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ASBMB TODAY

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Meet the 2023 ASBMB FELLOWS

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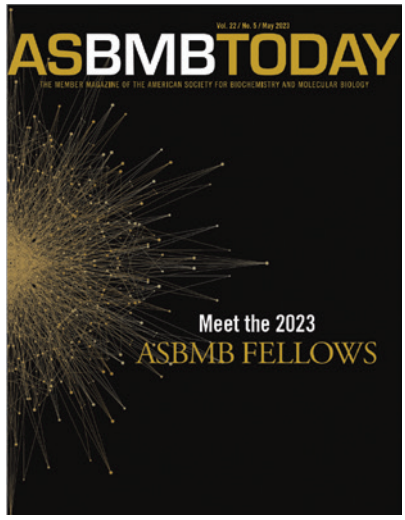

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Those who care and engage

By Comfort Dorn

In her essay about being named a fellow of the American Society for Biochemistry and Molecular Biology (page 37), Susanna Greer writes about her journey "from 'ASBMB member' to 'ASBMB member who actually engages deeply with, and cares about, the ASBMB.'"

Greer's is one of five essays by 2022 fellows in this issue illustrating many of the ways members can engage deeply with this society.

Both Paul Craig and Nathan Vanderford have served on the Education and Professional Development Committee. Craig has volunteered with the undergraduate poster competition and is a member of this magazine's editorial advisory board. Vanderford has served twice on an annual meeting planning committee.

Alex Toker is editor-in-chief of the Journal of Biological Chemistry after spending years reviewing countless submissions as an editorial board member and associate editor.

Greer spent six years on the Science Outreach and Communication Committee, three of them as chair, and helped design the society's The Art of Science Communication course.

Ralph Bradshaw, an ASBMB member since 1971, has served on numerous committees and as the society's treasurer, was the first editor of the journal Molecular & Cellular Proteomics, and co-wrote the ASBMB history book published to mark the society's centennial.

Also in this issue: short profiles of the newest class of fellows. They've worked on public affairs, membership, diversity and more.

And if the masculine-sounding term "fellows" gives you pause, let me reassure you. According to something called the Online Entymology Dictionary, "fellow" is derived from an Old English word for "partner, one who shares with another," an Old Norse word for money, and a Proto-Germanic root meaning "to lie down, lay." Thus the etymological sense seems to be "one who puts down money with another in a joint venture." This source assures us it is "not etymologically masculine."

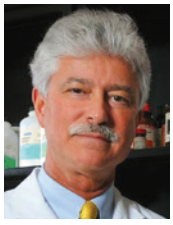
I really like that bit about a joint venture. It's not just about hanging around together; it's about engaging with others and moving together into the unknown.

That's why it's such an appropriate word for ASBMB fellows.

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

Fliesler wins retina research award

Steven Fliesler has earned the 2022 Paul Kayser International Award in Retina Research from the Retina Research Foundation. Fliesler, a distinguished professor at the Jacobs School of Medicine and Biomedical Sciences at the State University of New York at Buffalo, will receive this biennial honor at the February meeting of the International Society for Eye Research in Australia.



FLIESLER

Fliesler also holds an endowed chair and serves as director of research for the ophthalmology department at Buffalo, and he is a research career scientist at the Veterans Affairs Western New York Healthcare System. His research has explored how isoprenoid lipid metabolism undergirds development and maintenance of the retina.

The Kayser award recognizes lifetime achievement by a researcher for work that increases understanding of vitreoretinal diseases or disorders. At the award ceremony, Fliesler will speak on "Hereditary Retinal Diseases: Cruisin' for a Bruisin' Down the Mevalonate Pathway."

"Genetic defects in this biosynthetic pathway produce a host of human diseases, which profoundly impact the central nervous system, including the retina," Fliesler said in a UB news article.

Fliesler earned his Ph.D. in biochemistry from Rice University and did postdoctoral work in lipid metabolism and biochemistry of the retina at Baylor College of Medicine. He has published more than 150 peer-reviewed journal articles, book chapters and review articles and has edited two books. His research program has won federal and private extramural grants for close to four decades.

AAAS, NIH recognize Okafor

Denise Okafor, a researcher at Pennsylvania State University, recently was selected to receive the 2023 Marion Milligan Mason Award for Women in the Chemical Sciences from the American Association for the Advancement of Science, and late last year she won a New Innovator Award from the National Institutes of Health.

Okafor is an assistant professor in the department of biochemistry and molecular biology and the department of chemistry at Penn State, where her lab explores structural mechanisms of signaling and regulation in protein complexes. She and her team use simulations to determine how conformational dynamics of proteins change in various functional states. She especially is drawn to the study of nuclear receptors, with their complex regulatory mechanisms.

OKAFOR

As a postdoctoral fellow at Emory University School of Medicine, Okafor used molecular dynamics simulations to study ligand regulation and functional evolution in nuclear receptors.

The AAAS award is named for Marion Tuttle Milligan Mason, who aimed to support the advancement of women in the chemical sciences and honor her family's commitment to higher education for women. Endowed by her estate, the Mason award is granted every two years to four or five women at the start of their academic research careers, giving each scientist $55,000 to support their basic research in the chemical sciences.

The 2022 New Innovator Award supports early-career investigators who propose innovative, high-impact projects in the biomedical, behavioral or social sciences that relate to the NIH mission. Some 70 researchers around the country were selected in 2022. The $1.5 million multiyear award will fund Okafor's project, Improving Drug Design to Eliminate Side Effects: From Computational to Animal Models.

Lemmon named pharmacology chair

Mark A. Lemmon has been appointed chair of the Yale University pharmacology department. He will begin this new position on July 1. Lemmon has been deputy director of the Yale Cancer Center for the past year and is co-director of the Yale Cancer Biology Institute.

The Lemmon lab focuses on receptor tyrosine kinase, or RTK, signaling as well as how RTK mutations can cause diseases such as cancer. His research necessitates wide collaboration between geneticists and clinical investigators and uses cellular, biochemical, biophysical and structural techniques. Lemmon's recent articles focus on how EGFR mutations influence the receptor's sensitivity to its ligands and inhibitors. He also studies other RTKs, including several that function as pseudokinases.

LEMMON

Lemmon earned his Ph.D. from Yale University in 1993 and then

completed postdoctoral training at New York University. Before coming to Yale, he was a faculty member at the University of Pennsylvania's Perelman School of Medicine for 19 years and chaired the department of biochemistry and biophysics from 2008 to 2015.

In 2016, Lemmon was elected a fellow of the Royal Society. He also has been awarded the Dorothy Crowfoot Hodgkin Award from the Protein Society. He served as the secretary for the American Society for Biochemistry and Molecular Biology between 2007 and 2013 and is chair of the editorial board of the Biochemical Journal.

Advocacy groups recognize Bankston

Adriana Bankston has received an advocacy award from the Advocacy Association and has been named to the Science Coalition board of directors. The Advocacy Association gives advocacy awards to professionals who advance the field via thought leadership and mentoring. The Science Coalition's mission is to sustain the federal government's investment in fundamental scientific research.

BANKSTON

Bankston is a principal legislative analyst with the University of California Office of Federal Government Relations. She is also a fellow with Advancing Research Impact in Society, a biomedical workforce and policy research investigator at the STEM Advocacy Institute and a member of the American Association for the Advancement of Science Section X Steering Group. In addition, she is the CEO and managing publisher of the Journal of Science Policy & Governance.

Bankston earned her Ph.D. in biochemistry and cell and developmental biology from Emory University in 2013.

Through all of her roles, Bankston channels her interest in diversity, equity and inclusion; academic research culture; STEM workforce development; and science policy training. She has received numerous awards, including the 2022 Emerging Broader Impacts Leader Award from Advancing Research Impact in Society, and has published her work in high-profile outlets such as Inside Higher Ed. She is a frequent contributor to ASBMB Today.

Baserga joins NASEM RNA modifications group

Susan Baserga, a professor at Yale University, is helping advise the U.S. government on direct sequencing of modifications in RNA.

Baserga has been named to a new committee, Toward Sequencing and Mapping of RNA Modifications. The National Academies of Sciences, Engineering and Medicine, or NASEM, launched the group last year to assess current techniques and goals for the direct sequencing of RNA modifications.

The committee will evaluate scientific and technological discoveries and related infrastructure and workforce needs to better understand the roles RNA changes play in human health and disease. The group aims to produce a report with recommendations for decision makers.

Baserga chairs the American Society for Biochemistry and Molecular Biology Women in Biochemistry and Molecular Biology Committee and was a member of the Public Affairs Advisory Committee for six years. She received the society's William C. Rose Award in 2016.

BASERGA

Baserga is a professor of molecular biophysics and biochemistry, genetics and therapeutic radiology at Yale. In her laboratory, she studies ribosome biogenesis; the nucleolus; human diseases linked to ribosomes, known as ribosomopathies; and the impact of ribosome biogenesis on cell growth, cell division and cancer.

Bollinger receives Abeles and Jencks Award

This year's Abeles and Jencks Award for the Chemistry of Biological Processes goes to J. Martin Bollinger Jr., a professor at the Pennsylvania State University Eberly College of Science.

BOLLINGER

Administered by the Division of Biological Chemistry of the American Chemical Society, the award was created in 2022 to honor Robert Abeles and William Jencks, trail-blazing researchers in biochemistry. The first recipient was Karen Allen, also a member of the American Society for Biochemistry and Molecular Biology.

Bollinger is a professor in the departments of chemistry and of biochemistry and molecular biology at Penn State, where he helped assemble a renowned bioinorganic chemistry group. He credits his laboratory

co-director, Carsten Krebs, and their students, postdocs and collaborators of two decades for the recent honor. Bollinger and Krebs, a professor of chemistry and of biochemistry and molecular biology, study how enzymes use metal ions to catalyze reactions involving oxygen.

"The science in which I have been involved has always been a team effort, and all credit for this honor goes to the team," Bollinger said in an article on the Penn State website.

He has received numerous recognitions throughout his career, including the ASBMB's William C. Rose Award in 2022, the Society of Biological Inorganic Chemistry Early Career Award in 2008, the Searle Scholar Award in 1996, and the Camille and Henry Dreyfus New Faculty Award in 1995. In 2010, he was elected a fellow of the American Association for the Advancement of Science.

Bollinger will receive the Abeles and Jencks Award, which consists of a $6,000 honorarium and a medal, at the ACS National Meeting scheduled for August in San Francisco.

Nobel laureate Paul Berg dies

By Paula Amann

Paul Berg, a Nobel Prize winner, a pioneer in the field of genetic engineering and a past president of what would become the American Society for Biochemistry and Molecular Biology, died Feb. 15 at age 96. He had been living on the campus of Stanford University, where he was an emeritus professor.

Berg joined the American Society of Biological Chemists, forerunner of the ASBMB, in 1955 and served in 1975 as the society's 52nd president.

A 1972 study on insertion of DNA from the E. coli bacterium into the animal virus SV40 was a milestone for Berg's career and for science. This first known instance of recombinant DNA launched the field of genetic engineering. Resulting medical advances have included hepatitis vaccines, synthetic insulin and human growth hormone.

The work also won Berg the 1980 Nobel Prize in chemistry, which he shared with two other scientists, Walter Gilbert and Frederick Sanger.

Berg was aware of public concerns about the new knowledge. "The recombinant DNA breakthrough has provided us with a new and powerful approach to the questions that have intrigued and plagued man for centuries," Berg said in his Nobel acceptance speech. "I, for one, would not shrink from that challenge."

Berg also took part in the ethical debate over recombinant DNA. He helped organize the 1975 Asilomar conference in California on the potential perils of the new technology. The meeting of some 140 international scientists set early standards for genetic research, with an eye to safeguarding public health.

Later, in a 2008 article in the journal Nature, Berg argued that profit motives, along with deeply held religious and ethical beliefs, make regulating research difficult: "The best way to respond to concerns created by emerging knowledge or early-stage technologies is for scientists from publicly-funded institutions to find common cause with the wider public about the best way to regulate — as early as possible. Once scientists from corporations begin to dominate the research enterprise, it will simply be too late."

Berg was born June 30, 1926, in Brooklyn, New York. His parents were Jewish immigrants from Russia; his father worked in the garment business, and his mother was a homemaker. After trying unsuccessfully to enlist at age 17 as a pilot, the younger Berg served on Navy vessels during World War II.

He earned his bachelor's degree in biochemistry from Pennsylvania State University in 1948 and his doctorate from Western Reserve University in 1952. A one-year postdoctoral stint in Copenhagen took him to the Institute of Cytophysiology, where he and Wolfgang Joklik discovered a new enzyme that created the nucleoside triphosphates, building blocks of nucleic acids.

Berg returned to the United States to study with Arthur Kornberg at the Washington University School of Medicine in St. Louis. In Kornberg's lab, Berg discovered acyl adenylates, intermediates in the formation of fatty acyl-CoAs from fatty acids, ATP and CoA, and went on to serve as assistant professor of microbiology at Wash U.

Kornberg asked Berg to join him on the faculty of the Stanford School of Medicine in 1959 as it was moving into its current Palo Alto campus and expanding research efforts. The two helped launch the biochemistry department, which Berg chaired from 1968 to 1974.

In the 1980s, Berg's efforts to establish the Beckman Center for Molecular and Genetic Medicine at Stanford drew $50 million in donations. The center opened its doors in 1989, and he was its first director until 2000.

Berg married Mildred Levy in 1947; she died in 2021. They are survived by their son, John.

John Berg told reporter Emily Moskal of Stanford University that his father "was never looking to be famous, he was never looking to win the Nobel Prize; he just did what he did because he loved it."

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

Robert Michael Metrione

Robert Michael Metrione died June 18 in Neptune, New Jersey, at age 88. He was a member of the American Society for Biochemistry and Molecular Biology for almost 50 years, and before his retirement, he served more than three decades as a professor of biochemistry at Thomas Jefferson University in Philadelphia.

Metrione was born in Livingston, New Jersey, to Clara and Durand Metrione on August 22, 1933. He earned his bachelor's degree at Bowling Green University, where he met his future wife, Mary Ann Luedeke. He went on to receive a doctorate at the University of Nebraska and held a postdoctoral fellowship at Yale University.

Metrione's final research studies focused on DNA polymerase alpha, an enzyme complex that plays a role in launching DNA replication among eukaryotes. He also explored the inhibition of dipeptidyl aminopeptidase, an enzyme that aids in breaking proteins and peptides into their constituent amino acids.

Beyond his academic career, Metrione was known for his devotion to sharing jokes and silly faces with younger family members, slamming tennis balls, tending his community garden plot and crafting cavatelli, a kind of small pasta. He and his wife were active in the local horticultural society.

Metrione's wife, a teacher turned speech pathologist, died in August 2020. He is survived by his sister-in-law Judy Gary and her husband Bruce; sister-in-law Arlene; children Dan and Lori Metrione, Linda Lutz, Laura McBride, and Ellen and Brian Gibbons; and grandchildren, Hollie, Carly, Emily, Alec, Kelly, Brian and Maeve.

Jan van Eys

Jan van Eys, a physician–scientist who pioneered the use of chemotherapy as a primary intervention for pediatric brain tumors, died Sept. 24 at the age of 93. He joined the American Society for Biochemistry and Molecular Biology in 1960 and was a member for more than 60 years.

Born January 25, 1929, in the Netherlands, van Eys immigrated to the United States in 1951 after living through World War II and German occupation. In an interview with the University Club of Nashville in 2018, he said he came to the U.S. because he was "young, adventuresome and rebellious" and wanted to pursue a Ph.D. in biochemistry at Vanderbilt University, which he earned in 1955. He also completed his postdoctoral training at Vanderbilt while researching enzymology and metabolic regulation. He went on to earn an M.D. from the University of Washington in 1966.

As a physician–scientist at Vanderbilt, van Eys established a pediatric hemophilia and hematology specialty and completed foundational research on pyruvate kinase deficiency and hemophilia. In 1973, he moved to the University of Texas M.D. Anderson Cancer Center and became the chair of pediatrics, making substantial contributions to the field of pediatric oncology. After retiring in 1994, he continued to teach ethics courses to medical and graduate students.

Van Eys was a member of the institutional review boards at Vanderbilt University and Centerstone, a national health system that provides mental health and substance use disorder treatments. He was also a member of the board of the Tennessee Hemophilia and Bleeding Disorder Foundation and the board of the National Hemophilia Foundation.

He is survived by his partner, Judith Hodges; daughter, Dickey Catherine van Eys Fuchs; son, Jan Peter van Eys, and his wife, Patti; three grandsons; and two great-granddaughters.

Helen Conrad Davies

Helen Conrad Davies, a microbiology professor, passionate educator, and proponent for racial and gender equality at the University of Pennsylvania, died on March 23, 2022. She was 97.

Born Helen Rogoff on Feb. 14, 1925, in Manhattan, Davies graduated from Hunter College High School for Intellectually Gifted Young Ladies at age 15 and from Brooklyn College with a degree in chemistry at age 19. After receiving a master's degree in biochemistry from the University of Rochester in 1950, she earned her Ph.D. in physical biochemistry at Penn while raising her sons, Daniel and Richard.

Davies joined the microbiology department at Penn as the first female faculty member in 1965; in 1982, she became the department's first female full professor. Her research focused on the biochemistry of energy generation in prokaryotes. Specifically, she characterized and compared the kinetics of cytochrome enzymes across species, cellular locations such as the membrane or cytoplasm, and other biological variables. She was also active in the medical education literature.

Known on campus as the "singing professor," Davies taught generations of Penn students about infectious diseases using bespoke lyrics set to the tunes of popular songs, such as one about leprosy to the tune of the Beatles' "Yesterday." She expanded access to education and research through collaborations with local high schools, Baltimore's Morgan State University and other organizations; and persistently advocated for the fair treatment of women and members of historically marginalized groups on the faculty at Penn.

Davies' accomplishments were recognized by numerous honors, including the Lifetime Mentor Award from the American Association for the Advancement of Science in 1999 and the Alpha Omega Alpha Robert J. Glaser Distinguished Teacher Award from the Association of American Medical Colleges in 2006.

After the death of her husband, Robert, in 1993, Davies moved into the dormitories at Penn's Ware College House as the faculty master, where she continued to host, educate, advise and support her beloved students for nearly two decades. She is survived by her sons, Daniel and Richard.

— Nuala Del Piccolo

Robert Burnett Sanders

Robert Burnett Sanders, who made seminal contributions to reproductive biochemistry and authored the book "Contributions of African American Scientists to the Fields of Science, Medicine, and Inventions" died June 17, 2022, in Sanford, North Carolina. He was 83.

Born Dec. 9, 1938, in Augusta, Georgia, to Robert and Lois Jones Sanders, he attended Augusta's segregated public schools and graduated from Lucy Laney High School in 1955. He graduated from Paine College as valedictorian with a major in chemistry and then earned a Ph.D. from the University of Michigan in 1964. After completing his postdoctoral work at the University of Wisconsin, he joined the biochemistry faculty at the University of Kansas in 1966. At KU, he served as both associate dean of graduate studies and associate vice chancellor.

Sanders' research focused on the biochemistry of hormone action, the biochemistry of reproduction, and uterine biochemistry. His lab studied the properties of uterine adenylate cyclase in rats. His team established the biochemical events associated with the decidual cell reaction in the uterus of rodents and its association with increased concentration of cyclic adenosine 3′,5′-monophosphate, known as cAMP. The Sanders lab showed that adenylate cyclase, the enzyme that catalyzes the formation of cAMP, might play a central role in decidualization, a process leading to significant changes to endometrial cells in preparation for and during pregnancy. He also worked on parathyroid hormone action, epinephrine action, cardiac adenylate cyclase action, the biology of uterine metabolism, and amino acid transport in vivo and in vitro.

At KU, Sanders served as chair of the Minority Graduate Student Recruitment Advisory Committee and was an active member of the Boul, an organization for professional Black men whose mission is to bring about change collectively that cannot be accomplished by individuals.

Sanders is survived by his wife of 61 years, Gladys; two children, Sylvia and husband David Schneider and William and wife Margaret Esselborn; and a granddaughter, Ivy.

— Arti Dumbrepatil

Harnessing fats to relieve MS symptoms

By Marissa Locke Rottinghaus

Basic nutrition teaches that fat, when consumed in large quantities, can be harmful to human health. However, the components that make up fats are complex. Unsaturated fats can lower disease risk. In fact, in a new study, researchers found that a fat derivative may relieve symptoms of multiple sclerosis.

Justin Kim, a postdoctoral fellow at the Georgia Institute of Technology; Aditi Das, an associate professor at Georgia Tech; Andrew Steelman, an associate professor at the University of Illinois at Urbana–Champaign and their colleagues published their results in the **Journal of Biological Chemistry**.

MS is a chronic autoimmune disease of the brain and spinal cord in which the immune system attacks the cells and tissues that protect nerve fibers. MS can cause pain, vision loss, fatigue, impaired cognitive function and other symptoms. There is no cure, and it affects almost 1 million people nationwide. The researchers specifically looked at docosahexaenoyl ethanolamide, or DHEA, a derivative of lipids found in fish oil supplements, and its impact on the immune system.

"Our goal was to use something that is naturally found in food and the human body to see if we can enhance it to reduce the disease severity in patients," Das said.

Using mice genetically altered to develop MS, Kim, Steelman and Das noticed that DHEA is at its highest concentration in the mice when they are in a state of remission, which prompted the researchers to wonder if DHEA could dampen the disease inflammation.

"We thought if we could alleviate, control or reduce the level of inflammation, we could improve the disease outcomes and severity," Kim said.

Taking fish oil supplements has been linked to improved quality of life in patients with inflammatory conditions, but the details of this association never have been teased apart in MS until now. Kim, Steelman and Das showed that the DHEA lipid can reduce inflammation and disease signs in a mouse model of MS.

When the researchers supplemented the diet of mice with DHEA, the mice showed less severe and later onset of MS-like disease, likely due to the presence of fewer activated pathogenic T cells in the central nervous system, the team found.

"We believe our findings could lead to the discovery of new solutions to aid in managing symptoms of multiple sclerosis and other chronic inflammatory diseases like diabetes," Das said.

So should you start taking fish oil supplements? More research is needed into how DHEA affects other parts of the immune system and humans. However, the researchers are optimistic that this is a step forward in using naturally occurring fats or their derivatives to lower inflammation without the negative side effects of some prescribed medications.

The National Multiple Sclerosis Society advises patients that reasonable doses of fish oil and omega-3 fatty acid supplements are safe and may be beneficial. However, patients should consult with their doctors before changing their medications.

"There is no cure for MS, yet," Kim said, "and anything to help improve the patients' symptoms is always of interest."

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ELOVL4 mutations: Two sides of the same coin

By Andrea S. Pereyra

Fatty acids constitute cellular membranes, fuel energy production and act as signaling molecules. Long-chain fatty acids have tails of 13 to 21 carbons. The enzymes known as ELOVLs — short for "elongation of very long" — can extend these tails to make them into very long-chain saturated and very long-chain unsaturated fatty acids, known respectively as VLC-SFAs and VLC-PUFAs. Defects in the elongation of fatty acids can cause neuronal, ocular and skin problems.

Martin-Paul Agbaga, an assistant professor of cell biology and ophthalmology at the University of Oklahoma Health Sciences Center, studies the intersection between very long-chain fatty acids and human disease. In a recent publication in the **Journal of Lipid Research**, Agbaga and his team, which included Yeboah Kofi Gyening, described the mechanisms by which specific ELOVL4 mutations affect particular tissues.

"We are trying to figure out why some patients with ELOVL4 mutations only have retinal dysfunction, some only have brain dysfunction, and some only have skin dysfunction," Gyening, a recent Ph.D. graduate, said. "We are basically asking why the same mutation is causing such diverse phenotypes."

The team studied how two ELOVL4 mutants, one associated with brain disorders and the other with skin disease in humans, elongate a precursor fatty acid. They found that both these mutations had some limited capacity to elongate PUFA precursors to VLC-PUFA but blunted the enzyme's capability to biosynthesize VLC-SFAs.

The question of how the same ELOVL4 can synthesize different VLCFAs in different tissues remains unanswered. "You can get some clues from fish," Gyening explained. "Some fish species have two different ELOVL4 isoforms: ELOVL4a, which is more active in elongating VLC-SFAs, and ELOVL4b, which prefers VLC-PUFAs. Something similar could happen in humans, but we don't know yet."

In normal tissue, ELOVL4 is found in a cell's endoplasmic reticulum, or ER, but these authors also found it in the nuclear fraction.

The team wondered whether ELOVL4-related disease results solely from a decline in certain VLC-SFAs or if mutated protein within the cells also plays a role. "We did some experiments that indicate that ELOVL4 mutants can induce ER stress," Gyening said, "which could explain cell death observed in the cerebellum of some patients."

These findings also could help determine treatment for patients with ELOVL4 deficiency. "In the lab, we were able to artificially synthesize VLCFAs to incorporate into the diet of rodents carrying ELOVL4 mutations, resulting in a partial rescue of the phenotype," Gyening said. "Because we know which VLCFAs go down with the different ELOVL mutations, we could recommend personalized dietary supplementations as part of the treatment."

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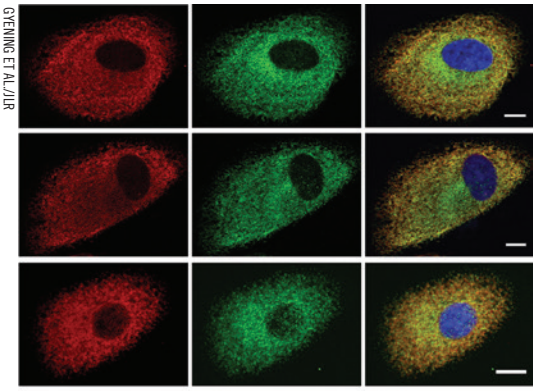
GYENING ET AL./JLR



Researchers transduced wild-type cells (top row) and those with mutations that can affect the brain and skin (middle and bottom) with MYC-ELOVL4 constructs, immunostained them for the transcription factor MYC (red) and the endoplasmic reticulum chaperone calnexin (green), then merged them (left column).

Andrea S. Pereyra (pereyraa18@ecu.edu) is a postdoctoral scholar at the East Carolina Diabetes and Obesity Institute. She earned her M.D./Ph.D. at Universidad Nacional de La Plata in Buenos Aires, Argentina. Follow her on Twitter: @ASPereyra

Diabetes and cancer — how can one medicine treat both?

By Sneha Das

Each year, nearly 18 million patients worldwide get a cancer diagnosis, and the disease causes about 10 million deaths. While researchers continue their quest to develop new, more effective treatments, they also study the anti-cancer properties of drugs prescribed for other disorders.

One such drug is metformin. Used as the first line of treatment for Type 2 diabetes since 1994, it helps patients maintain optimal blood glucose levels. The hormone insulin plays a vital role in the metabolism of glucose for energy. But in diabetes, cells can't sense insulin well, so blood glucose levels rise. Metformin lowers these levels in three ways: by increasing insulin sensitivity, decreasing glucose production in the liver and increasing intestinal absorption of glucose.

The benefits of metformin extend beyond diabetes treatment, and many have called it a wonder drug. Almost 400 clinical trials registered now for cancer treatment are testing metformin. One study has associated long-term use of metformin with reduced cancer risk. Though this correlation is strong, researchers did not know how metformin inhibits cancer until now.

A recent article in the **Journal of Biological Chemistry** describes the mechanism by which metformin can suppress tumor formation. The research team from Fudan University in China was led by Xiaoying Li.

Cancer cells constantly need nutrients to support tumor growth and metastases, and to keep up with

this high nutrient demand, cancer cell metabolism is altered. As a result, levels of gene products like mRNAs and proteins may differ between cancer and normal cells. To identify which genes are expressed differently, scientists use high-throughput screening methods. Li's group used a similar technique to identify the genes affected by metformin treatment in cancer.

"When we screened for differentially expressed genes in tumor cells treated with metformin, the HMGCS1 gene, which makes a critical enzyme in the mevalonate pathway, came into our view," Li said.

The mevalonate pathway is crucial for the production of biomolecules such as cholesterol, vitamin K and steroid hormones, and HMGCS1 plays a key role in their production. Intermediates from the mevalonate pathway can serve as nutrients to spur tumor growth in multiple types of cancers. This study investigates HMGCS1 and the mevalonate pathway in liver and lung cancers.

Li's team found that higher levels of HMGCS1 in cancer tissues correspond with poor prognosis and lower survival rates in patients. Subsequently, using mouse xenograft models, they found that metformin treatment can arrest tumor growth. The tumor arrest is at the level of transcription when a message coded in the DNA is copied into mRNA.

In cancer cells, metformin suppresses the transcription of the HMGCS1 gene by weakening the activity of its transcription activator, NRF2. The drug eventually lowers the level of the HMGCS1 enzyme and inhibits the mevalonate pathway, arresting tumor growth.

"This exciting finding happened by chance and led us to discover the complete story of the anti-tumor effect of metformin," Li said.

The research team plans to continue their work and investigate whether combining metformin with statins, drugs that inhibit cholesterol biosynthesis, can enhance the anti-tumor effect further.

It can take decades for the government to approve cancer medications for use in patients, and even then these drugs can be expensive. If clinical trials for cancer treatment are successful, metformin's longstanding safety profile and low cost will benefit patients.

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Pitfalls of relying on computers

By Chloe Kirk

Glycosylation is a frequent post-translational modification, and the resulting glycoproteins — proteins decorated with carbohydrates — are involved in many functions that influence proteins' physical and immunological properties. This means researchers need software that correctly characterizes glycosylation and identifies the types of glycoproteins involved.

Two important types of glycoproteins are O-linked and N-linked, so called because sugars are attached to the protein through an oxygen atom (O) or nitrogen atom (N) of the residues they bind to. Researchers have limited knowledge about protein glycosylation, especially O-glycosylation. According to Zsuzsanna Darula, head of the Single Cell Omics Advanced Core Facility at the Hungarian Center of Excellence for Molecular Medicine, or HCEMM, that's due to a number of factors: "their impressive heterogeneity, the inability to predict which residues may be modified, the identified modification sites are not always occupied, and several rather different glycans may modify the same residue."

Mass spectrometry, a valuable tool for discovering protein modifications, works by measuring the mass of an intact molecule and then fragmenting the molecule and measuring its pieces to decipher its chemical structure. Using the latest mass spectrometers with improved mass accuracy and detection sensitivity, Adam Pap and collaborators at the Biological Research Centre and HCEMM analyzed the largest intact human O-glycopeptide data set to date from human urine samples.

In the lab's initial analysis, Pap noticed that the urinary O-glycosylation landscape was more complicated than expected. The team ran the data through four automated interpretation search engines and also characterized it manually. They noticed large discrepancies among the search engine data interpretations, which they published recently in the journal **Molecular & Cellular Proteomics**.

The team originally had hoped to identify O-glycosylation differences between healthy individuals and cancer patients and, thus, potential biomarkers of bladder cancer. Instead, "We discovered in the process that our tools are not good enough yet for that purpose," Darula and Pap wrote in an email, "and we focused on the shortcomings and necessary improvements of data interpretation software."

More than half of the O-glycopeptides were picked up by only one of the four search engines, and some N-glycopeptides even qualified as O-glycosylation candidates, according to certain software. Only about 20% of the identifications were supported by three or four of the programs.

Glycopeptides are tricky to characterize. A researcher must determine both the sequence of the peptide and the number and composition of the individual modifying glycans, as well as their attachment sites. The authors recommend applying two fragmentation methods during the analysis: higher-energy collision-induced dissociation, or HCD, and electron-transfer dissociation and HCD in combination. The resulting spectra must be used in concert for the data interpretation.

According to Darula and Pap, the team's secret weapon was inspecting the data themselves, and in doing so they reported about 35 novel structures.

"Our study should be a warning for both the scientific community and the general public that we all want an easy and quick answer to most of our questions and for this reason, we throw our critical thinking aside and trust the computers too much," they wrote.

Darula and her team urge closer collaboration between software developers and mass spectrometry groups to improve the code accuracy in glycopeptide assignments.

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Reimagining drugs for a rare brain disorder

By Marissa Locke Rottinghaus

A team of researchers has developed a method to screen FDA-approved drugs to determine if they could be repurposed or improved to help patients with a rare, debilitating disease of the nervous system.

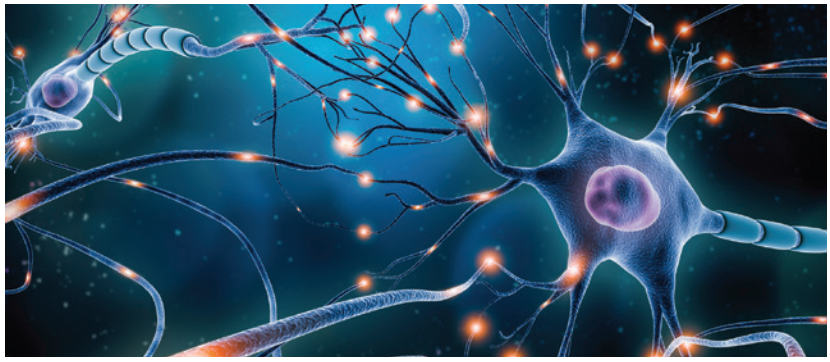
Spinocerebellar ataxia type 5 causes neurodegeneration. Loss of coordination, impaired gait and slurred speech are among the symptoms. With no cure or targeted therapy, SCA5 affects about 1,000 people in the U.S. but is within a class of diseases that plagues tens of thousands more.

Few researchers are trying to find a cure. However, one group published a recent study in the **Journal of Biological Chemistry** detailing a new method to screen for drugs that might help.

Robyn Rebbeck is a postdoctoral researcher at the University of Minnesota and one of the lead authors on the study. "Not only is there no known therapeutic to treat these diseases," Rebbeck said, "but, to our knowledge, there is no other research campaign to identify potential therapies for a lot of these ataxias."

SCA5 is caused by a mutation in the beta-III-spectrin gene, which is critical for creating connections between neurons in the central nervous system.

Adam Avery, an assistant professor at Oakland University, oversaw the work. "Our goal is to improve the conditions of these patients within the next 10 to 20 years," he said. "We want to provide SCA5 patients and their families with the hope of an effective treatment."



The researchers studied a mutation that causes β-III-spectrin and the structural protein actin to stick together. This abnormally tight interaction results in a traffic jam inside neurons, inhibiting their normal functions.

The research team created a pipeline to screen FDA-approved drugs against the mutated β-III-spectrin protein to find out if any can restore its function. This assay probes whether and how drugs change the interaction of mutant β-III-spectrin with actin.

Of the 3,000 FDA-approved drugs analyzed, two immediately stood out for their high efficacy and potency: ginsenoside Rb1 and micafungin. The researchers plan to screen thousands more compounds to get their best shot at finding an effective drug.

Piyali Guhathakurta, an assistant professor at UM and a lead author, said the team is now "primed for screening much larger libraries for compounds that can lead us to drugs that have the potential to treat SCA5. Our assay is the start of the drug-discovery campaign, with collaborators preparing to test these compounds in systems more akin to the human patients that we hope to treat."

The researchers plan to develop a cell culture and mouse model to test their hits from the drug screen more definitively. If the hits are successful in ameliorating disease in future models, they will be that much closer to a drug specific for SCA5 patients.

The team is optimistic about the potential of this new pipeline for studying mutations in β-III-spectrin–related proteins that cause other rare diseases such as muscular dystrophy.

"Our findings may pave the way for the development of a new class of drugs that will provide relief to patients suffering from SCA5 and additional diseases due to mutations in spectrin-related proteins," Avery said.

DOI: 10.1074/jbc.RA120.015417

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

From the journals

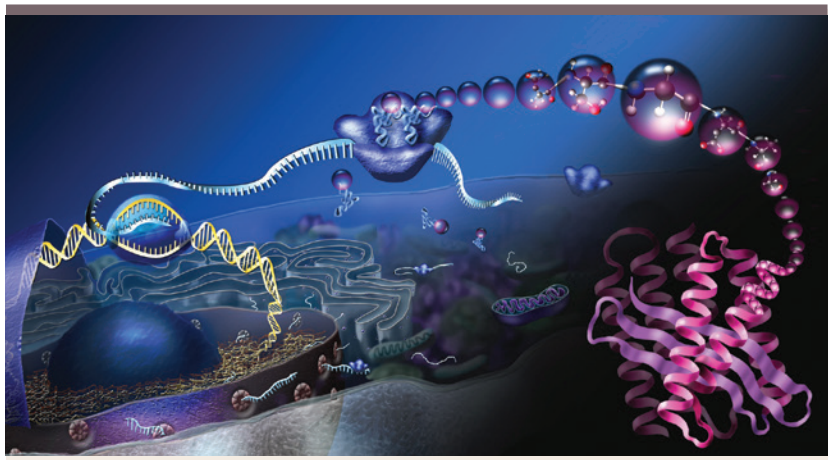
By Aparna Anantharaman, Ken Farabaugh & Nipuna Weerasinghe

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

Detecting protein–protein interactions in the brain

Proteins are workhorse biomolecules that form complexes to perform a vast array of cellular functions. Protein–protein interactions, or PPIs, are networks of proteins that serve as hubs for specific functions such as transport across the cellular membrane. Researchers can identify PPIs using proximity labeling, or PL, a highly sensitive technique that, unlike other methods that detect only stable PPIs, can detect both transient and stable PPIs in cells and whole organisms. In this method, the chimeric protein probes are designed specifically to detect proteins that are near each other.

In a recent review article in the journal **Molecular & Cellular Proteomics**, Boby Matthew, Shveta Bathla and a team at Yale University focus on how PL identifies PPIs in the brain. The authors describe common PL methods: biotin ligase–based approaches, such as proximity-dependent biotin identification or BioID and TurboID; peroxidase-based approaches, such as ascorbate peroxidase and horseradish peroxidase; and the split approach. They also provide an overview of the mass spectrometry analysis used to identify specific protein components of PPIs and applications of PL to capture PPI networks in the brains of whole living organisms.



NICOLLE RAGER/NATIONAL SCIENCE FOUNDATION

DNA is transcribed to RNA (left), which is translated to amino acids (center) that are folded into functional proteins (right).

A translation priority 'bar code'

To conserve resources and energy during periods of environmental stress, cells generally halt most mRNA translation activity and invoke mechanisms to control which mRNAs are translated into proteins. These mechanisms include upstream open reading frames, or uORFs, which can serve as regulatory elements by which ribosomes delineate mRNAs for heightened translation during stress. However, researchers know less about other elements of translational control.

In a recent article in the **Journal of Biological Chemistry**, Parth Amin and colleagues at Indiana University used polysome analyses and reporter assays to investigate the mechanisms regulating the previously reported preferential translation of one mRNA, encoding IBTK-alpha, in stress conditions. The authors found that the 5'-mRNA sequence of ITBKα contains a conserved stable stem-loop structure near a uORF site, uORF2, which effectively decreases translation re-initiation at the primary AUG start site. They also saw that during stress conditions, this stem-loop could be bypassed via a mechanism involving more modest translation at uORF1, a uORF further upstream.

These results show the importance of RNA secondary structures in regulating mRNA translation, particularly during the integrated stress response. Furthermore, the authors posit that these secondary structures can serve in conjunction with uORFs in what they call a "bar code" that ribosomes can scan to determine which mRNAs to translate preferentially during stress conditions.

DOI: 10.1016/j.jbc.2022.102864

—Ken Farabaugh

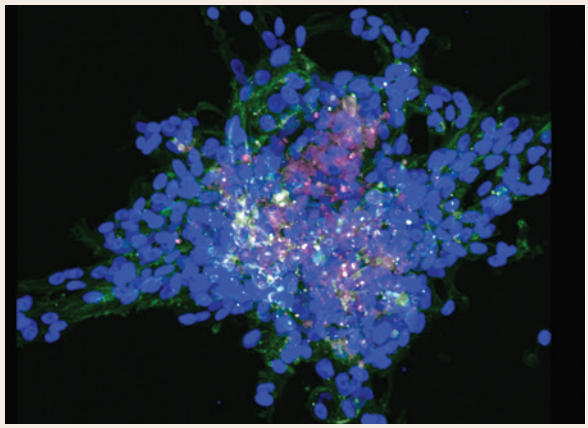
Finding biomarkers in preserved tumor tissue

The National Cancer Institute defines a biomarker as "a biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process, or of a condition or disease." Clinicians use cancer biomarkers in diagnosis, predicting disease course, selecting therapies, and monitoring cancer during and after treatment.

Because cancer is multifactorial, finding clinically relevant biomarkers poses a challenge. One way to tackle this problem is to identify protein-based biomarkers in tumor samples using formalin-fixed paraffin-embedded, or FFPE, tissues. However, accurately measuring proteins in FFPE samples is difficult.

In a recent article in the journal **Molecular & Cellular Proteomics**, Carine Steiner at Geneva University Hospitals and colleagues describe how they addressed this problem by coupling liquid chromatography with multiple reaction monitoring mass spectrometry to identify biomarkers from FFPE tissues. With this method, called LC-MRM/MS, they were able to simultaneously quantify multiple peptides extracted from FFPE samples of triple-negative breast cancer, or TNBC. This aggressive breast cancer subtype has a poor prognosis and lacks a generally accepted diagnostic biomarker.

Using LC-MRM/MS, the authors obtained quantitative data for 185 biomarker proteins from the FFPE tissues. They selected proteins that are associated with TNBC and other known markers of breast cancer such as HER2, EGFR and Ki-67. The authors included several quality checks to ensure they accurately measured relative changes in protein expression across sample groups. They also compared these results to work published by other groups and literature of proteins associated with TNBC.



This fluorescent microscopy image shows an invasive breast tumor derived from breast cancer cells in a matrix that mimics human breast tissue. The nucleus is blue, F-actin is green, and vimentin is white and pink.

The researchers concluded that LC-MRM/MS is a powerful tool for finding clinically relevant biomarkers through the relative quantification of proteins in FFPE tissue samples.

DOI: 10.1016/j.mcpro.2022.100416

— Aparna Anantharaman

The authors conclude that identifying PPIs in different brain cell types can provide insights into the complexity of the central nervous system and will contribute to understanding neuronal function and neurological disorders.

DOI: 10.1016/j.mcpro.2022.100422

Isolating HDL subtypes

High-density lipoprotein, or HDL, particles help transport lipids through extracellular fluids of the body and are notable for scavenging excess cholesterol from cells in reverse cholesterol transportation to the liver. This decreases the accumulation of atheromatous plaque within the walls of arteries. Thus, the higher concentration of HDL particles in the blood often is associated with a reduced risk of sudden plaque ruptures, cardiovascular disease and other disorders.

The relationship between HDL structure and function appears to depend, in part, on its protein composition, so accurate characterization of HDL particles will lead to better understanding of their various functions and roles in disease states. This characterization starts with isolating the particles from body fluids.

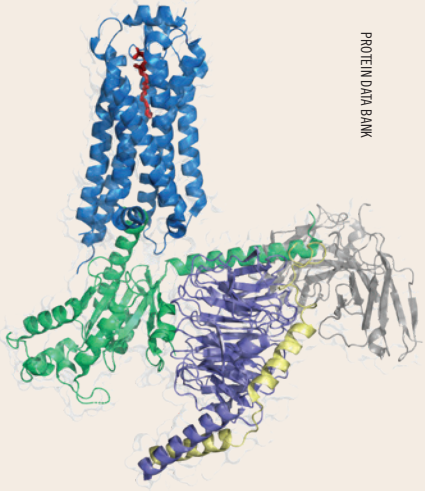
Michael Holzer and Senka Ljubojevic–Holzer at the Medical University of Graz worked with an international team to determine whether the choice of isolation technique influences the protein composition of the isolated particles. They found that three common methods for HDL isolation — immunoaffinity, density gradient ultracentrifugation and dextran sulfate precipitation — changed the type of HDL particles isolated and their functions.

These results, which the team describes in an article in the **Journal of**

A clickable molecule to study S1P metabolism

The lipid known as sphingosine-1-phosphate, or S1P, functions as a metabolic intermediate and a cellular signaling molecule. It exerts most of its known actions primarily by interacting with a family of five specific G protein–coupled receptors, or GPCRs, called S1P receptors 1–5, which are among the most abundant and widely expressed GPCRs in humans and are present in high concentrations in the immune and vascular systems.

Receptor-mediated S1P signaling is critical in regulating physiological processes such as growth, survival, migration and cell apoptosis. Because diseases such as cancer, diabetes and obesity are linked to the unbalanced metabolism and defects in the S1P signaling pathway, studying the S1P metabolism and its intracellular tracking helps researchers understand these disorders and develop therapeutic strategies.



This cryo-electron microscopy image shows the structure of Gi-coupled sphingosine 1-phosphate receptor 1 bound with S1P: receptor (blue); sphingosine-1-phosphate (red); Gi alpha (green), beta (purple) and gamma (yellow) proteins; and single-chain variable fragment 16 (gray).

Researchers can use S1P analogs containing small functional groups such as azides or alkynes that they can label with click chemistry to add sensitive tags to study the cellular metabolism of S1P. As azides and alkynes are rare in nature, click reactions can be performed on these analogs quickly and selectively in the presence of other functionalities that exist in biological systems. The corresponding S1P metabolites and the interacting proteins then can be identified and quantified using techniques such as fluorescence microscopy or mass spectrometry.

Christine Sternstein and a team at the University of Wuerzburg synthesized a new azido-functionalized S1P derivative that can be labeled via click chemistry with alkyne-substituted molecules. This clickable S1P derivative with a terminal azido group activated the S1P receptors similarly to S1P. The researchers carried out a successful staining experiment using this S1P analog with a bright fluorophore dye to visualize the distribution of S1P metabolites inside the cells, providing a powerful new tool for studying the cellular metabolism of S1P. The researchers' article on this study recently was published in the **Journal of Lipid Research**.

DOI: 10.1016/j.jlr.2022.100311

— Nipuna Weerasinghe

Lipid Research, will help researchers develop methods to isolate specific subtypes of HDL particles and compare, replicate and analyze proteomic HDL data.

DOI: 10.1016/j.jlr.2022.100307

Novel protein cleavage in a cerebral disease

Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy, or CADASIL, is the most common inherited cerebral small-vessel disease; it is characterized by defects in blood flow in small vessels, such as those in the brain, leading to stroke. This disease is caused by mutations in NOTCH3, a gene encoding a membrane receptor protein that also has been linked to cancer and aging.

In a recent study published in the **Journal of Biological Chemistry**, Soo Jung Lee, Xiaojie Zhang and colleagues at the University of Michigan identified a novel cleavage site in the NOTCH3 protein in CADASIL patient samples. Using proteomic analysis, they demonstrated not only that this cleavage at Asp964 was dependent on the adjacent proline residue but also that the cleavage product was highly enriched in patient brain tissue at degenerating arteries. Using large-scale microarrays and the protein interaction algorithm STRING, the authors predicted that several of the proteins would display increased binding to this cleavage product compared with the uncleaved protein, including transcriptional activators and metabolic enzymes. This suggests the local protein interactome could be altered in patients.

These findings are consistent with previous results indicating that

NOTCH3 cleavage is more prevalent in CADASIL patients and suggest that the interactome of cleaved NOTCH3 proteins could have a significant effect on artery degeneration. Future studies are needed to elucidate the downstream effects of these interactions.
DOI: 10.1016/j.jbc.2022.102772

A new tool to study a transporter

Nucleocytoplasmic transport is the movement of molecules between the nucleus and cytoplasm of a cell. This process allows for the regulated exchange of information and materials needed for normal cellular function. The protein importin β1 regulates both cytoplasmic and nucleocytoplasmic transport, so researchers are interested in characterizing all its subcellular interactions. The transient nature of these interactions with their cargoes and overlapping specificities of importins makes this work a challenge, and existing methods to study importin interactomes, such as the proximity ligation assay BioID, have limited efficiency.

In their recent article in **Molecular & Cellular Proteomics**, Didi-Andreas Song, Stefanie Alber and Ella Doron–Mandel at the Weizmann Institute of Science and colleagues describe how they generated a new, highly specific anti-importin β1 monoclonal antibody so they could characterize importin β1 interactomes using biotinylation by antibody recognition, or BAR. This method targets a unique region of importin β1 and has a high degree of specificity for its cytoplasmic form.

The researchers write that this new antibody-based tool will provide insights into importin β1 function by identifying its interactome and will elucidate the role of importin β1 in nucleocytoplasmic transport-related and non–transport-related cellular roles.
DOI: 10.1016/j.mcpro.2022.100418

Seipin's role in steroid synthesis

Steroid hormones include glucocorticoids, which regulate metabolism and immune function; mineralocorticoids, which help maintain blood volume and control renal excretion of electrolytes; and sex hormones, which are needed for sex differentiation in males and support reproduction.

These hormones are biosynthesized from cholesterol in the steroidogenesis tissues in the adrenal gland and gonads. Cholesterol from cholesteryl ester–rich lipid droplets, or CE-rich LDs, taken up from plasma is most important when steroidogenic cells are stimulated for an extended time. This hormone biosynthesis also requires a battery of oxidative enzymes in both mitochondria and the endoplasmic reticulum, or ER. Malfunctions of this pathway lead to disorders of sex development and salt–water balance.

Seipin is an ER protein that forms oligomeric complexes at ER–LD contact sites, and its deficiency severely alters LD maturation and morphology as seen in Berardinelli–Seip congenital lipodystrophy type 2. To learn about the role of seipin in CE-rich LD accumulation in steroidogenic tissues and steroid synthesis, Wen-Jun Shen from Stanford University and a team of collaborators generated mice with deficient expression of seipin, specifically in tissues of the adrenal gland, testis and ovary that normally accumulate CE-rich LDs. According to their finding published in the **Journal of Lipid Research**, LD and CE accumulation in the adrenals of the seipin-deficient mice was markedly reduced, showing that seipin plays a pivotal role in intracellular cholesterol trafficking.
DOI: 10.1016/j.jlr.2022.100309

A key molecule in lipid droplet catabolism

Lipid droplets, or LDs, are small, transient, lipid-rich cellular organelles

that serve as reservoirs or storage depots for lipid molecules such as cholesterol and triacylglycerides. Researchers recently found that proteins that connect LDs to the endoplasmic reticulum, or ER, may play a role in LD metabolism; however, scientists do not yet understand the mechanisms that regulate the growth and degradation of LDs.

Victoria Ismail and colleagues at Washington University School of Medicine in St. Louis describe in their recent publication in the **Journal of Biological Chemistry** how they found that double FYVE domain-containing protein, or DFCP1, an autophagy-related protein at the interface of LDs and the ER, contains a previously unrecognized NTPase domain. Using spectroscopy and mutation analysis, the researchers showed that DFCP1 can hydrolyze both adenosine triphosphate and guanosine triphosphate. They also observed that when hydrolytic or dimerization activity was lost, DFCP1 accumulation at LDs and co-localization of LDs with autophagosomes decreased, while LD size and density increased.

These findings suggest DFCP1 is an NTPase that modulates LD metabolism in cells. DFCP1 could be the linchpin to liberate free fatty acids from lipids stored in LDs, which then could be efficiently cleared via the autophagy lysosomal pathway.
DOI: 10.1016/j.jbc.2022.102830

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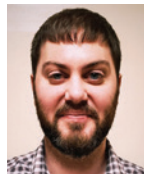


Nipuna Weerasinghe (nipunawe@arizona.edu) holds a bachelor's degree in chemistry from the University of Colombo, Sri Lanka, and a master's degree in chemistry from the University of Arizona.

Upcoming ASBMB events and deadlines

MAY

10	Motifs, modules, networks conference early registration deadline
10	Motifs, modules, networks conference abstract submission deadline
23	Transforming undergraduate education conference abstract submission deadline
31	Annual award nominations deadline

JUNE

1	Marion B. Sewer Scholarship deadline
12	Motifs, modules, networks conference regular registration deadline
20	CoA and CoA-derivatives conference early registration deadline
20	CoA and CoA-derivatives conference abstract submission deadline
27	Transforming undergraduate education conference regular registration deadline

JULY

11–14	**Motifs, modules, networks conference**
14	CoA and CoA-derivatives conference abstract submission deadline
27–30	**Transforming undergraduate education conference**

National Academies report calls for antiracist reforms

Institutions must make significant, structural changes, the authors say

By Marissa Locke Rottinghaus

The National Academies released a report last month on how structural racism is embedded in institutions that educate, train and employ professionals in the fields of science, technology, engineering, mathematics and medicine.

The Feb. 14 report's authors concluded that existing systems inherently disadvantage people from historically marginalized groups, and they recommended overhauling admissions, hiring, promotions, awards and more at, for example, universities, nonprofits, hospitals and companies.

"Racism is embedded in our society," wrote the authors of "Advancing Antiracism, Diversity, Equity and Inclusion in Science, Technology, Engineering, Mathematics, and Medicine Organizations." While racial biases held by individuals certainly must be addressed, they said, "structural racism requires active antiracist change at a system level."

The authors — a panel of experts on the science of antiracism, diversity, equity and inclusion; psychology; sociology; and implementing programs at STEMM organizations — emphasized that their work, which drew from the literature and lived experiences, "shows that patterns exist in the data and are not matters of opinion or moral judgments."

The report offers the following conclusions and corresponding recommendations.

Addressing structural and institutional racism

Conclusions: Historic systemic racism in the U.S. has harmed and continues to harm people from minoritized groups. Minority-serving institutions "provide culturally responsive student and faculty support" and can serve as models for predominately white institutions and other organizations.

Recommendations: Funders, philanthropies and other organizations that issue grants should invest in efforts to better understand how the policies, programs and practices of MSIs support students and faculty. Also, predominately white institutions should partner sustainably with MSIs.

Collecting better and more useful data

Conclusion: The rate at which people from marginalized groups obtain STEMM degrees lags behind their national population growth. Data on persistence, completion and transfers are lacking.

Recommendation: The National Center for Science and Engineering Statistics and the National Center for Education Statistics, among other organizations, should collect and share information on the demographics of students entering college to study STEMM and their educational outcomes by race, ethnicity, gender and field.

Exploring and learning from lived experiences

Conclusion and recommendation: Efforts to explore and document the experiences of marginalized groups are valuable and should be expanded.

Leveraging professionals and organizations

Conclusion: Marginalized individuals in STEMM respond to systemic racism by leaving the field, implementing tactics to fit in or transforming their environment.

Recommendations: Leaders and gatekeepers (people who can prevent access to resources) should do the following to "improve minoritized people's individual and interpersonal experiences":

- Collect and transparently present diversity data.
- Hire a critical mass of minoritized people, in particular where role models are lacking.
- Address discrepancies between institutional diversity statements and organizational reality.
- Recognize minoritized individuals in multiple formats, such as film and awards.
- Amend curricula and other content to "incorporate

more examples of minoritized role models."
• Change the physical environment to be more inclusive of minoritized people.
• Invest in evidence-based programs that increase minoritized people's access to others in STEMM careers (such as bridge programs and professional networks) and in-group peers (such as peer mentorship programs).
• "De-center White professional norms in culture, dress and appearance."
• Ensure people have access to "culturally responsive mental health providers or resources with experience in addressing racial stress, trauma and aggressions."

Addressing individual bias and persistent inequality

Conclusion: Gatekeepers (such as principal investigators, heads of research groups, human resource officers and others) "may not be able to monitor their own bias impartially" and "may unwillingly perpetuate it."
Recommendations: Organizations should create systems to collect data on the decisions of gatekeepers, develop more inclusive decision-making processes and include antiracism leadership duties in job descriptions for management positions.

Understanding and leveraging diverse teams

Conclusion: Conditions and policies that promote inclusion in STEMM organizations are required to end systemic racism.
Recommendation: Managers should increase team representation of minoritized individuals, promote equal status among team members and create a psychologically safe environment.

Understanding the role of leadership

Conclusions: Racial discrimination persists in the use of standardized testing, hiring, tenure processes and professional development efforts.
Recommendation: Organizational leaders such as CEOs, hiring managers, human resources supervisors and admissions officers should overhaul organizational processes that reproduce negative outcomes — such as fewer callbacks, lower offers for wages and startup packages, lower-ranked titles, and more critical evaluations — for people from minoritized groups at critical points of access and advancement.

'A multi-tiered strategy' is needed

The authors of the report stressed that both structural and mental paradigm shifts are needed.

"(T)his report emphasizes that the concepts of antiracism, diversity, equity, and inclusion are not goals for which a simple checklist will indicate success," the authors wrote. "Rather, they are goals that reflect culture change, accomplished by the creation of environments that focus on inclusive excellence, where all participants

have access to educational and professional opportunities, feel included, and have the resources to actualize their full potential. In order to do this, STEMM organizations will require ongoing leadership, resources, and commitment to ensure that these values become part of an intentionally maintained organizational culture."

Many organizations have trained personnel to recognize unconscious and conscious biases. However, the report emphasized that work that focuses on individual actions is insufficient. Systemic changes must be initiated at the team and institutional levels.

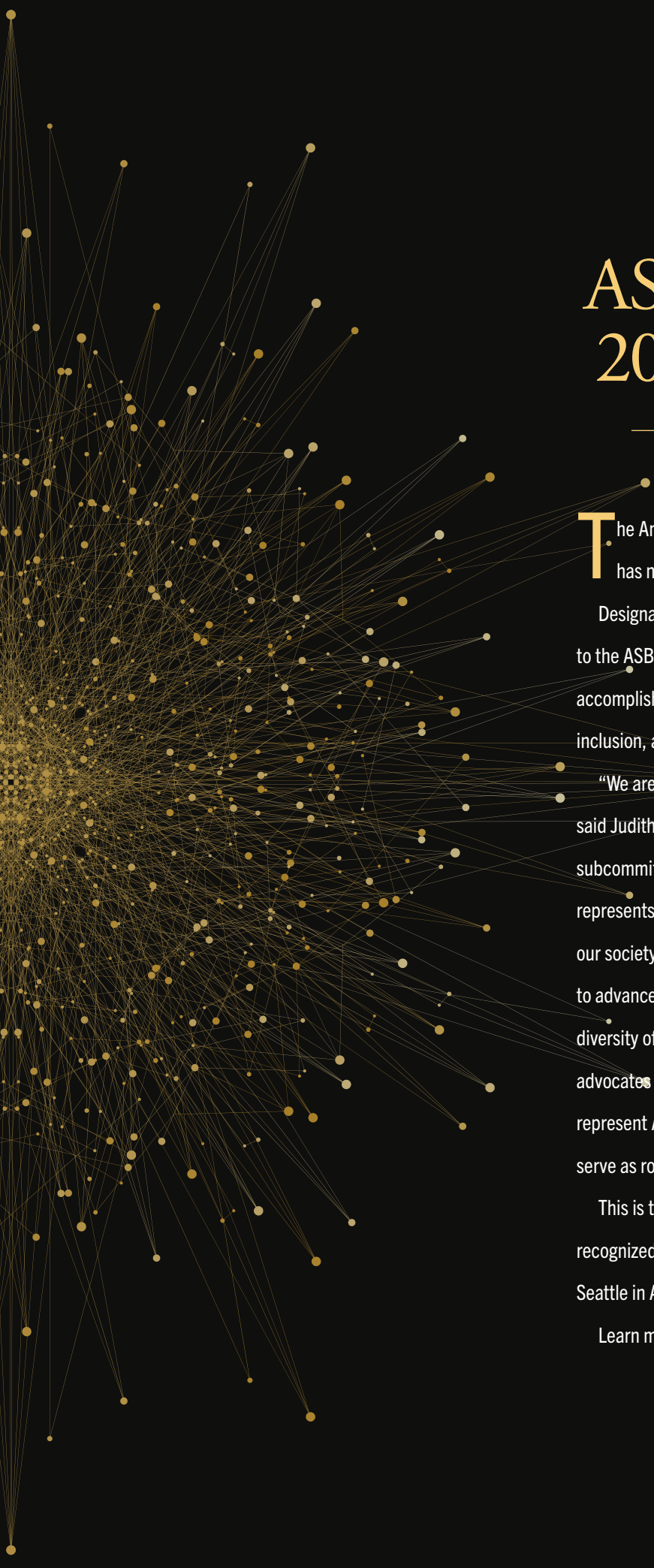
"(T)he committee and this report encourage a multitiered strategy that calls for change at the institutional and team levels," the authors wrote. "The combination of removing barriers for entry and for participation, while implementing practices that convey belonging, will allow a STEMM organization to move from broadening participation by the numbers to fostering a culture of inclusion, thriving, and success."

Ciearra Smith is the manager of diversity, equity and inclusion programs at the American Society for Biochemistry and Molecular Biology. Smith said that it's clear that the paradigm shift called for by the National Academies will take time to achieve and require the intentional efforts of scientists, academic leaders, executives, administrators, policymakers and more.

Smith emphasized that the first step in enacting change requires organizations to conduct audits of their current diversity, equity, accessibility and inclusion policies. Such evaluations should continue indefinitely, she added.

"We are disheartened but not surprised by the findings of the National Academies report," Smith said. "The ASBMB is committed to promoting a culture that values diversity, equity, accessibility and inclusion and one that supports scientists from historically marginalized backgrounds. We have been advocating for historically marginalized groups and systemic change in and outside of ASBMB with our policy and programmatic activities. Just one example of this is our collaboration with the National Black Postdoctoral Association to ensure all perspectives are accounted. This report gives institutions concrete strategies for changing their culture, but it will be up to their stakeholders to institute positive change."

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



ASBMB NAMES 2023 FELLOWS

The American Society for Biochemistry and Molecular Biology has named 20 of its members as 2023 fellows.

Designation as a fellow recognizes outstanding commitment to the ASBMB through participation in the society in addition to accomplishments in research, education, mentorship, diversity and inclusion, advocacy, and service to the scientific community.

"We are delighted to welcome the 2023 class of ASBMB fellows," said Judith Bond, past president of the ASBMB and chair of the subcommittee that manages the fellows program. "This group truly represents members who have provided exceptional commitment to our society through their service as well as outstanding contributions to advance the molecular life sciences. They reflect the breadth and diversity of our members as researchers, educators, mentors and/or advocates of our profession. It is an honor to have these individuals represent ASBMB, and we look forward to seeing them continue to serve as role models and mentors to aspiring scientists."

This is the third year the ASBMB has named fellows. They were recognized at the society's annual meeting, Discover BMB, held in Seattle in April.

Learn more about the 2023 fellows in the following pages.

Norma Allewell

Norma Allewell is an emeritus professor at the University of Maryland at College Park. She previously held leadership positions at Wesleyan University, the University of Minnesota and Harvard University. Her research focuses on protein structure, function and dynamics as well as metabolic regulatory mechanisms and diseases.

An ASBMB member since 1979, Allewell served multiple terms as a Journal of Biological Chemistry editorial board member and, starting in 2002, as an associate editor, which, her nominators wrote, helped to "catalyze and further develop a biophysical and structural perspective and presence" for the journal. During her final years of service, she helped devise a new strategic plan for JBC. She is a fellow of the American Association for the Advancement of Science.

In their letter nominating Allewell as a fellow, Charles Samuel of the University of California, Santa Barbara, and Lila Gierasch of the University of Massachusetts Amherst wrote: "Norma is a pioneer. … She maintained a cutting-edge research program and enjoyed success as a skilled administrator and academic editor."

Thomas Baldwin

An emeritus professor at the University of California, Riverside, Thomas Baldwin served as dean of the College of Natural and Agricultural Sciences from 2008 to 2012 and retired in 2015. He is the author of nearly 150 scientific papers, many of them focusing on bioluminescence in organisms ranging from bacteria to fireflies.

An ASBMB member since 1981, Baldwin represented the society on the board of directors of the Federation of American Societies for Experimental Biology, including one year (2017) as president. He has served on the editorial board of the Journal of Biological Chemistry, as a member of the Nominating Committee and its chair, and as a member of the Public Affairs Advisory Committee.

Balwin also helped launch what became the Science Outreach and Communications Committee, serving as its first chair. He also is among the ASBMB members who developed The Art of Science Communication, an eight-week online course.

Ralph Bradshaw, professor emeritus at the University of California, Irvine, nominated Baldwin as a fellow. "Tom is an accomplished scientist, educator and academic administrator," Bradshaw wrote.

Susan J. Baserga

Susan J. Baserga is the William H. Fleming, M.D., professor of molecular biophysics and biochemistry at Yale University, director of medical studies, and co-director of the predoctoral program in cellular, molecular and quantitative biology. Her lab studies ribosome biogenesis and assembly in yeast and human cells and pioneered the purification and identification of the protein components of the nucleolar SSU processome and the molecular basis of ribosomopathies.

Baserga, a physician–scientist who has been an ASBMB member since 2008, received the society's William C. Rose Award in 2016 for outstanding research and commitment to training young scientists. She served on the ASBMB's Public Affairs Advisory Committee and is a co-founder and current chair of the Women in Biochemistry and Molecular Biology Committee. Baserga has been involved in the society's recurrent Emerging Roles of the Nucleolus special symposium. She has written articles for ASBMB Today on wellness and women in academic science.

Jennifer Gerton of the Stowers Institute, who nominated Baserga, wrote, "In addition to her service to ASBMB, Susan is a seasoned leader in the field, and brings a special perspective as an M.D. and Ph.D."

ASBMB FELLOWS

Marilee Benore

Marilee Benore is a professor of biochemistry and biological sciences at the University of Michigan–Dearborn. Her lab focuses on the vitamin riboflavin, studying transport and detection via the protein riboflavin binding protein. They have conducted studies on a flock of chickens with a mutation in riboflavin-binding protein gene that lay eggs devoid of riboflavin, rendering the egg albumen transparent. Benore also conducts research in biochemistry pedagogy and women's persistence in science, technology, engineering and mathematics.

Benore is a former chair of the ASBMB's Student Chapters subcommittee and is a member of the society's Women in Biochemistry and Molecular Biology Committee. An ASBMB member for decades, she also has been involved in undergraduate poster competition judging for many years. Benore has published multiple articles in ASBMB Today about her scientific and personal experiences.

Michael Pikaart of Hope College, also a 2023 fellow, nominated Benore. "She is a careful, methodical and well-trained scientist who expects similar care from her students," Pikaart wrote. "She is inspired by the amazing biochemistry she studies. And she shares her knowledge generously in print and in person."

Charles Brenner

Charles Brenner is a professor and the Alfred E. Mann Family Foundation chair of diabetes and cancer metabolism within the Beckman Research Institute at the City of Hope National Medical Center in Los Angeles.

His laboratory focuses on regulation and dysregulation of nicotinamide adenine dinucleotide, or NAD, the central coenzyme of metabolism. Notably, Brenner discovered the nicotinamide riboside, or NR, kinase pathway to NAD and, by developing quantitative targeted NAD metabolomics, discovered that the NAD system is disturbed in multiple conditions of metabolic stress including heart failure, neurodegeneration, viral infection and postpartum. His work on NR has been translated successfully and has led to dozens of clinical trials worldwide, several of which are showing anti-inflammatory and other beneficial activities of NR in people.

The former 11-year head of biochemistry at the University of Iowa, Brenner also has contributed in all areas of biochemistry education, most notably with the publication of curriculum recommendations for premedical education.

Brenner is a former member and chair of the ASBMB Publications Committee; he served from 2009 to 2016. An ASBMB member since 1996, he is also former chair of the editorial advisory board of ASBMB Today. In 2016, he received the ASBMB Award for Exemplary Contributions to Education for his work on the society's position statement on undergraduate science education as preparation for MCAT and molecular literacy.

Rama Natarajan of City of Hope, who nominated Brenner, wrote that he "is a true leader who has advanced biochemistry and molecular biology with his own teaching, with his national work on education, with his mentorship of trainees and junior faculty members, with his highly original research program, with translation of his research program, and with his rigorous and broad commitment to outreach and honest science communications."

Craig Cameron

Craig Cameron is a professor and the chair of the microbiology and immunology department at the University of North Carolina at Chapel Hill. His lab studies the fundamental biochemistry of RNA viruses and RNA polymerases. Recently, he developed a microfluidics-based cell-culturing, imaging and data-analysis platform that enables high-throughput study of single cells infected by a virus that expresses a fluorescent reporter.

Cameron is an associate editor at the Journal of Biological Chemistry and served on the JBC editorial board for many years. An ASBMB member since 1999, he also has served on the advisory board for ASBMB Today, as chair of the ASBMB Maximizing Access Committee, as a member of the Public Affairs Advisory Committee, and as a member of the Education and Professional Development Committee. He is a co-chair of Discover BMB, the society's annual meeting.

S. Gaylen Bradley of Virginia Commonwealth University, who nominated Cameron, wrote that he has "established himself as an outstanding molecular biologist" and "has an impressive record of publications

on molecular biology of viruses and enzymes, including a 2021 paper on SARS-CoV-2 polymerase."

Sonia Flores

Sonia Flores is a professor and vice chair for diversity and justice in the department of medicine at the University of Colorado Anschutz Medical Campus. Her research focuses on human immunodeficiency virus, and she discovered that the HIV protein Tat causes oxidative stress by inhibiting the expression of mitochondrial superoxide dismutase.

Flores first became a member of the ASBMB in 1986 as a graduate student. Over the decades, she has organized and co-chaired many workshops at the intersection of science and social justice. She has been involved in the society's IMAGE grant-writing workshop since 2010. She is now the chair of the ASBMB Maximizing Access Committee. She also has published numerous works promoting diversity, equity and inclusion in ASBMB Today and other outlets and has championed parental leave and the mitigation of sexual harassment in science.

Ruma Banerjee of the University of Michigan Medical School, who nominated Flores, wrote, "For her substantial and substantive contributions to ASBMB and across all levels of our scientific community, to promoting STEM diversity, Sonia is most deserving of being recognized as an ASBMB fellow."

Susan Forsburg

Susan Forsburg, a distinguished professor at the University of Southern California, uses the fission yeast Schizosaccharomyces pombe to study how chromosome duplication and maintenance help keep the genome stable.

An ASBMB member since 2003, Forsburg served on the Public Affairs Advisory Committee from 2010 to 2012 and again from 2016 to 2022 and took part in Hill Day visits to the U.S. Capitol. She chaired a working group on harassment (2018–2019) and co-chaired a working group on diversity, equity and inclusion (2021–2022).

Four members nominated Forsburg: Anita Corbett of Emory University, Katherine Friedman of Vanderbilt University, Terri Goss Kinzy of Illinois State University and Tricia Serio of the University of Massachusetts Amherst. They wrote that Forsburg "is an outstanding scientist with an impressive track record of service to ASBMB as well as a commitment to the field of molecular biology." They continued: "She has been a tireless advocate for women and STEM and she shares generously of her experiences as an LGBTQ+ individual, providing a key role model for current and future generations of scientists."

Gregory J. Gatto Jr.

Gregory J. Gatto Jr., a biochemist and enzymologist with more than 15 years of experience in drug discovery, is a scientific director at GSK, where he manages new target identification and validation strategies for novel therapeutics. He was a co-author for several editions of the textbook "Biochemistry," originally authored by Lubert Stryer and first published in 1975, and plans to be involved with future editions.

Gatto was a member of the ASBMB Council from 2013 to 2016 and served on the Membership Committee from 2016 to 2022. He helped lead and moderate the society's 2020 webinar "Collaboration 101: Developing partnerships between academia and industry."

Nominators Mark R. Harpel of GSK and Jeremy M. Berg at the University of Pittsburgh School of Medicine noted Gatto's scientific rigor and innovative thinking. They also lauded his "practical application of central biochemical and molecular principles; disciplined translation of these principles to address unmet medical needs in human disease; and passion for educating and developing new as well as established scientists."

Robert Haltiwanger

Robert Haltiwanger is a professor at the University of Georgia's Complex Carbohydrate Research Center. He studies O-linked glycans and currently serves as principal or joint investigator on four major grants from the National Institutes of Health. He has authored 154 papers to date.

An ASBMB member for more than three decades, Haltiwanger has served on the Publications Committee and was co-chair of the 2021 annual meeting. He served as a member of the Journal of Biological Chemistry

editorial board and since 2022 has been a JBC associate editor.

Haltiwanger was nominated by UGA colleagues Christopher M. West and Michael Tiemeyer. "Bob is an outstanding scientist who, together with his tireless leadership and service efforts, has effected a significant and sustained impact on the field of biochemistry and molecular biology especially in the disciplines of glycobiology and developmental biology," they wrote.

Mark Lemmon

Mark Lemmon recently was named chair of the pharmacology department at Yale University, where he holds an endowed professorship and directs the Cancer Biology Institute. He previously served as deputy director of the Yale Cancer Center. His lab studies the signaling networks controlled by growth factor receptor tyrosine kinases that, when mutated, can cause cancers and other diseases. He also has contributed to the field of signaling through phospholipids and phosphoinositides and to membrane protein folding.

Lemmon served for six years (2007–2013) as the ASBMB's secretary and also as a Council member. He was a co-organizer of the society's 2009 annual meeting and of small meetings in 2015. He is a fellow of the Royal Society and chairs the editorial board of the Biochemical Journal.

Alex Toker, editor-in-chief of the Journal of Biological Chemistry, who nominated Lemmon, wrote, "Prof. Lemmon actively and effectively fosters the careers of not only those who work with him but, perhaps more impressively, of those young scientists whose work intersects with his."

Susan Marqusee

Susan Marqusee is a professor of chemistry and of molecular and cell biology at the University of California, Berkeley. In her laboratory, Marqusee and her team probe the structural and dynamic information encoded in the linear sequence of amino acids. In addition to her research, she served for 10 years as associate director of the California Institute for Quantitative Biosciences at UC Berkeley and for another decade as its director.

In 2012, Marqusee received the ASBMB's William C. Rose Award recognizing her contributions to research and her commitment to training emerging scientists. An ASBMB member since 1995, she served on the society's Council from 2015 to 2018. She was elected to the National Academy of Sciences in 2016 and to the American Association for the Advancement of Science in 2013.

Eva Nogales of UC Berkeley nominated Marqusee. "Susan has, in addition to a stellar scientific career, a fantastic record of service to the scientific community at large and to ASBMB in particular," Nogales wrote.

Pamela Mertz

Pamela Mertz is a professor at St. Mary's College of Maryland, where she teaches Biochemistry I and II lecture and lab, General Chemistry II lab, Medicinal Chemistry, and first-year seminar courses. She was a founder of the biochemistry major at her institution and continues to coordinate the program. Her lab has worked on a number of biochemical projects, including ones in the areas of lipid metabolism and intracellular drug synthesis. She also explores science pedagogy, from laboratory and capstone projects to students' professional skill development, and biomolecular visualization. She is on the steering committee for BioMolViz and on the editorial board for the journal Biochemistry and Molecular Biology Education.

Mertz has been an ASBMB member since 1999. She is chair of the ASBMB Student Chapters steering committee and was the southeast regional director for seven years. She played an instrumental role in St. Mary's ASBMB accreditation. For many years, she has served as a judge in the annual ASBMB undergraduate poster competition and received the ASBMB Science Fair Award for support of students at local science fairs.

She is a frequent contributor to ASBMB Today and has written on a variety of topics, including professional development and biochemistry education. She is one of the organizers for the 2023 ASBMB summer education meeting, "Transforming education in the molecular life sciences," that will be held at Suffolk University in July.

Kristin Fox of Union College, who nominated Mertz, wrote, "Her numerous activities of increasing responsibility show the high esteem that her colleagues at ASBMB hold her in."

James Ntambi

James Ntambi is a professor at the University of Wisconsin–Madison. His research program focuses on the genetic regulation of metabolism in health and disease. He studies adipocyte biology, differentiation, hormonal and dietary regulation of gene expression.

An ASBMB member since 1986, Ntambi was elected to the Council in 2018 and re-elected in 2021. He has organized ASBMB conferences and symposia for the annual meeting. He also has served as a judge for the annual undergraduate poster competition and brought many students into the ASBMB community. He won the 2013 ASBMB Award for Exemplary Contributions to Education and serves as an editorial board member of the Journal of Biological Chemistry.

Ntambi was nominated by Gerald Hart, Dan Raben, Suzanne Barbour and David Bernlohr. Raben wrote that Ntambi "has shown that this simple structural change in fatty acids is responsible for an incredible array of biology," while Hart noted his research "has been and continues to be truly outstanding and at the cutting edge, having dramatic impacts on our fundamental understanding of genetic regulation of metabolism." Bernlohr pointed to his work bringing together "academic and research institutions across the East and Central African region with the goal of building a Ph.D. training program in basic laboratory research in biochemistry and nutritional sciences," and Barbour noted "his commitment to training the next generation of biochemists and molecular biologists both here and in Uganda."

Phillip Ortiz

Phillip Ortiz is the assistant provost for undergraduate and STEM education at the State University of New York and has wide interests in improving STEM education and access for all students. He has made important contributions to remote and distance learning initiatives at SUNY and beyond. He regularly publishes commentaries and best practices in scholarly journals, and he also serves as the editor-in-chief of the journal Biochemistry and Molecular Biology Education.

An ASBMB member since 1991, Ortiz has been instrumental in organizing the society's annual undergraduate poster competition and frequently has served as a judge. He also served on and chaired the Maximizing Access Committee to promote diversity, equity and inclusion in the biochemistry workforce. He initiated the society's strong relationships with the Society for the Advancement of Chicanos and Native Americans in Science and the Annual Biomedical Research Conference for Minority Students. He also was involved in the founding and organization of the ASBMB Student Chapters program.

Marilee Benore, who nominated Ortiz and also was named a fellow this year, wrote, "Phil Ortiz has had a long-term and critical impact on the work of the ASBMB society in his diverse roles in education research, diversity and inclusion efforts, and in connecting BMB researchers internationally."

Michael Pikaart

Michael Pikaart is a professor at Hope College in Holland, Michigan. His lab focuses on environmental microbiology, working with nonprofit and government organizations to develop and test methods to ensure that drinking water is safe for humans and the environment. Another focus is biochemistry pedagogy; along with his collaborators in the National Science Foundation–funded BASIL project, Pikaart has played a major role in developing an undergraduate biochemistry research experience that allows students to help determine the enzymatic function of proteins with unknown activities.

Pikaart has been an ASBMB member for more than 20 years. He is director of Hope College's ASBMB-accredited biochemistry and molecular biology program and was instrumental in Hope achieving accreditation. He is very involved in ASBMB meetings and has served as an undergraduate poster competition judge since he joined the society. He also is dedicated to the activities of the society's undergraduate Student Chapters program and has served as a regional director and a member of the Education and Professional Development Committee.

John Tansey of Otterbein University, who nominated Pikaart, wrote, "His work with the society, his work with students, his scientific contributions and his contributions to education all collectively paint a picture of someone the society should be proud to call a fellow."

ASBMB FELLOWS

William Smith

William Smith is an emeritus professor at the University of Michigan Medical School, where he earned his Ph.D. more than 50 years ago. Smith began his career at Michigan State University, where he was a faculty member from 1975 to 2003 and department chair from 1995 to 2002. He joined the University of Michigan Medical School in 2003, serving as chair of the biological chemistry department and an endowed professor until 2015.

Smith's research focused on signal transduction, eicosanoid metabolism and function, lipids and lipid mediators, essential fatty acid metabolism, and nutrition. He probed the roles of nutritionally essential fatty acids, prostaglandins, nonsteroidal anti-inflammatory drugs and cyclooxygenases in inflammation, thrombosis and colon cancer.

An ASBMB member for more than four decades, Smith served as an associate editor for the Journal of Biological Chemistry from 2000 to 2015. He received the ASBMB Avanti Award in Lipid Biochemistry in 2004 and the William C. Rose Award for outstanding research and commitment to training young scientists in 2006. He was the Berzelius lecturer at the Karolinska Institute in 2004. In 2007, Smith, Al Burlingame, Heidi Hamm and Barbara Gordon were in the first ASBMB delegation that visited and developed relationships with Chinese scientists in Beijing, Shanghai, Guangzhou and elsewhere.

George Carman of Rutgers University, who nominated Smith, wrote: "Bill's scientific stature is exemplified by continuous funding from the NIH, service on national and international advisory boards, service on numerous editorial boards besides those operated by ASBMB, and numerous honors and awards."

Melissa Starovasnik

Melissa Starovasnik currently serves as a member of the board of directors for Twist Bioscience and is a member of the scientific advisory boards for a variety of biotechnology companies including Aarvik Therapeutics, Ambrx and Denali Therapeutics. She worked for 28 years at Genentech in roles of increasing responsibility; she served on the Research Leadership Team from 2010 to 2017 and oversaw the discovery and optimization of more than 20 protein therapeutic candidates that entered clinical trials.

She began as a postdoctoral researcher and scientist at Genentech, rose to become director and then senior director of structural biology (2007–2010), was then vice president of research operations and structural biology (2010–2012), eventually led the large-molecule drug discovery organization as vice president of protein sciences (2012–2017), and finally served as senior scientific advisor of research (2017–2021).

An ASBMB member since 2011, Starovasnik has been a member of committees dedicated to the society's annual awards and mentoring. She also has served on the Council and was a founding member of the society's industry advisory group, started in 2020 as an arm of the Membership Committee. She has written about landing industry jobs in ASBMB Today.

Wayne J. Fairbrother, a Genentech vice president who nominated Starovasnik, cited her service on several equity-focused committees. "Although Melissa's contributions to the Genentech research portfolio and pipeline were outstanding," he wrote, "I believe her greatest legacy is her contributions as a mentor and a champion for diversity and inclusion."

Judith Storch

Judith Storch is a professor of nutritional sciences in the School of Environmental and Biological Sciences at Rutgers University. Her lab focuses on fatty acid and cholesterol binding proteins, and her work has major implications for the treatment of obesity, cardiovascular disease and lipid-storage diseases.

An ASBMB member since 2003, Storch has served two terms on the editorial board of the Journal of Biological Chemistry, and she is a past member of the ASBMB Publications Committee. She is on the steering committee of the ASBMB Lipid Research Division and has written several articles in ASBMB Today representing the division. Storch is also a fellow of the American Society of Nutrition.

George Carman, also of Rutgers, nominated Storch. He has been her colleague for more than 40 years. "I have the highest regard for her as a scientist, educator and colleague with respect to outreach activities within and outside the ASBMB," Carman wrote.

Kelly Ten Hagen

Kelly Ten Hagen is a senior investigator and chief of the Developmental Glycobiology Section at the National Institute of Dental and Craniofacial Research, which is part of the National Institutes of Health.

Her lab studies the enzyme family and factors that regulate protein O-glycosylation and how this conserved protein modification influences organ development and function. Her lab provided the first demonstration that this modification is essential for viability and has examined the specific roles of O-glycosylation in mucous barrier formation, kidney function and protein secretion.

Ten Hagen has been a member of the ASBMB since 2006. She has served on the editorial board of the Journal of Biological Chemistry, has been a member of the Meetings Committee, has organized and spoken at various ASBMB events, was a founding member of the Women in Biochemistry and Molecular Biology Committee, and was elected to the Council in 2018. She is an elected fellow of the American Association for the Advancement of Science.

Ten Hagen serves as the associate scientific director for diversity, equity, inclusion and accessibility at the NIDCR. She received NIH Director's Awards and the 2019 NIH Equity, Diversity and Inclusion Award for her work supporting and promoting women in science.

She was nominated by Lawrence A. Tabak, acting director of the NIH. He wrote: "She was instrumental in advocating for changes in the reporting, investigation and adjudication of harassment within the intramural program of the NIH. Her efforts led to the formation of the NIH Anti-Harassment Steering Committee (on which she serves), which subsequently led to new policies and procedures for reporting and addressing harassment in the workplace."

‘It’s the DNA. It’s the proteins. And they all are in cahoots.’

A Q&A with JBC Associate Editor Brian Strahl

By Laurel Oldach

COURTESY OF BRIAN STRAHL

Brian Strahl became a Journal of Biological Chemistry associate editor in January 2022 after serving for many years on the JBC editorial board.

You may have heard that the structure of chromatin resembles a string of beads. The protein beads, or nucleosomes, along a strand of DNA are important in determining the strand’s shape and organization — and they can change over time. DNA is wrapped by the actions of proteins called histones, which form the DNA–histone structures we call nucleosomes. Nucleosomes create a barrier to DNA and our genes. Myriad chromatin-associated machines regulate this barrier by adding or removing histone posttranslational modifications. These PTMs provide the epigenetic information that defines when and how our DNA is accessed.

Brian Strahl, a professor in the biochemistry and biophysics department at the University of North Carolina School of Medicine, is interested in how modifications to nucleosomal histones can alter the structure and activity of DNA.

Histone proteins, and especially their extended tail domains, can pick up a variety of modifications. Each nucleosome is a round cluster of eight histone proteins. Enzymes that add functional groups to and remove them from the amino acids on histone tails have multiple effects: They can make it more or less likely for a gene to be transcribed, mark places where a polymerase or another protein ought to bind, and determine how tightly the genome is compacted. Sometimes, enzymes act in concert, with one modification driving another and producing an additive effect.

ASBMB Today caught up with Strahl to learn more about the histone methyltransferases and other epigenetic enzymes he studies. This interview has been condensed and edited.

Q: How would you describe your research focus?

Our lab thinks a lot about epigenetics, in particular how PTMs work. We are trying to solve how they function to recruit proteins to chromatin and what these interactions mean for downstream events like transcription, replication or repair.

Q: How did you get started in epigenetics?

I got into epigenetics as a grad student looking at transcription. I went to a meeting where for the first time I saw the nucleosome wrapped with DNA. Someone showed a slide of an acetyltransferase acetylating histone tails and the chromatin opening up. I thought, "Wow, that's what I need to be studying." Looking at promoter DNA was fun, but I realized that much of gene regulation is dictated by histones and things that modify histones. This was where I wanted to be.

That's what drew me to Dave Allis' lab at the University of Virginia. When I was a postdoc with Dave, we put forward this idea of a histone code where different PTMs come together on histones, creating an information messaging system that directs downstream functions in chromatin. Since starting my lab at UNC, I've tried to understand the proteins that interact with histones, what those interactions mean and how they work in combination.

Q: You proposed a histone code 20 years ago. Has the idea evolved?

It's still an unsolved area, and a lot of labs are working on it. There was controversy over whether there's really a code — some of it was semantics around how you define a code. The histone code probably isn't as strict as the genetic code; there are patterns built on histones that define what happens downstream, but they may not be completely directive. Rather, they're going to act in concert with other things like transcriptional regulators, chromatin remodelers and histone variants. They all come together, perhaps more in a chromatin code. We've come a long way from those early days, and a main takeaway is that histone PTMs are part of a much larger picture and all of these components are integrated.

Part of the code was also about cross talk, or how modifications on one histone can direct the outcome of others. There's a lot of evidence still coming out on how these modifications are either repressing or promoting others.

The evidence is pretty strong that there is some kind of information in these modifications. But the honest truth is even the term "epigenetics" is controversial. Some people are very strict that it has to mean information is transferred from mother to daughter cell, whereas others think epigenetics can occur when a gene is up- or downregulated, based on modifications that open or close chromatin but don't affect the DNA.

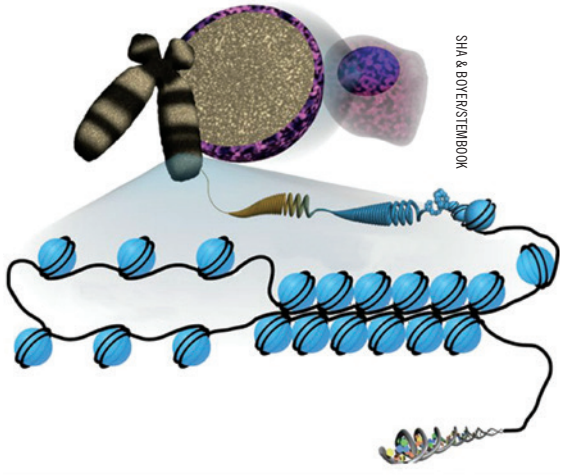
Q: So what does epigenetics mean to you?

I take the slightly looser stance. A lot of modifications on histones contribute to the opening of chromatin and transcriptional regulation, but the DNA has not been altered per se. I consider that a form of epigenetic regulation, but I can understand people who want it to be more strictly heritable.

There are some semantics, but I

We've come a long way from those early days, and a main takeaway is that histone PTMs are part of a much larger picture and all of these components are integrated.

A cartoon illustrates how DNA (black) is organized by wrapping around nucleosomes (blue) which are made of eight histones subunits. Modifications to the flexible tails of these histones can determine their spacing and how the DNA is organized.



SHA & BOYER/STEMBOOK

Brian Strahl gives a talk at an ASBMB meeting. He was a speaker at the society's popular biennial conference on transcriptional regulation at Snowbird, Utah, in fall 2022.

COURTESY OF BRIAN STRAHL

don't think there's any doubt now that multiple modifications on histones do function together in a way that can help support, if not direct, certain activities.

Q: What questions are you asking right now in your lab?

We're asking questions related to how histone methyltransferases function. We've been studying several for a long time that methylate histone H3 at lysine 36. One of them is called SETD2; I discovered the yeast homolog Set2 as a postdoc and brought that to my lab. Mammalian SETD2 is an enzyme that associates with RNA polymerase II and travels with it during transcription. We've been trying to understand how the enzyme gets to chromatin and its role in transcription.

Set2 and SETD2 led me to other proteins that associate with polymerase and work together to drive methylation, acetylation and even ubiquitylation on histones. And importantly, how these PTMs direct their functions in transcription.

With another methyltransferase, we've been interested in its histone reading domains. That's a theme in chromatin biology: Many of the enzymes that modify histones themselves have domains that bind the same modification they're producing. We get these read/write mechanisms that help modifications spread along chromosomal arms. Or they sense other modifications: For example, histone acetylation could be a signal for methyltransferase activation. Sometimes these modifications are repulsive and will kick off proteins with the opposite function.

Histone modifications sometimes create chromatin signatures that help other enzymes know where to be: to recognize that landscape and stick around and do something else or to not be there. Often, one modification repels or recruits the production of others and creates a greater PTM landscape, layer upon layer, until we have all kinds of distinct modification types at a region that creates that specific chromatin signature. One example might be the unique set of PTMs found at core promoters — these being lots of H3 and H4 acetylation and certain forms of histone methylation as well as a specific histone variant.

The type of modification signatures getting built could indicate this is a promoter or this is an enhancer, or different modifications might create a signature that we see only in transcribed gene bodies. Our lab has been trying to study how all these modifications become associated and what they do to regulate the chromatin environment that transcription needs.

Q: It seems like a baroque way of labeling DNA.

We have a lot of DNA. We have over 6 billion base pairs, and only 2% of our genome is genes. With all that DNA in the nucleus, we've got to ask: How does the cell know where to find a gene? It's a needle-in-the-haystack kind of problem.

There are layers of organization that begin with a lot of repressed heterochromatin being smushed up against the periphery of the nucleus, while the gene active regions are more interior. Then, within those regions, we have a lot of structure where genes are organized together in little hubs with all the ingredients for gene regulation. Now, within that region where the gene is, how do I know where the promoters are?

A promoter has a unique fingerprint of modifications and even histone variants, and the whole thing

says, "Hey, this is where the polymerase should initially bind to get transcription going." Those regions become harder to find if they don't have all the modifications there. And, of course, the DNA sequence at promoters is really important to all of this.

Q: What chemical differences might a polymerase complex recognize between an acetylated and a methylated region as it scans through the DNA?

Acetylation neutralizes positively charged lysines. When the histone tails are unacetylated, they tend to collapse and bind to the DNA, so the tails are hidden — which is probably great in the gene bodies but not so great when we want to bring in the polymerase.

When the histone tails become acetylated, the tails pop off the DNA; now they're more exposed and accessible to build up more transcription modifications. I think this is part of the secret sauce for how modifications may function. As the polymerase moves into the gene bodies, there are other modifications — even DNA methylation. There's a lot of cross talk.

So we have a combination of histone and DNA modifications at all locations, driving information systems that define promoter enhancer, gene body — or repetitive sequences that we want to keep shut down.

A lot of these modifications not only build a code that directs on and off, but now we're finding some of them direct chromatin into territories like loops, domains and even liquid–liquid phase-separated droplets that help to bring all these factors together.

It's an exciting time in the field. We've discovered a huge number of distinct modifications and hundreds of places where they exist on histones. But we don't yet really understand what they all do. Some modifications are more about making the nucleosome more slippery on DNA rather than recruiting an effector protein. We have a lot to learn.

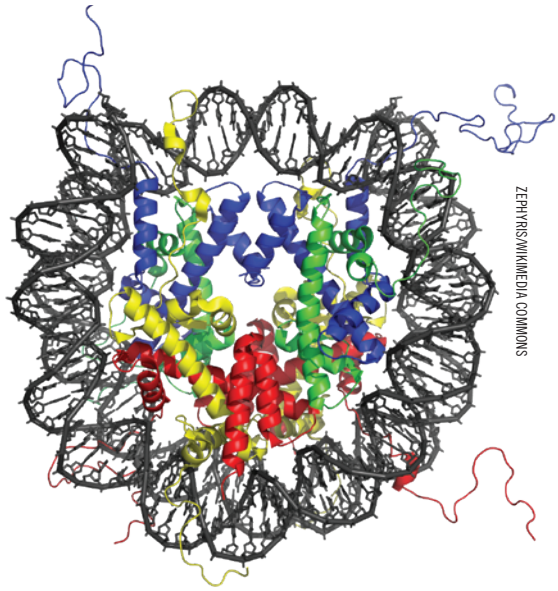
One area that's been huge in the field is mass spectrometry, which can look at all of the modifications on each individual molecule. Papers on this have found, just in residues 1 to 50 from a histone that's 115 amino acids long, there are well over 200 distinct combinations of different patterns of modifications in cells.

Q: In less than half of one of the four core histone proteins, you've already got 200 possible combinations?

It gets even more complex. In addition to histone PTMs, you have histone variants, DNA, DNA methylation, remodeling machines that use ATP to space the nucleosomes appropriately. All these things are working together.

A little more than 20 years ago, we got these exciting ideas about the histone code that I would argue galvanized the field, because no one had really put together that this modification and that modification may work together to recruit a protein with multiple docking domains. That's been realized; we have multiple domains that read multiple modifications now. But it's become more complex because it's not just the histones; it's all these other things working together. It's the DNA. It's the proteins. And they all are in cahoots, all the time. It's amazing.

I also need to mention that it's a sad moment in the chromatin field with the recent passing of David Allis. He was such an inspirational person, friend and mentor. He helped the careers of so many — in and outside



ZEPHYRIS/WIKIMEDIA COMMONS

An X-ray structure of the nucleosome published in 2002 shows how DNA (dark gray) wraps around an octamer of histone proteins (multicolored). The histones' C-termini, or tails, protrude past the DNA and are accessible to the histone modifying enzymes that Strahl's lab studies.

When the histone tails become acetylated, they're more exposed and accessible to build up more transcription modifications. I think this is part of the secret sauce for how modifications may function.

I've always felt close to the American Society for Biochemistry and Molecular Biology. I got an ASBMB Young Investigator Award back in 2005, and this has been a home for me. So I've always wanted to contribute and be a part of the society.

his lab — and contributed so much to the field. We all miss him dearly.

Q: How did you become a Journal of Biological Chemistry associate editor?

I was on the editorial board for I don't know how many years — quite a long time. Then all of a sudden, someone nominated me as a potential associate editor. I was just honored. I've always felt close to the American Society for Biochemistry and Molecular Biology. I got an ASBMB Young Investigator Award back in 2005, and this has been a home for me. So I've always wanted to contribute and be a part of the society.

Q: What's it like transitioning from the person who writes one review to the person who assesses them all?

It's really exciting; in looking at all the reviews, you begin to see all the pieces and how they work together to shape a helpful response. My main goal is to help the authors make the best possible paper and to give advice on what is important to focus on for a revision. It's really fun.

The hardest thing has been when papers have not been reviewed very positively and I have to let people know there are issues or problems. I try to figure out how to relay things in a constructive way: How can they use the comments to develop a better paper to come back with or take somewhere else? A few times, I've seen authors take the comments to heart, do a lot of work, and come back with a brand-new paper that is massively revised and way better. And they sailed through review. Those have been really fun experiences. I feel like I'm contributing to science and the passing of information from the lab to the journal.

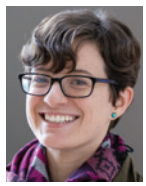
COURTESY OF BRIAN STRAHL

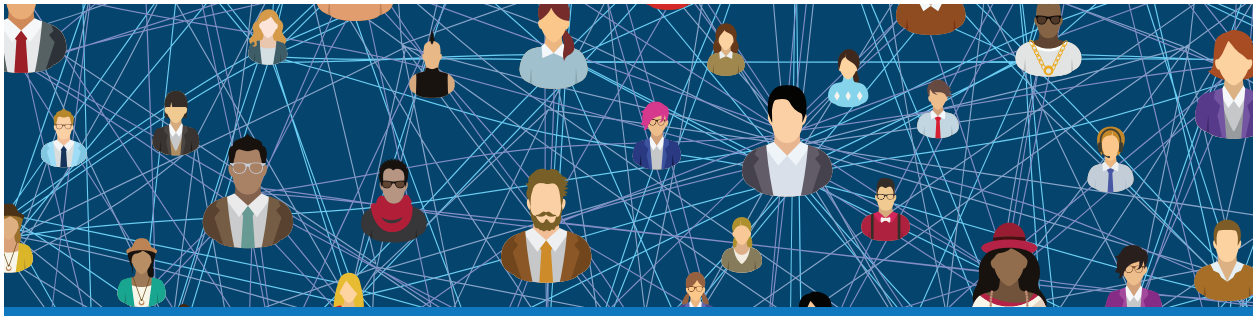
When he's not in the lab, Brian Strahl likes to unwind by playing the guitar. He sometimes jams with his son, Kyle.

Q: You were recently an interim chair, you run a lab and you work for the JBC, so a lot of your time is spoken for. But when you aren't working, what do you like to do?

I play guitar: jazz, blues, some rock. I was in a high school band and in the jazz bands in college. It's a fun pastime because it can get my mind off work and it takes me someplace else. Sometimes that's exactly what I need. I wish I had more time to play than I do, but I do enjoy the hobby a lot. My 18-year-old son plays too now, so sometimes we jam out.

Laurel Oldach (laurel.oldach@gmail.com) is a former science writer for the ASBMB. Follow her on Twitter: @LaurelOld.





Connect with colleagues at an ASBMB conference

The ASBMB organizes virtual and in-person events that cover scientific research, educational best practices, the funding environment and more.

Upcoming ASBMB conferences

Motifs, modules, networks: Assembly and organization of regulatory signaling systems
July 11–14 | Potomac, Md.

Explore all upcoming events at asbmb.org/meetings-events.

Transforming undergraduate education in the molecular life sciences
July 27–30 | Boston

CoA and CoA-derivatives
Aug. 15–18 | Madison, Wis.

ASBMB
American Society for Biochemistry and Molecular Biology

Motifs, modules, networks:

Assembly and organization of regulatory signaling systems

July 11–14 | Bolger Center, Potomac, Md.

This interdisciplinary conference will bring together researchers in structural biology, biochemistry, computational biology and proteomics who investigate cellular signaling networks and leverage these insights into the development of new therapeutic strategies.

IMPORTANT DATES:
May 10: Early registration deadline
May 10: Abstract submission deadline
June 12: Regular registration deadline

asbmb.org/meetings-events/motifs-modules-networks

ASBMB
American Society for Biochemistry and Molecular Biology

Leveling up

Essays by 2022 ASBMB fellows

By Angela Hopp

Education. Advocacy. Diversity. Outreach. Publishing. And more.

Everything the American Society for Biochemistry and Molecular Biology does requires member participation and input. If you're on the outside looking in, that seems pretty obvious, right? The ASBMB is a member-led society, so it makes sense that members are the driving force for all it achieves.

Less obvious is what that engagement feels like and what it means to the people doing the doing. And that's what we asked the second class of ASBMB fellows, named about this time last year, to think about and write about for this issue.

The fellows program recognizes the many ways members make a difference in our community. The society bestows the honorific, but the truth is these folks leveled up a long time ago. They believed in the cause, and they committed to it. Maybe not all at once. Maybe little by little. But at some point they found themselves all in.

We hope you'll enjoy their stories of how they became immersed.

People in the ASBMB have changed my life

By Paul Craig

I planned to bring several of my students at the Rochester Institute of Technology to present in the undergraduate poster competition at the 2013 American Society for Biochemistry and Molecular Biology annual meeting. That plan was interrupted by the Boston Marathon bombing on April 15.

The meeting was being held in Boston days later, and by the Friday it was scheduled to open, I had all but decided not to go. Around 10 p.m. that night, we heard that the last perpetrator had been captured.

"I think we can make the meeting," I told my wife, "but I'm not going to try to get there for the poster competition at noon on Saturday."

Not two minutes later, Greg Dodge, a student in my research group, called and said, "If we leave Rochester at 4:30 a.m., we can make it for the poster competition."

We parked outside the convention center about 11:45 a.m., and the students presented their work. It was great, and, as always, they learned so much — especially that they belong in our community.

'We are all your friends'

I started attending ASBMB annual meetings in 1980 as a graduate student — I think we were the American Society of Biological Chemists then — presenting posters of my Ph.D. and postdoctoral work. I took advantage of the job placement service when I completed my Ph.D. and again as I was finishing up my postdoc. I never actually found a job from the search, but the process helped me better understand the kind of job I wanted and the kind of people I wanted to work with.

I've repeatedly had encounters in the society, and especially at the annual meetings, that have had a tremendous impact on my life and my career.

The first time I gave a talk at an ASBMB meeting, it was about incorporating molecular visualization in student projects at RIT, where I had just begun teaching. During a break in the session before my talk, I

bumped into Rod Boyer. He asked how I was doing, and I told him I was terrified. He said, "Relax, Paul — we are all your friends here."

I really like to play with tech tools, so for this talk I had created my own PowerPoint presentation template. When I started presenting, the contrast was poor on the screen and almost unreadable. Rowena Matthews, one of my professors from the University of Michigan, ran around the room, working with the audiovisual team to tune the lighting to make my presentation work.

I presented educational software in a poster at the ASBMB meeting for the first time in 1995. I don't think there was an education section at that time, so they put me in a section on enzyme kinetics. I was not getting much traffic at my poster, but then Judy Voet found me and was so encouraging. She told me not to stop.

When I was invited to serve on the Education and Professional Development Committee, I had a conversation with Marion O'Leary, who was chairing the committee. We talked about educational software development, and he encouraged me to have a bigger vision and to dare to pursue excellence.

My greatest joy

A few years later, I was invited to a biochemistry education meeting in San Francisco that preceded the regular ASBMB meeting. This is where relationships really began to flourish. I was able to room with my dear friend Bob Bateman, who has always been an encourager and a cheerleader for me.

The education meeting was packed — I think they were expecting 30 people and 300 of us signed up. There were so many posters that they had to run some of the poster sessions at lunch. We had great conversations, and I will never forget Judy Voet coming around to our posters, bringing us apples and granola bars to help keep us going.

I met Phil Ortiz at that education meeting and continue to enjoy our wonderful friendship after more than 25 years. I made many lifelong friends at that meeting and many meetings since (Marilee Benore, Kathleen Cornely, Joe Provost, Don and Judy Voet, to name a few). Now my greatest joy at ASBMB meetings is seeing my friends.

One of my favorite activities at the ASBMB annual meetings is the undergraduate poster competition. It is so exciting to work with other faculty members who are committed to undergraduate research and to meet their students and see the exciting work they are doing. Maybe the best thing for me about the competition is seeing my own students present their work in an arena where I know they will be challenged and nurtured at the same time.

I could tell many other stories, but they all would point in the same direction — the people I have met and worked with at the ASBMB meeting have completely changed my life and my career. They have provided me with inspiration and encouragement. We have shared our joys and our disappointments. It has been a great privilege to pursue teaching and research in a field that I love with people I love.

Paul Craig (paul.craig@rit.edu) is a professor of biochemistry and head of the School of Chemistry and Materials Science at the Rochester Institute of Technology. He won the 2018 ASBMB Award for Exemplary Contributions to Education and is a 2022 ASBMB fellow. Follow him on Twitter: @PaulCraigRIT

Saying yes to a community of communicators

By Susanna Greer

"Be careful what you wish for, lest it come true." This old saying perfectly sums up the path that took me from "ASBMB member" to "ASBMB member who actually engages deeply with, and cares about, the ASBMB." *

I am an immunologist by training, and I joined the American Society for Biochemistry and Molecular Biology as an assistant professor when my lab's research took a turn to study signaling cascades and post-translational modifications involved in regulating immune responses to cancer.

I encouraged my trainees to join the ASBMB, attend the annual meeting and give talks (I've always thought the ASBMB provided the best career development

opportunities for young scientists), but I rarely attended the meeting myself. I was too busy being a mom and a professor and starting my own company to attend many conferences — especially one where I thought (incorrectly) I would not find folks who shared my interests.

One such interest was science communication. My mom was an English teacher, and I debated competitively in high school and college. I have always loved the flexibility of the English language to explain even the most mundane activities in lovely and exacting prose. As a graduate student, I learned science writing. As a postdoc, I honed my skills in scientific presentation. As a faculty member, I saw those two skills sets marry into an ability to quickly understand, summarize and share exciting science in ways nonscientific communities could grasp.

The trainees in my lab were well versed in science communication and presented not only their research but also anyone else's in the lab with confidence. I elevated science communication in the courses I taught and expected Ph.D. students who invited me to serve on their committees to sharpen their science communication skills under my tutelage. I started a science communications consulting firm, and faculty members, universities and nonprofits hired us, embracing my mantra: "Any topic can be shared with, and understood by, any audience if the presenter is willing to work for it."

What I was missing in all this activity was fellowship in a like-minded community of those who considered science communication to be an art.

About a decade ago, I had one foot out the door of a Federation of American Societies for Experimental Biology science policy and advocacy reception when I found myself hunted like a turkey at Thanksgiving by none other than Tom Baldwin — a professor at the University of California, Riverside, outstanding biochemist and active ASBMB member. So active that, seeing the need for the society to expand its offerings in science outreach, he recently had formed the Public Outreach Committee (now the Science Outreach and Communication Committee).

Tom had learned from someone in the crowd of my bent toward all things science communication, and before I knew it, I was a member of his committee. About 30 seconds after that, I was chair of the not-yet-existent subcommittee formed to tackle science communication. Like it or not, I had found my people.

Two years later, our fledgling committee had ideated, developed, launched and taught the Art of Science Communication, a premier skills course still offered (in a beautifully evolved format) by the ASBMB.

Becoming involved in the ASBMB, spending time with the incredible members of the committee, learning from them and collaborating with them all felt like coming home after a long, lonely journey. Throughout my career, I've interacted with many hundreds of outstanding scientists, and I have learned from each of them, but never have I equaled the return on investment of time and energy in human interactions that I have received from service to the ASBMB. I have learned that many scientists care about science communication and science outreach just as much as I do, and I have been able to learn their techniques, hear their stories and grow exponentially in my own abilities.

Once I care about something, it's easier to say yes to volunteering, no matter how busy I am.

I want future generations to benefit from the ASBMB just as much as I have, so when I was asked to join the Finance Committee, my answer was a quick yes — no turkey hunt–type stalking needed to rope me in. A year later, when nominated for the ASBMB Council, I was honored, and another quick yes followed. If and when the ASBMB asks again, my answer will always be yes.

In a time when so much divides us, we are lucky to come together within and through the ASBMB and engage in the things we love — to share and receive and share again the beautiful biochemistry that makes our world, and ourselves, tick. I always will identify as an immunologist, but nowhere else have I been able to bring all of me to the table of science.

Perhaps I'm a biochemist at heart, or maybe I'm just good at understanding and sharing why and how biochemistry touches everything we do. Regardless, I encourage you to find your community in the ASBMB. You will not regret it, and you likely will get much more back than you give.

*I was about to type that there should be a shorter name for this. It turns out there is: ASBMB fellow.

Susanna Greer (sgreer@v.org) is the chief scientific officer of the V Foundation for Cancer Research. She was a member of the ASBMB Science Outreach and Communication Committee from 2013 to 2020, serving as chair for three years, and is now a member of the society's Council and Finance Committee and a 2022 ASBMB fellow.

Investing in the next generation

By Nathan L. Vanderford

I earned my Ph.D. from the University of Kentucky's biochemistry department. Each year, the department would send all its second-year graduate students to the annual meeting of the American Society for Biochemistry and Molecular Biology. For me, this occurred in 2005, a year the meeting was held in San Diego.

This was only my second major scientific conference, and I was so excited to learn that Nobel laureates Michael Brown and Joseph Goldstein were opening the meeting with the Herbert Tabor/Journal of Biological Chemistry Lectureship. I was enrolled in a lipids course, and we were learning about cholesterol metabolism by, among other methods, reading seminal papers in which Brown and Goldstein described the molecular mechanisms controlling cholesterol metabolism.

Seeing these two scientific giants speak did not disappoint. As a grad student studying connections between transcriptional regulation and metabolism, I was enthralled to hear them describe how sterol regulatory element binding proteins regulate cholesterol metabolism. This was a motivating factor for me to continue my scientific training and career.

I earned a travel award to the meeting and presented a poster describing some of my early graduate work. I was both scared to death and excited to present. I later felt a sense of validation; scientists from around the world were interested in my research.

The science at the meeting was amazing, and so was San Diego. My classmates and I found plenty of time to enjoy the city. We kayaked in the San Diego Bay and took in a Padres game. We tried to forget about an exam waiting for us back on campus in our proteins and enzymes course. As I recall, our exam scores reflected all the fun we'd had.

Attending that meeting kicked off my relationship with the ASBMB and was a defining moment in my scientific career. It got me hooked on the excitement of sharing scientific discoveries and networking with colleagues at scientific meetings.

More recently, I've organized an ASBMB-sponsored career development meeting at my university for trainees. I served on the society's Education and Professional Development Committee and on the planning committee for the 2020 annual meeting in San Diego. The COVID-19 pandemic caused the cancellation of that meeting, so I served again in 2021 when the society held its first virtual annual meeting.

Over the years, I've had a front-row seat watching how the society affects the scientific community, especially trainees and other early-career scientists. Just like the 2005 meeting for me, I believe ASBMB activities have career-defining impacts on countless individuals each year. When the society provides travel awards to the annual meeting, trainees get to present their research to the scientific community — just like I did. I imagine this opportunity jump-starts many scientific careers.

Every time I look back on my time as a grad student, the ASBMB — and especially that meeting — stands out as a pivotal aspect of my training. I love the idea of a department sending an entire class of graduate students to the ASBMB annual meeting. I don't know how many do so, but if your department doesn't, it should.

The scientific and personal benefits of sending trainees to the ASBMB meeting are well worth the investment. Think of the stories your trainees will tell years down the road. Better yet, think of the impact they will have both in scientific discoveries and in their own mentoring of yet another new generation of biochemists.

Nathan L. Vanderford (nathan.vanderford@uky.edu) is an associate professor at the University of Kentucky College of Medicine and a 2022 ASBMB fellow.

The ASBMB and me

By Ralph A. Bradshaw

I was elected to membership in the American Society of Biological Chemists (now the American Society for Biochemistry and Molecular Biology) in 1971 and was appointed to the editorial board of the Journal of Biological Chemistry two years later. Thus, my association with the society spans some 50 years, and it is a period dotted with pleasant memories of camaraderie, exciting opportunities and major challenges — all recalled with a sense of time and effort well spent.

Although I was involved in many ASBMB activities, three stand out: serving as treasurer from 1991 to 1997, launching Molecular & Cellular Proteomics in 2000 and co-writing the society's 100-year history in 2009.

Managing the money

My two terms as ASBMB treasurer followed on the heels of a three-year term as a Council member, a period when the leadership of the society struggled in its relationship with the Federation of American Societies for Experimental Biology. As FASEB underwent a substantial reorganization, the ASBMB financial picture changed, and I spent much of my first term restructuring the budget with astute fiscal insight from Chuck Hancock (the society's executive officer) and the Finance Committee, whose members included Emil Smith and Herb Tabor. Our efforts stabilized the ASBMB's reserves and set the stage for the most exciting event of my time in this office: the creation of the eJBC.

By 1990, JBC had an annual content of 22,000 pages. Largely to address issues associated with accelerating growth, the journal began to shift away from an all-print publication by offering a CD-ROM version. This solved some of the problems of storing the print edition, but it was not popular, and it soon became clear that an alternative strategy was needed. Publishing the JBC on the internet was an obvious solution, an idea that was championed by Stanford University professor Bob Simoni, an associate editor, and Stanford University librarian Michael Keller. It was a giant and fiscally risky leap into the unknown. JBC had become the ASBMB's major source of revenue, and any plan that negatively affected its financial structure would seriously compromise other society activities.

As the fiscal watchdog, I was asked to sit in on all the planning sessions as the pros and cons of this daring proposal were evaluated. With no guarantee it would work, technically or financially, the society's leaders decided in January 1995 to launch JBC Online in time for that year's annual meeting in April in San Francisco.

It was a hectic three months, but through the yeoman efforts of the ASBMB staff (particularly Barbara Gordon, our former executive director, who was director of publications at the time); Cadmus Journal Services personnel; and the Stanford team, it was accomplished, to the delight and amazement of several thousand meeting attendees.

JBC became the first research journal in the biological sciences to publish on the internet. The subsequent stampede of journals to go online demonstrated that it was an idea whose time had come.

Launching a journal

In May 2000, the leadership held a retreat to review various ASBMB activities. The group assigned to consider publications proposed that the society should start a new journal, and the rapidly growing discipline of proteomics was its first choice. In a subsequent exchange with Dick Hanson, then ASBMB president, I strongly supported this idea, and he encouraged me to draft a proposal for consideration at an upcoming Council meeting in Boston.

Although I had trained as a protein chemist (and always considered that to be my principal description), I was only superficially involved in proteomic research and recognized that I needed a partner who was more legitimately associated with this area. I contacted Al Burlingame at the University of California, San Francisco, and recruited him with a minimum of cajoling. The proposal, with myself as editor and Al as deputy editor, was prepared and approved. Over the next year, we created a detailed plan, and the journal name, Molecular & Cellular Proteomics, was trademarked. The finance and publications committees

and Council approved the plan, and MCP was launched a year later.

Unlike JBC, MCP's financial structure was based on the online version, and for the first year it was distributed without charge. As a result, it accrued a lot of red ink and took several years to reach a break-even point. As editor, I had to meet regularly with the Finance Committee that I had chaired a few years before. Sitting on the opposite side of the table and enduring constant barbs until we turned the profitability corner was the least rewarding part of the MCP launch. The journal's rapid success and international acclaim were a soothing balm for these wounds.

Writing the history

The ASBMB celebrated its 100th anniversary in 2006. A plaque was dedicated commemorating the society's first organizational meeting in the Belmont Hotel in New York City on December 29, 1906. My wife, Penny, and I were among a small group of officers, members and friends gathered in the Altria Building (which now stands where the Belmont Hotel did) for a brief ceremony. Michael Bloomberg, then the mayor of New York, issued a proclamation declaring December 28, 2006, to be ASBMB Day (a day early, but it was the closest we could get).

I already was working on a book documenting the first 100 years of the society. Parts of the early history of both the society and JBC had been written previously, but a great deal remained to be recorded, and the project, as these things are prone to do, kept expanding.

Originally, Bob Hill agreed to write about the second half of the century while I focused on the first 50 years, but he had to drop out, so Chuck Hancock and I took over his part. Nicole Kresge, then editor of ASBMB Today, organized biographical sketches of the 80 presidents who had served over the century, and several other individuals contributed material for the later chapters.

The 522-page finished work, "The ASBMB Centennial History: 100 Years of the Chemistry of Life," was published in 2009. With planning, data gathering and writing, it was a major effort but one I am extremely proud of. I do not begrudge any of the many hours I spent on it. I hope the writers of the next 100 years' history of the ASBMB will find it useful.

These three vignettes capture only a small slice of my ASBMB experiences, but I hope they convey the satisfaction I have enjoyed from my half century with the society. The ASBMB has been a large and rewarding part of my professional life and has enriched my enjoyment of science and my chosen career.

Ralph A. Bradshaw (rablab@uci.edu) is a professor emeritus at the University of California, Irvine, and a professor at the University of California, San Diego. He was the first editor-in-chief of Molecular & Cellular Proteomics and served on the editorial board and as an associate editor of JBC for nearly 30 years. He served on the ASBMB Council and several committees and was the society's treasurer and historian. He is a 2022 ASBMB fellow.

An unpredictable journey

By Alex Toker

People often ask me how I got into science and biochemistry. I do not come from a family of scientists. Instead, my earliest recollection of exposure to science is as a teenager wandering around the displays and halls of the Natural History Museum and the Science Museum in London. For reasons that are hard to recollect, I was fascinated by all things of the natural world, and I spent hour upon hour every weekend in these two great museums diligently devouring all the knowledge I could find.

It therefore felt quite natural to study biology and biochemistry for my undergraduate degree at King's College London and then pursue a Ph.D. in biochemistry at the National Institute for Medical Research, also in London. As luck would have it, I landed a postdoc in Lewis Cantley's lab in Boston, first at Tufts University and thereafter at Harvard Medical School. That's where my interests in cell and molecular biology and biochemistry solidified and, equally importantly, where I first encountered the Journal of Biological Chemistry and

the American Society for Biochemistry and Molecular Biology.

In the mid-1990s, the JBC was still a print publication. Each week, Dr. Cantley would receive the large, distinctively light green JBC hard copy. He'd circle and label with the initials of each postdoc and student a manuscript in the table of contents that was relevant for us. That was our signal to read that paper. He performed this weekly routine much in the same way we now look at eTOCs in our emails.

Academic publishing has undergone a radical (re)evolution and change in the ensuing 30 years, but one thing has not changed: Since its inception in 1905, JBC has set the standard for high-quality, enduring research. It's a journal for scientists, run by scientists, and owned and supported by the ASBMB, a society that formed shortly after JBC was founded and that, after more than 100 years, continues to support and advocate for science.

As a postdoc in the 1990s, I never could have predicted my own journey with the ASBMB. I was extremely proud to publish my papers in JBC as a trainee and then in my own lab, and as I transitioned to independence, I jumped at the chance to review JBC papers on an ad hoc basis whenever asked. Perhaps this was one reason I was formally invited to join the JBC editorial board, on which I served two terms.

As an EBM, I would review 60, 70, sometimes 80 papers in one year (something we no longer allow at JBC). At an ASBMB annual meeting, the inimitable Bob Simoni, a JBC associate editor, told me that one of the associate editors had coined the term "tokered" to describe the quantity and speed of JBC reviewing. Perhaps this is why I was invited to join the JBC board as an associate editor, and again I jumped at this opportunity.

After serving one and a half terms as an AE, I was delighted to be chosen as editor-in-chief, starting in fall 2021.

People often ask me, Why do you do all this work? I am a firm believer in academic science and society publishing and giving back to the scientific community. I am also a believer in many of the principles that guide the ASBMB and JBC in terms of publishing, advocating for science, promoting a culture of inclusivity and diversity, and ensuring the integrity of the published content in the three ASBMB journals.

Being an EBM, AE and EiC is a tremendous amount of work. We all are working scientists, with many demands on our time and countless commitments. But this work is incredibly rewarding. As active scientists in each of our communities, we play a major role in shaping the direction of the journal and ensure we maintain the standards of rigor, reproducibility and enduring science that ASBMB journals are known for.

I also have been privileged to meet and work with some extraordinary scientists over the years, most notably Herbert Tabor, who was JBC EiC for more than 40 years, and Lila Gierasch, my JBC EiC predecessor. The spirit of community and fraternity at the ASBMB and JBC is something I pay a great deal of attention to when it comes to recruiting new EBMs and AEs. This spirit is equally evident in the many staff members who have worked at the ASBMB over the years.

When I received news that I had been selected as a fellow of the ASBMB last year, I was incredibly honored but also tremendously humbled. Seeing my name alongside so many extraordinary scientists, many of whom I consider my science heroes, is something that teenager wandering around the museums in London some 40 years ago would never in his wildest imagination have predicted.

Alex Toker (atoker@asbmb.org) is a professor and chief of the division of signal transduction in the departments of medicine and pathology and the cancer center at Beth Israel Deaconess Medical Center at Harvard Medical School as well as editor-in-chief of the Journal of Biological Chemistry and a 2022 ASBMB fellow.

An uncharted journey

By Ilga Winicov Harrington

The author was born in Riga, Latvia, in 1935 and spent her childhood under Soviet and German occupation. During and after World War II, her family lived in a German labor camp and a displaced persons camp. In 1950, they sailed to the United States and settled in Pennsylvania. She earned a Ph.D. from the University of Pennsylvania in 1971.

These edited excerpts are from her memoir, "Uncharted Journey From Riga," published in 2022.

Close look at the food chain

Although we lived in the capital city of Riga, I spent two summers on farms, the second during my last year in Latvia.

One morning, the men had gone out to the fields, and so had most of the women. I was home with the cook and the timid house servant, Liene. The cook was planning to have chicken for dinner and asked Liene to go and kill the chicken so that she could get it ready for later in the day.

Liene started to cry. "No, no, I can't do it! Kill a chicken, never!"

The cook was beginning to get agitated, but she apparently considered the job beneath her station and was not about to do it herself.

Without thinking, I said, "Never mind, I can do it." After all, I had seen John, the hired man, do it a couple of times. All you had to do was catch the right chicken, take it to the tree stump behind the hen house, hold its head to the block, and take the axe and chop off its head with your other hand.

The cook looked a bit dubious. "All right, I guess."

Liene started to cheer up. "When you are done, I'll pluck it," she offered. So the three of us went out to the henhouse. The cook gave me the axe, which I leaned against the dark stump. She then picked out the unsuspecting chicken and handed it to me. Liene had disappeared.

At that point, the chicken must have become suspicious, and I had a bit of trouble holding it under my arm. Not surprisingly, it did not want to lay its head on the block like a compliant victim. Finally, I managed to wedge it with my knee, and, anxious not to let it loose, I raised the axe, and with one blow the chicken's head rolled on the ground. What happened next both shocked and scared me. Besides the amount of blood, the now headless chicken did not fall to the ground but staggered around the small clearing, finally falling with its feet still twitching in the air. The cook calmly picked it up and went to the house.

I stood frozen. Without any forethought, I had killed an animal. The chicken must have been in such agony as it staggered around there. The eye in the severed head stared at me from the trampled grass on the ground.

I could not eat chicken that night. The adults were understanding.

This scene came to haunt me many years later. I was a research assistant in a laboratory at Temple University School of Medicine in Philadelphia. We studied liver biochemistry in rats and measured liver enzyme activity after various treatments. The rats had to be sacrificed with a guillotine before excising the liver and subjecting it to various biochemical analyses. After barely managing to dismember one rat the first day, I acknowledged that I simply could not do this task. Fortunately, the lab director was sympathetic and found one of the other technicians for that part of my job.

Welcome to the labor camp

One midwinter morning at the labor camp school in Leipzig, the authorities decided to check on our progress to see if we had learned sufficient German to salute the Führer in the proper manner on state occasions. The assistant commandant arrived in his brown uniform with the SS insignia on the collar, black belt with the revolver at the side, high black boots spit shined, carrying his hat under his arm, and a small truncheon in his hand.

He made rounds of the classroom, checking our notebooks. So far, so good! But then he wanted some of us to demonstrate our pronunciation and answer simple questions in German. The teacher called on some of the better students, and again, everything went well.

COURTESY OF ILGA WINICOV HARRINGTON

Ilga Winicov Harrington was in second grade in 1948, the year she and her family left Riga to live in a labor camp in Germany.

Until … the assistant commandant picked out the tallest boy in the class and asked why he was not working in the factory. He certainly looked old enough. The boy, not one of the brightest students, stood up and just stared; the question was too complicated for him to understand.

While the irritated man turned to the teacher, one of the other boys made a rude noise behind everyone's back. The man jerked back in fury, and, swearing in words none of us understood except for the inevitable "verfluchte Auslander" (cursed foreigner), started to hit the standing boy on his head with the truncheon he carried. The teacher stood stony-faced while the boy crumpled over his desk, shielding his head with his arms, but the man did not stop.

Without thinking, I jumped up and shouted, "Nein, nein, er hat es nicht getahn!" (No, no, he did not do that!)

Suddenly, it was deathly quiet in the class. The man turned to me with the raised truncheon, said something very quickly to the teacher, spun toward the door, and left. We rose quickly, but the door was already closing behind him.

That evening, a guard came in the dining hall and asked that mother and I accompany him to the administrative building. After some wait in the hallway, we were shown into the commandant's office.

It was a warm, well-lit room with colorful rugs on the floor and a large desk, behind which sat the man who had come out on the steps and addressed us on the day of our arrival. His pale eyes speared me across the room, and in an angry voice, he asked if I had shouted at the assistant that day in school. I managed to answer, "Ja."

I felt he needed an explanation. My German was not good, so I told him in Latvian that an innocent child was beaten. Mother took a deep breath and translated my words. There was a long silence, then the commandant got up and came around the desk.

"Komm her," he said in a firm voice.

I slowly walked toward him and focused on the toes of those polished boots glinting ominously in front of me. I was afraid to look any higher and hoped he did not have a truncheon in his hand.

If he had one, I did not want to see it coming down on my head.

We stood like that for what seemed a long time, and, suddenly, he put his finger under my chin and made me look up at him. His voice was firm but not angry as he berated me, though I only partially understood him. The essence of his words was that if I wanted to avoid serious punishment, I was never to shout and challenge my superiors again. I can still hear his emphatic voice: "Niemals, niemals!" (Never, never!) After that, he dismissed us.

Mother and I were badly shaken.

"We were lucky," was all mother could say.

COURTESY OF ILGA WINICOV HARRINGTON

Ilga Winicov Harrington and her friend Rita, top right, depart from a displaced persons camp in Würzburg, Germany, to attend summer camp.

The joys of being a grad student

As I settled into the fall routine in the University of Wisconsin bacteriology department, I found my days full of classes that I needed to take as a first-year graduate student. These included Soils and Food Bacteriology. The Wisconsin bacteriology department was focused on bacterial physiology and the practical applications of knowledge of the microbial world. We learned the sequence of organisms that were required to make sauerkraut and even made mead from yeast and honey.

My rounds of faculty offices to find an adviser for a project that I might undertake for my master's thesis were somewhat disappointing. Most of the faculty preferred to take on Ph.D. students in their laboratories, since it meant a longer commitment. So I was pleased to find that Elizabeth McCoy would take me on for a project looking for bacterial viruses that might be causing toxin production by the bacterium Clostridium botulinum, a lethal food pathogen. A couple of other laboratories recently had shown that this was the cause of toxicity in a different disease organism. Since botulism was the cause of death from food poisoning, it was worth investigating

COURTESY OF ILGA WINICOV HARRINGTON

Ilga Winicov Harrington and graduate student Sun Lin-Hoffman work in the lab at the University of Nevada School of Medicine in 1992.

whether a similar latent bacterial virus was the reason for toxin production in C. botulinum.

This meant spending the next year and a half growing these toxic organisms anaerobically with fermenting oats, which used up most of the oxygen in the sealed jar. We needed to duplicate the natural growth conditions in sealed cans of food with little or no acidity, where these bacteria produced their most lethal toxin. In the days before mechanical laboratory pipettors, this meant transferring the toxic liquid by mouth pipetting.

This process, using a pipette as a long glass measuring straw, required me to suck up the liquid with my mouth to the desired level, quickly put my finger on the top of pipette to stop the liquid, and then transfer the contents of the pipette to another container by lifting my finger to release the liquid. It was very important to stop the sucking process well before the liquid got to my mouth, since a small amount of the stuff would readily kill mice. Mouth pipetting makes an excellent lesson in concentration on your work. Needless to say, I have never been tempted to get Botox treatments.

Adult education

There were still very few women graduate students in biological sciences and even fewer at the postdoctoral or faculty level. However, Lewis Pizer's lab at the University of Pennsylvania probably had more than the usual number of female members.

Helene Smith, who would make significant contributions in cancer research, just had graduated. By the time I arrived, Margaret Miovic was about to graduate. Margaret eventually became a pediatrician, but at the time, she was the only other person I knew who was in graduate school, was married and had small children. Roz Eisenberg came to the lab as a postdoc a year later. She showed that it was possible to progress even further in academia and juggle the responsibilities at home with those in the lab.

At the time, Helen Davies was the only woman faculty member of the microbiology department. For years afterward, I would recall her advice whenever, due to my back problems, I was teased by my male colleagues about women being "too weak to do any necessary heavy lifting in the lab." I would smile sweetly and quote Helen. "Please lift this for me. I will be happy to do some thinking for you in return."

New moves in academia

As summer wound down, I needed to finish a couple more experiments, and then I would write my thesis and go on to Bob Perry's lab at the Fox Chase Cancer Center with my postdoctoral fellowship in hand.

Unfortunately, the last experiments required a very pure enzyme preparation, and Murphy's law struck. My phosphoglycerate dehydrogenase died on the third and last crystallization step. This meant that I had to go back, grow large amounts of the bacteria and start from scratch. Lew would not let me go with a partially negative thesis.

"If you are going to do something like this, it is worth doing it well," he said as I told him about my uncooperative enzyme.

Of course, he was right. I went back to the lab. The next purification succeeded, and I was able to finish the experiments and the draft of the thesis.

My thesis committee was kind, but Mildred Cohn went through my writing in her best Journal of Biological Chemistry editorial style. Those pages had a lot of red ink on them, and it portended much of my future interactions with journal editors.

And then it was over. I was awarded my doctorate, and I remember thinking, "This was such a lot of work, but I don't feel any different."

Ilga Winicov Harrington (winicov@asu.edu) is a retired professor; her research focused on mechanisms of gene regulation in animal and plant systems and salt tolerance in plants. She is now a writer and blogger living in coastal Maine.

Equity, diversity and inclusion: community outreach's hidden toll

By Raul A. Ramos

My first panic attack occurred in 2020, two weeks before the initial COVID-19 lockdown. I was at a seminar when, without warning, I felt like I couldn't breathe. Worried that I would lose my lunch then and there, I exited the room promptly. Many more episodes would follow over the next few months, including some in my sleep. Every time they happened, the triggers were the same: lecture halls, attending a presentation, or the idea of giving one. The irony of these triggers was not lost on me; I had spent the past few years heavily involved in outreach, delivering talk after talk in schools across the country. I realize now that I'd fallen into the pitfalls of a system which capitalized on this work without considering the pressure it would create for me. To move forward, I knew I had to find a way to stay true to myself and reconcile helping my community with trying to become a research scientist.

Three years earlier and barely two years into my Ph.D., I received an email with the subject line: "Want to inspire students to study science?" The Association for the Advancement of Science was looking for academics "interested in sharing with students how they fell in love with science, obstacles they've overcome, and why they aren't the stereotypical image of a scientist." As a teenager, role models in my community had saved me from a more dangerous path; I felt I was being offered a chance to perhaps be that person for someone else. I replied enthusiastically to the email, and my outreach efforts began there.

Call me naïve, but I was unprepared for how much academic institutions love a good story — and mine was definitely a hit. As a teenager, I was expelled from middle school and then incarcerated as a juvenile offender. Fast-forward a few years, I was pursuing a Ph.D. in neuroscience at a top research university in the United States. My outreach work gathered momentum more quickly than I had expected. Just one year after my first event, I travelled across the country on behalf of AAAS to engage in a marathon of over 15 presentations in three days. I spoke to about 200 kids, mostly incarcerated students who shuffled to my presentations in handcuffs. Having shuffled in their shoes, I felt a heavy responsibility to continue my outreach efforts. I genuinely believed I could positively impact people's lives if I continued to invest my energy in these extracurricular activities. And so, I did.

This work brought a level of publicity I had not anticipated. I was the subject of several online articles, and my university contacted me for a magazine feature. I even appeared on a postcard for donors, being quite literally milled into donor fodder. There was an eager attitude towards showcasing someone with such a clear redemption arc in their personal story. Regrettably, I was not focused on the consequences this tokenization could have on me or others looking to follow in my footsteps. Instead, I concentrated on leveraging the attention I received to create more opportunities for outreach work.

The success of my outreach events may have suggested that my Ph.D. was going well. But, beneath the surface, I was fighting all the battles of a junior graduate student. I struggled to learn the highly specialized techniques I needed for my work while trying to fit in with my new lab and dealing with a cross-country move which had turned my world upside down. It took some time before I started to recognize the toll that juggling my scientific training and outreach work took on me. It is not until now, a year after defending my Ph.D., that I can more clearly articulate how overwhelmed I was by the pressure.

I had always wanted to authentically convey my life experiences, but a dissonance emerged. At outreach events, I was taking the stage as someone who had "made it"; back in the lab, I struggled to get my experiments to work. As my confidence began to crack, feelings of imposterhood oozed out. I started to feel like a phony. I never considered halting my outreach activities, believing they were intrinsically more valuable than my work as a scientist. Instead, like many graduate students, I thought about dropping out and I looked into careers that would take me away from the bench and into public service. Ultimately, my mentors convinced me that there was still something to be gained from overcoming my scientific challenges. So, I pushed forward; I muscled on until the

weight of these unresolved feelings became too much and the panic attacks started.

I kept my anxieties a secret from all but those closest to me. When the lockdowns brought in-person presentations to a halt, I used the pandemic as a convenient excuse to not engage in any outreach. The truth is, I was learning about my symptoms and how to manage them, attempting to cope with what was essentially an extreme case of late-onset stage fright. For many years I had been caught in a balancing act, trying to juggle two parts of my life that were no longer in phase: I had to balance the scales again. I decided to recommit myself to my scientific training. I used this time to grow as a scientist and I finished my Ph.D., reaching a stage where I could finally transcend the basics to enter more creative territories. This was when I received an invitation to give an outreach talk at my undergraduate alma mater.

Suddenly I was in a familiar place, standing at the front of the classroom where I had taken general chemistry 10 years ago. I had given this talk a dozen times before but never as Dr. Ramos and never at the institution where my journey into science began. This was a homecoming, an inauguration, and a victory lap, all woven together by threads of nostalgia and warm memories. I had sat in these students' chairs, and now I was here to talk about how I had made it to the other side of my Ph.D. I forced myself to focus by making eye contact with my audience, and soon the students picked up on the fact that this was a unique full-circle moment. My presentation transitioned into a lively back-and-forth about my experiences and careers in science. I felt so much pride for these students and for my community. A realization finally dawned on me: I was there to inspire them, but they were, in fact, inspiring me. They had been doing so all along. When growing pains and imposter syndrome had made me look for the door, I doubled down on becoming the scientist and role model I wanted to be for them.

Now that the dust has settled, I've begun to unpack my grad school experience. Community outreach is often seen as performing a service, a one-directional act of giving back to inspire and uplift others. I understand now that giving back motivates me to keep growing as a scientist, but that I took on too much too quickly. I've learned that to be a better role model for younger students, I also need to take care of myself professionally and personally, and I am now much stricter when choosing which opportunities I allow myself to get involved with. However, I have also been reflecting on how the system was all too eager to facilitate my outreach efforts without considering how they might impact me.

"I had given this talk a dozen times before but never as Dr. Ramos and never at the institution where my journey into science began. This was a homecoming, an inauguration, and a victory lap, all woven together by threads of nostalgia and warm memories."

To be clear, the people I have collaborated with along the way were all well-intentioned, and they provided me with a platform to do meaningful work. Once I found myself working within the system, I leaned into it. I assumed that more publicity would give me more chances to do the work I believed in — and it did. I recognize that I actively participated in my own tokenization, but I am also aware that there was an inherent imbalance of power. As a graduate student trying to build a career, I suspect that institutions knew I would not say no to an opportunity.

This sort of institutional propaganda is not inconsequential. Equity, diversity, and inclusion initiatives are often a labor of love performed mainly by those with marginalized identities. We usually do so without compensation for our time and expertise or even the recognition that this effort can cut into time and energy vital for our scientific development. By becoming our university's next poster person and participating in our own tokenization, we allow institutions to paint a rosy picture and appear more inclusive and supportive than they actually are.

I firmly believe that there is a continued need for scientists to engage in community outreach, and I hope that others can explore this work while being wary of the system in which they are working. Our younger generations do need role models, but we should never sacrifice who we are along the way.

This article originally appeared in eLife. It is a Sparks of Change column, "where people around the world share moments that illustrate how research culture is or should be changing."

Raul A. Ramos is a postdoctoral researcher in the molecular and cell biology department at the University of California at Berkeley. Follow him on Twitter: @RamosNeuro.

'I was in the right place at the right time'

By Martina G. Efeyini

Mark Witmer, a senior director at Bristol Myers Squibb, talked to ASBMB Today about what it is like to be an industry manager. Witmer is a member of the American Society for Biochemistry and Molecular Biology Membership Committee.

1 How did you get into industry?

I was in the right place at the right time. My postdoctoral adviser (Joe Villafranca) had spent his entire career at Penn State and decided it was time to make a change. In 1992, he came to Bristol Myers Squibb to become executive director of a department. I was looking for a job, and he offered me a position in his new lab.

2 Tell me more about your journey.

When I first started, I was asked to work in the lab, and I was hired to do lab research. Then I was asked to manage one scientist, and over time I was given additional management opportunities.

As my career progressed, I spent less time at the bench.

My current position is entirely management. That involves managing several senior direct reports who themselves are responsible for managing teams.

We're part of the small-molecule drug-discovery organization at BMS. Our teams are responsible for producing recombinant proteins that drive drug discovery, creating cell lines using CRISPR methodology, culturing mammalian cells and doing biophysical characterization.

Mark Witmer

CURRENT POSITION
Senior director, Bristol Myers Squibb

EDUCATION
Ph.D. in organic chemistry from Cornell University and postdoctoral fellowship at Pennsylvania State University

FIRST JOB OUTSIDE OF ACADEMIA
Senior principal scientist, Bristol Myers Squibb

FAVORITE MOLECULE OR PROTEIN
"My favorite protein is glutamine synthetase, and that's because that's the protein I worked on as a postdoc. It's the first protein that I ever purified, and it was basically like making tofu, a bunch of reputation steps. It was very easy to purify."

3 What has been good about being a manager?

I've had a lot of growth opportunities.

There were a couple of reasons why I spent my entire career here. One was personal and related to family location, but it was also because of the science. There was good science going on here — and having a lot of good colleagues here who I really trusted and had trust in me.

4 What qualities and skills are most important?

Respect — demonstrating respect for all of your colleagues and treating them as well as you can. Also, passion — having passion. And be willing to learn new things; change is constant in industry.

Finally, maybe most of all, is to be a strong and excellent collaborator, because we are all working on one big team to create new drugs and new medicines to help patients. I often say you can be the smartest scientist in the world, but if you can't work with other people, you're not going to last going to last very long.

5 Any final advice?

It's really important to have the right mindset, and you have to be technically excellent, but you also have to be a good people person.

(This interview has been condensed and edited. To read a longer version, go to asbmb.org/asbmbtoday.)

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