cancer.

"These are tools that are going to be used to design new drugs and new classes of drugs," Brini said. "I think my research is important for the future."

Brini's own future, however, and that of other scientists like him, likely will unfold in places with LGBTQIA+ friendly laws, policy and cultural climates. If he hadn't clinched his tenure-track position in New York or one of the eight other U.S. states he considered, Brini said, he would have taken his talents to London or elsewhere in Europe.

Raechel McKinley, science policy manager with the ASBMB's public affairs team, contributed her technical expertise to this story.

Paula Amann (pamann@asbmb.org) is the ASBMB's science writer.

> **"My concern is that legislation like this (Alabama's anti-LGBTQIA+ law) will keep highly successful researchers from applying."**
>
> **CONSTANZA CORTES**

PRIDE

‘I hope our actions show our members that we’re doing our best to support them’

A Q&A with ASBMB Policy Manager Raechel McKinley on the organization’s national-level advocacy for LGBTQIA+ scientists, trainees and students

By Marissa Locke Rottinghaus

RAECHEL MCKINLEY

The American Society for Biochemistry and Molecular Biology’s public affairs department advocates on behalf of members for sustainable funding for biomedical research, policies that strengthen and diversify the biomedical research enterprise and measures that support international scientific collaboration. The ASBMB Public Affairs Advisory Committee and staff want to be sure that researchers’ concerns are known in Congress and at federal funding agencies such as the National Institutes of Health and the National Science Foundation.

But in their home states, LGBTQIA+ scientists are facing unprecedented challenges, as their legislatures and even local governments are enacting laws and policies that make them feel unsafe and unwelcome.

Although the ASBMB policy team primarily advocates on behalf of scientists to the federal government, some of its work can contribute to protections and support at the state level, such as its recommendations relating to Title IX, the LGBTQIA+ Data Inclusion Act and other federally funded diversity initiatives.

Raechel McKinley is a science policy manager at the ASBMB who specializes in diversity, equity, inclusivity and accessibility policy and advocacy. She is also a queer woman. She discussed the work the ASBMB public affairs team is doing to better the lives and scientific careers of LGBTQIA+ students and researchers. The interview has been edited for length, clarity and style.

Q: Late last year, the ASBMB weighed in on changes proposed for Title IX. What were its recommendations?

Title IX is over 50 years old, and we believe it is crucial that it be updated to extend protection to LGBTQIA+ students and postdocs. As the current ruling stands, they are not protected. We first expressed concern about proposed changes to Title IX in June 2021 after the Department of Education held a public hearing to gather information on improving Title IX. In that comment letter, we urged the Department of Education to update the definition of sexual harassment and institute more provisions to protect sexual harassment survivors.

Later, in 2022, we sent additional recommendations on the updated proposed changes to Title IX to the Department of Education. Most importantly, we wanted to ensure that the rule explicitly protects lesbian, gay, bisexual, transgender, queer or questioning, intersex, asexual and other nonstraight, noncisgender identifying people. In addition, we recommended measures that would make sure people are protected from retaliation. We made this recommendation because there's currently a lot that's being done at the state level that threatens students in K–12 as well as higher education. We want to make sure that people within higher education are protected. Since we don't do much work on the state level, through advocating for changes to Title IX, we can help ensure that discrimination does not happen at the state level.

Q: Tell me about the society's comments on the LGBTQ+ Data Inclusion Act.

The LGBTQ+ Data Inclusion Act mandates that LGBTQIA+ individuals be included in federal surveys. Currently, there's no requirement to include them. Even when they are included, the questions sometimes do not accurately collect data on the LGBTQIA+ community.

After consulting with LGBTQIA+ groups such as Out to Innovate, a professional society that supports LGBTQIA+ scientists in STEM, we submitted a position statement in support of the bill.

Q: Why is LGBTQIA+ data collection important?

This population's needs are varied and unique. Data on gender identity and sexual orientation will give policymakers a better understanding of the challenges they face — such as higher incidences of mental health concerns, HIV, sexual harassment, lower socioeconomic status and less support from family members and schools. This way, they can target outreach and funding programs to support LGBTQIA+ people.

Also, we want to make sure that survey questions use inclusive language to help all LGBTQIA+ individuals feel recognized.

At the ASBMB, we follow evidence-based decision-making when putting together our recommendations. This bill will allow us to better advocate for the LGBTQIA+ community in the future using data and facts.

Q: The society also recently sent recommendations to the National Institute for Allergy and Infectious Diseases about its diversity and inclusion efforts. How does that relate to LGBTQIA+ scientists?

We applauded the NIAID for

"This population's needs are varied and unique. Data on gender identity and sexual orientation will give policymakers a better understanding of the challenges they face."

RAECHEL MCKINLEY

> "[I]n August 2022 we submitted comments on the Department of Education's Equity Action Plan suggesting that the federal government work with professional societies to diversify grant reviewers and support staff."
>
> RAECHEL McKINLEY

prioritizing and seeking input on their DEIA efforts. We recommended that they collect and report on data of underrepresented groups. Right now, we can't properly advocate for LGBTQIA+ individuals because they are not included in any type of data collection. More extensive data collection will better inform us so that we can advocate for funding opportunities or safe zone training for LGBTQIA+ trainees and investigators.

We also urged the NIAID to act now to expand grant supplements and establish targeted outreach programs to better connect trainees and scientists from similar backgrounds. We hope the agency will lead the way and encourage other institutes to prioritize DEIA.

Q: You mentioned safe zone training. What is that?

The Safe Zone Project is a training program that can help you get the skills to facilitate conversations surrounding LGBTQIA+ issues and create a more inclusive environment for all students. After you receive the training, you get posters that you can put up in your lab or classroom to show that it is a safe zone. This is an identifier that you are a person who is informed and willing to talk about LGBTQIA+ issues. It is not always evident who is an ally, but this is a simple way to signal your allyship.

Q: Your team advocates broadly for policies supporting scientists in marginalized groups. How do these actions promote equity for LGBTQIA+ individuals?

We have been promoting DEIA for all types of underrepresented scientists, which includes LGBTQIA+ individuals, since the public affairs team was created at the ASBMB. In 2018, we released a comment letter to the National Institute of General Medical Sciences with our recommendations to promote faculty diversity in STEM. We have also been very vocal in our DEIA recommendations to the NIH in response to their 2022 Scientific Workforce Strategic Plan and the NIH-Wide Strategic Plan for DEIA for 2022–2026 as well as to the National Science Foundation supporting the expansion of their sexual harassment policy in 2018. These statements all proposed efforts to research and mitigate harassment, specifically of LGBTQIA+ scientists. The NIH Workplace Climate and Harassment Survey, which appropriately surveyed the LGBTQIA+ community, showed that bisexual individuals had higher instances of harassment in the workplace.

We also understand the challenges that LGBTQIA+ individuals are facing in educational settings, especially in states with anti-LGBTQIA+ legislation. That is why in August 2022 we submitted comments on the Department of Education's Equity Action Plan suggesting that the federal government work with professional societies to diversify grant reviewers and support staff.

We also released a statement supporting the Educational Opportunity and Success Act of 2023, which would help underrepresented students stay in the academic pipeline and succeed after grade school.

Finally, in order to promote DEIA practices that include LGBTQIA+ individuals at the state level, we recommended that the NIGMS help institutions improve trainee mentoring opportunities for underrepresented groups as well as highlight more alumni with diverse identities and backgrounds to

promote student confidence.

I hope that our actions show our members that we are doing our best to support them.

Q: How can allies advocate for the LGBTQIA+ community?

A good place to start is your local community. Most cities or towns have an LGBTQIA+ center. Go in there and talk with people. You can really find out firsthand the needs of your community. Helping out and giving back is a great way to show your allyship.

I also think standing in solidarity with the community right now and giving people the resources they need to fight against these anti-LGBTQIA+ policies and ideas is so important. If anyone feels targeted by all the legislation out there, you can help those individuals craft responses to send to their state and local lawmakers.

It is also important to get people connected with civil rights groups that are well equipped to handle these situations.

Q: What resources can people use to stay informed?

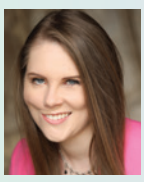
The Gay & Lesbian Alliance Against Defamation has a glossary of terminology to help you learn about all types of sexual orientation, gender identities and even flags. Each community has their own flag, so this is a great, fun way for people to identify themselves within the community.

In addition, the National LGBTQ Task Force puts on a conference called Creating Change, where they equip you to be an activist in your community. I have attended and highly recommend it.

To stay informed on legislation, check out the Human Rights Campaign and the American Civil Liberties Union. There's also a website called GovTrack. You can enter your ZIP code, and it'll give you all of the information that you need about your senators and representatives at the state and federal levels. You can find out if they've endorsed or opposed a bill. The website also gives you an automatic response to send feedback and a way to reach out to them, so you don't have to craft anything yourself.

If you're a scientist in STEM, there are many organizations you can reach out to such as Out to Innovate; 500 Queer Scientists; Pride in STEM; Out in Science, Technology, Engineering and Mathematics; and many others. If anyone is interested in reaching out to me or the rest of the public affairs team, you can email publicaffairs@asbmb.org.

Marissa Locke Rottinghaus (mlocke@asbmb.org) is the science and policy communications specialist for the ASBMB.



Taking action at a state level

While the ASBMB advocates on your behalf at the federal level, many science policy issues pop up at the state level. Here's how you can advocate within your local community, with our help.

By Sarina Neote

At the American Society for Biochemistry and Molecular Biology, the public affairs department and the Public Affairs Advisory Committee work together to ensure that policymakers hear from scientists on proposals and changes that would affect the scientific community and scientific research. We strongly believe scientists must be partners in creating a science policy that works for researchers and for the larger innovation pipeline.

The efforts of the staff and the PAAC focus on the federal government; we work with Congress and with federal agencies. However, a good chunk of governing and policymaking happens at the state level. That's why ASBMB members need to be engaged in state advocacy issues. We can help.

We've heard from members that they want to work at the state level to make sure bad policies aren't enacted and cause harm to the research enterprise as a whole. In the past year alone, numerous bills have been introduced that, if passed, would have a huge impact on the research communities in multiple states. For example:

- Lawmakers in Idaho introduced a bill to the state legislature that would criminalize the administration of mRNA vaccines across the state.
- In May, Florida passed a law that prohibits state universities from using funds to promote, support or maintain any programs that advocate for diversity, equity and inclusion.
- And in Ohio, another bill was introduced to remove any required training or courses on diversity, equity and inclusion.

But it can be hard to know where to start when it comes to state advocacy.

That's where we can help you. The ASBMB public affairs team has put together a state advocacy toolkit to get you started. You can find it at asbmb.org/advocacy. It's so important to participate in the governing structures of the states and communities where you live and work, whether that's the state legislature or the county board of education. And it's important for all policymakers, at the local, state or federal level, to hear directly from scientists about issues affecting the scientific community.

We suggest three courses of action you can take at the local level:

1. Reach out to your local representative and set up a meeting.
2. Organize a letter-writing campaign.
3. Write an op-ed on a specific issue and get it published in a local newspaper.

Our toolkit walks you through the steps of how to communicate about an issue, either verbally or in writing, gather support in your community, and/or connect with organizations that are already doing this work in your area.

And you can always reach out to the public affairs staff at publicaffairs@asbmb.org with any questions or concerns. Scientists need to make their voices heard, and we're here to help.

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

Listen, learn and support

Interviews with four LGBTQIA+ scientists

By Tian Yu

In this special Pride issue of ASBMB Today, we feature four interviews with LGBTQIA+ scientists who are trained in STEM fields.

These scientists discussed their experiences in the science community and shared their stories. They also shared advice for people who want to better support LGBTQIA+ individuals and reflected on recent progress and setbacks in terms of inclusivity and support within science, technology, engineering, and mathematics.

The interviews have been edited.

Redefining what a scientist looks like

Riley Eisert–Sasse is a gay nonbinary transgender man and a computational biophysical chemist. He earned his bachelor's degree in chemistry at the University of Wisconsin–Platteville and is working on his Ph.D. at Pennsylvania State University.

Q: Talk about your research and how you got interested in it.

A: I'm a chemist doing my Ph.D. at Penn State in Denise Okafor's lab. Most of my colleagues are molecular biologists, but Dr. Okafor was able to take me on because of her secondary appointment in chemistry.

My research focuses on human nuclear receptor proteins, specifically the farnesoid X receptor, or FXR, which is mostly found in the liver and kidneys. I'm working on finding predictive properties of different ligands of FXR through computational molecular dynamics simulations.

Q: What were you looking for in a lab, aside from research interests?

A: For me, finding the right culture is even more important than finding the right research interests. I wanted to find a group of people who would be supportive of my career goals and me as a person. It was about finding somewhere that I could do research and develop as a scientist.

Q: Have you encountered any challenges related to your identity as a member of the LGBTQIA+ community?

A: When I was doing my rotations, I was worried that people wouldn't view me as a scientist because of how I presented myself. Starting at a new institution and changing fields at the same time was a culture shock. Due to the difference in teaching styles between an R1 institution and a smaller college, many of my professors at Penn State assumed I had background knowledge that I didn't have.

Also, going to college in rural Wisconsin, although I did have a great support system and professors and supervisors that I still keep in touch with, I didn't present myself as openly queer because of safety concerns.

RILEY EISERT–SASSE

> "The most important thing is to not ignore our identities but also not reduce us to them. It's OK to ask questions and learn about different cultures and identities."
>
> RILEY EISERT-SASSE

Q: What advice do you have for someone in a similar situation?

A: Prioritize your time and not try to do everything at once. Join committees or service organizations that get you interacting with people who are not your day-to-day lab mates.

Q: How can scientific work environments better support and welcome LGBTQIA+ individuals?

A: The most important thing is to not ignore our identities but also not reduce us to them. It's OK to ask questions and learn about different cultures and identities. And it's important to not assume that LGBTQIA+ individuals are going to do something just because of their identity.

Q: What inspired you to become an educator?

A: My math teacher in high school was the first person I came out to, and he found creative ways to respect my identity while never doubting my ability to succeed in STEM.

This experience influences the way I interact with my students. For example, I read the last names on their roster and tell the student to respond with their first name. This ensures that I will be using the correct name and am respectful to all students, including those who may go by a different name than what is listed on their roster.

Q: What's your philosophy of teaching and being a role model?

A: I believe that being a visible and openly queer teacher helps to broaden the perception of what a scientist can look like. Although I had many wonderful mentors, I did not have a role model who is queer like me and works in STEM.

I want to show my students that anyone can be a scientist, regardless of their identity. Hopefully, this will open up their vision of scientists to include more people like me, instead of a middle-aged white dude in glasses.

TOM WELTON

Leading with intention

Tom Welton is a sustainable chemist at Imperial College London, former president of the Royal Society of Chemistry, U.K., and a gay man.

Q: How did you become interested in sustainable chemistry?

A: Back in the early 1980s, I was interested in environmentalism and how humans interacted with the environment. As a chemist, I became particularly aware of how chemicals and chemical pollution could be hazardous to the environment, and I was interested in finding ways to produce useful chemicals in a less damaging way.

Q: Please talk about your decision to come out as gay in the 1980s.

A: Coming out was an easy decision for me. I was so obviously gay that people didn't even look surprised when they found out. So the decision wasn't "Do I come out?" It was "Do I bother putting energy into staying in the closet?" I didn't want to waste my energy pretending to be someone I was not.

Being a successful academic is incredibly difficult and tiring, so I needed every last bit of resource available to me to achieve my goals. I did not want to waste any emotional energy on things that shouldn't go into my work.

Q: How have you modeled inclusivity in your work environment?

A: To increase inclusivity, you have to be deliberate about including people.

While I was head of the department, I always went in through an entrance at the other end of the building. I had to walk through the building to get to my office and say hello to everyone I saw in the morning and goodbye to everyone I saw in the evening. Additionally, I would stop and ask people how they were doing.

These were really small acts but made a difference. I made sure to take the time for inclusivity. Not only was it meaningful to meet and greet others in the hallway, but they appreciated that I paused from my busy schedule to do so. It showed people just how much their work matters when the department head takes a few moments out of his day to acknowledge them personally.

Q: What progress or setbacks have you seen in inclusivity and support for LGBTQIA+ individuals?

A: We're seeing an intensification of hostility toward transgender people in the broader community.

The double hit of being treated as a threat while at the same time being trivialized that was faced by gay men in the past is now being directed toward transgender people. This is not progress, but a setback.

We need to have more compassion and empathy toward transgender people and change the negative perceptions through ordinary people living their lives with dignity and openly.

Q: What advice do you have for people who want to be better supporters of the LGBTQIA+ community?

A: Don't be afraid to ask how you can be better, as long as your intent is good. People can tell the difference between someone who is deliberately trying to offend them and someone who is just being clumsy with their words.

> **"To increase inclusivity, you have to be deliberate about including people."**
>
> **TOM WELTON**

Prioritizing DEI in science communication

Hope Henderson is bisexual and a science communicator. She translates science into lay language and does content strategy for the Innovative Genomics Institute. She earned a Ph.D. in molecular and cell biology from the University of California, Berkeley, and a bachelor's degree in biology from Brown University. She also has a background in science studies and bioethics.

Q: Tell us about your work as a science communicator at the Innovative Genomics Institute.

A: As the communication strategist at the Innovative Genomics Institute, I am involved in planning our content strategy, writing and doing interviews, social media, managing our translation program, working with illustrators, and sometimes working with student writers to help get them experience and training in writing.

Q: How did you get started in science communication?

A: I started as a bench scientist in molecular biology and genetics. As a graduate student, I wrote a few pieces

HOPE HENDERSON

> "I believe the public has a right to scientific information. Writing in an inclusive way supports people in accessing that information and feeling like the research — that their tax dollars are funding — belongs to them."
>
> HOPE HENDERSON

for science blogs and a grad student science magazine. While finishing my Ph.D., I began writing part time at the Innovative Genomics Institute.

Q: Discuss the importance of diversity, equity, and inclusion in science communication.

A: DEI is always on my mind as a science communicator. In writing news articles, I have a rule for myself that I quote and show an image of at least one researcher who is not white and at least one researcher who is not a man.

When writing about disability and illness, it's key to use language that is factual, neutral and noneuphemistic. I'm also thoughtful about trying to use language that is inclusive around different family structures and cultures.

I believe the public has a right to scientific information.Writing in an inclusive way supports people in accessing that information and feeling like the research — that their tax dollars are funding — belongs to them.

Another one of my goals is to do what I can to help shift the image of who a scientist is, from someone who looks like Einstein to a much wider range of possibilities. Incorporating principles of DEI in science communications helps open the doors to everyone interested in a science career.

Q: What advice do you have for young LGBTQIA+ scientists?

A: Activism is an amazing thing to do, but it can also take a real toll on your well-being when it takes the form of going into unwelcoming environments and trying to change them. If you want to do that, all power to you. But another valid path is seeking out environments that accept you as you are, seeking out people who already have a more inclusive vision of what science can be, and working with them to build toward that shared vision.

JAN ELDRIDGE

Understanding trans people as individuals

Jan Eldridge is a transgender woman and a theoretical astrophysicist based in New Zealand as the head of the physics department at the University of Auckland.

Q: How did you become interested in theoretical astrophysics?

A: I became interested in the field because of my love for science fiction. I grew up watching "Star Wars" and "Doctor Who" and later discovered my passion for math and physics in school. This led me to pursue a degree in astrophysics at the University of Cambridge.

As an astrophysics professor, you get to show your students the beauty and wonder of our universe. But it's not just about exploration, you work hard to make the university a better place for everyone. It's quite funny, in some ways it feels like being Doctor Who.

Q: How can institutions or universities better support and welcome young scientists?

A: By realizing that diversity is a good thing. Different groups have different needs, and changing systems to help one group can actually help everyone.

For example, having more all-gender bathrooms can benefit not only nonbinary and transgender

students but also caregivers who need to bring their children of the opposite gender to work or those who have elderly parents of the opposite gender visiting them.

Q: What positives do you see for LGBTQIA+ people in the scientific community?

A: As a transgender person, my experience has been generally positive. The scientific community has been quite welcoming, and many people in the rainbow community are excellent scientists.

There have been setbacks in terms of inclusivity and support for the LGBTQIA+ community, including trans individuals. Some people still believe in the binary concept of gender and ignore scientific evidence that shows that gender is not just male or female. However, the scientific community has been working on making science more inclusive, and there is greater visibility of LGBTQIA+ scientists.

Many professional bodies of science have done surveys of the rainbow community within the work and have been aware of issues. There is a huge push to make science more inclusive, and many scientific conferences have groups for the rainbow community.

Q: What advice do you have for other transgender scientists?

A: Everyone needs to balance their personal safety, career and relationships when deciding whether or not to come out as transgender or nonbinary. It's important to prioritize one's own well-being and only come out if it's safe and feasible to do so.

Many trans people are still in the closet, so to speak, and they go on living good and useful lives. But you have to wonder, if it were possible for them to be themselves, how much better would it be?

My advice for other trans individuals is to remember that they are not alone. There are many other trans and gender-diverse people in science, and there are role models. The stories about people like us have been hidden in the past, but there is now greater visibility and recognition of LGBTQIA+ scientists.

"My advice for other trans individuals is to remember that they are not alone. There are many other trans and gender-diverse people in science, and there are role models."

JAN ELDRIDGE

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Redefining STEM

Pride in STEM says it aims to "queer up science spaces" and to "science up queer spaces"

By Arti Dumbrepatil

COURTESY OF ALFREDO CARPINETI

Alfredo Carpineti, one of the founders of Pride in STEM, wants STEM to be a place "where everyone can feel that they belong."

The goal of Pride In STEM, according to the group's website is "to break down any barriers between those who do STEM work and people who are interested in it, as well as highlight the positive and negative aspects of being an underrepresented group in STEM."

Pride in STEM, established in the United Kingdom in 2016, is committed to amplifying and honoring the voices of the queer community. The charity, organized around a deed of trust, is the brainchild of Alfredo Carpineti, an astrophysicist; Matt Young, a neuroscientist and science communicator; and Chris Carpineti, a content creator in science communication. What started as a simple idea of creating a safe support group for queer scientists has grown into a powerful force redefining the fields of science, technology, engineering and mathematics. The organization was nominated for the Gay Times Honours in 2017.

"My ideal vision for the STEM field is a place where there is no harassment anymore," Alfredo Carpineti said, "that discrimination is not even considered because it not only needs to be left at door, but it is a place where everyone can feel that they belong."

Pride in STEM has 10 trustees representing a variety of backgrounds and identities. The organization does not have a formal membership and gauges interest based on social media followers and attendees at its events. Many of those attendees work in the biological sciences.

The founders of Pride in STEM acknowledge that cultural changes in some parts of the world have helped the LGBTQIA+ community, but they know this journey has just begun and ahead is a long road to real equality. They want LGBTQIA+ people in STEM to work and thrive without fear of discrimination.

"We love to tell the fairy tale that science is for everyone," Alfredo Carpineti said. "But it is not true, and we need to make it for everyone just not by saying it but by taking steps to make it true."

Alfredo Carpineti talked to ASBMB Today about questions and problems faced by the queer community in STEM. This interview has been edited.

Q: What does Pride mean to you?

Pride means visibility, Pride means belonging and Pride means safety.

For me, Pride is about a feeling of belonging for all the people who feel they do not belong in STEM. The queer community, people of color, underrepresented groups and women need to understand we belong in STEM, and this is what Pride stands for me.

Q: What are common issues faced by the LGBTQIA+ community in STEM?

In different aspects, we are all seeing the same limitations. The first and foremost thing that should be stamped out is harassment, which is so common in academia. I always question how it is allowed to continue and how people in positions of power are shielded from responsibility. A 2021 report by the All-Party Parliamentary Group on Diversity and Inclusion in STEM on "Equity in the STEM workforce" helped us understand the disparities between LGBTQ+ people and non-LGBTQ people.

Even within our community, there is bias. For example, a white gay man like me would have difficulties concerning career opportunities, professional devaluation and social exclusion compared with a straight white man, but I will not have the same difficulties as a woman or a queer person of color or a trans person.

Major issues that plague this field are discrimination while securing grant funding, lack of network and peer support, intentions to leave STEM and health difficulties.

COURTESY OF ALFREDO CARPINETI

Members of Pride in STEM march in the London pride parade in 2018.

While specific issues affect individuals in queer communities, once you start scratching the surface, these are the same issues faced by all underrepresented communities.

Q: How is Pride in STEM making STEM inclusive?

We did not start with these big goals in mind. Our beginnings are way humbler. We just started as a simple networking group. We wanted to have a community where anyone could voice their concerns, talk about their problems or just come enjoy a beer.

But within the first few weeks, here in the U.K., we started getting messages from scientific societies, universities and research institutes asking for advice on addressing LGBTQ+ issues in STEM. This was new territory for us because we were not experts; we were just a group of queer people in STEM. So, we decided to get in touch with Stonewall, which is the largest European charity operating in the U.K. for LGBTQ rights. They have advice

Alfredo Carpenti, one of the founders of Pride in STEM, wants STEM to be a place "where everyone can feel that they belong."

about LGBTQ rights in the workplace so we were able to have a little list of resources that LGBTQ+ individuals in STEM might find useful. In the aspect of promoting role models, we helped organize the International Day of LGBTQ People in STEM, which happens every year on Nov. 18.

To increase scientific awareness, we conduct Out Thinkers events across the U.K. Out Thinkers is an open platform to highlight LGBTQ+ researchers and bring people together. These events run in queer bars, theaters, tech companies, museums, universities or research institutions where queer scientists talk about their science and their journeys.

We also participate in a parliamentary discussion forum organized by the British Science Association to identify problems faced by the LGBTQ+ community and to promote diversity in STEM, in all its forms, from how to support family planning to promote STEM outside of major cities.

Q: How are your efforts perceived?

The negative feedback is that we are constantly told that we are bringing politics into science, or creating identity politics. Our identity is not political, our identity is politicized. Who we are is a matter of debate, because people want to debate our rights. This is completely wrong.

A positive feedback example that comes to my mind instantly is that a person whom I had known on Twitter came to me after an event and just said thank you. He said, "I had no idea that having a STEM career was possible for someone like me."

If I can help one person, I am very happy and proud. Our organization is doing things that are very important for the community, but if I can help one person my job is done. I think we are making a difference in the world, and my firm belief that is every mountain can be moved, it just takes one rock at a time.

Q: What is your advice to young queer STEM graduates?

My advice is that your struggles are probably big and often serious. But you are not alone. There are people like you out there and it is just a matter of finding them.

Social media is a great way to connect, and there are also places like Pride in STEM where you can get in touch with people and find people that have shared experiences or can relate to your experiences, and I think that is very important.

Humans are, after all, a social species, and by finding community, I think our burdens can sometimes be lifted. Things might not be perfect, but there is this shining hope that you can do it as others have done it — knowing that you are going to be okay because other people like you are OK.

> **"There are places like Pride in STEM where you can get in touch with people and find people that have shared experiences or can relate to your experiences, and I think that is very important."**
>
> ALFREDO CARPINETI

Arti Dumbrepatil (artidumbre@gmail.com) is a freelance science writer and communicator. With her academic training plus expertise in science communication, she transforms complex, jargon-filled science into enjoyable and comprehensible content. Follow her on Twitter: @rtisciwrites.

A space for LGBTQIA+ grad students to be their best

By Anna Hu

"It all started in a little room with about three people."

That's how Wesley Burford remembers the beginning of the Sexuality Alliance for Scientists, or SAS, at the University of Texas Southwestern Medical Center. Seven years later, SAS is a chapter of the international organization Out in STEM, or oSTEM, and its membership has swelled to several dozen.

Burford was one of the people in that room back in 2016, along with two other founders and their faculty director, Nancy Street, who was then the dean of diversity and inclusion for the graduate school. He said he was approached by his fellow graduate student Jessica Hicks, who was passionate about starting an LGBTQIA+ group for the grad students on campus. Hicks became the first president of SAS, and Burford later took over as the second.

At the time, the U.S. was experiencing political upheaval around the so-called "bathroom bill" in North Carolina that barred transgender people from using restrooms consistent with their gender identity. Burford, who is from San Diego and attended college in San Francisco, was initially unsure what kind of reception their fledgling organization would receive in a state that has not historically been the most welcoming to queer people.

"Dallas is a very lovely area for LGBT people," Burford said. "But overall … everybody understands that when you're living in a space that's not always really inclined to support you, you live in that sort of limbo. And so we definitely wanted to make a community."

Once they started, the organizers found a community that was willing and excited to show up. Among their earliest events were informal pizza party socials, where students could gather at a local pizza parlor to chat with their peers and faculty members.

Burford attributes their initial success in part to a core group of LGBTQIA+ and ally faculty members who were willing to advocate for their students. And as the students became more comfortable talking with the faculty, the value of the meetings grew.

"All of a sudden, you start having these really meaningful and helpful scientific discussions and career discussions and life discussions," Burford said, noting that students who were initially intimidated by their professors found an environment conducive to conversations.

The socials also helped identify the needs of the queer community on campus. Many of the questions students had — for instance, "How 'out' should I be on a résumé?" — led to SAS events such as résumé workshops and networking opportunities.

SAS's goal was to provide a safe space for LGBTQIA+ students, and the founding executive board was intentional about privacy measures such as not maintaining an official membership list.

"We were really interested in the beginning at not actively identifying queer people," Burford said. "Our philosophy was, it's the people who aren't going to step out from the shadows into the light that are the most vulnerable."

The lack of a membership list led to some pushback from the university's administration, but the group compromised by taking a head count at each event and having an optional sign-in sheet. The goal was to keep events open to all interested students, and they've maintained that philosophy over the years.

In 2020, SAS became a chapter of oSTEM, a national organization of LGBTQIA+ people in the science, technology, engineering and mathematics community. oSTEM has more than 100 student and professional chapters in the United States and abroad, so UT Southwestern joined a global network with this shift.

Grad student Richard Ruedas was president of SAS when they applied for oSTEM chapter membership. He recalls it was a relatively smooth process (just an application for and a few signatures from administration and faculty) and one that brought

COURTESY OF RICHARD RUEDAS

Members of the University of Texas Southwestern Medical Center oSTEM chapter participate in the Dallas LifeWalk.

many benefits.

"We always want to increase our recruitment of LGBTQ folks to the graduate program here," Ruedas said. "It made sense because oSTEM is chapter-based, which is nice, and has a lot of undergrad chapters all over the country."

Similarly, grad student Anthony Hernandez Vasquez, who is now president of the oSTEM chapter, highlighted the advantage of belonging to a wider organization. "As a member of a larger community, we have access to a platform that allows us to extend our reach within our institution," he said.

Having the oSTEM framework helped guide their activities, Vasquez added. These include social gatherings and seminars focused on advocacy and visibility of the LGBTQIA+ community.

Although some early networking hopes were thwarted by the COVID-19 pandemic, the UT Southwestern chapter attended oSTEM's conference remotely for two years. In 2022, Burford and Ruedas, who are both still executive board members of the UT Southwestern chapter, attended oSTEM's first in-person conference since the pandemic began.

When they arrived at the Boston Sheraton hotel where the conference took place, Ruedas was surprised by the 1,000-plus people in attendance, he said. "I wasn't expecting it to be quite that large. But it was great. We networked with a lot of people and learned a lot of strategies that we can bring back to the chapter."

He said one session offered information on organizing a regional conference, which could be useful for their chapter down the road.

Ruedas and Burford are now wrapping up their Ph.D.s and looking to turn their oSTEM responsibilities over to the next generation of grad students, including Vasquez. Both are optimistic about the future of the chapter. After a dip in engagement during the pandemic, these days about 25 to 30 people consistently attend the general meetings, and more attend career panels or seminars.

Ruedas looks forward to potential collaborations with other oSTEM chapters within the University of Texas system, including at UT Dallas, Austin and Arlington. Meanwhile, Burford said it was both "humbling and exciting" to see the directions the new executive board is taking — starting a book club, for instance. Now that the group is a chapter of an international organization, he sees more ways to provide students with opportunities such as going to a national conference or applying for oSTEM's scholarship program. He also noted that these opportunities may take on more importance as the Texas university system recently paused new diversity, equity and inclusion efforts.

"And that, I think, is the most important," Burford said. "It's just to make sure that being a member of the LGBTQIA community is never an obstacle to doing great science, which is really the organizational motivation."

"We're not here to do anything but help facilitate you being the best scientist and best student possible, and to communicate that having a fertile environment … is critical to you being the best scientist you can be."

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 a volunteer writer for ASBMB Today.

500 Queer Scientists:

Increasing LGBTQIA+ visibility in STEM one story at a time

By Jessica Desamero

As a bisexual scientist, I sometimes feel like I have to hide my sexual identity in the lab. When a colleague and friend from a neighboring lab told me she was pansexual, I was glad I could talk to her about things like celebrating Pride Month and was just overall happy someone like me was there.

Queerness is a part of personal identity, yet often in science, technology, engineering and mathematics workspaces, we can feel we need to keep our queerness hidden because we might be considered unprofessional for speaking about it. As a result of this hiding, a queer person may feel alone and underrepresented in their field.

When I first heard about 500 Queer Scientists, a website where I saw scientists like my colleague and me, I wanted to find out more, so I got in touch with Lauren Esposito, a curator of arachnology at the California Academy of Sciences who runs a research lab focusing on the biology and evolution of spiders and scorpions. I asked Esposito to tell me how 500 Queer Scientists got started.

In spring 2018, Esposito helped with an event held at the academy in collaboration with 500 Women Scientists, an organization that works to make science more inclusive and accessible. Esposito, who uses she/they pronouns and identifies as queer, was happy to be in a space that empowered women, but at the same time, they felt they did not truly belong.

After the 500 Women Scientists event, Esposito reflected on their experience of not having queer scientists around them and not being able to express queerness in the lab.

"That sense of your own personal identity being unprofessional is really psychologically damaging and makes science not really, necessarily feel like a space that's welcoming for queer and trans people," they said.

This led Esposito to create 500 Queer Scientists, a campaign to increase LGBTQIA+ visibility in STEM.

At 500 Queer Scientists, scientists submit their own biographies and share stories about how they identify, what they do in STEM and how they experience being a queer scientist. So far, the site has 2,000-plus stories and counting.

I contacted three of the scientists to ask why they shared their stories.

Jui-Lin Chen is a postdoctoral researcher and immunologist at Weill Cornell Medicine. "I want to be out there saying, 'Hey, there are also some gay scientists out there trying to use their knowledge to improve human health and advance human knowledge,'" Chen said. "It's also OK to be gay in science fields."

Aflah Hanafiah, a Ph.D. candidate at Pennsylvania State University, wanted to show that trans people are diverse and have multiple backgrounds. By sharing her story, she hopes to start discussions. "If you only know one person of that particular background, you have to question why are they the only one," she said. "Why is it that we don't see more, and what can we do to support a more diverse group of scientists?"

Bernie Santarsiero, a research professor at the University of Illinois Chicago, wants to be part of an environment where people feel safe to come out and explore their sexuality.

"There's been a few cases where individuals have come out to me that hadn't been out before because they feel like there's somebody that they can talk to, somebody they can approach," he said. "It creates a better environment for you to be a better scientist, to be able to not have to hide a part of your life but be able to be open about it as well as go ahead and explore your own career and be successful in your career."

Advocating for vaccines

As a first-generation immigrant from Taiwan, Chen, who is gay, encourages people from other countries to pursue science in the United States despite the cultural and

COURTESY OF JUI-LIN CHEN

Jui-Lin Chen is a postdoctoral researcher and immunologist at Weill Cornell Medicine.

systemic differences.

During his Ph.D. at Duke University, Chen combined nanomaterials to develop next-generation HIV vaccines. As a postdoc, he has continued this HIV vaccine research. He also studies how children respond to COVID-19 vaccines, with the goal of developing better vaccines for them.

The most enjoyable thing about being a vaccine scientist is "the feeling of contributing to society, that you are using your knowledge and all your skills to improve human health," Chen said.

He recently created a science blog called The Immunologist where he shares immunology concepts and research in a fun and accessible way.

Because North Carolina is a conservative state that had just passed House Bill 2, an anti-LGBTQIA+ bill preventing transgender people from using bathrooms that align with their gender identity, Chen was initially worried about going to Duke for his Ph.D. But he was grateful that Duke turned out to be a very liberal school; an LGBTQIA+ student group worked hard to help people feel comfortable on campus. This group was his first source of support. Then, one day, one of his Ph.D. colleagues revealed to Chen that he was gay too, and they became best friends.

Moving for meaning

As a trans Muslim woman, Aflah (who generally uses a single name) grew up in Malaysia, a country where homosexuality is classified as a criminal offense, with no LGBTQIA+ rights and no laws to protect the LGBTQIA+ community from discrimination and hate crimes. In Malaysia, queer people can face many possible challenges, from being forced to undergo conversion therapy to sacrificing their identity. This made it especially meaningful for her to declare and celebrate her identity in the U.S.

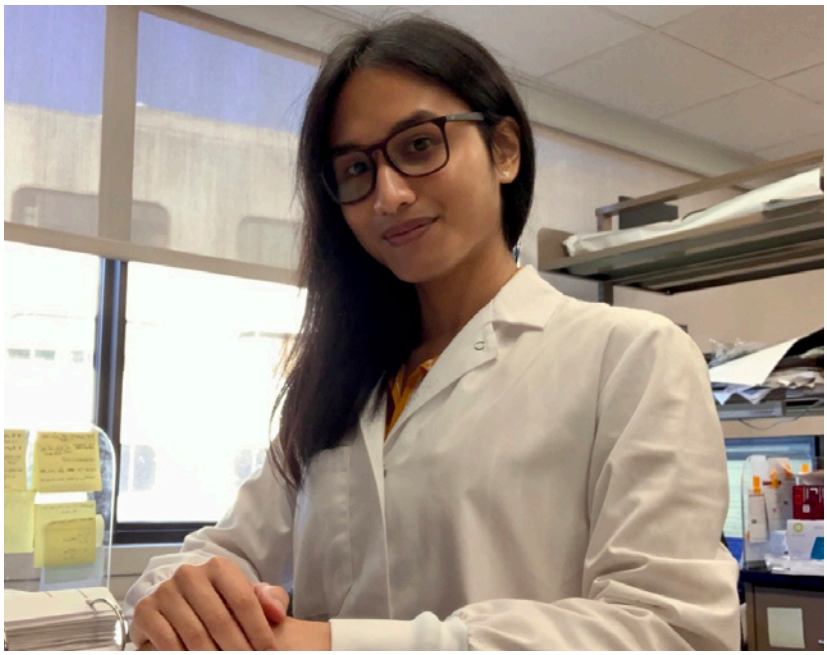
Aflah works in an epigenetics lab, where she studies the role of polycomb repressive complex 1, or PRC1, in mammalian systems. PRC1 is a group of protein complexes involved in the expression of developmental genes in plants, insects and mammals. She works with stem cells as well as mice.

Since Aflah was a child, she's been captivated by the mechanics of life. In her home country, she excelled in high school and obtained a scholarship, allowing her to move to the U.S. and continue her scientific studies. This move took her away from a queerphobic country where she was not safe. "I needed to get out so that I would have the chance to actually live and lead a life that's meaningful," she said.

Aflah has a small group of trusted friends she calls her chosen family. "Honestly, I'm very happy," she said. "It's only a couple of people that I really, really trust that's like my people. And that's all you need."

She connected with these friends through shared experiences of being foreigners, international students or of minority backgrounds. She advises anyone looking for similar support to be careful about whom you trust and to trust yourself first and foremost.

"When you don't have a



COURTESY OF AFLAH HANAFIAH

Aflah Hanafiah, a Ph.D. candidate, works in an epigenetics lab at Pennsylvania State University.

community, you have yourself," she said. "So have that very strongly in you, navigate your life, and find your people when you can and try your best to form that small community."

On the margins and outside the box

Santarsiero, who is gay and Latino, has helped build programming at UIC for underrepresented and marginalized students in STEM and biomedical research at various stages in their academic careers. He helped lead the Latin@s Gaining Access to Networks for Advancement in Science, or L@s GANAS, program for Latinos and Hispanics, the DuSable Scholars Program for Black and Native American students, and the NIH-funded Portal to Biomedical Research Careers Postbaccalaureate Research Education Program, or PBRC PREP, for underrepresented minority groups, all of which aim to reduce equity gaps for students of color.

Santarsiero's past research focused on biochemical systems and drug discovery with an emphasis on innovative approaches to developing new drugs. He co-led a group at the Novartis Institute of Functional Genomics and co-founded a small drug discovery company called Syrrx, which developed and used robotics to accelerate multiple stages of drug discovery, including gene cloning, protein expression, crystallization and data collection. In 2003, Santarsiero and his partners sold Syrrx after developing a few drug leads that were useful in treating diabetes.

COURTESY OF BERNIE SANTARSIERO

Bernie Santarsiero is a research professor in the College of Pharmacy at the University of Illinois Chicago.

COURTESY OF LAUREN ESPOSITO

Lauren Esposito, the founder of 500 Queer Scientists, runs a research lab focusing on the biology and evolution of spiders and scorpions.

As a professor in the College of Pharmacy at UIC, Santarsiero talks about ways to optimize pharmaceutical health care — these include teaching doctoral students and future health practitioners to be truly accepting and create a safe environment to make their patients feel comfortable.

"I think you want individuals to be open because that is the optimal way that you can actually help them in terms of being able to, in your own craft, support them," he said.

Santarsiero also believes teams should be diverse in terms of race, ethnicity or gender, and sexuality.

"It's the most efficient, creative way that individuals can actually attack a problem," he said. "You don't want to surround your people with, simply everybody has the same point of view or same background, same perspective, because then you're not really going to be able to kind of think outside the boxes easily."

Building a community

I was inspired by hearing these stories directly from their sources, and I'm grateful that 500 Queer Scientists exists. I hope more people continue to share their stories on this platform.

As 500 Queer Scientists evolved, it became about both sharing stories on the website and making virtual connections. Scientists have the option to include their Twitter/Instagram handle or LinkedIn URL along with their bios. In this way, others can reach out to them personally.

"Oftentimes queer people are in isolated labs all over the country, all over the world," Esposito said. "Or sometimes they're in spaces where it's not safe for them to talk about their identity openly. But by connecting virtually, there's ways to share in the community and share in your identity that sometimes you can do sort of secret or through an alternate personality."

Building community was a driving force behind 500 Queer Scientists.

"What I'm most proud of is finding my own community, like going from feeling really alone to feeling like there's a community out there," Esposito said. "And then I'm far, far from the only one in the room. ... I was looking for my community, and I feel really proud that I've been able to find that community and connect with people all over the world that share my identity."

Jessica Desamero (jdesamero@gradcenter.cuny.edu) is a graduate student in the City University of New York's biochemistry Ph.D. program and volunteers with two science outreach organizations, BioBus and World Science Festival. Follow her on Twitter: @JessicaDesamero.

Breaking ground in LGBTQIA+ health

Wisconsin med school is home to the first focused AMA Foundation fellows program

By Christina Swords

When I was a graduate student in chemistry, I felt prepared for and (somewhat) knowledgeable about the expectation that I needed to complete a postdoc as the next step in my training to become a bench scientist. I didn't know until I was in my current position, five years later, that medical doctors also have an optional stage of specialized training after residency called fellowships.

Today, I am a graduate medical education coordinator and manage several fellowships in the Department of Family Medicine and Community Health at the University of Wisconsin–Madison. These programs offer opportunities for clinicians to spend a year or two practicing and learning in a specific field.

In 2021, the American Medical Association Foundation awarded our school of medicine and public health the funding to support its first national LGBTQ+ Health Fellowship. We are graduating our first two trainees in the program this year.

What is it?

The program supports one or two physicians each year as they are trained and equipped to serve LGBTQIA+ populations. Our trainees must have completed a residency in family medicine, internal medicine, pediatrics or combined internal medicine-pediatrics and be on track for an academic or clinical career in primary care.

The goal of this one-year fellowship is to prepare physicians to improve primary care in the LGBTQIA+ community, advance health equity and become leaders in providing health care for individuals of all genders.

If you are an M.D. or D.O., depending on where you complete your residency, you may or may not feel prepared to tackle these issues. If this is an area you are especially passionate about, taking a year after your residency to focus on the health needs of the LGBTQIA+ community may be a great opportunity.

Muhammad Daud is one of the program's first fellows. "I've seen firsthand the immense barriers that LGBTQ folks face within our health care system," he said. "Medical education often fails to adequately prepare providers to offer robust care to sexual and gender minority patients. That's why I chose to do this fellowship — to expand my clinical skills and academic knowledge to better care for the new diverse and authentic American family."

Community engagement

New medical fellows are often surprised by how much time in a fellowship is unstructured. In the LGBTQ+ Health Fellowship, blocks are set aside for academic work; the fellows make their own schedules and work on scholarly projects at their own pace. This year's fellows helped design curriculum in collaboration with the Midwest AIDS Training and Education Center and co-authored an expert opinion piece on the HIV risk reduction plan known as pre-exposure prophylaxis, or PrEP. Overall, unstructured activities take up about 50%

of their time; they spend about 30% in clinical rotations and the remaining 20% in one of the UW Health primary care clinics.

At the UW School of Medicine and Community Health, our LGBTQ+ health fellows spend one day each week in a primary care clinic, several half days per week practicing at sites focused on the LGBTQIA+ community and several days per month attending education sessions.

Each UW fellowship is unique. This one breaks the year into 12 one-month blocks of focused learning on LGBTQ+ health care and community issues. For example, during a month focused on pediatric and adolescent medicine, fellows rotate through UW health clinics, including those that support transgender, nonbinary, gender-questioning, and gender-diverse youth. While working at these clinics, the fellows attend learning sessions where they can discuss and ask questions about the medical needs of this community. Many community-based groups have welcomed our fellows into their space for education and engagement.

Months that focus on reproductive, sexual and behavioral health and geriatrics also emphasize clinic work.

While developing this program, our curriculum team recognized that the fellows need to spend time engaging with community needs. Therefore, the program includes blocks of time focused on advocacy and anti-oppression, where fellows meet with community leaders and participate in events such as Trans Law Help Wisconsin's Name & Gender Marker Change Clinic.

Finding a focus

If you're a med student or M.D. looking into fellowships, it's important to understand the structure and to consider what best fits your interests and career goals.

The UW LGBTQ+ Health Fellowship encourages self-exploration. Fellows can work on developing specific skills, and each fellow is encouraged to follow their own path to become the kind of LGBTQIA+ health leader they imagine.

During the second half of the year, fellows get to build a four-week curriculum based on their experiences in the first six months. They can return to a specific clinic or site to gain more experience in that area, start a new project or travel to gain experience in other locations.

The structure can vary among LGBTQ+ fellows working at different organizations. Some may focus on clinical time and case studies while others focus more on teaching and learning. Some will incorporate community work into their clinics, while others will have separate time for advocacy and community projects.

Fellows take part in designing their curriculum. For example, our first fellows had a particular interest in HIV care in urban areas, but we couldn't offer this experience in largely rural and suburban Madison. The fellows connected with a local clinic focusing on HIV care that has a partner clinic in Milwaukee. They brought us a proposal to work there, and we were able to support a two-week rotation in that city.

Regular personal mentoring with our fellowship directors and core faculty and goal-orientated training further support fellows; they leave with comprehensive skills and the confidence to be leaders in LGBTQIA+ health.

This program is one way the AMA Foundation fulfills its mission to limit health-care inequities. More medical schools are applying for competitive AMA Foundation Fellowship Program funding. In 2022, Harvard and Vanderbilt were awarded funding to start programs at their institutions.

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My queerness helped me see myself as a scientist again

By Elizabeth Van Itallie

When my ninth year of graduate school begins, I feel like a failure. Everyone else in my cohort has graduated, I have no first-author publications, and the project I've been working on for the past four years has been overhauled due to a lack of results. I don't know how to integrate this experience with my previous run of academic successes. Sometimes I can't fall asleep because I'm sobbing so hard.

I am also struggling to identify a post-Ph.D. career for myself, and I meet with a career services adviser. She asks me to reflect on what I enjoy, my interests and my values.

For the past six months, I've spent all day, six days a week, writing scripts to visualize and explore a proteomics data set. The data set itself is a consolation prize — I'm working with it as a result of the research project overhaul. But I enjoy the analysis. So, I tell her that. I also say that my interests are books and queer culture.

The adviser doesn't comment on my interests, but she does tell me I should be a data scientist. I understand why, but it's not the answer I'm looking for. I'm hoping for an out from my identity crisis. If my future career has nothing to do with science, then there's an easy explanation for the failure I've experienced: I'm just not a scientist.

I find comfort in my queerness. Queer book club is my favorite Zoom activity, I listen to episodes of a podcast that recaps the TV show "The L Word" to relax and I heal my adolescent didn't-realize-she-was-gay self by reading queer young adult books.

When I was an undergrad, discovering that I enjoyed research and felt at home in a lab, I also came out as gay, lesbian, queer. It made my life make sense. During graduate school, identifying as a scientist and a Ph.D. student felt more important.

Now, looking at my bookshelf, I think harder about my interest in queer culture. I am particularly interested in the queer history of the HIV/AIDS pandemic in the U.S.

In my sophomore year, my biochemistry professor presented a slide of yearly deaths in the U.S. due to various causes that highlighted the dramatic rise and decline of those attributed to HIV/AIDS. He then introduced us to triple combination anti-retroviral therapy. The lecture left a lasting impression on me.

TED EYTAN FLICKR.COM

AIDS Quilt at the National Building Museum

I listened to a similar lecture on the science of HIV in graduate school as part of the course for which I was a teaching assistant. I discussed the lecture with a friend, and she bought me a copy of Randy Shilts' book about the AIDS crisis, "And The Band Played On." I read more; the history is so much more complex than the scientific successes that the courses celebrated.

Learning about the HIV/AIDS pandemic expands my understanding of being queer. My queerness is more than whom I date; it's also about being part of a community with a long history of fighting against the status quo and caring for each other.

Previously, when I thought about science in my

future, I envisioned leaving the basic science of my Ph.D. research and doing something that could explicitly impact communities I care about. My exploration focused on reproductive health. But now, after reflecting on my interest in queer culture, I realize that, of course, the HIV pandemic continues.

In the U.S., HIV disproportionately impacts Black men who have sex with men and trans women, the Centers for Disease Control and Prevention reports. Globally, cis women make up close to 50% of new cases, according to the Joint United Nations Programme on HIV/AIDS.

I reach out to a colleague who worked on HIV immunology for his Ph.D. I start identifying drug companies that work in HIV prevention and treatment, and I start an online course titled "AIDS: Fear and Hope."

Eighteen months after the career services meeting, with my Ph.D. thesis successfully defended and my short postdoc finishing my papers coming to a close, I see a posting for a bioinformatics job working on HIV-1 vaccine development. It's at an academic institute in the city where I'm planning to move. I apply. I still haven't escaped my science identity crisis, and I constantly dream of leaving science altogether. But I decide that I can't walk away just yet; I need to give it one more try.

The day I move into my new apartment, I get an email about an interview for the job. When the interviewer asks why I applied, I say that learning about the HIV/AIDS pandemic has been an important part of connecting with my queer identity. At the end of the afternoon, I am escorted to the director's office. On the atrium wall, I see a quilt — each section oriented around a name. I immediately know what it is: a panel of the AIDS Memorial Quilt. In 1987, almost 2,000 panels, handcrafted by friends and families of the deceased as a physical testament of loss and love, were displayed at the National Mall during the Second National March on Washington for Lesbian and Gay Rights.

A month later, I start the job. Of course, I love the scripting and analysis, but I'm surprised to realize that I'm excited about the data and the scientific approach too. Also, I am not terrible at it. It turns out I am a scientist, and I'm incredibly grateful to feel some confidence in that identity again.

I'm also grateful for my queerness. It's an identity I don't feel I need to earn, and leaning into it brought me to where I am now. Every day, as I take the path through the institute to and from my office so I can pass the quilt, I remember the weight of the HIV/AIDS pandemic past and present, and I feel the connection between my queer self and my scientist self.

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My story for LGBTQ+ visibility in the life sciences

By Danny M. Hatters

I grew up in rural southeastern Australia, which is an area of stunning natural beauty. Our house was set in natural bushland with lots of space to ride motor bikes and go exploring. I was fortunate to have parents who instilled in me a sense of discovery and of nature.

I was fascinated by the natural life-forms around me — especially the things I could get up close to. I caught small bugs and critters with my net to keep in an aquarium. In the nearby creek, I found fossils of small crustaceans and ferns that got me interested in evolution. I became obsessed with the ideas of continental drift and the ancient supercontinent of Gondwanaland. I was one of those kids who had every type of pet — guinea pigs, mice, aquarium fish, frogs, chickens — and I had my own little rainforest-themed garden. I was always interested in the science of biology, and I was good at school.

These were the key factors that gave me direction, and I ended up a professor in biochemistry.

An integral part of me, as of everyone, is my sexuality. I knew I was gay at a young age — probably around 11 or so, but it is hard to pin down the exact time I put two and two together. The world was blatantly homophobic back in the mid-1980s to early '90s — it was the peak of the AIDS epidemic — but I was always sure that the way I felt was fundamentally normal despite a culture that pushed other ideas.

I was confronted from a very young age with the reality that the default templates for how to live life did not fit me. I was expected to marry a woman and have kids. And though my parents, friends and teachers were kind and sympathetic, they lacked firsthand experience of being gay, so even if they'd known, they couldn't have provided me with alternatives.

For me, being gay was, as it probably was then for most gay teenagers, something to be kept totally secret. I knew no one who was openly gay. I lived in a rural region before the internet and with no gay support groups I knew of. Prevailing attitudes portrayed LGBTQ+ people as nonexistent, sick or to be mocked. I was on my own, trying to imagine what my life might be like ahead.

COURTESY OF DANNY HATTERS

For much of his life, Danny Hatters, a professor at the University of Melbourne, has experienced the "generally parallel worlds" of science and the LGBTQIA+ community.

Grappling with this isolation dominated my mind during my teenage years. By the age of 15, I no longer could stay silent, so I found the courage to talk to two people at school I trusted: a friend and a teacher. They encouraged me to come out to my parents. That was the hardest thing I have ever done in my life. Thankfully, those people at school and my parents were wonderful. Coming out was a big deal, but it didn't change the fundamental issue of being on my own trying to learn about how to live my life.

After I finished school, I finally was in a position to begin to learn how to live as a gay man. Attending university meant moving to a big city where, for the first time, I met other LGBTQ+ people.

During orientation week of 1993 at the University of Melbourne, I sought out the GaySoc society's stall

and encountered a group of enthusiastic students. I remember Bronski Beat was playing on a portable stereo in the background. I was so nervous to approach the stall, but the three people I talked to, Cameron, Marina and Damien, were just so warm and welcoming. They invited me to attend the regular lunchtime discussion groups they ran at the student union. It was the beginning of a new world, and it is no exaggeration to say I was like a kid in a candy shop from that moment on.

Lacking a template for living meant I had unbridled freedom to explore. This freedom is a special privilege of our LGBTQ+ community, but it took me more than a decade to work out how to harness it to be able to live my most rich and rewarding life. With so much choice, combined with my inexperience and a lack of role models, I didn't know how to build meaningful connections beyond the shared experience of sexuality. I also felt a disconnect between what the gay world offered and my own personal interests — such as becoming a scientist.

In the academic world of biomedical sciences, we are lucky to work with educated and enlightened colleagues who generally have no problems with LGBTQ+ people. But the lack of visible LGBTQ+ scientist role models left me feeling alienated and fueled imposter syndrome during my graduate student and postdoc years.

The institute where I did my postdoc often hosted esteemed visiting scientists for seminars, and these visits included a lunch or dinner where postdocs could meet the guests in an informal setting. The institute worked hard to provide a diverse program of visitors, including many women and scientists from ethnic minority groups. The informal meetings led to fascinating discussions about many topics, especially personal perspectives on lives and careers. It was actually a very good program. But never were any of the guests openly LGBTQ+.

People sometimes ask why sexuality matters in the context of life science research, considering our research is about testing hypotheses that generally are unconnected to the researchers' sexuality. My answer is that it doesn't matter at the direct level the questioner asks — but the lived experience of being gay creates a deeper imprint on self-identity that permeates all aspects of a person's life, including their work life. Social discussions with colleagues occur through the prism of heterosexual assumptions as people talk about their wives or husbands or kids. Such small things form the social bonds that are important in networking and in career discussions about work–life balance. If I do bring up my partner in social discussions — even just very casually — the fact that my partner is male too often becomes the point of the discussion. Sometimes I am OK with that, but other times it is kind of tedious and can make me reluctant even to bring up the gender of my partner.

I am not setting a gay agenda by being assertive about this — indeed, I am uncomfortable about asserting my sexuality anywhere, because it is a very personal thing. Rather, I am asking non-LGBTQ+ people to think about the assumptions they might be making on topics they normally might not need to think too hard about. For example, assuming that a person they meet for the first time will have a partner of the opposite sex when asking social questions sets up barriers for people who are gay.

When an institution is establishing policies and a scope of inclusion is relevant, a well-intentioned inclusion policy that leaves out a minority group (either in wording or by action) can make the feeling of exclusion worse than if there were no policy at all. I have felt that many times in my life.

In my younger years, particularly in my early 20s to early 30s, I would have felt more comfortable and more a part of the scientific community if I had known more about others like me. My personal development would have benefited from having role models who shared my experience and whose example resonated with the whole of me — particularly LGBTQ+ scientists who had successful careers and were inspiring and confident in their own skin without needing to be in the closet. Sure, I knew great gay people in the LGBTQ+ community, and I knew great scientists — but I felt those two realms were generally parallel worlds. I know they shouldn't be and are not really. I hope to provide a beacon to others who hunger for role models.

The world has become so much better in so many ways for the LGBTQ+ community over the last two decades. I am writing this as Australia is abuzz with WorldPride celebrations in Sydney. The world definitely has come a long way, especially in the last decade. But we still can work to create beacons of visibility that showcase a wide variety of people who are scientists — this is relatively easy to do if you put yourself out there. The sexuality of many LGBTQ+ people is invisible unless they put their hands up.

And thus, here I am — a full professor running a lab on the mechanisms of neurodegeneration. This is my story for visibility.

Danny Hatters (dhatters@unimelb.edu.au) is a professor of biochemistry and pharmacology and a member of the faculty of medicine, dentistry and health sciences at the University of Melbourne.

A journey with Chelsey

By Renae Crossing

"Funnily enough … for whatever reason," Chelsey once told me, when she played Pokémon as a kid, the character Butterfree was always on her team.

Chelsey and I took the train to Sydney every Tuesday for university classes, two hours each way. I remember us sitting at the end of the carriage where you could be opposite, only we sat on the same side. (There's a metaphor or two there.) Sometimes we'd do our readings or finish an exercise. Mostly we talked about life.

We both went to church growing up, and that came up a bit. We talked at some point about the church's attitude to people being gay. Years later, I couldn't remember what I'd said, only that I didn't regret the essence of our conversations.

We listened and clicked, turning words over like people can turn the seats on newer trains; it made sense that you could change direction. At that time, Chelsey had a different name from now.

First stop

Chelsey and I had studied first-year engineering in a former mining town, one year apart, but we didn't know each other in her first year. That time was "deeply uncomfortable," Chelsey told me recently. There were maybe two or three women, and her recollection of the cohort was of misogyny and racism. "Even the good ones were pretty shit."

I met Chelsey shortly after she'd swapped majors. "I'm enjoying this arts stuff," she said.

My shift was from chemistry to biology to biochemistry. Both of our paths rose to meet us as we emerged from that which had taken us as far as we'd willed. We moved toward expression. We walked toward wonder.

Science-educated, Chelsey could pick up a scientific paper. "For years I just spent so much time trying to justify, to know the ins and outs of sociology and genetics and biology and psychology and history of feminism and colonialism," she said. "We shouldn't have to do that, but we're asked to do it all the time. It's kind of exhausting."

We caught up recently, grateful for the way conversations around us have changed. "I like to educate (about what it means to be trans) because I choose to," Chelsey said. "I don't want to educate because it's expected of me or forced on me, I suppose."

"At the end of the day, people don't need to understand every little intricacy of it to respect you."

Time to make a change

Chelsey came out between 2014 and 2016, around the time that the TIME magazine article "The Transgender Tipping Point" came out.

"Things have been hard ever since," Chelsey tells me now, "but it's been worth it."

None of her friends were openly trans when she came out; she knew one trans man who was an acquaintance. It was international visibility that turned the tide. "Laura Jane Grace came out and was on the cover of Rolling Stone," she said. "Laverne Cox's visibility — that helped. Things were changing a lot at that time."

With a burgeoning music scene in our hometown, people no longer feel they need to travel to Sydney. A club rumored to be gay-friendly closed down, but a punk band began, then events through initiatives "Queer AF" and, more recently, "Deer Gaze."

"People stick together and go to events and there's a nice little community," Chelsey said. "It's funny to see people come from bigger cities, like Melbourne even, which is seen as the bastion in this country (where most trans women have gone) … It feels really flattering. We had to work for it, so we don't take it for granted."

Born again

Chelsey has a mind for linguistics and I've been thinking how, although the subject of transition often makes Christians bristle, the language echoes phrases used in churches all the time.

"I checked all the boxes," before deciding to transition, Chelsey said. A partner, a job she was reasonably happy with, an overseas trip. "Nothing could replace

COURTESY OF RENAE CROSSING

Chelsey now has this tattoo on her arm of Butterfree, the Pokémon character that was always on her team.

what I knew was missing. I knew I had to finally address it."

It required honesty. "There was a part of me at the time that was like, 'No, I'm just an ally,'" she said. "I'd been suppressing myself since I was 3 years old."

Is that too young for people to know? That's what people said about me becoming a Christian when I was a child.

The phrase, "Do not conform any longer to the pattern of this world," echoes in my mind. This biblical line presents itself like an agamograph — a three-dimensional art form where viewers think they know the image but then they walk a little further and it looks different from another angle.

And the idea, too, that you can be born again.

Terminology

"Hormones are way more powerful than a lot of people give them credit for," Chelsey said. "I've lost an inch in height and a shoe size."

Doctors had told her that wouldn't happen, but the same occurred with no small number of her friends. People's bone structure doesn't change, Chelsey explained; the ligaments between the bones do.

I went to a seminar in church where the most common word used to describe trans people was "confused," which I thought was ironic because Chelsey knew exactly who she was. It occurred to me years later that this was a projection.

"It's a misconception that all trans people feel like they were born in the wrong body," Chelsey said.

And not everybody wants surgery, let alone the associated medical bill.

I think back to Butterfree, who now lives on Chelsey's arm. "There's a stereotype that goes back to the '90s, probably even earlier," she told me, "of trans women getting butterfly tattoos. It was my way of claiming that and making it mine, the whole metaphor of transformation, pupating and all that stuff. Metamorphosis."

Perhaps it's not so much rebirth as progression.

Being seen

Though she says she's "lucky enough to 'pass' an amount of time," Chelsey stopped working in anything customer-facing, music aside. In retail or hospitality, she said, "You never know what you're going to get."

Everybody notices different things in realizing another person's gender; Chelsey told me there's no clear pattern in how people respond.

"People have read me: 'That's a trans woman,'" she said, while others think, "'That's just a dyke.' People think I'm a straight, cis woman sometimes, and I think that's really weird."

The one Chelsey hates, she said, is when people treat her as though she's a man — because that's a calculated response. "They have to look at me, and think, 'I've caught you out. You're trans, and I don't think they really exist, and therefore I'm going to say what I think will offend you.' … I'll take anything else," she said.

In 2023, trans visibility is "a double-edged sword," Chelsey said. Without safety, visibility is violence. Laverne Cox, the trans woman on the cover of TIME in 2014, has recently described this year as "the height of backlash."

Support can come from unexpected places. "I'm constantly surprised," Chelsey said, "by the kinds of people who you end up with on-side," including elderly people.

On the other hand, "You can get some pretentious hipster dude who will try and pretend to not be transphobic to impress the straight cis girls, and then you find out (otherwise)," she said.

Chelsey plays music professionally, and there's a safe door policy; venues want to make sure no one gets hassled. If someone doesn't like the policy of a safe space, they're going to miss the music.

Chelsey has taught me more about trans people than anyone else I know. And though it's been 10 years since I met her, I'll always imagine us on those blue train seats with the confetti pattern. We are side by side, the world going by.

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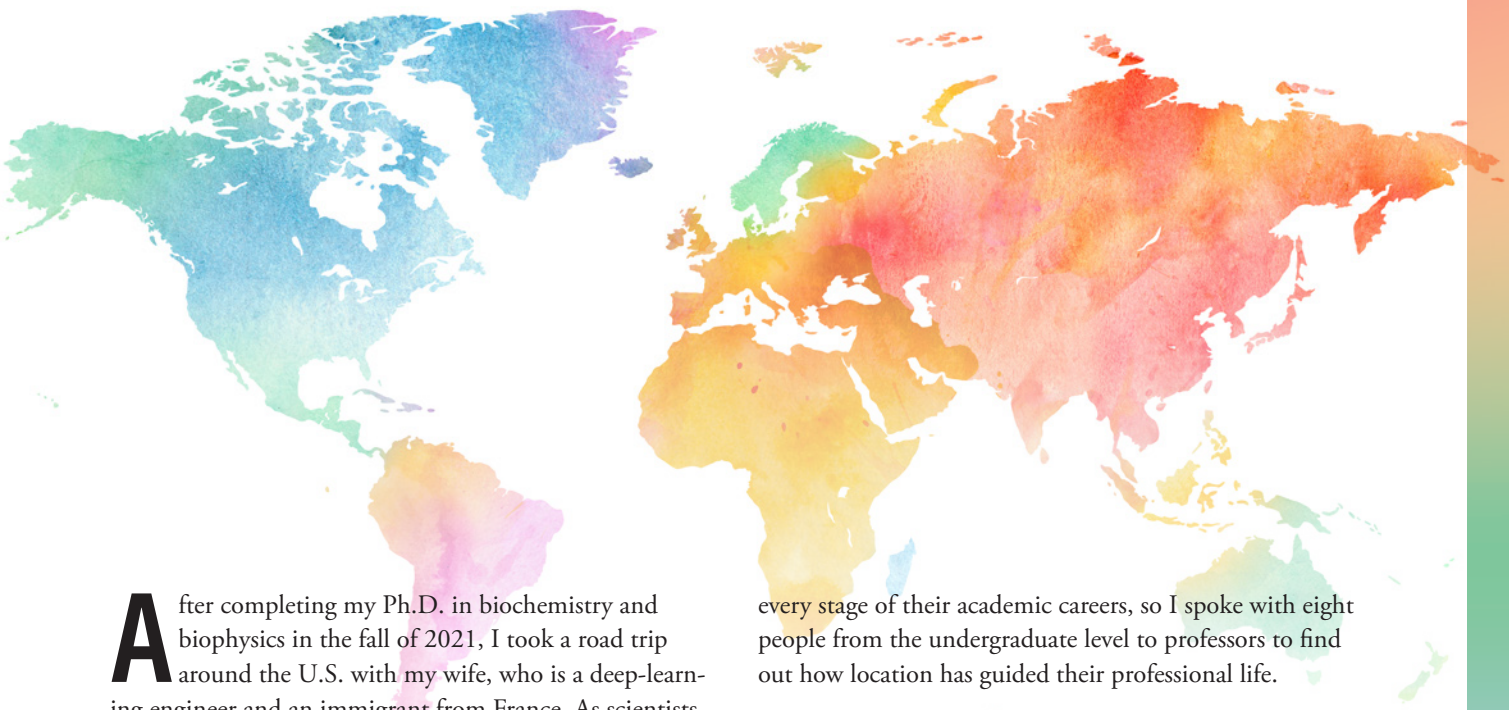
LGBTQIA+ scientists face location limitations

By Heather Masson–Forsythe



After completing my Ph.D. in biochemistry and biophysics in the fall of 2021, I took a road trip around the U.S. with my wife, who is a deep-learning engineer and an immigrant from France. As scientists and a bicultural, queer couple, we are constantly weighing our career, lifestyle and travel options and limitations.

The demands of research often force scientists to move every few years and to travel regularly for research or conferences, and where we go to follow opportunities is typically out of our control — it's determined by the location of the field site, instrument, collaboration, conference or job opening. One scientist, Anita Di Chiara, told me, "I feel like I do not have the freedom to choose where I go. To choose where I go, I would have to leave academic research."

These travel demands can weigh heavily on any scientist, but those in the LGBTQIA+ community face additional hurdles; cultural acceptance and laws can vary dramatically among states and countries. Questions expand beyond "Will I like the food and weather there?" to "Is it safe for me to be myself?" "Will I have access to the health care I need?" "Is there a dating pool for me?" and "Will I legally be my son's mother?"

LGBTQIA+ scientists consider questions like these at every stage of their academic careers, so I spoke with eight people from the undergraduate level to professors to find out how location has guided their professional life.

Undergraduate to graduate school

Lisa Coe is a laboratory technician at New York University Abu Dhabi in the United Arab Emirates, a country where homosexuality is punishable by law. Coe, who identifies as queer, moved to the UAE for her job after completing her bachelor's degree in microbiology in the U.S. in 2020. Before she moved, the university put her in contact with someone in the department who is openly gay so she could ask him questions.

Despite cultural obstacles, Coe has formed a queer community in the UAE through the on-campus Pride group and dating apps. She said she benefits from the globalized area she's in and the privilege that comes with being from the U.S. After having an incredibly supportive adviser during her undergraduate research and then living within a culture that is more difficult to navigate as a queer individual, Coe is carefully considering her graduate school location and advisor options that work for her and her partner.

Two trans men in Europe, who asked to remain anonymous, told me about the factors that influenced their decisions about graduate school. Both said they had significant concerns about health-care options.

"I can only look at places with universal health care because my medication is expensive," one said.

Not only is cost a huge concern, but the paperwork involved in obtaining needed health care can be limiting, overwhelming or difficult to navigate. In many European countries, the process to receive hormones includes a diagnosis or letter from a doctor, which often requires long wait times and is not necessarily transferable to another European country. One man told me that even though he was excited about a research project in another country, he can't go there because of these limitations.

"Sometimes it's better to take a better work environment over research," he said.

Another concern raised by one of the men was consideration of surgeries in regard to trans health care. These typically come with assessments and long wait times, and sometimes must be completed in several stages; to get them done, a person will probably need to stay in one place for more than the few years that most academic positions last.

To further complicate the situation, one man spoke to me about being unable to attend a conference that would have been important for his professional development and networking because it was held in a country that would not allow him to enter as a trans person.

"Maybe conference organizers just don't think about it," he said, but he does not have that luxury.

Graduate school to postdoc

Boomer Russle is a Ph.D. candidate at the University of Tennessee, Knoxville, and he has always lived within a single two-hour driving radius in Tennessee. He is comfortable being out as a gay man and has a great support system, but the queer community in this region, and consequently the dating pool, is small and limited compared with other places in the U.S.

Russle loves his department, but the decision to stay so close to home for undergrad and his Ph.D. was largely driven by financial limitations and family obligations, not by dating prospects. Of course, dating isn't a priority in graduate school, he said, but it does often overlap with the time in people's lives when they find a life partner.

"People don't apply to grad school thinking about what stage of life they'll be in there," he said. "If I had thought about it, I would've applied to other places not in the Bible Belt."

Russle plans to try to move to a new place for his postdoc, but he said he wouldn't be surprised if he ultimately ended up back in a place similar to Knoxville because it is so important for queer people to show up and stay in these regions to advocate for other members of the community and to be role models for other upcoming LGBTQIA+ scientists.

Postdoc to professor

Ranen Aviner, a postdoctoral fellow at Stanford University and the University of California, San Francisco, is looking for a faculty position. Aviner moved to San Francisco from Israel for his postdoc, and he said that navigating academia is already difficult, but being gay adds a layer of frustrating difficulties.

Aviner's partner is also in academia, so they have to navigate the difficulty of two partners securing academic jobs in the same area, commonly referred to as the "two-body problem." And to complicate the situation further, if Aviner were to move back to Israel for his next step, they would have to face new legal, distance and cultural challenges to stay together.

Because of these complications, Aviner said, "I can't think about the next step, about where the science takes me, because it comes with loss. It's a really emotional decision."

Additionally, Aviner has enjoyed living in San Francisco, where being gay is well accepted, so it isn't something he worries about much. He said that feeling accepted and safe frees up mental space for other things, and he'd like to remain in an accepting environment. "There's no point in adding additional stress and burden," he said.

Up to this point in his career, Aviner has noticed that many people in university systems view LGBTQIA+ diversity statements as simply performative and think that being a part of the LGBTQIA+ community shouldn't matter in the workplace. The responsibility often falls on LGBTQIA+ people to explain how they bring diversity, he said, when universities should be asking what they can do to help people in the LGBTQIA+ community overcome barriers.

"It's disrespectful to think that you shouldn't bring this into the work environment," he said, "because people talk about their families."

Anita Di Chiara is a postdoctoral researcher at the National Institute of Geophysics and Volcanology in Rome. Through her Ph.D. and four postdocs, she has

lived in Italy, the U.S., Brazil and England. Beyond moving every few years, Di Chiara has also had to travel extensively for fieldwork, often to places that are not welcoming to the LGBTQIA+ community. She is always very careful and tries not to draw attention to herself, she said, and if her partner is traveling with her, sometimes it's best to let people think they're sisters.

Di Chiara found an accepting environment in San Diego, where for the first time she was able to come out as a lesbian to her supervisor, and in São Paulo, Brazil, home to the largest Gay Pride Parade in the world.

Due to the pandemic and visa issues, Di Chiara and her partner had to move back to Italy, which she said was a difficult transition after becoming accustomed to more inclusive environments. Although same-sex couples can obtain a civil union in Italy, marriage is not legal, and adoption or surrogacy is not an option for same-sex couples in Italy who want to be parents.

Beyond the postdoc

Within the U.S., as well, marriage and parenthood laws can dictate where queer families can live comfortably.

Katie Thompson–Peer, an assistant professor in the developmental and cell biology department at the University of California, Irvine, said laws regulating the LGBTQIA+ community have influenced her decisions since choosing a graduate school. She went to Harvard University for her Ph.D. because Massachusetts was the only state at the time where she and her partner could get married and share legal benefits such as health care. She then moved to San Francisco for her postdoc — by that time, California also acknowledged her marriage.

Even after gay marriage became legal throughout the U.S., Thompson–Peer knew that state laws governing parental rights could make a huge difference in her life. Although both parents may be listed on the birth certificate, this administrative document is not protected by the Full Faith and Credit Clause of the U.S. Constitution, meaning that other states are not required to recognize it, and not all will.

To guarantee legal recognition by other states, Thompson–Peer had to go through second-parent adoption procedures, which can be long and expensive, and vary significantly among states. Additionally, she wanted to make sure her son would grow up in an environment that embraced their family.

"In California, he's not the only kid who has a family structure that is reflective of ours," she said. "It's one thing to put myself in these situations, but it's another thing to put my kid in these situations."

Thompson–Peer was lucky enough to have faculty options in California, where the legal proceedings were manageable and she knew her son wouldn't constantly have to explain his family structure. She loves her position at UC Irvine, which was also the only place she interviewed that put her in contact with an equity officer during the interview process.

Sharon Collinge is a professor of environmental studies at the University of Colorado, Boulder, and executive director of the school's Earth Leadership Program. Collinge identifies as a lesbian but kept this to herself through her undergraduate and master's degrees. Being in the Midwest at the time, she didn't have many scientist role models to look up to, let alone queer scientists, but she said she still misses the Midwestern lifestyle.

"I grew up in a fairly small town, and I love the small-town life and the values, and connection with nature, and I still can't live in those towns in the U.S.," Collinge said. "They're mostly not welcoming to LGBT+ people … and that makes me sad."

After moving to Boston and pursuing her Ph.D. at Harvard, Collinge was able to start being more open about her identity. She considered this when applying to postdoc and faculty positions later.

"I was super-excited, not only for a great job, but to find my people," she said.

Collinge is happy and comfortable in Colorado, but she has also had to travel extensively throughout her career, including a sabbatical in Tanzania. Living in the traditional culture there, she couldn't share much about her personal life.

"When you can't be who you are, then you feel like you're missing half of your body," she said.

Even as a tenured professor, she still thinks about these issues when meeting new people and visiting new places, because simply sharing that she has a wife can shut down conversations.

"I wish I could just be me and just show up," she said, "but it's still complicated."

(This article was originally posted on the ASBMB Today website in June 2022.)

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LGBTQIA+ scientists in history

By Elizabeth Stivison

June is Pride Month, which commemorates the Stonewall riots of 1969, when patrons of a gay bar, The Stonewall Inn, in New York City fought back against a police raid. It was an inflection point in the gay liberation movement. To celebrate Pride Month, I wanted to share a bit about LGBTQIA+ scientists through history.

I often feel uncomfortable with these lists, especially when sexual orientation and/or gender identity is speculative. Many LGBTQIA+ people in history couldn't come out publicly (and the truth is that many today still can't), and it feels a little intrusive to guess based on a letter or some ambiguous anecdote. But I also know that the good that comes from the visibility of those historical figures is significant. It's important to learn about the contributions LGBTQIA+ people have long been making. So I've included in this list people who were public about their identity and/or orientation as well as people who are thought to have been LGBTQIA+.

This list is more on the historical side and includes mostly (though not entirely) people who are no longer working scientists. If you are interested in learning about current LGBTQIA+ scientists, take a look at 500 Queer Scientists (see page 56) or the Twitter account PrideInSTEM (see page 50). If you're looking for more resources, visit the Out to Innovate website for LGBTQIA+ people in STEM.

Isaac Newton (1643–1727)

Newton is most famous for developing the theory of gravity and his laws of motion. Living in the 1600s and 1700s, he certainly never declared his orientation publicly. But there has been endless speculation about it in the 21st century.

Newton never married and never seemed to have romantic relationships. A friend evidently once tried to set him up with a woman, and this event caused him extreme stress, possibly being a trigger for his nervous breakdown in 1693. More recently, as asexuality has become more visible as an orientation, it has been speculated that Newton was asexual.

Alan Hart (1890–1962)

Hart was a physician who studied and treated tuberculosis, notably developing the X-ray technique to identify cases, which saved countless lives. He also raised funds for TB research and for TB patients who couldn't afford treatment. He was also a novelist on the side.

Hart was assigned female at birth

and became one of the first known people to have gender-reassignment surgery, when he had a hysterectomy in 1917. He lived the rest of his life as a man. He was married to his wife, Edna, from 1925 until his death, and the two were prominent members of their community in Connecticut.

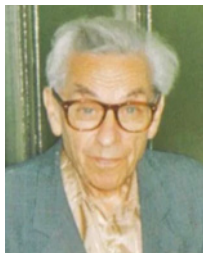
Rachel Carson (1907–1964)

Carson was an ecologist, marine biologist and writer. She's most famous for her 1962 book "Silent Spring," for which she thoroughly researched and described the harm humans do to the environment and ourselves by using pesticides indiscriminately. The book was a catalyst for the environmental movement, which led to the formation of the Environmental Protection Agency.

It is not clear what Carson's orientation was, though a series of letters between her and her friend Dorothy Freeman, published after Carson's death, have provoked speculation that they were in love. The deep love is clear from the letters, but the exact form that love took remains unclear to us because Carson seems to have burned some of the letters right before her death and the content of those can't be known. Some argue that the fact that she felt she had to destroy the letters is evidence of a romantic relationship in a conservative society, but we can't know that for sure.

Paul Erdős (1913–1996)

Erdős was a prolific mathematician who published more than 1,500 papers on problems in disciplines ranging from discrete mathematics to probability theory. He worked at several universities and was a member of science academies of eight different countries.



Erdős never dated or married, and it has been speculated that he was asexual. He describes falling in love with numbers and referred to numbers, especially prime numbers, as his best friends. In fact, the title of a biography of him is "The Man Who Loved Only Numbers."

Sally Ride (1951–2012)

Ride was the first American woman to go to space. She was a physicist by training and was hired in the first class of NASA astronauts to include women. After two missions to space on the Challenger shuttle, during which she operated the robotic arm to set satellites into orbit, Ride left NASA. She used her fame from her time as an astronaut to promote science education, founding Sally Ride Science to encourage children to go into STEM fields and writing several books for children about space travel and the solar system.

Ride was married (from 1982 to 1987) to fellow astronaut Steve Hawley. However, when Ride died in 2012 it became public through her obituary that she had a female partner, Tam O'Shaughnessy, for the last 27 years of her life. Ride had been very private her whole life, partially because of the culture of NASA and fear that revealing her orientation might overshadow her career, and she never discussed her relationship with O'Shaughnessy in the press. Before she died, however, she told O'Shaughnessy that she didn't have to be secret about it anymore, and it became public when her obituary was published.

Ben Barres (1954–2017)

Barres was a neuroscientist focusing on the role of mammalian glial cells and their interactions with neurons in the nervous system. He was named chair of the neurobiology department at the Stanford University School of Medicine in 2008.

Barres was assigned female at birth and transitioned to male in 1997. He used his position as a professor at Stanford to not just do research but to also advocate for gender equality: Having experienced society as a woman and a man, he knew firsthand the inequalities that existed. He also advocated for the rights of postdocs working in academia.

Svante Pääbo (born 1955)

Pääbo is a geneticist and the recipient of the 2022 Nobel Prize in Physiology or Medicine. His work gave rise to the field of paleogenomics.

Pääbo's genetic research using the DNA from bones of ancient hominins, or other species of humans, uncovered a previously unknown species, the Denisovans, and was the first group to sequence the entire Neanderthal genome. These two achievements contribute to our understanding of where we, the only living species of humans left on earth, came from.

Pääbo has written publically in "Neanderthal Man: In Search of Lost Genomes," his 2014 book about his life and work, that he identifies as bisexual.

Mark Harrington (born 1959)

The ACT UP Science Club and the Treatment Action Group

The AIDS Coalition to Unleash Power, better known as ACT UP, was formed in 1987 to address the AIDS epidemic, which was killing thousands of people a year in the U.S., the vast majority of whom at the time were gay men. ACT UP staged many protests and marches to bring attention to the fact that, each day the crisis was ignored by those in power, people were dying. ACT UP members protested at the National Institutes of Health and the Food and Drug Administration, demanding AIDS research and treatments.

One branch of ACT UP called the Science Club was headed by Mark Harrington, an HIV-positive gay man. Though not formally trained as lab scientists, Harrington and members of the Science Club made a real impact on HIV treatment through their activism and studies. They addressed the lackluster response by the scientific community by diving into the biology of HIV, the virus that causes AIDS, and the syndrome. They read everything from textbooks on virology and immunology to the most recent papers being published. The group members became experts on the disease as well as the drug-approval process so that they could not only protest but have real data-driven discussions with scientists, including Anthony Fauci.

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The founders of the Silence=Death Project offered this logo, created in 1987, to ACT UP when the two groups joined forces.

Members of the Science Club attended and spoke at conferences with scientists, explaining where researchers needed to focus and what drugs should be made available to patients. Harrington delivered a speech in which he showed slides of his own infected lymph nodes to illustrate what he thought key areas of research needed to be and what the shortfalls of current research on animals and lab strains of HIV were.

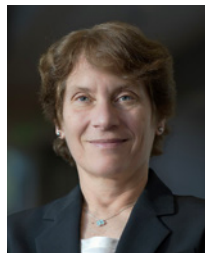
The Science Club later became its own group, the Treatment Action Group, and continued its mission of saving lives through accelerating AIDS research and getting treatments out to patients.

Harrington was named a MacArthur Foundation fellow in 1997 for his work, and still works fighting AIDS today.

Carolyn Bertozzi (born 1966)

Bertozzi is a Stanford University professor and one of the recipients of the 2022 Nobel Prize in Chemistry. She developed bioorthogonal chemistry, which focuses on chemical reactions that are compatible with living systems and is already used in biology and chemistry labs around the world. She's also founder of several startups and recipient of a 2015 MacArthur Foundation grant.

Bertozzi's work helped produce a system whereby scientists can put chemical tags on molecules that reliably react and connect only with a corresponding tag. This system can be used in synthesis of complex molecules such as drug conjugates, "clicking" the subunits together, or can be used in cells to join molecules as a tool to answer biological questions without greatly disrupting the rest of the cell chemistry.



Bertozzi identifies as a lesbian and has been open about her orientation for several decades. She and her wife have three children.

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