

Vol. 20 / No. 2 / February 2021

ASBMB TODAY

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

**Can urban
universities
be better
neighbors?**





Proteinases and their inhibitors

Feb. 24–26

This meeting covers diverse and vibrant fields of protease research, such as mechanistic studies on proteases in their molecular, cellular and organismic context.

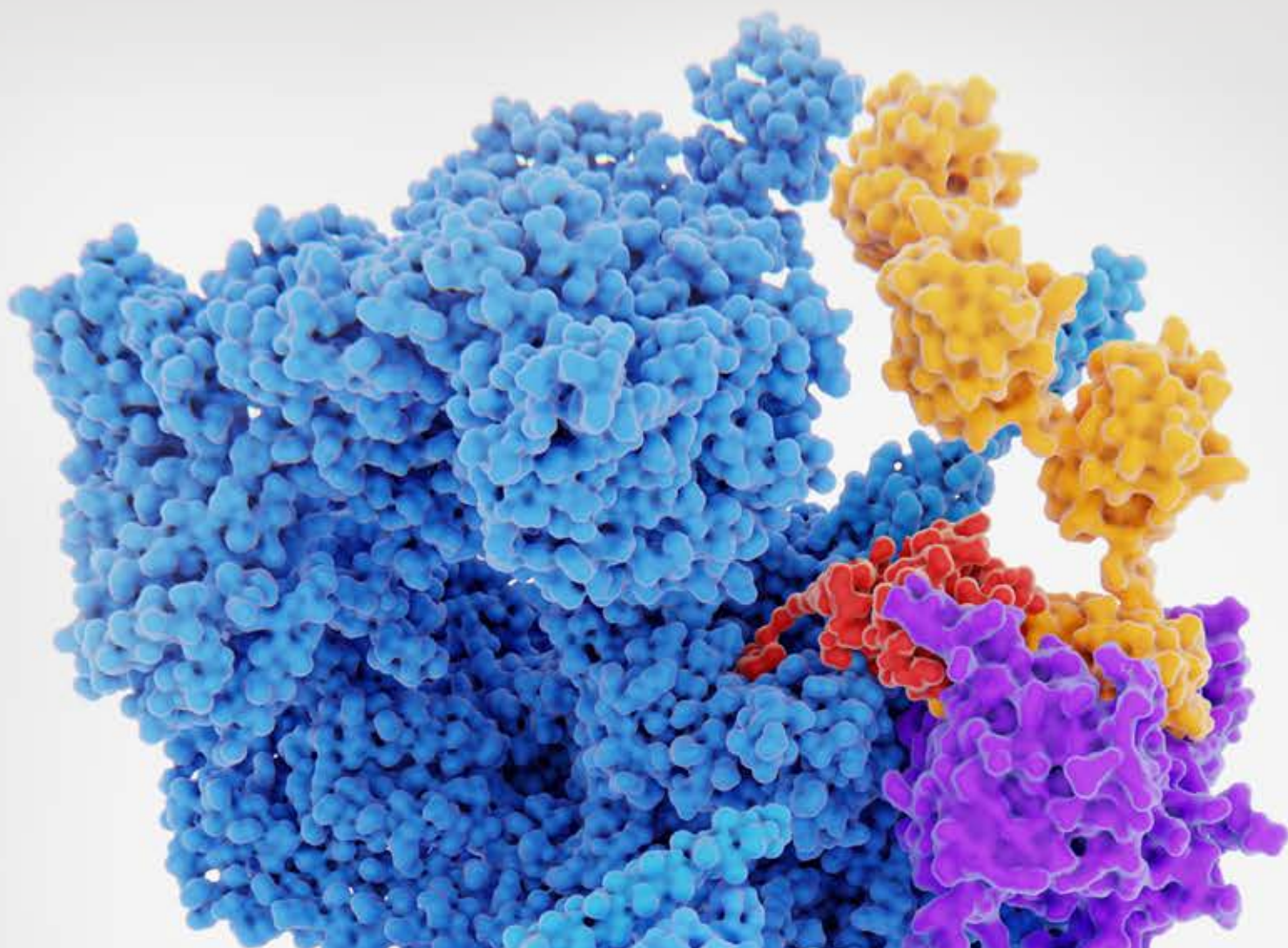
Sessions include:

- proteolysis in cancer
- proteolysis in neurosignaling and neurodegeneration
- proteolysis in blood coagulation
- discovery of protease substrates
- mechanisms and engineering of proteases, ligases, their substrates and inhibitors

Regular registration deadline: Feb. 22

Learn more and register at:

asbmb.org/meetings-events/proteinases-and-their-inhibitors



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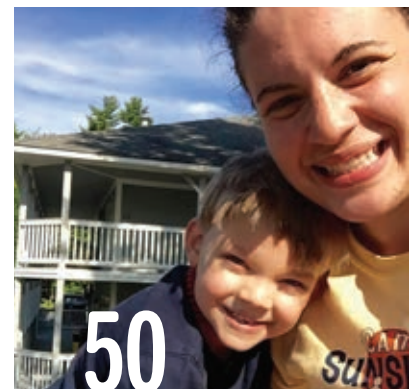
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PRESIDENT'S MESSAGE

Miller named ASBMB executive director

By Toni Antalis

On behalf of the American Society for Biochemistry and Molecular Biology Council, I am pleased to announce that Stephen Miller, deputy executive director and chief financial officer of the ASBMB, will be appointed to the position of executive director upon the retirement of the current executive director, Barbara Gordon.

Steve joined the society in July 2004 as the financial controller. During the succeeding years of his service to the ASBMB, he held the positions of director of finance and then chief financial officer. He has become more involved in the journals and society operations as deputy executive director.

The ASBMB Council began the process of identifying a new executive director upon the announcement of Barbara's retirement. With the major move of our journals to open access, as well as other anticipated operational enhancements, the council considered continuity and experience with society operations to be critically important during this transition period. Based on Steve's deep knowledge of and commitment to the society, the council made the decision to ask him to take on the role of executive director, and we are delighted that he has agreed to serve in this position for the next several years.

In early 2023, the ASBMB Council plans to initiate a wide-ranging search for the next, longer-term executive director. This plan will allow for an orderly transition of the society



STEPHEN MILLER

leadership and move to open access.

In his new capacity as executive director, Steve will be shepherding the transition to open access for the ASBMB journals, developing a strategic plan to guide the society through the next several years, and expanding the opportunities and benefits the society provides for its members.

We warmly thank Barbara for her many years of service and for her long-lasting legacy in bringing the society to where it is today. We are also deeply thankful for the commitment and dedication of all of the ASBMB staff during this time of transition as we open an exciting new chapter for the society.

Toni Antalis Toni Antalis (tantalis@som.umaryland.edu) is a professor of physiology at the University of Maryland School of Medicine, where she is also the associate director for training and education for the Greenebaum Cancer Center and the director of the graduate program in molecular medicine.



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PRINT ISSN 2372-0409

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Steitz receives Microbiology Society prize

Joan Steitz, the Sterling professor of molecular biophysics and biochemistry at Yale University and a Howard Hughes Medical Institute investigator, will receive the 2021 prize medal from the United Kingdom's Microbiology Society.

"Britain and British science have occupied a special spot in my heart ever since I was a postdoctoral researcher at the Laboratory for Molecular Biology in Cambridge in 1967–70," Steitz told the Microbiology Society. "So much of my subsequent life and science were shaped



STEITZ

by my experiences there."

Steitz is known for her studies involving RNA, including insights into how ribosomes interact with messenger RNA and the

splicing of introns by small nuclear ribonucleic proteins, or snRNPs, which occur in eukaryotes. As a postdoc, she studied translation initiation in bacterial systems. After joining the faculty at Yale, she published her findings demonstrating that ribosomes use complementary base pairing to identify the start site on mRNA. Her discovery of the role of snRNPs and the related small nucleolar RNPs in splicing explains why humans have only double the number of genes of a fruit fly. Her work could provide insights into diagnosis and treatment of autoimmune disorders that develop when patients make anti-nuclear antibodies against their own DNA, snRNPs or ribosomes.

A fellow of the National Association for the Advancement of Science

and the American Academy of Microbiology and a member of the National Academy of Sciences and the National Academy of Medicine, Steitz has received many honors, including the Lasker–Koshland Special Achievement Award in Medical Science, the National Medal of Science, the American Society for Cell Biology's E.B. Wilson Medal and the American Society for Biochemistry and Molecular Biology's 2015 Herb Tabor Research Award.

Steitz will receive her award and present a lecture at the Microbiology Society's annual conference in April, which will be held online.

Alrubaye wins award for international education

Adnan Alrubaye of the University of Arkansas won the 2020 Hoyt H. Purvis Award for Service in International Education.

Alrubaye, a research assistant professor and the associate director for the university's cell and molecular biology program, is credited with having helped double the size of the graduate program through recruitment of students from the Middle East and elsewhere. He has made numerous trips abroad to meet with prospective students, government officials and administrators at academic and research institutes.

In a statement, Dean Patricia Koski said, "He has been a leader in community international relations and in the Muslim community on campus, and he is dedicated to bringing different religions together for peace and understanding."

The Purvis award, which was issued to three members of the university community during a Nov. 19 ceremony online, is named after an emeritus professor of journalism

and international relations. Alrubaye, who teaches microbiology, animal bacteriology and prokaryote biology to about 900 students annually and who recently was inducted into the



ALRUBAYE

university's teaching academy, won the faculty award.

Alrubaye earned bachelor's and master's degrees from the University of Baghdad in the early 2000s. He went on to earn

his master's in secondary education and his Ph.D. in cell and molecular biology at the University of Arkansas Fayetteville campus, where he also completed a postdoctoral stint.

He has won numerous teaching awards, including the university's Most Outstanding Faculty Member award in 2019.

Fierke joins Brandeis leadership

Carol Fierke, who was until recently a provost and executive vice president at Texas A&M University, is now provost, executive vice



FIERKE

president and chief academic officer at Brandeis University in Waltham, Massachusetts. She assumed her new duties Jan. 1.

Fierke earned her doctorate in biochemistry at

Brandeis in 1984 and conducted postdoctoral research at Pennsylvania State University. Her first faculty position was at Duke University, after which she spent almost 20 years as a professor at the University of Michigan. Prior to moving to Texas A&M,

MEMBER UPDATE

she served as Michigan's chemistry department chair, vice provost and dean.

Fierke's research group studies metalloenzymes in yeast and human cells, including structural studies of metal ions and substrates in the active site of catalytic RNAs and proteins. She also has been committed to advancing diversity in the

departments where she has worked.

She received the 2020 Mildred Cohn Award in Biological Chemistry from the ASBMB and also has been recognized with the American Chemical Society's Repligen Award in the Chemistry of Biological Processes and the Protein Society's Emil Thomas Kaiser Award.

Brandeis President Ron Liebow-

itz praised Fierke's management, research and mentoring skills in an article on the university's website, saying, "As a consensus builder with a demonstrated commitment to making institutions more diverse, equitable and inclusive, Dr. Fierke is already a champion of the values that have defined the Brandeis community since 1948."

York named Impossible Foods CSO

John York, previously chair of the Vanderbilt University department of biochemistry, recently left that role to become the chief science officer at Impossible Foods.



YORK

The startup, founded by biochemist Pat Brown and based in Oakland, California, develops and markets plant-based imitation meat. The company has put considerable effort into biochemical research to re-create the experience of eating meat, notably incorporating a heme protein from soy. The company is outspoken about its mission to combat climate change and other environmental problems by reducing meat consumption.

"The opportunity to use biochemistry to save the planet is a spectacular motivation," York stated in a press release from Impossible Foods.

York came to Vanderbilt from Duke University, where he was a professor for 16 years and a Howard Hughes Medical Institute investigator. In eight years at Vanderbilt, he pursued a long-standing interest in inositol phosphate signaling. He also developed a line of research into the effect of reductive sulfur fixation on iron homeostasis and physiology after the lab identified a family of proteins including both inositol phosphatases and sulfur-assimilation enzymes. According to a press statement from Vanderbilt, York deepened the university's focus on basic science and helped make the biochemistry department the most funded by the National Institutes of Health in 2019.

Cortez takes over Vanderbilt biochemistry department

David Cortez, Richard Armstrong professor for innovation in biochemistry at Vanderbilt University, is serving as the interim chair of Vanderbilt's department of biochemistry, effective Jan. 1.

"The people in this department and at Vanderbilt make it special, and I will do everything I can to support them as they pursue their goals," Cortez stated in a Vanderbilt press release.

Cortez received his Ph.D. from Duke University in molecular cancer biology, conducted postdoctoral research at the Baylor College of Medicine, and joined Vanderbilt as a young professor in 2002. His lab has studied replication stress, DNA damage responses and other pathways that control genome stability and works on developing cancer therapeutics that target DNA damage pathways.



CORTEZ

Cortez is also associate director for basic sciences research at the Vanderbilt-Ingram Cancer Center. He has received awards from the National Cancer Institute, the MD Anderson Cancer Center and the Pew Charitable Trust. In 2017, he became a fellow of the American Association for the Advancement of Science.

New IUBMB award named for Whelan

The International Union of Biochemistry and Molecular Biology announced recently that it had established a new award named after its former president **William “Bill” J. Whelan**. The IUBMB Whelan Young Investigator Award will be



WHELAN

issued annually to a promising early-career scientist.

Whelan is a pioneer in the study of glyco-gen synthesis. He discovered glycogenin, which provided the

then-missing link in the biosynthetic pathway that converts glucose into glycogen.

Though he retired in 2019 from the University of Miami School of Medicine, where he served for many years as the biochemistry department chairman, he remains co-editor-in-chief of the journal *IUBMB Life*.

He is a fellow of the Royal Society of London, an honorary member of the Royal College of Physicians of London and a fellow of the American Association of Academic Scientists, among other honors.

The IUBMB also has a fellowship, established in 1983, in his name: the IUBMB Wood-Whelan Research Fellowship.



FISCHER

He has been a member of the ASBMB since 1965.

The first winner of the award, **Élyse Fischer**, is a graduate student

in the laboratory of David Barford at the Medical Research Council Laboratory of Molecular Biology in Cambridge, England. She studies spindle assembly checkpoint activation. She is the granddaughter of Edmond Fischer, Nobel laureate and Whelan's longtime friend.

Élyse Fischer will give a talk at the IUBMB's 2022 Young Scientists Program, which will be held in conjunction with the organization's 25th congress. She also will be invited to contribute a review article to *IUBMB Life* and will receive a cash prize, a certificate and a physical award.

Forsburg named distinguished professor

Susan Forsburg, the University of Southern California Dornsife professor of biological sciences, has been named a distinguished professor of USC.

Forsburg's lab studies chromosome duplication and segregation using *Schizosaccharomyces pombe*, or fission yeast, which is distinct from the familiar brewer's yeast, *Saccharomyces cerevisiae*. Using a toolbox that includes molecular biology and microscopy, her team researches the molecular checkpoints and repair activities that keep fission dividing smoothly or cut it off in case of disruption. They study what happens when replication stalls, potentially destabilizing the genome. The response to replication stress is the first barrier to malignant transformation in humans, making this simple yeast an unexpected model for cancer research.

After earning her Ph.D. in genetics at the Massachusetts Institute of Technology in 1989, Forsburg went to Oxford University for a postdoc-

toral fellowship with Paul Nurse, where she began her career-long use of *S. pombe* as a model organism. She started as an assistant professor



FORSBURG

at the Salk Institute for Biological Studies and became an associate professor there, cross-appointed to the University of California, San Diego, prior to joining the faculty

at the University of Southern California in 2004.

Forsburg is a member of the ASBMB Public Affairs Advisory Committee. She is a fellow of the American Association for the Advancement of Science, the California Academy of Sciences and the Association of Women in Science. She is an elected member of the American Academy of Microbiology.

Rye receives UNSW Medicine research award

Kerry-Anne

Rye, a professor at the University of New South Wales in Sydney, Australia, and co-editor-in-chief of the *Journal of Lipid Research*, has received the Uni-



RYE

versity of New South Wales Faculty of Medicine Award for Academic Research Excellence.

Rye, who received her Ph.D. from Flinders University in South Australia and was a postdoc at the University of Illinois at Urbana-Champaign, has been a research professor at UNSW since 2013.

MEMBER UPDATE

She is deputy head of the School of Medical Sciences, where she studies the mechanisms by which diabetes can lead to heart disease. She was the first to report that the athero-protective high-density lipoproteins in human plasma inhibit inflammation in coronary arteries and that these HDLs also have anti-diabetic properties.

This is not the first time the UNSW has honored Rye, who was recognized as the UNSW School of Medical Sciences Researcher of the Year in 2016. Among her other awards are several nods for research and mentoring from the American Heart Association's Atherosclerosis, Thrombosis and Vascular Biology Council. She is also an editorial board member of two AHA journals and has held multiple leadership roles within that organization.

Sonenberg receives honorary doctorate

The Institut national de la recherche scientifique in Quebec awarded an honorary doctorate to McGill University biochemist **Nahum Sonenberg** during the INRS virtual graduation ceremony in November.

Sonenberg holds the Gilman Cheney chair in the department of biochemistry and the Goodman Cancer Research Centre at McGill. He earned his Ph.D. in biochemistry from the Weizmann Institute of Science in 1976 and held a Chaim Weizmann postdoctoral fellowship at the Roche Institute of Molecular Biology before joining McGill University in 1979.

The Sonenberg lab's primary research is on the translational control of protein synthesis. His work has led to a number of break-

throughs including the discovery of the mRNA 5' cap-binding protein eIF4E, the rate-limiting component of the eukaryotic translation apparatus. Eukaryotic



SONENBERG

translation initiation factor 4E overexpression is prominent in many cancers, suggesting its utility as a tumor marker and anti-cancer drug target. The lab now works on translational control in cancer; oncolytic viruses as anti-cancer drugs; microRNA control of translation; and translational control of plasticity, learning and memory, and brain disease.

Sonenberg is a foreign associate of the National Academy of Sciences, an international member of the National Academy of Medicine and an international honorary member of the American Academy of Arts and Sciences. He has received the Killam Prize in Health Sciences, the Robert L. Noble Prize from the National Cancer Institute of Canada, the Wolfe Prize in Medicine, the Rosenstiel Award, the McLaughlin Medal of the Royal Society of Canada, the Order of Canada and the Canada International Gairdner Award.

Schekman joins Eureka scientific board

Randy Schekman, a professor at the University of California, Berkeley, and an investigator with the Howard Hughes Medical Institute, has joined the scientific advisory board of clinical-stage biotechnology company

Eureka Therapeutics.

Schekman shared the Nobel Prize in physiology or medicine in 2013 for discoveries of machinery regulating vesicle traffic, particularly his work that began in the 1970s to characterize the yeast secretory pathway. His lab subsequently discovered a protein complex key for vesicle budding called COPII. He also is known widely for founding the journal *eLife* in 2012 and for his continued calls for publishing reform and open science.

In recent years, Schekman's lab has continued to characterize the formation and trafficking of vesicles, paying particular attention to extracellular vesicles that contain



SCHEKMAN

small RNAs and to the molecular mechanisms of autophagy.

Schekman's honors include the Lewis S. Rosenstiel Award for Distinguished Work in Basic

Medical Research, the Gairdner International Award, the Eli Lilly Award in Microbiology from the American Society for Microbiology, and the Albert Lasker Award in Basic Medical Research. He is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

Eureka Therapeutics was founded in San Francisco in 2006 by industry veteran Cheng Liu, who previously worked in antibody therapeutics at a company now owned by Novartis. Liu, who earned his Ph.D. at UC Berkeley, said in a press release that he and Schekman have known each other for over 20 years. Eureka Therapeutics develops T cell therapies to target cancer cells, with particular focus on solid cancers.



AAAS fellows announced

Of the 489 members of the American Association for the Advancement of Science elected as fellows this year, 33 are members of the American Society for Biochemistry and Molecular Biology.

The tradition of electing AAAS fellows began in 1874.

Since then, the recognition has gone to thousands of distinguished scientists.

Two 2020 Nobel laureates, Jennifer Doudna and Charles Rice, are both AAAS fellows and ASBMB members.

The AAAS will hold a virtual induction ceremony for the newly elected fellows on Feb. 13.

The honorees will receive certificates and rosette pins in gold and blue, colors symbolizing science and engineering, by mail.

The ASBMB members who are 2020 AAAS fellows are listed below by section.

Section on Biological Sciences

Suresh K. Alahari | Louisiana State University Health Sciences Center School of Medicine: For distinguished contributions in cancer research and teaching, with a focus on signal transduction.

Diana M. Downs | University of Georgia: For distinguished contributions to the field of bacterial metabolism and physiology, particularly metabolic pathway integration and stress.

Gloria Cruz Ferreira | University of South Florida: For distinguished contributions to the field of iron-heme metabolism, particularly using enzymology and spectroscopy to study heme synthesis and the molecular basis of heme-related disorders.

Michael William Gray | Dalhousie University (Canada): For distinguished contributions to the field of molecular evolution, particularly in the area of endosymbiosis, organelle origins, molecular biology and genomics.

Ursula Jakob | University of Michigan: For seminal discoveries of how reactive oxygen species play pivotal roles in a range of biological processes and for method development to identify redox-regulated proteins/ pathways.

Patricia Kiley | University of Wisconsin–Madison: For distinguished contributions to understanding mechanisms that regulate *E. coli*'s lifestyle in different oxygen environments, specifically how transcription factors exploit Fe-S metal centers for oxygen responses.

Samuel J. Landry | Tulane University School of Medicine: For distinguished contributions to the field of structural and molecular immunology, particularly for the analysis of protein immunogenicity and CD4+ T cell epitope prediction.

Rodney L. Levine | National Heart, Lung and Blood Institute: For distinguished contributions to our understanding of the effects of oxidative modifications of proteins.

Beronda L. Montgomery | Michigan State University: For distinguished contributions to plant biology and microbiology, particularly using photobiological analyses to investigate physiological and morphogenic adaptation of photosynthetic organisms.

Katsuhiko (Katsu) Murakami | Penn State: For outstanding contributions in the field of structural biology, particularly the role of RNA polymerase in prokaryotic gene regulation.

AAAS fellows continued

Rama Natarajan | City of Hope National Medical Center: For distinguished contributions to the field of diabetes and its vascular complications, particularly for studies showing the roles of epigenetics and noncoding RNAs.

Basil Nikolau | Iowa State University: For distinguished contributions to the field of biochemistry, particularly for the characterization of novel metabolic processes.

Franklin Wayne Outten | University of South Carolina: For distinguished research contributions deciphering the mechanisms for iron sulfur cluster biogenesis, its regulation, and its roles in microbial physiology and stress responses.

William S. Reznikoff | Marine Biological Laboratory: For deciphering the molecular details of transposition by studying a model bacterial transposon.

Charles Rock | St. Jude Children's Research Hospital: For cutting-edge research on bacterial lipid metabolism, the results of which have advanced the promise of fatty acid synthesis inhibitors as new bacterial antibiotics.

James V. Staros | University of Massachusetts Amherst: For distinguished contributions in cell biology on the mechanisms by which binding of polypeptide hormones to their surface receptors is transduced into signals.

Vassie Ware | Lehigh University: For contributions to understanding ribosomes and for outstanding initiatives in undergraduate science education.

Section on Chemistry

Joan Blanchette Broderick | Montana State University: For distinguished contributions to the field of bioinorganic chemistry, particularly for elucidating the novel chemistry of iron–sulfur clusters in biological radical initiation.

Phillip E. Klebba | Kansas State University: For distinguished contributions to the understanding of the membrane transport mechanisms of bacteria relevant to their practical applications in human health.

Raymond C. Stevens | University of Southern California: For the development of technologies to significantly accelerate drug discovery and protein structure determination, including of G protein–coupled receptors, that have led to new biological insights and therapeutics.

Section on Dental and Oral Health Sciences

Renny Theodore Franceschi | University of Michigan: For distinguished contributions to the fields of transcriptional control mechanisms of bone formation, signaling and extracellular matrix biology of osteoblast differentiation as well as teaching and service.

Section on Medical Sciences

Ronald W. Davis | Stanford University: For pioneering work in functional genomics and clinical genomics, and in particular his development of novel technologies.

Catherine Drennan | Massachusetts Institute of Technology: For her structures of metalloenzymes and insights that show how nature harnesses and redirects the reactivity of enzyme metallocenters to perform challenging reactions.

Hudson Freeze | Sanford Burnham Prebys Medical Discovery Institute: For identifying and characterizing the mechanistic underpinnings of many glycosylation diseases and work toward new treatments.

Thomas H. Haines | City College of New York (retired): For initiating and setting up the CUNY Medical School at City College of New York to educate minority and disadvantaged students.

Shan-Lu Liu | Ohio State University: For distinguished contributions to our understanding of virus–host interaction and viral pathogenesis as well as impact on scientific communication, diversity and international collaboration.

Rodger P. McEver | Oklahoma Medical Research

Foundation: For services to cardiovascular biology and hematology, and in particular to understanding the forces that govern cell–cell adhesion, and for distinguished scientific leadership.

Alan Saghatelian | Salk Institute for Biological Studies:

For mass spectrometry–centered work identifying novel endogenous peptides and lipids in cells and determining their regulation and targets.

**Jerrold Ross Turner | Brigham and Women’s Hospital/
Harvard Medical School:** For distinguished contributions to cell biology, physiology, pathobiology and diagnosis in gastrointestinal science, particularly for defining functions, regulatory mechanisms and molecular therapies targeting mucosal barriers.

Section on Neuroscience

Alan L. Goldin | University of California, Irvine: For distinguished contributions in understanding the function of sodium channels and their role in seizure susceptibility, and for promoting the development of physician–scientists.

Linda Jo Van Eldik | University of Kentucky College of Medicine: For distinguished contributions on how aberrant glia-neuronal interactions impact neurodegenerative processes, focusing on identification of signal transduction pathways that mediate neuroinflammatory responses of activated glia.

Section on Pharmaceutical Sciences

Patricia Babbitt | University of California, San Francisco: For distinguished contributions to the field of computational biology and bioinformatics, particularly related to protein structure/function and applications to drug target identification and drug design.

Walter H. Moos | University of California, San Francisco: For distinguished contributions to the fields of pharmaceutical sciences and medicinal chemistry targeting human health and disease.



Don't forget to renew your ASBMB membership!

Over the past 100 years, the ASBMB has grown and changed with the times to become the supportive community of discoverers that it is today.

ASBMB members are driven to better understand what makes life work. With patience, perseverance and insatiable curiosity, and through collaboration and hard work, we seek to uncover the secrets of life.

Thank you for your membership.

If you need to renew your ASBMB membership, you can do so here:

society.asbmb.org/SignInRenew



Raoul Carubelli



Raoul Carubelli, a research scientist whose work ranged from ribosomes and cytochromes to cancer and cataracts, died in June at age 90.

Born in Cordoba, Argentina, to Italian immigrant parents in 1929, Carubelli served in the Argentine army engineers as a young man, reaching the rank of second lieutenant in the reserves before he was discharged in 1949.

After leaving the army, he attended Argentina's Universidad Nacional de Cordoba, earning bachelor's degrees in pharmacy and biochemistry while working as a laboratory instructor. He went on to graduate school at the University of Minnesota.

He worked as a research scientist at the Oklahoma Medical Research Foundation for 37 years, from 1957 to 1994, and thereafter at the Dean A. McGee Eye Institute. On two yearlong sabbaticals in Germany, he visited the Max Planck Institute for Virus Research in Tübingen and the German Cancer Research Center in Heidelberg.

Carubelli's first grant was a research career development award from the National Institutes of Health awarded in 1968. Over the years his research covered many topics. Early on, he studied how ribosomes and cytochromes embed in the membranes of the endoplasmic reticulum and the nucleus and how they could be disrupted chemically. Later, he became interested in glycosylation, with particular focus on the enzyme neuraminidase and how it changes during the development of cancer. In his later years, as a member of the Dean McGee Eye Institute, he studied the molecular changes behind the development of corneal lesions and cataracts.

Carubelli loved to travel for work and pleasure; he presented at many international meetings and took his wife and two children on numerous international vacations. While at home, his family wrote, he spent time fishing, hunting and writing letters to the editor of *The Daily Oklahoman*.

Carubelli is survived by his wife, Barbara, to whom he was married for 60 years; son Michael and daughter Cecilia; two grandchildren; great-grandchildren; and family in Oklahoma, Cordoba and Canada.

Charles M. Radding



Charles M. Radding, a professor emeritus of genetics at Yale University, died Oct. 20 at age 90. He was a member of the American Society for Biochemistry and Molecular Biology for 40 years.

Born June 8, 1930, in Springfield, Massachusetts, Radding earned an M.D. from Harvard Medical School in 1956. He served a medical internship in Boston and a research fellowship at the National Institutes of Health before conducting postdoctoral research at Stanford University with Arthur Kornberg. Radding joined the faculty at the University of Michigan before moving to Yale in 1967.

In his lab, Radding characterized cellular proteins that mediate DNA recombination, focusing on the *recA* protein from *E. coli*. By purifying and studying proteins, he was able to reconstitute key steps of recombination in the lab. He and his colleague Matthew Meselson of Harvard formulated the articulation of a new general model of recombination known as the Meselson–Radding Model.

Radding was elected into the National Academy of Sciences in 1995 and served for many years as an editor of the journal *Proceedings of the National Academy of Sciences*.

According to a Yale School of Medicine profile, Radding is remembered as an outstanding teacher, engaging lecturer, and dedicated and inspiring mentor: "He often accessorized his lectures with props: long rubber tubes representing DNA strands to illustrate difficult-to-visualize concepts like positive and negative DNA supercoiling and DNA strand exchange. Occasionally, the tubing got into a hopeless tangle, to the great amusement of the class!"

His interests outside the lab included classical music, literature, fine food and languages, with a special fondness for French, the profile states, and "he was always happy with little urging to speak French, or, for that matter, any of a series of ersatz languages and accents that sounded surprisingly authentic."

Radding is survived by his wife of more than 65 years, Natalie, as well as three daughters and a grandson.

Establishing connections — from people to synapses

By *Jaclyn Brennan*

When José Zepeda was in his early teens, his mother was deported, and his family moved from Cambridge, Massachusetts, to San Luis Río Colorado in Sonora, Mexico. There he witnessed the poisoning access to drugs in a border town. “I saw friends who went through that and struggled,” he said. “I always wondered what I could do to help.”

As a youngster, Zepeda was an avid reader of science and nonfiction books. By high school, he had turned his attention to books on philosophy and neuroscience, wanting to know more about the brain’s involvement in addiction.

Looking to satisfy his curiosity about brain signals, rationality and the function of biological organisms at their core, Zepeda returned to his home state for college, pursuing a degree in biochemistry at the University of Massachusetts Boston. He had the opportunity to work in neuroscience labs at Harvard Medical School and MIT, where he was exposed to studies of molecular neuroscience and synaptic plasticity.

He also joined the UMass ASBMB Student Chapter, first as a general member, then becoming vice president and, in his final year, president. He initially was attracted to being around like-minded individuals and receiving mentorship about working in a lab. However, Zepeda said the outreach component of the club was what he loved the most.



COURTESY OF JOSÉ ZEPEDA

José Zepeda, former president of the UMass Boston ASBMB Student Chapter, is now a Ph.D. student in neuropharmacology at Vanderbilt University.

The ASBMB-UMB chapter provides resources to those interested in biochemistry and molecular biology — both within and outside the university. As chapter president in 2019, Zepeda started biweekly journal clubs to discuss articles in the ASBMB’s *Journal of Biological Chemistry* and triweekly professional development events including CV, resume and interviewing workshops. He also led the chapter’s partnership with the local — and underfunded — McCormick Middle School, where members teach a class of eighth graders general science topics through lectures and labs, everything from thermodynamics to the structure and function of small molecules.

“Working with eighth graders was extremely rewarding,” Zepeda said. “Their energy and curiosity for science are enviable. I was deeply impressed

with their questions and ability to pick up the material so quickly.”

He also continued to be fascinated by the human brain. Now a first-year Ph.D. student pursuing neuropharmacology at Vanderbilt University, Zepeda seeks to help develop cures and treatments for neurological disorders and diseases. He specifically focuses his scientific attention on neuroplasticity, studying the brain’s ability to reorganize itself through the formation of new neural connections.

Zepeda’s interest in connections goes beyond scientific inquiry. From his desire to help his teenage friends to engaging with eighth graders in the study of science, leading a strong executive board and organizing professional development events, Zepeda has a passion for forging connections. And he urges others to do the same. If more scientists would go out of their way to engage with the public, Zepeda believes they could improve the credibility of science and overcome its politicization.

“Since the COVID-19 outbreak, there has been a lot of distrust between the outside community and the scientific community,” he said, “and as scientists, we have an obligation to build that trust with the communities we serve.”

Jaclyn Brennan (jabrennan@gwmail.gwu.edu) is a post-doctoral researcher at George Washington University, where her research focuses on electrophysiology of the cardiac conduction system. Follow her on Twitter @jaclynb_phd



10 young scientists win PROLAB awards

By Angela Hopp

Ten early-career researchers have won travel grants from the Promoting Research Opportunities for Latin American Biochemists program. They will use the awards to conduct research in academic laboratories in the United States and Canada.

Since 2012, the American Society for Biochemistry and Molecular Biology, the Pan-American Society for Biochemistry and Molecular Biology, and the International Union for Biochemistry and Molecular Biology have issued about 100 travel awards to young biochemists.

This year's PROLAB travel grants are going to Ph.D. students and postdoctoral fellows from Argentina, Brazil, Chile and Uruguay. All but one will work in the United States.

Carolina Alberca is a Ph.D. student at the Universidad de Buenos Aires in Argentina. She is a member of the neuroepigenetics lab in the department of biological chemistry. "The main objective of my Ph.D. thesis is to identify the cellular and molecular mechanisms underlying the cognitive deficits derived from perinatal protein malnutrition in mice and the effects of reversion due to



a stimulating growth environment, with special emphasis on the epigenetic mechanisms," she said. She will spend time in the lab of Reid S. Alisch at the University of Wisconsin School of Medicine and Public Health. The grant, she said, "will allow me to learn about novel techniques and will provide me tools to broaden and enhance my specialization in the neurobiology field."

access to equipment not yet available in my country," Antelo said. "I believe this will be an extraordinary experience to expand our knowledge on the role of internal protein dynamics in bacterial resistance and to strengthen the international collaboration between our labs."

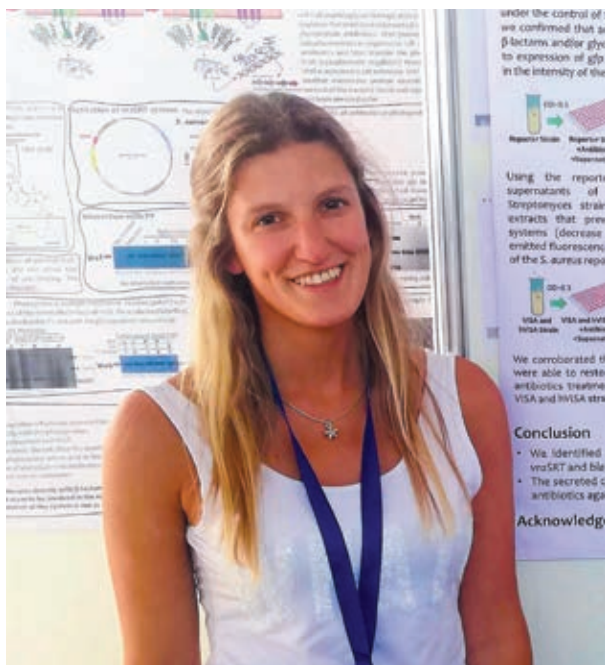
Giuliano Tomás Antelo is a Ph.D. student at the Fundación Instituto Leloir in the Ciudad Autónoma de Buenos Aires, Argentina. He studies "how the molecular evolution of transcriptional regulators in pathogenic bacteria gave rise to new resistance mechanisms against antibiotics and the immune system." He will spend time

in the lab of David P. Giedroc at Indiana University's chemistry department. "I'm grateful for this opportunity that will allow me to learn cutting-edge nuclear magnetic resonance spectroscopic techniques and grant me



access to equipment not yet available in my country," Antelo said. "I believe this will be an extraordinary experience to expand our knowledge on the role of internal protein dynamics in bacterial resistance and to strengthen the international collaboration between our labs."

Melisa Antinori, a Ph.D. student at the Universidad Nacional de Rosario in Argentina, is working on a thesis project focused on the mechanism of activation of the *vraSRT* system of *Staphylococcus aureus*, which results in resistance to β -lactam and glycopeptide antibiotics. She will be joining the lab of Gerry Wright at McMaster University in Canada. At McMaster's Michael G. DeGroot Institute for Infectious Disease Research, she plans to continue studies of bacterial resistance to antibiotics. "This research stay will allow me to use unique compounds to evaluate whether there is direct interaction of vancomycin or of cell-wall-derived fragments with the proteins of the



vraSRT system,” she said. “I will be working in one of the most renowned laboratories in my area of research, in contact with experts in the subject, which will greatly contribute to my formation as a scientist.”

Dayana Benchoam is a Ph.D. student at the Universidad de la República in Uruguay who studies the reactivity of biological persulfides.



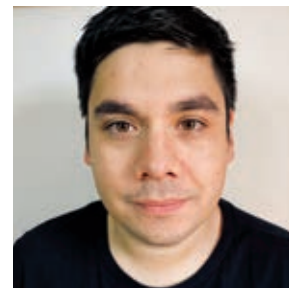
She will spend time in the lab of Ruma Banerjee at the University of Michigan. “This visit is a valuable opportunity to transition from my studies on low-molecular-weight persulfides to proteins with an expert in the field,” Benchoam said. “It will nurture my doctoral training and broaden my knowledge, allowing me to bring back expertise that would be useful in the research setting in my own country.”

Priscila Chiavellini is a Ph.D. student studying aging at the Universidad Nacional de La Plata in Argentina. She’ll be joining the lab of Vittorio Sebastiano at Stanford University. At the Institute for Stem Cell



Biology and Regenerative Medicine, she looks forward to getting “experience in state-of-the-art techniques and a deeper understanding of the biological processes underlying the reversion of aging.”

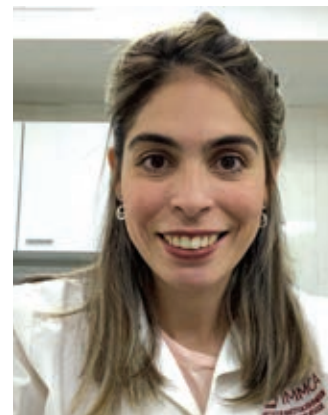
Pablo Cruz Núñez is a Ph.D. student at the Facultad de Medicina of the Universidad de Chile. He studies ion channels and is particularly interested in how post-translational modifications regulate store-operated Ca^{2+} entry components. He will be visiting the lab of James



S. Trimmer at the University of California, Davis. “This award means to me a great challenge and opportunity to expand my knowledge in molecular and cell biology of ion channels. I expect to learn a lot from great researchers in a collaborative environment, which could mean, in the future, an opportunity for the development of high-impact studies,” Cruz said.

Maria Florencia González Lizárraga is a postdoctoral researcher at the

Instituto de Investigación en Medicina Molecular y Celular Aplicada in Argentina. She is studying the proteins involved in neurodegenerative diseases and will be working in the lab of Rodrigo Maillard at Georgetown University “on the



characterization of the interaction between α -synuclein and tau proteins using optical tweezers.” She added: “This approach will allow us (to better understand) the cross-talk between these proteins at the level of single molecules. This will also help to identify novel targets for designing therapeutic interventions in a variety of neurodegenerative diseases.”

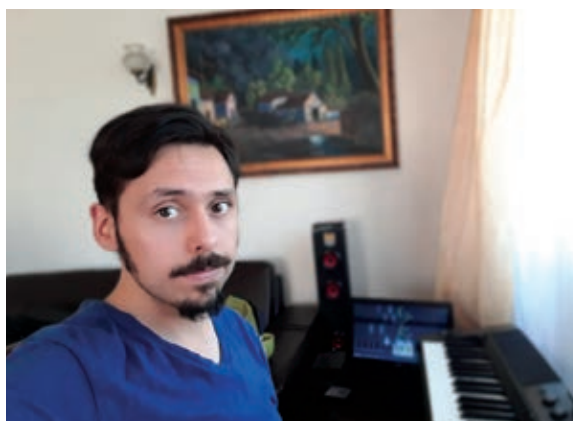
Marisol León Cabrera is a Ph.D. candidate at the Universidade de São Paulo in Brazil, where she’s working to understand the metabolic impacts of maternal obesity on prenatal development in a mouse model



using multimodal imaging. She will be visiting the lab of Kimberly K. Buhman at Purdue University. “The PRO-LAB scholarship (will make) my dream to (go) to Purdue University to perform chemical imaging experiments come true,” León said. “My research quality and impact will greatly improve. Also, the mentorship I will receive in this international experience will certainly play a major role in my future academic career.”



Maria Florencia Rossetti is a postdoctoral researcher at the Universidad Nacional del Litoral in Santa Fe, Argentina. “The general objective of my research project is to explore the importance of maternal nutritional environment during prenatal and early postnatal life on brain functions and to provide novel mechanisms through which such early experiences may lead to the onset of metabolic syndromes, neurodevelopmental disorders and other brain disorders later in life,” she said. She will be joining the lab of Nancy G. Forger at Georgia State University. “My project in the Forger lab will address how information about the maternal microbiota is conveyed to the offspring brain. This training will give me new tools for gut microbiota and microglial practices and the possibility to interact with foreign students and scientists resulting in a professional and cultural enriched experience.”



Ian Silva is a Ph.D. student at the Facultad de Medicina of the Universidad de Chile, where he studies the role of transient receptor potential channels on Ca^{2+} signaling and cellular migration. He will be visiting the lab of Madesh Muniswamy at the University of Texas Health Science Center at San Antonio. “During this rotation, using a model of colon cancer cells, I will evaluate whether two TRP channels are involved in the regulation of mitochondrial function,” Silva said. “Thus, this rotation will give me the opportunity not only to learn new methodologies to address mitochondrial functions, but will lay the foundations for future collaborations.”

About the awards

The ASBMB welcomes applications for PROLAB scholarships from trainees and new investigators (not more than five years past postdoctoral work) from all countries in the Pan-American Society for Biochemistry and Molecular Biology, including Spain and Portugal.

The awards offset the costs of travel and living expenses for one to six months up to a maximum of \$5,000.

For more information, go to the Career Resources section (awards, grants and fellowships) at asbmb.org.

Angela Hopp (ahopp@asbmb.org) is executive editor of ASBMB Today and communications director for the ASBMB. Follow her on Twitter @angelahopp.



Sewer scholarship program funding doubled

Meet the 2020 recipients of this ASBMB diversity award

By Stephanie Paxson

The American Society for Biochemistry and Molecular Biology's Marion B. Sewer Distinguished Scholarship for Undergraduates has the potential to double its reach this year.

The ASBMB's Minority Affairs Committee created the scholarship in 2015 to support students who excel academically and are dedicated to enhancing diversity in science. This year the MAC and the Student Chapters Steering Committee will be able to select up to 10 undergraduate students to receive up to \$2,000 toward tuition instead of the usual five, thanks to a donation to the scholarship fund from New England Biolabs.

Lana Saleh, a member of the MAC, has worked to expand the program. "Every year, the Marion B. Sewer Scholarship program receives a substantial number of applications from talented undergraduates who are working diligently to overcome seri-



MARION B. SEWER

ous social and financial challenges," Saleh said. "Not surprisingly, the vast majority of the applicants are from underrepresented groups in STEM. While there were many qualified candidates in the past years, we had the resources to offer five \$2000 scholarships. This resulted in us turning down qualified applicants who were in dire need of this financial assistance to complete their degrees. Receiving a donation of \$10,000 from New

England Biolabs means we are able to do more. NEB's commitment to diversity in STEM and their support of the Marion B. Sewer scholarship mission in promoting inclusion and equality in the life sciences is reflected through this generous donation."

The award honors Marion B. Sewer, who was an ASBMB member and past deputy chair of the Minority Affairs Committee when she died in January 2016 at age 43. Sewer was a principal investigator on projects devoted to increasing participation among underrepresented minorities and furthering student training. She also wrote about issues that URM scientists face, such as impostor syndrome. Sewer's work reflected her commitment to diversity and inclusivity of underrepresented minorities in science, technology, engineering and math.

Here, the latest five recipients of the Sewer scholarship describe their personal goals and how they promote diversity. Their statements have been edited.

2020 RECIPIENTS

Faria Afreen, Brandeis University



My long-term goal is to become a physician-scientist with a lab that focuses on creating personalized cancer treatment by researching one of the many mechanisms of pathogenesis at a

molecular level. Cancer's heterogeneity makes it a mammoth of a disease to treat, but I am optimistic that my future lab, in collaboration with other clinical, scientific and bioinformatical research groups, can create treatments that will reduce patient suffering. I hope that, as a physician, I am able to explain clearly to my patients their illness and treatment plans to help

reduce any distrust of health professionals.

Additionally, as someone who entered college not having prior research experience or family members in science, I am driven to give other students, particularly those underrepresented in science, the tools and resources they need to be successful. There is a leaky pipeline in both

science and medicine. I hope to play a role in fixing it by creating a culture that values compassion, teamwork and mentorship and practices inclusive teaching styles.

Jennifer Burdette, Tidewater Community College

For the past few years, I have been a student at Tidewater Community College, attending classes to earn my associate degree in science to ultimately transfer to a four-year university. This past spring, I completed my studies toward my associate, and I have been accepted to the University of Virginia, where I plan to obtain a bachelor's degree in the field of biochemistry. Afterward, I plan to apply to be a part of a medical scientist training



program to earn a Ph.D. and M.D. to begin the long and arduous process of becoming a physician and biomedical scientist.

I decided to choose this career path because I hope that I can bring some positive change to the world by leading a breakthrough in science, answering science's most plaguing questions or finding a cure for some of the world's most aggressive diseases.

Alisha Holden, California State University, Northridge

Currently working on my B.S. in biochemistry, I eventually plan to go on to grad school and earn a master's degree, preferably in chemistry.



My career goals include becoming a scientific researcher in the biomedical field as well as, in the future, becoming a chemistry teacher. As I have participated in a research project focused on cellular signaling, I am currently interested in research on that topic.

Rishi Mehta, University of Cincinnati

My professional goal is to lead a clinical research laboratory aimed at uncovering data-driven insights to treat pediatric inflammatory bowel disease. To do so, I aim to attend medical school at a top research institution with the goal of becoming a clinician investigator and conducting patient-focused



research. My career goal is to push the field of IBD treatment and research so that one day we no longer will think of the colon as a question mark.

Prashit Parikh, Vassar College

I am currently a senior at Vassar College studying biochemistry. Following graduation, I hope to pursue an M.D.–Ph.D. in computational biology in order to become a physician–scientist.



My goal is to combine my interests in public health and medicine with modern computational techniques to advance human health and disease. By combining my medical practice and research experience, I believe that I will be able to institute positive change not only for my patients but also the scientific community at large.

Ultimately, I also would like to start a program where students from disadvantaged backgrounds would be able to shadow physicians and conduct research, giving them the opportunity to explore their research interests and to understand better what being a medical professional entails. Overall, I am excited to contribute to the forefront of science and medicine.

Stephanie Paxson (spaxson@asbmb.org) is the diversity and undergraduate education coordinator at the ASBMB. Follow her on Twitter @stephaniepaxson.



About the Sewer scholarship

The Marion B. Sewer Distinguished Scholarship for Undergraduates provides up to \$2,000 toward tuition to students who demonstrate an interest in the fields of biochemistry and molecular biology and enhance the diversity of science. Students whose social, educational or economic background adds to the diversity of the biomedical workforce or who show commitment to enhancing academic success of underrepresented students are eligible. Deadline to apply is June 1, 2021. See details at asbmb.org/diversity/undergraduate-scholarship

Send us your news!

Have you recently been promoted or honored? Do you have good news to share with your fellow ASBMB members? Email it to us at asbmbtoday@asbmb.org and don't forget to include a photo!



PLEASE DONATE

Marion B. Sewer Distinguished Scholarship for Undergraduates

This scholarship provides financial support to students who will diversify the scientific workforce.

Make a donation to help the ASBMB achieve our goals.

The late Marion Sewer was a leader in the field of steroid hormone biosynthesis at the University of California, San Diego and deputy chair of the ASBMB Minority Affairs Committee. Just 43 years old when she died, Dr Sewer worked to make science more inclusive and retain talented students and scientists of color.

Your gift will honor Marion Sewer's memory and help support the newest members of the scientific enterprise.

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Increasing diversity to improve health care — for all of us

By Jack Lee

Diversity is at the core of the National Institutes of Health's All of Us Research Program.

The program aims to gather medical records, survey responses and DNA samples from 1 million or more individuals of different races, ethnicities, ages and geographic regions. Researchers will be able to use this large body of data to identify how biological, lifestyle and environmental factors impact human health.

All of Us began through the formation of a precision medicine working group in 2015. After a period of infrastructure development and testing, the program opened enrollment across the United States in 2018. Since then, more than 270,000 participants have provided biosamples — such as blood, urine and saliva — carrying genetic information.



GAIL JARVIK

Gail Jarvik, a medical geneticist at the University of Washington, is a co-leader of the Northwest Genomics Center, one of the three All of Us genome centers. She and her colleagues Deborah Nickerson and Evan Eichler are spearheading efforts to sequence participants' samples and return information about their DNA. The other two All of Us genome

centers are partnerships led by Baylor College of Medicine and the Broad Institute.

All of Us “has had a focus from the start on enrollment of diverse populations,” Jarvik said, “with the recognition that those populations are underserved in medicine, and in particular, in genomics.”

Genetic data, such as whether an individual has a specific version of a gene, can provide valuable insight into a person's health. Certain versions of the BRCA1 and BRCA2 genes, for example, can indicate people with a higher risk of developing certain cancers, such as breast and ovarian cancer. Polygenic risk scores go a step further, combining details about multiple genes to predict the risk of an individual developing a disease. These scores, however, have generally been developed based on populations of European ancestry, Jarvik said.

The larger, more diverse data set being developed through All of Us could be used to make new and improved predictions of health risks for people of other ancestry groups. For example, there may be versions of genes more common in people of non-European ancestry that haven't been studied yet. Additionally, by including electronic medical records and information about lifestyle factors, the new data set will help researchers better understand health outcomes for people of many different backgrounds.

Anastasia Wise is the NIH program

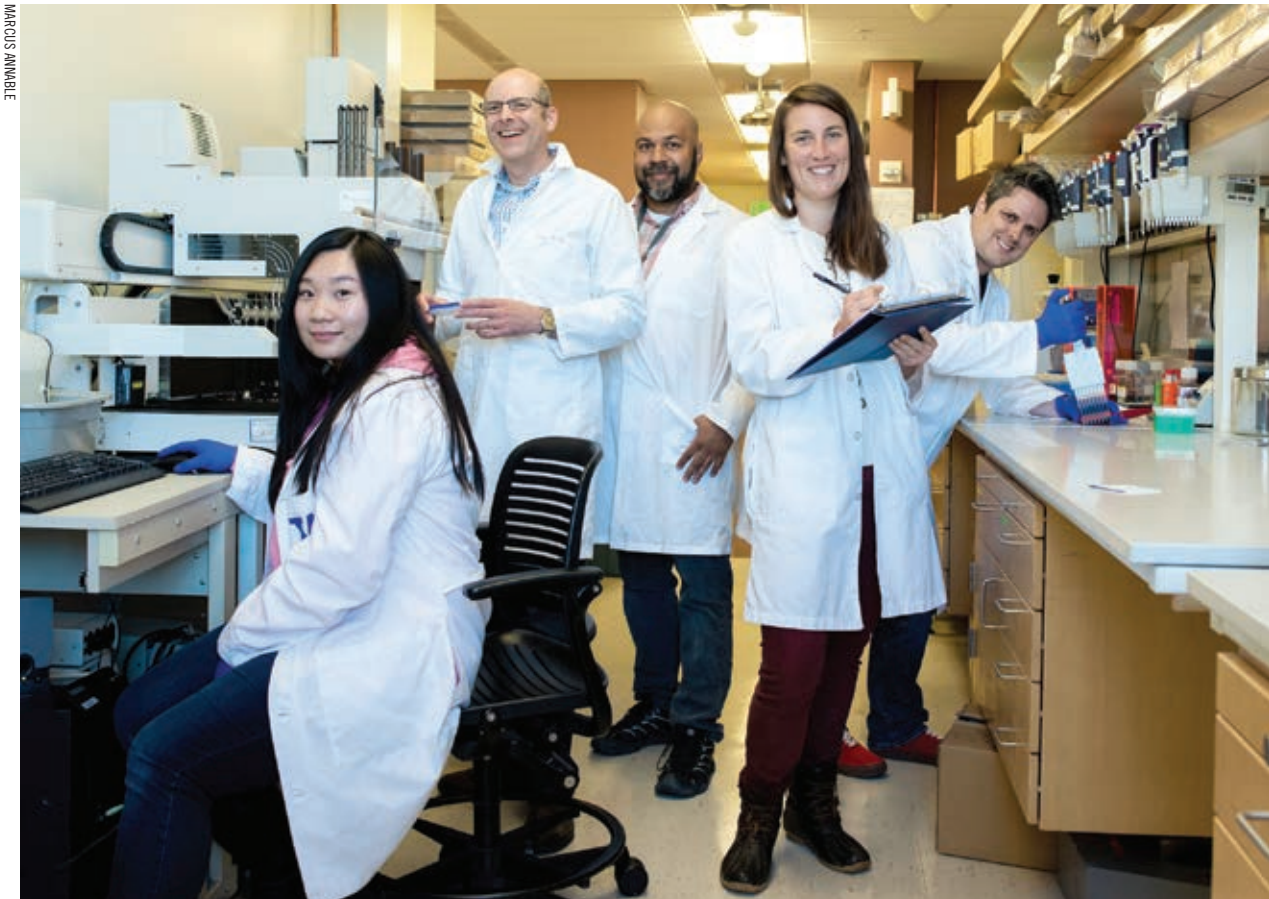
officer for the Genetic Counseling Resource with the All of Us Research Program.

“We're really trying to reflect the diversity of the United States,” Wise said. So far, more than 80% of the contributed biosamples are from members of underrepresented communities. In addition to racial and ethnic minorities, this includes individuals from other groups that typically haven't been part of research, such as sexual and gender minorities and members of low-income households.

The All of Us Research Program encourages inclusion in a number of ways, including the use of imagery that reflects diverse communities and preparation of information in multiple languages. The program also has national community engagement partners that increase public awareness and encourage participation by members of underrepresented groups. One of these organizations is the Delta Research and Educational Foundation. Based in Washington, D.C., DREF promotes research on issues affecting African American women and their families.

“The All of Us Research Program offers a vital opportunity to increase the number of African American participants in biomedical research and lead a path towards closing the health disparity gap,” DREF President Carolyn Lewis stated in a press release.

Regina Locust, the DREF Re-



Among the early researchers on the All of Us project at Northwest Genomics Center were, left to right, Ashley Kang, Jeff Weiss, Marcus Annable, Alison Schiele and Matt Richardson.

search Matters program manager, has planned and presented events that engage with African Americans and inform them about science research. Initially, these events were in-person and of all sizes, from book clubs and fellowship groups to the Essence Festival and national conventions. The COVID-19 pandemic has forced a shift to a virtual format.

“When we interact with minority communities, we engage in everyday conversations,” without unfamiliar acronyms or complicated terminology, Locust said. These conversations then can lead to dialogue about precision medicine and the All of Us Research Program. For example, talking about depression can lead to a discussion about how lifestyle, behavior and

environmental factors affect an individual’s health. “That’s how we then tie in the importance of understanding and participating in research,” Locust said.

In addition to providing valuable data for research purposes, participants can decide if they want to receive details about their genetic ancestry and traits. In November, All of Us began returning genetic results to participants.

“Our participants are really partners in the research,” Wise said. The program developed an informed consent process, allowing participants to choose the results they want to get. At this stage, participants are receiving information about their genetic ancestry as well as several genes linked

to traits such as earwax type and cilantro preference. The program plans to provide participants with health-related information in the future.

All of Us also plans to begin making genetic data that’s stripped of personal details available to researchers in about a year. NIH officials hope that broadening the data that’s available to researchers will accelerate research discoveries, making health care more useful for all, Wise said.

Jack Lee (jackleescience@gmail.com) is a freelance science writer. Read more of his work at jackleescience.com/writing and follow him on Twitter @jacklee.



The vaccine race heats up

Researchers address distribution challenges by prioritizing higher temperature tolerance, ease of manufacturing

By *Guanani Gómez–Van Cortright*

Researchers around the world are racing to develop COVID-19 vaccine options at a record pace, but the logistical challenge of getting vaccines to everyone who needs them remains daunting. Most vaccine formulas must be kept at very low temperatures during their journey from assembly to a person’s arm, a major obstacle for those living in remote locations or underserved communities without access to long-term refrigeration.

In a recent paper in the **Journal of Biological Chemistry**, researchers at the Molecular Biophysics Unit at the Indian Institute of Science in Bengaluru, India, address distribution challenges by designing a coronavirus vaccine that can withstand four weeks at temperatures as high as 37 degrees Celsius (about 98 degrees Fahrenheit) as well as 90 minutes at 100 C (212).

Raghavan Varadarajan, the project’s principal investigator, is pleased by the vaccine candidate’s hardiness. “The most exciting thing that we didn’t expect is that we could keep this protein at very high temperatures and it was still viable,” Varadarajan said. “We hadn’t tried it before, and we wanted to see how far we could push things.”

In addition to temperature tolerance, Varadarajan’s team considered ease and accessibility of manufacturing. The first COVID-19 vaccines on the market are messenger RNA–based, but India lacks facilities with the expertise to make mRNA vaccines, and the technique requires extensive

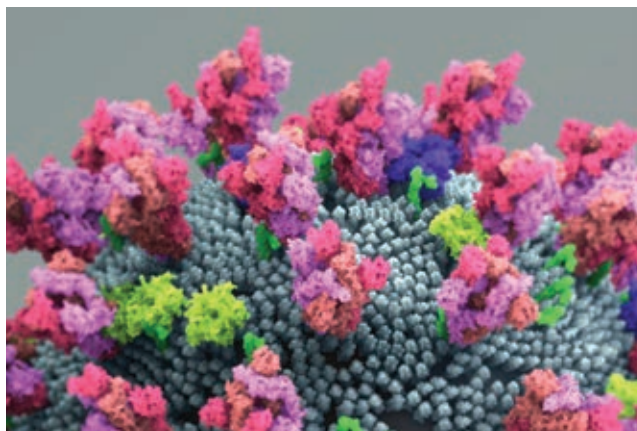
refrigeration. Instead, they focused their efforts on developing a protein-based vaccine, which takes longer to develop but is easier and more affordable to produce.

The target proteins are the coronavirus’ spikes, the distinctive points of the virus’ crown that allow it to bind to the receptors known as ACE-2 on the surface of host cells.

“Once the virus is able to come close to the cell, that binding of the spike protein is the beginning of the infection,” Varadarajan said. “Therefore, if your body is able to create antibodies that block this interaction, you can prevent infection.”

The portion of the spike protein needed for binding is the receptor binding domain, or RBD. Varadarajan’s team engineered a protein fragment in its image. They expressed this fragment in mammalian cells, creating mRBD (m for mammalian-expressed), and then tested its ability to stimulate the immune system of guinea pigs to make antibodies that could block the coronavirus’ spike proteins from interacting with host receptors.

Because mRBD stimulates an immune response with good yields of receptor-blocking antibodies,



remains viable after a month at 37 C and would be straightforward and inexpensive to manufacture, it could become an accessible and portable vaccine option.

“Certainly, other people along with us and before us have also made related protein subunit vaccines with similar fragments, but nobody had looked at the temperature stability to this degree,” Varadarajan said. “In that sense we were fortunate — that we looked for this property, and it turned out to exist.”

Varadarajan’s team is continuing to develop their vaccine with challenge trials of mRBD and improved variants in hamsters, which are also susceptible to SARS-CoV-2, as the lab strives to immunize those who may be out of other vaccines’ reach.

DOI: 10.1074/jbc.RA120.016284

Guanani Gómez–Van Cortright (guaninigvc@gmail.com) is an outdoor educator and freelance science writer.



Vision health depends on fat

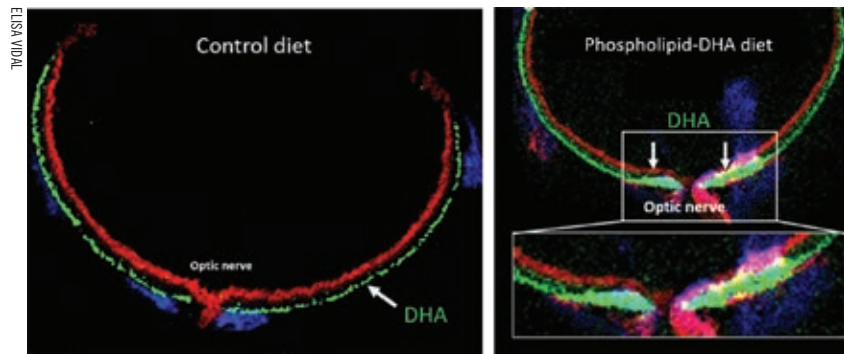
By Jaclyn Brennan

Our eyes are rich in fatty acids that help the retina receive, convert and send light signals to the brain. Healthy ocular fatty acid content relies on a diet rich in omega-3 long-chain polyunsaturated fatty acids, or LC-PUFAs, but guidelines for obtaining these dietary fats to maintain vision health remain controversial and incomplete.

To understand better how dietary omega-3 supplementation can modify the content of fatty acids in the retina, researchers at Louisiana State University and the Université Bourgogne Franche-Comté investigated how lipids and lipid metabolism intervene in the function and dysfunction of the retina. The results of their study are detailed in the **Journal of Lipid Research**.

The study began by looking at dietary guidelines in Western countries, which recommend consuming 500 mg of fatty acids per day to reduce the risk of developing age-related macular degeneration, or AMD, the most common cause of blindness in the elderly of developed countries. A diet rich in two key fatty acids — docosahexaenoic acid, or DHA, and eicosapentaenoic acid, or EPA — has been shown to be associated with a lower risk of AMD development, but the 500 mg per day recommendation does not take into account a number of key factors, according to the study's lead author, Elisa Vidal.

“This recommendation is not precise for the chemical forms or source of EPA and DHA in dietary supplements,” Vidal said, “despite the fact that the chemical form — aka,



Compared to a control diet, an omega-3 supplementary diet rich in phospholipids increases docosahexaenoic acid (green) content in the optic nerve.

phospholipids or triglycerides — can effectively influence bioavailability and distribution in retina.”

The creative collaboration between the Neuroscience Center of Excellence at LSU and the Eye and Nutrition Research Group in Dijon, France, afforded researchers the chance to investigate LC-PUFA changes that followed different omega-3 rich diets. The human body cannot make alpha linolenic acid, the precursor of EPA and DHA, and is inefficient at making these fatty acids. To investigate the effects of supplements, the researchers created experimental diets of five lipid blends using varying concentrations of both fish and plant oils (such as sunflower, palm, rapeseed and herring roe). Fed to rats, these different mixtures of EPA and DHA were analyzed after eight weeks for their uptake in rodent plasma, red blood cells and the retina.

“Using mass spectrometry molecular imaging and other approaches, we showed, for the first time that the content of fatty acids in the photoreceptor layer can indeed be modified by an omega-3 food supply,” Vidal said.

Holistically, this study unravels fundamental questions. In the rat, “EPA and DHA provided as dietary supplements can enhance DHA content in the retina and trigger changes in spatial organization of fatty acids in the outer retina,” Vidal said. This can help provide guidance on what sources of dietary fatty acids might be beneficial for preventing irreversible visual impairments.

The researchers next want to understand better the mechanisms regulating how fatty acids containing phospholipids or triglycerides travel — from oral uptake, through the digestive tract, and to the retina and retinal pigment epithelial cells. Molecular changes in the eyes are one thing, but functional consequences in the retina are crucial to prevent the effects of aging.

DOI: 10.1194/jlr.RA120001057

Jaclyn Brennan (jabrennan@gwmail.gwu.edu) is a post-doctoral researcher at George Washington University, where her research focuses on electrophysiology of the cardiac conduction system. Follow her on Twitter @jaclynb_phd



A mold's dangerous responses to its environment

By *Laurel Oldach*

Aflatoxins are among the most dangerous of natural products. At a high dose, the toxins can cause fatal liver failure; at lower doses, by forming adducts with guanine bases in DNA, they can cause mutations that lead to liver cancer.

The toxins are made by filamentous fungi in the *Aspergillus* family found in soil and are able to colonize the grains and seeds that constitute many of the world's most important food crops. *Aspergilli* don't need aflatoxins to survive; they activate aflatoxin synthesis in response to environmental conditions, especially heat and moisture. Since hotter days are coming worldwide, researchers would like to find strategies to reduce aflatoxin production.

The genome of *Aspergillus flavus*, the chief culprit in introducing aflatoxin to human and animal food supplies, first was sequenced in 2006. But there's a difference between knowing what sequences are in a genome and knowing what they do; many sections of the *A. flavus* genome have not been annotated, meaning that researchers have had little insight into their function.

In a recent article in the journal **Molecular & Cellular Proteomics**, researchers at the Fujian Agriculture and Forestry University in China, led by Mingkun Yang, report on a proteogenomic analysis of *A. flavus*. By using the whole fungal genome instead of only its known coding sequences as the reference database



JANICE HANEY CARR AND ROBERT SIMMONS

A scanning electron micrograph shows the fruiting body of an *Aspergillus* fungus.

to identify peptides detected through mass spectrometry, the team discovered over 700 new protein-coding genes.

“The authors provide a significant improvement to the genome annotation in *Aspergillus* and demonstrate the use of proteogenomics as a tool especially in organisms lacking high-quality genome annotations,” one anonymous peer reviewer wrote.

Researchers cultured the fungus under cold, salty and oxidative stress conditions to maximize phenotypic variability, and they were rewarded: The fungi expressed a smorgasbord of proteoforms, including over 200 new-to-science splice variants, some single-amino-acid variants and a few unexpected intergenic peptides. In follow-up quantitative PCR experiments, the researchers observed that stressful conditions substantially affected the expression of some of

the new genes.

Based on homology to other, better-annotated proteins in the literature, the authors think that they may have identified new metabolic enzymes, signaling proteins and stress response factors. They have not yet determined whether any of the new genes are involved in aflatoxin production.

According to the researchers, follow-up studies of the new protein-coding genes and when and where they are expressed may improve our understanding of when and why aflatoxin is produced.

DOI: 10.1074/mcp.RA120.002144

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From the journals

By Nuala Del Piccolo, Lisa Nicole Learman, Laurel Oldach & Anand Rao

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

ChIP-ing away at ChIP-Seq pain points

Chromatin immunoprecipitation followed by next-generation sequencing, or ChIP-Seq, is used widely to identify genomewide DNA binding sites and enrich chromatin modifications. Cheap and relatively easy to set up, ChIP-Seq has become a cornerstone of epigenetics research. For all its merits, however, researchers still haven't found an appropriate method for defining a quantitative scale for ChIP-Seq data analysis.

Bradley Dickson of the Van Andel Research Institute and collaborators determined that a commonly used method for comparing ChIP-Seq signal strength with external references — spike-in normalization — may be flawed, leading to inaccurate conclusions. To address this issue, the authors appealed to the physics exploited by ChIP-Seq to develop a physical model that produces a quantitative scale for ChIP-Seq result comparison. To test their model and demonstrate this scale, the researchers examined the impacts of an enhancer of zeste homolog 2, or EZH2, inhibitor using ChIP-Seq; their experimental results were predicted accurately by the model but not by conventional spike-in-based indications. The researchers also found a sensitivity issue in spike-in normalization practices that has not been considered in the literature. This, according to the au-

thors, places limitations on the utility and trustworthiness of certain spike-in normalization methods as well as published results utilizing them.

A paper recently published in the **Journal of Biological Chemistry** describes the authors' approach — called the sans-spike-in method for quantitative ChIP-sequencing, or siQ-ChIP — which may prompt changes in community practice of ChIP-Seq, data reporting and analysis.

DOI: [10.1074/jbc.RA120.015353](https://doi.org/10.1074/jbc.RA120.015353)

How adiponectin fights fatty plaques

The formation of fatty plaques in the arteries, called atherogenesis, can lead to problems such as heart attack, stroke or even death. Fat cells, called adipocytes, secrete a protein called adiponectin into the bloodstream, where it can block these fatty plaques from forming, but researchers do not yet know how adiponectin performs this protective function. In a recent study in the **Journal of Lipid Research**, investigator Akemi Kakino from Shinshu University and a team of Japanese researchers describe how adiponectin protects against atherogenesis by blocking the uptake of specific types of low-density lipoprotein, or LDL, that have atherogenic properties.

These atherogenic varieties, such as oxidized LDL and electronegative LDL, enter cells via scavenger receptors and trigger a cell signaling cascade that causes plaque formation. The researchers found that the more adiponectin there was in the cell culture medium, the less efficiently LDL could gain entry into the cells. The decrease in plaque-causing LDL

uptake led to lower levels of LDL-induced atherogenic signaling cascades. The authors used the same concentrations of adiponectin found in the human body, strongly supporting the idea that blocking atherogenic LDL uptake is a physiological function of the protein and not just something that occurs in artificial laboratory conditions. Overall, the results provide insights into how adiponectin protects us from developing fatty arteries and offer a new therapeutic target in the treatment of atherosclerosis-related diseases.

DOI: [10.1194/jlr.RA120000767](https://doi.org/10.1194/jlr.RA120000767)

How to keep Staph from sticking

Staphylococcus aureus, a bacterium that can cause pneumonia and heart infections, often adheres to skin, causing the blisters and abscesses known as staph infection. The adhesins that bind the bacteria to host skin ligands are a promising therapeutic target. However, researchers are unable to develop anti-adhesives without efficient methods for studying *S. aureus* adhesion.

In a recent paper published in the **Journal of Biological Chemistry**, Laurene E. Petrie and colleagues at the University of Guelph describe how they developed and validated a high-throughput assay that enables the large-scale profiling of *S. aureus* adhesion to host ligands. The authors profiled a sequence-defined *S. aureus* transposon mutant library, identifying mutants that had reduced adhesion to the human-derived extracellular matrix molecules fibronectin, keratin and fibrinogen. To compare

Gastric bypass affects microRNA production

Over one-third of people in the United States are obese, putting them at increased risk for heart disease, stroke, diabetes and certain cancers. Bariatric surgeries, procedures performed on the stomach or intestines to induce weight loss, can help these individuals lose weight. The most commonly performed weight loss surgery, a gastric bypass, creates a small pouch from the stomach that connects directly to the small intestine. After the surgery, the usable portion of the stomach is very small, limiting the amount a person can eat. In addition, swallowed food bypasses most of the stomach and some of the small intestine, causing less food to be absorbed.

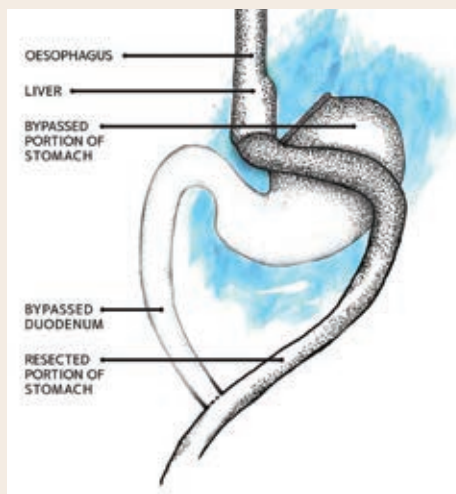
Even before they lose weight, patients' metabolic and cardiovascular systems function better after the surgery. Jan Hoong Ho at the University of Manchester and a team of British and Australian researchers have discovered how high-density lipoprotein, or HDL, the so-called "good cholesterol," might be involved in this phenomenon.

Lipoproteins are small particles that carry cholesterol, other lipids, proteins and nucleic acid cargo between cells. HDL is considered helpful because it transports cholesterol out of tissues and to the liver, where it can be neutralized. However, researchers do not yet understand exactly how HDL controls the removal of cholesterol from tissues. Recently, researchers have found that HDL particles can carry microRNAs, short RNAs that impede the expression of genes. In a recent study in the **Journal of Lipid Research**, Ho and colleagues demonstrate that the microRNAs within HDL particles may confer the protective effects of gastric bypass.

The group showed that HDL's cholesterol efflux capacity is improved after gastric bypass, independent of weight loss, and that this improved function correlates with the levels of certain microRNAs within the HDL particle. The discovery of microRNAs that regulate the removal of cholesterol from tissues gives researchers a potential therapeutic avenue in the treatment of obesity and metabolic disorders.

DOI: 10.1194/jlr.RA120000963

— Lisa Learman



During a gastric bypass surgery, the top portion of the stomach is made into a small pouch and connected directly to the small intestine, a process that decreases nutrient absorption and eventually leads to weight loss.

the genetic requirements of adhesion to each host ligand, the researchers generated an *S. aureus* genetic adhesion network, which identified a core gene set involved in adhesion to all three host ligands, as well as unique genetic signatures.

With the new assay, researchers can do high-throughput screens capable of identifying new anti-adhesives.

DOI: 10.1074/jbc.RA120.015360

Unraveling a cancer stem cell inhibitor

Much like healthy stem cells, cancer stem cells are capable of self-renewal, dormancy and generation of multiple tissue-specific cell types. Since they maintain malignant tumors instead of healthy tissue, they are an enticing but elusive therapeutic target. Recent studies identified a small molecule — napabucasin — that inhibits cancer stem cell activity. Researchers hypothesize that napabucasin targets the Stat3 signaling pathway, which regulates wound healing, tissue integrity and tumor proliferation. However, they have not yet characterized the drug's precise mechanism of action.

A new study in **Molecular & Cellular Proteomics** examines protein–drug interactions following napabucasin treatment in zebrafish. Led by Niels Leijten from Utrecht University and Petra Bakker from the Hubrecht Institute, the authors analyzed the whole organism using thermal proteome profiling. With this new technique, they identified binding events — for example, of a protein to a drug — through changes in the thermostability of folded protein structures. The researchers found that napabucasin activates aldehyde dehydrogenases, a class of enzymes responsible for metabolism of vital biomolecules including the morphogen retinoic acid, but does not change Stat3 signaling. They plan

to explore further the relationship between napabucasin, aldehyde dehydrogenase activity and cancer stem cell viability in future experiments.

DOI: 10.1074/mcp.RA120.002273

Ceramide anchors cilia proteins

Cellular cilia depend on an axle-and-spoke arrangement of microtubules for structural integrity, meaning that to generate cilia, a cell must synchronize microtubule and membrane extension. The plasma membrane lipid ceramide regulates the length of cilia and transport along growing cilia, but researchers have been uncertain of how ceramide concentration is sensed.

In a recent article in the **Journal of Lipid Research**, Priyanka Tripathi and a team from the University of Kentucky report that lipid modification of cysteine residues on a microtubule protein allows direct binding to ceramide in the membrane. Microtubules are made up of two subunits, alpha tubulin and beta tubulin, each of which can be post-translationally modified. A subset of acetylated alpha tubulin is palmitoylated, and the researchers showed using immunoprecipitation and fluorescence microscopy that palmitoylation allows tubulin to bind to ceramide. It also helps tubulin recruit a GTPase involved in protein transport into the cilia.

The authors report that the interaction between ceramide and palmitoyl-tubulin is required for new cilia to form in human-derived neural progenitor cells, where they eventually mature into dendrites and axons. The interaction is also necessary for a distantly related eukaryotic algae to grow flagella.

DOI: 10.1194/jlr.RA120001190

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Ataxin-2 to RNA's rescue

Spinocerebellar ataxia type II, or SCA2 — a hereditary neurological disorder characterized by the progressive loss of muscle control — is among the most common forms of spinocerebellar ataxias. Individuals with SCA2 first experience problems with coordination and balance, speech, swallowing, and eye control. Over time, symptoms also include weakness in limbs, muscle wasting, uncontrolled muscle tensing and involuntary jerking movements. People diagnosed with SCA2 often survive only 10 to 20 years after showing initial symptoms.

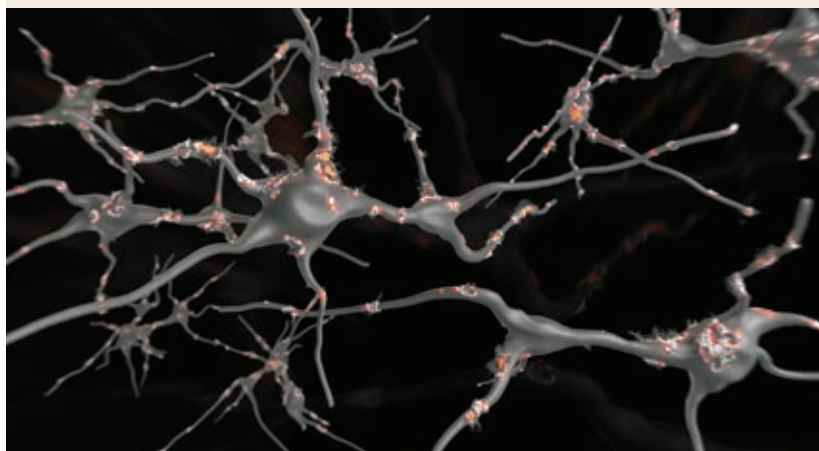
Nearly 25 years ago, researchers identified the root genetic cause of SCA2 as mutations in the Ataxin-2 gene. Ataxin-2, a cytoplasmic protein that binds and stabilizes a number of mRNA sequences and is expressed widely throughout the brain, is involved in several translation-related processes including the regulation of RNA stability/translation, suppression of harmful R-loop formation, involvement in cellular stress response, and germline and circadian rhythm formation. However, researchers have not yet uncovered the direct role of Ataxin-2 in translation.

Polyadenylation is an important feature in the pre-processing of mRNA. It refers to the addition of multiple adenosine monophosphate to an RNA transcript, creating what is known as a poly(A) tail. Using transcriptional pulse chase analyses, Hiroto Inagaki of Nagoya City University and colleagues found that Ataxin-2 promotes post-transcriptional polyadenylation of its target mRNAs. The researchers also conducted a polysome profile analysis, providing direct evidence that Ataxin-2 enhances translation of its target mRNAs. By doing so, Ataxin-2 stabilizes the RNA molecule, preventing its degradation.

The researchers describe this work in a recent paper in the **Journal of Biological Chemistry**. They believe their findings show new ways that Ataxin-2 may be involved in the pathological processes of not just SCA2 but also amyotrophic lateral sclerosis and other neurodegenerative diseases.

DOI: 10.1074/jbc.RA120.013835

— Anand Rao

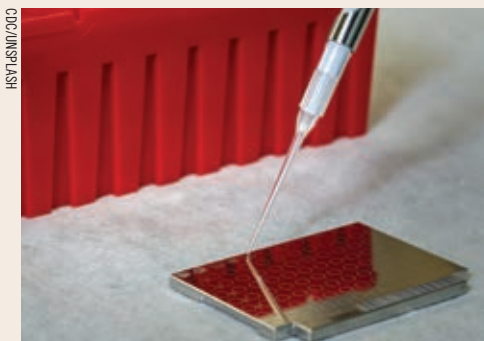


Noninvasive tool provides oral cancer prognosis

Oral squamous cell carcinoma, which affects about 34,000 people in the U.S. each year, is found in the cells lining the lips and mouth. Metastasis to the lymph nodes is a sign of disease progression and may be accompanied by changes in proteolytic activity. During proteolysis, enzymes cut up proteins into short fragments called peptides. Recent work suggests that characterizing the sequence and abundance of these molecules — a method dubbed peptidomics — might provide new insight on cancer biology and in the clinic. In a recent paper in the journal **Molecular & Cellular Proteomics**, Leandro Xavier Neves of the Brazilian Biosciences National Laboratory and a team of Brazilian clinicians and scientists describe their analysis of oral squamous cell carcinoma patient saliva using peptidomics.

After extracting peptides from saliva samples, the research team analyzed and compared the peptide content in samples from patients with and without metastasis to the lymph nodes. They found more than 1,000 uniquely expressed peptides in each group and an additional 1,628 peptides expressed by both groups. A series of statistical analyses identified 77 peptides of particular interest; all of these peptides are overexpressed in samples from patients with lymph node metastasis, which supports the hypothesis that proteolytic activity increases in metastatic disease. Ten of these peptides also correlated with clinical features of metastatic tumors. The researchers used a panel measuring the abundance of five peptides to classify patients according to metastatic state.

To predict which enzymes generated this distinctive saliva peptidome, the team compared the sequences of peptides and full-length proteins to identify the most common cleavage sites. Many of the predicted enzymes are associated with the lysosome or vacuole, linked to immunity or present in the oral microbiome. They then examined the expression



Peptidomics analyses of saliva samples from oral squamous cell carcinoma patients correlate with disease metastasis. The technique may be a useful noninvasive prognostic tool.

squamous cell carcinoma may be useful for patient prognosis.

DOI: 10.1074/mcp.RA120.002227

of these enzymes in publicly available oral squamous cell carcinoma tissue data. This analysis showed that enhanced expression of enzymes — but not the proteins they target — associates with metastasis and reduced survival, further bolstering the link between proteolytic activity and disease progression.

Together, these analyses of proteolysis in oral

— Nuala Del Piccolo

CONTINUED FROM PAGE 25

Discovering an old DoG_s' new trick

Heterotrimeric G proteins regulate a variety of signaling pathways that control cell development and influence cell morphology via actin/cytoskeleton remodeling. There are four main families of G proteins: G_i/G_o, G_q, G_s and G_{12/13}. Researchers long have thought that G_s, unlike its family members, is coupled specifically and exclusively to adenylyl cyclases.

In a new study published in the **Journal of Biological Chemistry**, Alejandro Castillo-Kaulil of the Center for Research and Advanced Studies of the National Polytechnic Institute and collaborators challenge this dogmatic view by identifying a new G_s target. Using biochemical, molecular biological and chemogenetic approaches, the researchers demonstrated that the Gas subfamily of G proteins can regulate the activity of Rho GTPases such as Rho guanine nucleotide exchange factor, or Rho-GEF. The interaction identified by the group activates the small G protein Cdc42 by G_s-coupled GPCRs, stimulating a rearrangement of the cytoskeleton and inducing formation of fingerlike protrusions called filopodia.

These results provide new insight into G protein activity and define a new role for RhoGEF coupling in G protein function.

DOI: 10.1074/jbc.AC120.015204

A pathogen's proteins target mitochondria

The tick-borne pathogen *Coxiella burnetii* causes Q fever, or query fever, a rare flulike disease that can spread to humans who inhale dust particles contaminated by infected farm or

domestic animals. When *C. burnetii* infects a human macrophage, it transfers as many as 150 effector proteins into the host cell. Researchers know these proteins change the host's physiology to support the infection. However, they know little about the contributions of the individual effector proteins, partly due to their diversity and scarcity.

Laura Fielden and colleagues at the University of Melbourne hypothesized that *C. burnetii* effector proteins target the mitochondria — known as the powerhouse of the cell — because that organelle is crucial in cellular homeostasis. To test this, the team isolated mitochondria from human macrophages infected with *C. burnetii* and analyzed the proteins using high-sensitivity mass spectrometry.

The team's recent paper in the journal **Molecular & Cellular Proteomics** identified seven *C. burnetii* proteins associated with the mitochondria, including two not previously found in the organelle. They found that one of these effector proteins, MceC, moves to the inner mitochondrial membrane and interacts with mitochondrial proteins involved in quality control and metabolic function.

This study presents an adaptable method for characterizing the contributions of a pathogen's effector proteins.

DOI: [10.1074/mcp.RA120.002370](https://doi.org/10.1074/mcp.RA120.002370)

Pinpointing therapies in PAK pathways

The serine/threonine kinase P21-activated kinase-1, or PAK1, influences cancer-related biological processes such as cell migration, invasion and angiogenesis. However, researchers have not completely delineated the network of signaling

molecules linked to PAK1.

Jae-Hong Kim of Kyungpook National University and a team of international collaborators used genetic transformation screens, RNAi, pharmacological inhibition and migration assays to characterize PAK1-mediated signal transduction pathways thoroughly. The researchers selected 19 candidate PAK1 genetic interactions that had human orthologs and were expressed in glioma for further examination in mammalian cells, brain slice cultures and orthotopic glioma models. RNAi and pharmacological inhibition of potential PAK1 interactors confirmed the importance of several genes related to the mitotic spindle, proteolysis, autophagy and metabolism in PAK1-mediated glioma cell migration, drug resistance and proliferation.

These results, published in the **Journal of Biological Chemistry**, provide a comprehensive view of PAK1-mediated signal transduction pathways and identify new drug targets for glioma therapy.

DOI: [10.1074/jbc.RA120.014831](https://doi.org/10.1074/jbc.RA120.014831)

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Can urban universities be better neighbors?

By Laurel Oldach

Davian Baldwin began studying universities' impact on their neighborhoods two decades ago, when he stumbled across a case study in real time at the University of Chicago, where he was visiting as a junior professor to do archival research. After a day in the university's research library, he went outside and found a protest underway.

"The university was in the process of taking a historic blues club in the historically Black community of Bronzeville ... and moving it to the campus neighborhood of Hyde Park," Baldwin said. Local activists were in the process of objecting.

The Checkerboard Lounge did end up moving to Hyde Park and stayed open there for a dozen years before closing in 2015. For Baldwin, now a professor at Trinity College, the story kindled a long-standing academic interest. "I found out that this was just the tip of the iceberg of the ways that the University of Chicago had control of the South Side," he said. "They were the biggest employer; they were the largest health care provider; they were the largest landholder on the South Side; and they were the biggest policer."

With the decline of manufacturing, universities have become a significant economic force in many cities. According to one estimate, 11% of jobs in American cities today are at universities and hospitals, sometimes called "eds and meds."

"Universities are among the most powerful institutions in advanced society," said Ira Harkavy, an associate vice president and founding director of the Netter Center for Community Partnerships at the University of Pennsylvania. As such, Harkavy and many colleagues see an ethical imperative for universities to do more to contribute to their local communities. The idea has caught on in academic administration; dubbed the anchor movement, this approach to managing the business of running a university also takes the community into account.



Chicago's Checkerboard Lounge in 2003, before it was moved to Hyde Park.

DISCOSOUR/FILICOR

LEFT: GELARERI VINDEZA | RIGHT: FILICOR, ELLI POISSON

The defensive moat strategy

In some ways the conflict between town and gown is as old as universities. The expression comes from traditional attire in Europe, where students were required to attend lectures in capes and mortarboards that set them apart from neighbors not affiliated with the university.

The divide remains apparent, minus the quaint costumes, in many U.S. universities today. At urban campuses and medical centers in cities like Philadelphia, Chicago and Baltimore, badge-wearing students and staff board free, liveried campus shuttles while nonaffiliated residents wait for the city bus. Campus security guards are posted at building entrances or on street corners. University staff and students are disproportionately white and Asian, while the people who live in nearby neighborhoods are disproportionately Latino and Black.

In the early 2000s, not long before Davarian Baldwin stumbled across the Checkerboard Lounge protest, Charles Rutheiser began working with the Annie E. Casey Foundation, a

large philanthropy that works to improve life for American children and youth. The foundation was looking to data-informed approaches to expand opportunity for young people growing up in poor urban neighborhoods. When Rutheiser and his colleagues visited grant sites, they noticed a striking pattern.

“In many of those distressed, disinvested communities, there was either a university or a hospital, or sometimes both, located either smack dab in the middle or immediately adjacent to the community — but for all intents and purposes, that institution might have been on Mars,” Rutheiser, who is now a senior associate at Casey, said.

As American cities struggled with shrinking populations, job loss, poverty, crime and disinvestment through the mid-20th century, both Baldwin and Rutheiser said, universities were ill-equipped to pick up and leave. Instead, they adopted a bunker mentality that lingered for decades. “As I witnessed firsthand in Baltimore during the 1980s and 1990s, this defensive posture ... generated deep mistrust, hostility and conflict between institutions and communities,” Rutheiser said.

Tragedy reoriented one elite university away from trying to shut out the city and its many problems. At the University of Pennsylvania in the mid-1990s, Rutheiser said, increasing crime near campus that culminated in the murder of a graduate student “led the university to rethink whether it should be in West Philly at all.”

Penn leaders “realized that current business as usual was just not sustainable, that the defensive moat strategy was not working,” Rutheiser said. “The institution made a commitment: No, we’re going to stay, and we’re going to make a renewed effort,” both to integrate with the community in

The University of Pennsylvania, shown here, launched a center for community engagement in 1992.



West Philadelphia and to improve the neighborhood.

“Why do universities exist? They exist to improve the world,” Har-kavy said, adding that the ethical obligation to alleviate community suffering is stronger given universities’ nonprofit status. “Whatever we have done has, in my judgment, been significantly insufficient given the state of our world and the state of our community.” The center for community engagement that he leads was founded in 1992 as part of Penn’s effort, which also involved significant investments in neighborhood safety, affordable housing and a few local schools.

“The University of Pennsylvania, in doing it, actually showed it could be done,” Rutheiser said.

Anchoring neighborhoods

The idea of a university as an anchor for its community — as department stores used to anchor shopping malls — started at the fringes of academia in the early 2000s, supported initially by philanthropic investment from the Annie E. Casey Foundation. Over time, the term has become widespread in university administrative circles, mentioned in reports from the Obama administration’s Department of Housing and Urban Development and cited as a key strategy in a National Academies of Sciences, Engineering and Medicine report on improving health disparities. A dominant model for how an institution can benefit its community has emerged, focusing on how a university’s corporate functions might be localized.

“It really centered on the areas of hiring and purchasing,” said Bobbie Laur, executive director of the Coalition of Urban and Metropolitan Universities, or CUMU, about how the anchor institution concept took



shape. “Universities are doing all this work in communities — but who are they hiring for their jobs? And where are they purchasing their goods from? Once we took a look at that, we realized there was a lot of improvement that could be done.”

Alyssa Berman-Cutler, executive director of community development in the University of Chicago’s Office of Community Engagement, runs the university’s anchor initiative. “We think about our anchor mission work ... as how we leverage our role as a large employer and large purchaser on the South Side (of Chicago) to be a good partner in community economic development,” she said.

Historically, in communities around the university, she said, “There was definitely a sense that the university was a little bit Other: that we might have been their neighbor, but we weren’t really part of the community.”

Six years ago, the university launched an effort called UChicago Local, which aims to hire more people from and purchase more from companies located in nine neighborhoods around the

Boarded-up commercial buildings in Chicago’s Englewood neighborhood, one of the neighborhoods near University of Chicago’s campus that it has prioritized for investment.

The idea of a university as an anchor for its community — as department stores used to anchor shopping malls — started at the fringes of academia in the early 2000s, supported initially by philanthropic investment from the Annie E. Casey Foundation.



CAMILLO JYERGARA

An intersection several blocks south of the University of Chicago’s campus, in the Woodlawn neighborhood, shown in 2019.

university’s campus. With hire-local, buy-local and live-local components, the program maps directly onto the priorities that the CUMU initiative espouses. At least one other university, Johns Hopkins, has a program similar in scope and design, and many more have local hiring or procurement initiatives.

With more than 15,000 employees, the University of Chicago is the seventh-largest employer in the city. About 30% of its faculty and staff live in the nine priority neighborhoods; Berman–Cutler said the program aims to raise that to 40%. Her office encourages hiring managers to identify and interview local job applicants, work with nearby job-training and placement organizations, and talk to community groups to identify barriers to employment.

For example, a background check is part of the hiring process for all employees. The university does not automatically disqualify candidates with criminal records, instead considering each case individually, but Berman–Cutler said she learned

from community leaders that former offenders may view the check as a sign that it isn’t worth their time to apply. There, she said, is an opportunity for better communication.

The university also seeks to buy from local businesses and writes into contracts that a certain percentage of subcontractors must be locally owned. Food and transportation purchasing are especially suited to local procurement. Still, “It can’t be charity,” Berman–Cutler said. Except in a few cases where a business’s mission clearly aligns with the university’s social mission — she cited a biodegradable cutlery company with a strong training program in manufacturing — local vendors must offer competitive pricing.

According to CUMU’s Laur, helping small companies scale up and compete is part of many universities’ anchor missions. “In order for a small vendor to support such a large institution, they need to have the business practices in place to be able to do so,” she said. That could include bookkeeping, accounting and billing, or it could involve business planning. “Many of our members have been working for years to support programs that help build that capacity and help smaller ventures within our cities to be competitive.”

The third arm of UChicago Local, the live-local program, envisions university staff and faculty as residents of the communities surrounding the campus. The university offers forgivable loans to help university employees purchase homes in those neighborhoods.

“I’m a community-development professional first,” said Berman–Cutler, who spent 10 years at the non-profit Uptown United before coming to the University of Chicago. “I feel like this is an incredibly impactful way to do that work.”

Alex Goldenberg, the director of a community organizing group called Southside Together Organizing for Power based in Chicago's Woodlawn neighborhood, has watched the university's relationship with its neighbors change since he came to the city in 2002, when he said that the university had a "history of being extremely closed off and really not engaging at all with its neighbors. ... I've seen it move from that to (saying), 'No, we want to engage with our surroundings in a more meaningful way.'"

He credits strong leadership in the university's civic engagement office for the changes and noted that hiring organizers like Berman-Cutler who are expert at building relationships has been an important part of the program's success. Goldenberg said the university's procurement work is especially impactful. "In the science library, the coffee shop is owned by a local South Side operator, which when I first came to the university was unheard of — just not the kind of thing that happened."

Still, Goldenberg said, he feels that the university should do more. "While it's good, it still pales in comparison to what would be needed to truly address the decades of systemic disinvestment, displacement and destabilizing impacts that the university has had on the community."

Fraught histories weigh on the present

"People's past history and experience of each other, and each other's institutions, also informs how they show up and what they expect and what they suspect of each other," Rutheiser said.

Building trust is a delicate business. Ryan Petteway is an assistant professor of public health at Portland State

University studying the role of location in health. Before he moved to Oregon, he spent a few years working for the Baltimore health department.

It troubled Petteway that the department's headquarters was across the street from a public housing development but completely disengaged from it. "I grew up in public housing myself," he said. "I've always known no one gives a shit about us."

To counter the impression of uncaring institutions, Petteway went door to door to meet the public whose health he was working to improve. During one of these walks, he and a local public housing resident got to talking about Johns Hopkins, whose medical campus was just a block or two away. The resident's comments were "a shared sentiment for pretty much everyone I talked to," Petteway said.

"If they had a working relationship, where Hopkins was somehow supporting their organization with a grant, it was kind of like, 'OK, we'll get along because you're providing resources.' Outside of that I didn't talk to anybody in these communities that thought highly of Hopkins at

It troubled Petteway that the department's headquarters were across the street from a public housing development but completely disengaged from it.

Baltimore's Douglas Homes public housing project, where Ryan Petteway went door-to-door to canvass residents. The development is across the street from the Johns Hopkins Medical Center.



CELARENH VINDIEZA

Slavery and reparations

In addition to efforts to build wealth in surrounding neighborhoods, some universities are reckoning with their own history of the severest racial inequity: holding slaves.

American studies professor Davarian Baldwin credits Ruth Simmons, former president of Brown University, for bringing attention to this academic history. “In 2003, when she said ... ‘we’re going to grapple with our roots in slavery,’ that was huge, that was heroic, and people thought that she was crazy,” he said. Today, dozens of universities in the U.S., Canada and the U.K. belong to a coalition called Universities Studying Slavery.

Scholars recently found census documents from 1850 proving that Johns Hopkins, the founder of the eponymous university, counted at least four people as his property. The find disproved a popular belief that Hopkins, and his parents before him, were avid abolitionists. The discovery was part of a historical examination project called the Hopkins Retrospective, launched in 2013, that aimed to reexamine the university’s history. The news was released with an earnest open letter from the presidents of the university, medical school and hospital, promising to reckon with the finding and why the university accepted the story of Hopkins as abolitionist without question for so long. They also promised to join the Universities Studying Slavery.

Georgetown University — which sold 270 people in 1838 to raise funds — formally apologized in 2017. By way of making reparations, the school has offered since 2016 legacy consideration for admission to anyone descended from one of the people the university sold.



Johns Hopkins

all ... there’s a community awareness of the harms that Hopkins had done historically and a sense of the harms they’re doing right now.”

Along that walk, he said, looking down a street from the housing project toward campus, he saw a hiring ad for new security guards, clearly designed to be seen by passersby. It might have been a university effort to offer employment opportunities to local residents: advertising entry-level jobs close to home for disadvantaged potential applicants. To Petteway, it read very differently. “If you want to come on this campus, the only way you can come on this campus is if you’re one of our sentinels,” he said.

“That was my read of that context.”

Rutheiser said that things have changed at Hopkins in the past 10 years. University leaders have worked to redress some specific historical harms, for example, launching twice-annual symposia commemorating Henrietta Lacks, a Black cancer patient whose cells, taken without consent at Hopkins in 1951, became the immortal HeLa cell line, and offering full scholarships for high-performing graduates of Baltimore city schools.

In Petteway’s experience of conversations about inequality, he said, “It’s always about going forward and how we can build equity and justice ... and not thinking about how we can repair harms in the past.” Later he added, “If whatever is happening is not done from a restorative-justice perspective, then I don’t think it’s realistic for us to expect any real change in the level of rapport and trust.”

Not all aboard

Not all academic administrators like the anchor movement.

“There are some institutions that have been completely immune to this,” Rutheiser said, citing Columbia University in New York as an example. Some universities, he said, consider local community service ancillary to their key constituents and their mission of teaching and research. “They serve their students, their staff, science as a whole, and so forth, and not the people living across the street.”

Harkavy, too, said he has seen “fear of a kind of mission drift” when trying to persuade colleagues to invest substantial resources locally. “Universities feel that they’re doing (beneficial) things, and they don’t often see how doing this more centrally fulfills their mission.”

Even if a university leader supports

an anchor mission in principle, it can be challenging to execute. Academia is known for its inertia and fondness for tradition. A case study published in the journal *Higher Education Policy* found that research faculty incentives are not well aligned with community benefits. Universities are decentralized, and different orientations toward the community across departments and units can make for a complex overall picture. Finally, while counting changes in employee or vendor locations may be straightforward, measuring the impact of a community-oriented mission on a local economy or population subject to hundreds of other factors can be very difficult.

For some leaders in academia, seeing institutions launch anchor commitments, and seeing such commitments as prestige projects, has been compelling, Rutheiser said. The Carnegie Foundation for the Advancement of Teaching, which developed the widely used classification system for colleges based on size, research activity and highest degree conferred, has launched a special classification to recognize institutions with strong community commitments.

Compulsory vs. voluntary contributions

The University of Pennsylvania was an early adopter and an important front-runner in the anchor institution movement. Yet, in the past year, the university has been deeply embattled over what it owes its community.

“Universities are identified as an inherent public good ... because they provide services to their cities or their communities that would normally have to be procured by the government,” Davarian Baldwin, the American studies scholar who recently has published a book on university-city

MAX COHEN / THE DAILY PENNSYLVANIAN



relations, said. Thanks to this classification in the tax code, universities generally do not pay property taxes on what they own, despite some being major urban landholders. Baldwin and some others argue that this, in effect, robs cities of revenue, especially when universities lease property to for-profit businesses.

Partly in response to such critiques, many universities make voluntary contributions to their city governments known as payments in lieu of taxes, or PILOTs. PILOTs are assessed as a portion of the taxes that would be owed on the property universities hold, and institutions can write off services that provide social good. In the 1990s, when Philadelphia was on the brink of bankruptcy, Penn, like many nonprofits, contributed in the form of PILOTs. But later the university dropped the practice.

In recent years, university students and school-based community groups in Philadelphia, led by the nonprofit Jobs with Justice, campaigned to get the university to return to the

Participants in a 2018 protest in support of PILOTs outside of the University of Pennsylvania’s Ben Franklin College Hall.

Many universities make voluntary contributions to their city governments known as payments in lieu of taxes, or PILOTs. PILOTs are assessed as a portion of the taxes that would be owed on the property universities hold, and institutions can write off services that provide social good.

Penn donated \$250,000 to support businesses near its campus; Hopkins gave over \$2 million; and the University of Chicago contracted with local caterers and with its own food service staff to coordinate a food-distribution program in the early months of the pandemic.

practice. A Penn spokesperson told the student newspaper last summer that the university's contributions to school programs and financial contributions to two schools outweighed what it might do with PILOTs. (The paper reported that the school district had received about \$861,000 from the university in cash assistance the prior year.)

In 2020, with a new push by activists, a group of staff and faculty launched a petition called Penn for PILOTs. The organization calculated that if the university were to pay 40% of the property tax rate on the land it owns, the annual total would be \$40 million, or about 0.35% of the university's annual revenues. (If passed through directly to the school system, the sum would represent a 2.5% increase in funding from the local government, which covers about half of the system's annual operating expenses.)

The petition happened to launch just weeks before George Floyd's murder sparked a national wave of social-justice activism. It was signed by more than 1,100 faculty and staff.

"The two really came together," said Mary Summers, one of the faculty members who organized the Penn for PILOTs campaign. "I remember one faculty person said, 'A man kneeling on someone's neck for eight minutes is a clear example of racism. But so is a child that's not learning to read in an underfunded, overcrowded school with lead and asbestos.'"

In November, Penn pledged to donate \$100 million over 10 years to remove asbestos and lead from Philadelphia public schools. It wasn't what Penn for PILOTs was asking for, but it was a significant investment. Summers said, "We see it as a first step," adding she felt certain the pressure activists put on the university had a real impact.

Pep Marie, a lifelong Philadelphia resident and activist who co-led the Pay Your Fair Share movement with a parents' organization called Philly SUN, was not impressed by the gift. "I think UPENN likes to position itself as a savior to Philly," she wrote in an email, "by providing a lot of resources no one asked for instead of paying their taxes or responding to asks from school communities."

Summers traced a connection between the anchor movement and how universities contribute to their cities' bottom lines. "The idea of calling them anchor institutions is saying, 'The cities lost ... their factories; now they can depend on universities and medical centers.' But if that's what this new economy is going to look like, these big institutions ... have to support the public institutions that everybody needs."

She anticipates that growing political pressure — such as a bill in the Pennsylvania state legislature that would exempt nonpublic buildings such as dormitories and gyms from the public good classification — might incentivize universities to pay PILOTs eventually.

Harkavy said he sees PILOTs as very far from a settled question in Penn's ongoing effort to support its community. "It's one of a number of activities that are on the table, in terms of 'What should institutions do?'"

A tumultuous year

Laur expects the Black Lives Matter movement to prompt greater investment in anchor work. "Layering in anti-racism and trying to think about trying to address systemic inequities has always been a part of what we've talked about."

Meanwhile, universities face difficult financial decisions. A November

headline in the Chronicle of Higher Education read, “Colleges have shed a tenth of their employees since the pandemic began.” Student enrollment has dropped, and revenues have followed. Some institutions have frozen hiring during the pandemic, and procurement is paused with many students living off campus and many staff working from home.

If universities are in crisis, their cities may be even worse off. According to a recent estimate, 12 million Americans are behind on rent by an average of almost \$6,000, and close to half of almost 9 million renters surveyed expected to be evicted within months. Businesses have closed, homicides have increased, and, for many children, education has been disrupted for close to a year. All this in addition to the psychological impacts of a year of isolation raises deeply concerning questions about the future.

Community-engagement offices at major universities have helped out as they can. Laur said that many universities in the anchor network have acted as trusted conveners during the pandemic, connecting individuals or schools in need of services to the government agencies or foundations that can help them. At the University of Chicago, Alyssa Berman–Cutler’s office has worked to support businesses with which they have relationships, offering them free marketing and administrative support in applying for loans and grants.

Then there’s direct support: Penn donated \$250,000 to support businesses near its campus; Hopkins gave over \$2 million; and the University of Chicago, in addition to making \$680,000 in grants, contracted with local caterers and with its own food service staff to co-

A kaleidoscopic movement

This article focuses on three large, private universities in majority-Black cities. These schools have a lot in common, including an outsized effect on their postindustrial cities’ economies, since each is among its city’s largest private employers. But they represent just one slice of the anchor movement.

“It’s not just the Hopkinses, UPenns and UChicagos of the world,” Charles Rutheiser of the Annie E. Casey Foundation said; smaller colleges with less substantial endowments, and in some cases large public universities, have also expressed anchor commitments.

As the concept has gained popularity, the number of institutions pursuing an anchor mission has grown. They’ve organized into several groups, including the Anchor Institutions Task Force, which includes libraries, hospitals and museums in addition to universities and colleges, and an anchor learning network run by the Coalition of Urban and Metropolitan Universities of about 30 universities. Those universities and colleges are diverse in location and size, including state and private universities and ranging in size from just 2,200 students at Wagner College in New York to almost 28,000 at California State University in Los Angeles.

“What really binds everybody together,” said Coalition of Urban and Metropolitan Universities executive Bobbie Laur, “is a clear commitment to place.”



ordinate a food-distribution program in the early months of the pandemic.

“It was a really nice win-win-win that we were able to stand up very quickly, in part because we had relationships with some of these businesses earlier on,” Berman–Cutler said.

Still, some projects have halted. In light of budget uncertainty, Chicago’s live-local forgivable loans for employee housing have been suspended, at least for 2021.

Laur said that she doubts the pandemic will end the anchor movement. “The university’s success is tied to the success of our cities,” she said. As such, she expects that even if the scale of hiring or purchasing at universities changes, the processes the anchor movement has inspired for hiring and

purchasing more equitably will stay in place.

The anchor movement addresses a number of complex problems that have yet to be resolved — and that Harkavy believes society must face. “If you look at the world today, at what the profound problems are ... issues like extreme inequality, social justice and racial justice, issues related to environmental degradation; these are issues that occur in their most sharp and clear form in America’s cities.”

Laurel Oldach (loldach@asbmb.org) is a science writer for the ASBMB. Follow her on Twitter @LaurelOld.



Securing space for Black women scientists in a crooked room

By Courtney Chandler

Kimberly Jackson noticed as a graduate student that when she attended scientific meetings, she was one of the only Black women in the room. She remembers feeling discouraged, but she also saw it as a challenge — one she's worked intentionally to address and change.

"I decided early on in my career that I didn't have to be the only Black woman in the room," she says. "I could bring other Black women with me into this space."

Jackson is now chair of the department of chemistry and biochemistry and director of the food studies program at Spelman College, a historically Black college for women in Atlanta, Georgia. In addition to her research on cancer therapeutics and drug discovery, she and her colleagues have worked hard to develop approaches that train and retain Black women in science, technology, engineering and math fields.

Jackson has written about how lasting discrimination and stereotypes have left the STEM space as a proverbial "crooked room" for women of color. They often are forced either to contort themselves in order to fit in an atmosphere in which their abilities are diminished or to decide to stand straight in a space that is disorienting, uncomfortable or both. In these unlevel environments, lack of opportunity and recognition diminishes women's achievements.

The data reflect this reality. Afri-



SPELMAN COLLEGE

As chair of the department of chemistry and biochemistry and director of the food studies program at Spelman College, Kimberly Jackson studies cancer therapeutics and drug discovery. A Fulbright Scholar, she also works with her colleagues to develop approaches that train and retain Black women in STEM fields.

can American women earned only 6.2% of all Ph.D. degrees granted to women in 2019. When looking at life sciences specifically, the total number of women earning Ph.D.s increased 12% from 2010 to 2019. Yet the number of female African Americans earning Ph.D.s in life sciences increased only 1% in the same time span. In fact, in several life science fields including marine biology, astrophysics, applied physics and neuropsychology, not a single doctorate went to an African American man or woman in 2019.

Spelman's success at righting the crooked room for its students is well documented. Spelman is a Department of Defense Center of Excellence for Minority Women in STEM and has been recognized by

the National Science Foundation as the leading producer of Black women who go on to earn doctorates in the sciences.

Jackson and others have published on practices they've identified that support the success of Black women in STEM, guiding the way for other colleges and institutions to follow. But Jackson doesn't think many institutions are using these resources — despite her work and Spelman students' success, she says she isn't seeing widespread impact.

"We should have more institutions knocking down Spelman's door to ask questions and listen about how to successfully make these changes, yet it hasn't happened," she said.

Instead, she sees institutions looking to Spelman not to emulate its

success but to feed off its student pool. Spelman prides itself on creating accomplished students who come from an encouraging environment. But the spaces they move to next are often not the same.

“Instead of re-engineering their environment to welcome our students, many of these institutions try to change (our students) as if they’re the deficit,” Jackson says, citing first-hand accounts she’s heard from past trainees and focus group data she’s collected. “We can produce wonderful students but if they go into a space where they’re not conformable, it can be extremely derailing.”

Life after Spelman

Alison Brown, program director at the National Heart, Lung and Blood Institute’s Division of Cardiovascular Sciences and a Spelman alumna, says her experience as an African American woman in STEM largely has been influenced by her environment. When she was pursuing a master’s degree at Columbia University, she said, she felt comfortable, partially due to the diversity of New York City. But as a Ph.D. at Tufts University in Boston, she had a different experience.

“I definitely experienced those moments of microaggressions when eye contact is avoided in meetings or where your competency or quality of work is questioned, especially during group projects,” Brown says. “Body language and responsiveness to ideas all play a role in feeling dismissed or diminished.”

She was the only African American Ph.D. student in the food policy and applied nutrition program, a field dominated by white women. She remembers one group project in particular where her idea to develop a nutrition intervention for dia-

COURTESY OF ALISON BROWN



Alison Brown received a 40 Under 40 Health Award from the National Minority Quality Forum in 2018 at the same time she was experiencing microaggressions in her Ph.D. program at Tufts University.

betics in a predominantly African American community in Boston was dismissed completely by classmates. Instead of conforming to their project ideas, she set out and completed the project on her own.

“Although I excelled in the project, it was hurtful, being dismissed and having to do the project completely by myself,” she said. “I had many experiences like that.”

Brown earned her Ph.D. in 2017, but many Black students in STEM still have similar experiences. Destiny Van, another Spelman alumna, now a second-year Ph.D. student in Cornell University’s biochemistry, molecular and cellular biology program, said it’s still difficult to find Black women represented in the STEM research community outside of historically Black institutions. Van says this lack of widespread representation can make it seem overwhelming to continue in a STEM career.

“It was an amazing experience to be surrounded by so many other Black woman-scientists (at Spelman) and live in a community where I did not have to question my worth because of my identity,” Van says. She credits Jackson with teaching her the importance of standing in her identity and confidently pursuing her future.

“The research community is slowly striving towards inclusion and diversity,” Van said. “But they are also struggling to maintain these students and assure they are in a safe space to not only strive for success but to speak up without fear.”

Strategies for change

In response to these lasting challenges, Jackson continues to identify strategies that can be used to create spaces where Black women in STEM can thrive. She’s writing a paper on how cohorting, in which programs or institutions accept at least two Black candidates together, can be used to help support women of color during their education or careers.

Mentor and mentee training is another institution-level change that could help provide a secure space for Black women. Mentors and mentees can get the tools they need to form mindful and productive relationships in many places, Jackson said, including the National Research Mentoring Network. The NRMN provides anti-racism and unconscious bias training modules, among others, that could help mentors ensure an inclusive environment for women of color.

Jackson hopes institutions that are committed to reengineering their STEM spaces to be inclusive and supportive of Black woman can look to Spelman as a guide

COURTESY OF DESTINY VAN



Destiny Van, a second-year Ph.D. student in Cornell University's biochemistry, molecular and cellular biology program, said it's still difficult to find Black women represented in the STEM research community outside of historically Black institutions.

“I think there needs to be re-hauling of the entire scientific enterprise. We need to change how people perceive what a scientist should look like and then make changes to support this diversity.”

KIMBERLY JACKSON

and partner. She thinks continued lines of communication between these institutions and Spelman can be critical to driving and sustaining change.

As an example, Jackson points to the Leadership Alliance, a consortium of colleges, universities and private institutions aimed at supporting underrepresented students during their education and research careers. As a member of the alliance, Spelman works to increase the readiness and competitiveness of its scholars as they enter careers in the biomedical workforce.

These focused efforts will be critical, but Jackson believes more global changes are needed to secure space fully for Black women in STEM.

“I think there needs to be re-hauling of the entire scientific enterprise,” she said. “We need to change how people perceive what a scientist should look like and then make changes to support this diversity.”

While a scientific overhaul is out of her hands, Jackson is optimistic

that the next generation of Black women will continue to advocate for their space in STEM.

“They speak up for themselves,” Jackson says. “My generation was a bit quieter and more reserved, but this generation is more expressive about their feelings and what they’re going through — they won’t hesitate to blast you on social media.”

Students can’t take on the burden of changing the STEM space on their own. Despite their advocacy and the efforts of Jackson and others, Spelman grads know work is still needed to right the crooked room permanently.

“We’ve moved the needle, but not far enough,” Brown said. “We still have a long way to go.”

Courtney Chandler

(courtneyc19@gmail.com) is a postdoctoral researcher at the department of biochemistry and molecular biology at the Johns Hopkins University School of Public Health and an industry careers columnist for ASBMB Today. Follow her on Twitter @CourtneyCPhD.



‘Every experiment and every breakthrough matters’

An interview with NYMC dean Marina K. Holz

By *Angela Hopp*

Marina K. Holz, a researcher and dean at New York Medical College, started her scientific career with her eye on cancer for both scientific and personal reasons.

As a Ph.D. student at Harvard Medical School, she studied the serine/threonine kinase mTOR. It regulates cell growth and, when its pathway goes awry, can contribute to tumor progression. At the same time, her mother was undergoing treatment, which ultimately failed, for breast cancer.

“Her experience created the desire for me to pursue this area of research and to focus on diseases that affect women,” Holz told NYMC’s annual Chironian Magazine in 2019.

So that’s what she did. Her first faculty position was at Yeshiva University in New York City. There, she built a lab that studied signaling pathways and growth factors in breast cancer.

Within a few years, however, the science led Holz in a new direction. She followed it from a disease that affects many to one that affects very few: the rare disease lymphangiomyomatosis, or LAM for short, a metastatic neoplasm that affects the lungs in women of childbearing age.

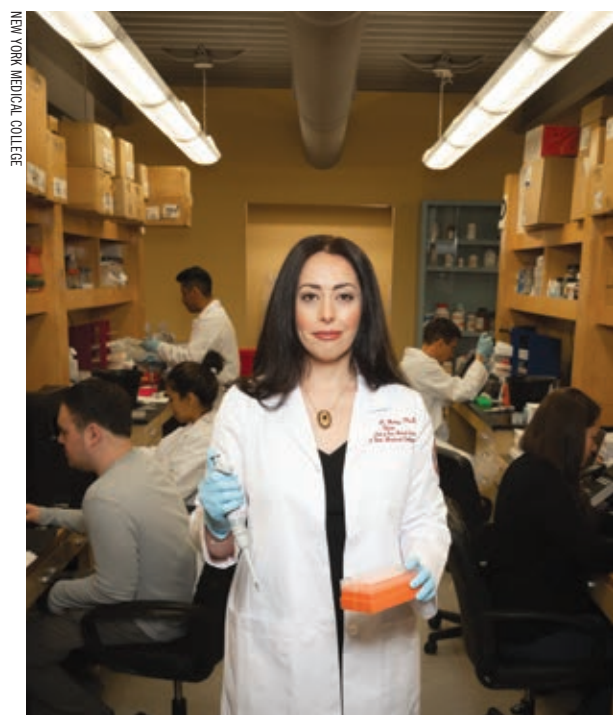
She has continued her studies of LAM at her new lab at NYMC, where she heads up the Graduate School of Basic Medical Sciences and directs its integrated Ph.D. program.

In observance of Rare Disease Day on Feb. 28, ASBMB Today talked to Holz about her work on therapies for LAM, one of which is being tested on a small number of patients, and with the LAM Foundation, which funds research and advocates for patients.

Q. Tell me a bit about your lab’s work.

A. My lab studies the mechanisms of cell growth and proliferation. We are specifically interested in the mTOR signaling pathway and its crosstalk with estrogen signaling. mTOR is a master regulator of cell growth and thus important for development and progression of several diseases.

Estrogen is a hormone that regulates reproductive functions and is crucial for the development of many diseases, such as breast cancer. We would like to uncover how the two pathways work in concert to regulate gene expression at the level of transcription as well as translation, fine-tuning the cellular responses in homeostasis and disease.



Marina K. Holz is dean of New York Medical College’s Graduate School of Basic Medical Sciences and directs its integrated Ph.D. program. She is a member of the American Society for Biochemistry and Molecular Biology’s Women in Biochemistry and Molecular Biology Committee.

“What specifically interested me about LAM was the obvious connection to estrogen, since the disease mainly manifests in women of childbearing age and is exacerbated during pregnancy. I felt that my lab could draw on many lessons from our breast cancer work to develop new insights into LAM.”

Q. How did you begin to get involved with rare disease research?

A. In the early 2000s, pioneering work of several labs, including John Blenis’, where I was doing my Ph.D., uncovered the connection between mTOR and a rare genetic disease called tuberous sclerosis complex, or TSC. (Editor’s note: Blenis moved from Harvard to Weill Cornell in 2014.)

Mutations in genes TSC1 or TSC2 lead to TSC, which causes benign tumors called hamartomas in many organs as well as central nervous system manifestations, including epilepsy and autism.

Some patients with TSC develop pulmonary lymphangiomyomatosis, a rare disease in which TSC1 or TSC2 mutations metastasize, causing cystic lung destruction. Pulmonary LAM is seen in 30% to 40% of adult TSC patients.

However, LAM can also arise sporadically in women with no history of TSC, and sporadic LAM affects women almost exclusively.

What specifically interested me about LAM was the obvious connection to estrogen, since the disease mainly manifests in women of childbearing age and is exacerbated during pregnancy. I felt that my lab could draw on many lessons from our breast cancer work to develop new insights into LAM.

Q. What’s life like for women with LAM?

A. The initial symptoms are ambiguous and include shortness of breath and bronchitislike symptoms, fatigue and chest pains, and some women experience pneumothoraxes. There is a progressive decline in lung function.

Many women require oxygen

supplementation quite soon, while others do not. The diversity in the disease progression is in itself an area of active investigation. For some, lung transplantation is eventually needed.

The decrease in the quality of life for women, who are usually diagnosed in their 20s to 40s, is devastating. Moreover, patients who require oxygen have to face rude behavior from strangers in public who assume that the harm is self-inflicted because of smoking.

Q. What are their treatment options?

A. TSC1/2 mutations cause abnormal activation of mTOR. The mTOR inhibitor sirolimus, an analog of the naturally derived agent called rapamycin, is approved by the Food and Drug Administration for the treatment of LAM.

The therapy strikingly stabilizes lung function and improves quality of life. So, while having any rare disease is an enormous health challenge, LAM is exceptional in the rare disease space because of the availability of a life-extending treatment.

Like many drugs, however, it is not without side effects, which include some immunosuppression, mouth sores, gastrointestinal issues, etc., and unfortunately some women either don’t tolerate it well or their disease still progresses while on the drug.

Q. You won a grant from the LAM Foundation in 2013, and that was the start of a long relationship with the organization. How did that play out?

A. I attended a LAM research symposium — LAMposium — to accept the award, and what was so remarkable about it was the prominent role and the participation of the patients, who



were an integral part of the event.

Sitting in sessions with these amazing women, who asked detailed and informed questions about the nitty-gritty of research, talking to them during meals and dancing with them at the gala crystallized for me something that I previously felt only intuitively: how much every experiment and every breakthrough matters to real people who depend on these advances to save their lives.

I went on to join the scientific advisory board of the LAM Foundation, which for the past 25 years has been funding research into LAM as well as engaging in patient advocacy and building a clinical care network in the U.S. and worldwide.

The efforts of the LAM Foundation have led not only to an FDA-approved treatment but also greater awareness of the disease in

the medical community, increasing the likelihood that women get proper diagnoses when they present with some of the ambiguous symptoms of LAM.

Q. The work you began with that one-year pilot grant led to clinical trials of a new combination treatment. Tell us about that.

A. This trial is led by Dr. Nishant Gupta, my wonderful collaborator at the University of Cincinnati.

It is built on preclinical work from my lab that showed that adding resveratrol, a naturally derived compound, to rapamycin (an mTOR inhibitor used for treatment of LAM), specifically causes death of TSC-deficient cells.

We hope that, unlike rapamycin, which stops disease progression but doesn't eradicate the TSC-mutant cells, with disease resuming upon ces-

Holz earned her bachelor's degree in microbiology and immunology at McGill University in Montreal in 2001 and her Ph.D. in cell and developmental biology at Harvard Medical School in 2006. Since 2018, she has been a professor of cell biology and anatomy and dean at New York Medical College.



NEW YORK MEDICAL COLLEGE

In 2013, Holz won the LAM Foundation's Pilot Award to study mTORC1 and S6K1 signaling in LAM and the connections between S6K1 and estrogen in LAM cells. She is shown here at the foundation's annual conference, known as the LAMposium, with patient and board member Edén Pontz.

sation of treatment, the combination would allow patients to stop treatment without disease progression.

This is a first trial in humans, and it's still ongoing, but some data should come soon.

Q. How has the COVID-19 pandemic affected your work at NYMC?

A. Like most institutions around the country, NYMC shuttered the research labs in March of 2020. We gradually reopened in May but are working at a slower pace due to our efforts to give space to researchers and reduce the time they have to spend together. I am really grateful to my team, who continue to do research despite the risks.

Q. How has the pandemic affected LAM patients or the foundation's work?

A. A highly infectious and deadly respiratory disease is a huge concern to patients who already have a lung disease. Some of the precautions like wearing masks are challenging for people who are on oxygen and struggle to breathe.

The LAM Foundation did an amazing job holding virtual educational events for patients as well as research symposia and even an online gala, which allowed it to fund a new slate of researchers for its 2020 grant cycle.

Q. Over the summer, you wrote an article for us about how the pandemic was affecting women in science. It was one of our most-read articles in 2020!

A. I am not a prolific writer, but I felt compelled to speak up, because right from the onset of the pandemic

I realized that the setback to women's careers was enormous and would have effects for years to follow. So I'm glad that this article was read and shared widely.

I feel strongly about advocating for women in science at all career levels, and I am proud to be part of the American Society for Biochemistry and Molecular Biology's Women in Biochemistry and Molecular Biology Committee, whose mission is to increase participation, visibility and status of women within the scientific community.

Q. Any final thoughts?

A. There is still much more to be done in understanding the origins of sporadic LAM, improving the quality of life of LAM patients and developing curative treatments, but hope is on the horizon.

I am also optimistic about the future of science in general. In the past year, we experienced great lows but also amazing highs — several Nobel prizes awarded to women and two vaccines approved for prevention of COVID-19.

Like most scientists, I miss my colleagues and the collaborations that are forged at conferences and breakthroughs that happen in institute hallways. But scientific work must go on, because there are real people who depend on us to deliver the treatments for diseases we know and, as we unfortunately discovered, ones yet to come.

Angela Hopp (ahopp@asbmb.org) is executive editor of ASBMB Today and communications director for the ASBMB. Follow her on Twitter @angelahopp.





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The world after COVID-19 will be a different place. Let's reimagine ways the scientific enterprise could be more sensible and just.

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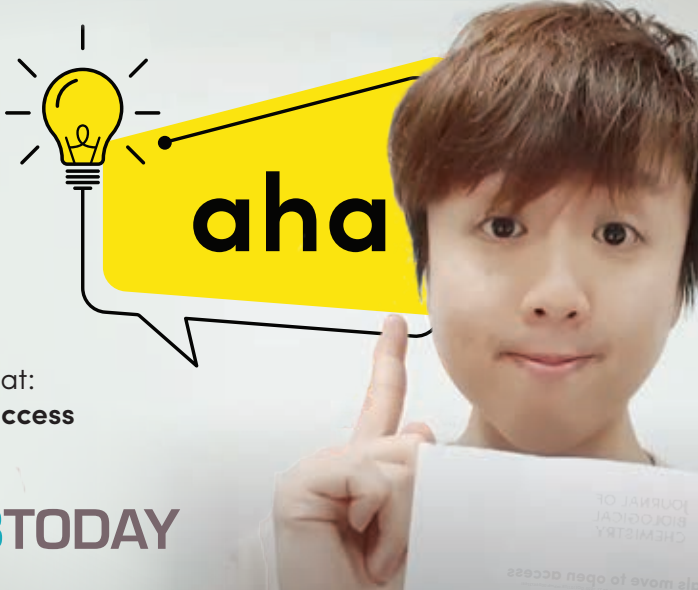
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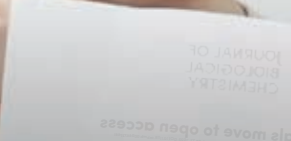
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#BlackInX Twitter movement creates visibility for Black scientists

By *Martina Efeyini*

In honor of Black History Month, I am showcasing Black scientists who have careers outside of academia or industry. This is my career story as well. I am a toxicologist, science communicator and science education advocate. As a Black woman in science, I grew up not seeing people who looked like me in spaces where I wanted to be, especially in the media. Now we are slowly seeing more Black scientists represented on television and social media and in different industries.

Last year as the COVID-19 pandemic started, we also were going through a racial reckoning. During this time, the #BlackInX Twitter movements were on the rise; more people were speaking up about the racial injustices, challenges and lack of visibility of Black scientists. Currently, there are more than 30 #BlackInX Twitter movements.

I am focusing on two: #BlackInMicro and #BlackInChem. Both movements started because the organizers realized that they did not see scientists who looked like them, and they wanted that to change. These movements made learning about Black scientists more accessible and changed the narrative of what a scientist looks like. They also created a safe space and an environment where encouraging the next generation of Black scientists was at the forefront.

In addition to the growth of #sciencetwitter and the #BlackInX



KISHANA TAYLOR

Twitter movements, last year CrossTalk.Cell.com published multiple lists of 100, 100 more and 1,000 inspiring Black scientists in America. I encourage you to follow and collaborate with more Black scientists this year. As a Black scientist, I am grateful these movements were created and that the next generation of scientists will have many Black science role models. I look forward to the growth of these movements.

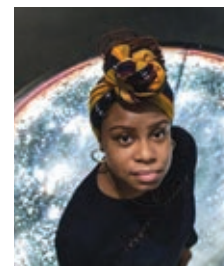
#BlackInChem

Devin Swiner, a Ph.D. candidate at Ohio State University, shared how putting out a call for action on Twitter started a chemistry movement: “#BlackInChem was inspired by all



DEVIN SWINER

the other #BlackinX weeks, and the goal was to showcase and celebrate Black chemists. During #BlackinAstro, founded by Ashley Walker (an intern at NASA Goodard Flight Center and #BlackinChem co-founder), I tweeted that I would love to curate #BlackinChem, if I found some help.”



ASHLEY WALKER

Soon other grad students and professionals started chiming in on Twitter. Swiner did not expect to get all these responses. From there, the group of co-organizers formed to make #BlackInChem. Along with Swiner and Walker, the organizers included Ayanna Jones, a Ph.D. student at Emory University; Kathleen Muloma Rink, a National Society of Black Physicists associate; Natérica

das Neves Rodrigues Lopes, a Marie Curie research fellow at Lipotec SAU; Samantha Theresa Mensah, a Ph.D. candidate at UCLA; and Heidi Nelson–Quillin, a scientist at the Azimuth Corp.

“It started because of a need to center Black people doing chemistry,” Swiner said. “We saw it as a great opportunity to show the world that we exist and do great science.”

#BlackInChemWeek was created to bring more visibility to Black chemists and build a community. The virtual events ran Aug. 10–15 and included virtual events and Twitter chats featuring different chemistry specialties, an elevator pitch competition, a career journey panel and a networking event. After this successful week, @BlackInChem has over 6,200 Twitter followers and is continuing to grow.

Visit their Twitter page, @BlackInChem, and website, Blackinchem.com.

#BlackInMicro

Ariangela J. Kozik and Kishana Taylor, two Black women postdoc microbiologists, were encouraged by #BlackInX to start #BlackInMicro.

Kozik has a Ph.D. in comparative pathobiology from Purdue University. She is a postdoctoral research fellow at the University of Michigan Medical School in the division of pulmonary critical care. She conducts research in Yvonne Huang’s laboratory on how the respiratory microbiome is involved in the presentation and pathogenesis of asthma.

Taylor has a Ph.D. in interdisciplinary biomedical sciences from the University of Georgia. She is a postdoctoral fellow at Carnegie Mellon University in Elizabeth Wayne’s lab. Her research focuses on the role of macrophages in SARS-CoV-2

infection and subsequent development of COVID-19.

“Earlier this spring and throughout the summer, there were many movements formed in the wake of continued racial inequality and violence,” Kozik said. “In the academic community, this included #ShutDownSTEM, #BlackBirdersWeek, and others that gathered a coalition of scientists and STEM professionals to speak out more openly about the challenges faced by their Black colleagues and to amplify the presence of Black scholars in their fields.

“In the context of a pandemic with disproportionate impacts on the Black community along with widespread misinformation about microbiology, we also felt a sense of urgency,” she added.

Others felt it too; a week later, 30 people coming from different career levels in microbiology came together to organize #BlackInMicroWeek. Running from Sept. 30 through Oct. 4, it included a roll call and discussions about STEM education disparities in the Black community, vaccines, virology, and HIV and the Black queer community. @BlackInMicro has over 7,100 Twitter followers and is continuing to grow.

Visit their Twitter page, @BlackInMicro, and website, Blackinmicrobiology.org.

Martina Efeyini (mefeyini@gmail.com) is a toxicologist, science communicator and advocate for the next generation of scientists. She works at the University of Maryland, Baltimore, CURE Scholars Program and is a careers columnist for ASBMB Today. Follow her on Twitter @mefeyini.



ARIANGELA J. KOZIK



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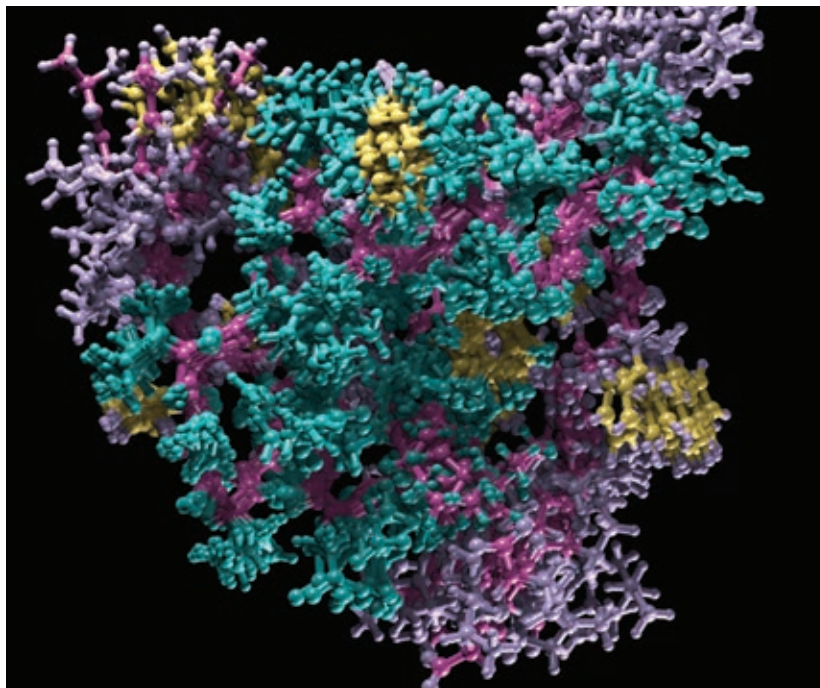


The evolution of proteins from mysteries to medicines

By Ken Hallenbeck

What does the word “protein” make you think of? Steak and eggs, or a health food diet, perhaps? What about a cancer drug? Today, advanced medicines are often a purified protein rather than something synthesized by a chemist. Proteins, built within our cells from individual amino acids, are an intricate class of biomolecules that fulfill a wide array of functions in human biology. That is why a healthy diet includes a constant stream of protein: to fuel the maintenance of our trillions of internal biomolecule machines. Their core role in our biology is also why protein dysfunction leads to many human diseases. Fortunately, over the last 50 years, scientists have uncovered how to use proteins themselves as drugs to treat the diseases they cause.

It didn’t start fancy, though. In the late 1800s, doctors researching diabetes narrowed down the problem to the pancreas. In the 1920s, Frederick Banting, Charles Best and J.J.R. Macleod discovered that reinjecting patients with pancreas extracts containing the protein insulin restored blood glucose regulation. They won the 1923 Nobel Prize for their experiments, and the first protein drug was born. But extracting insulin from animal pancreases for therapeutic use was difficult and inconsistent, and it would take researchers decades to learn how to produce human insulin for use as a medicine. First, basic



molecular biology research uncovered the structure of DNA and how DNA is translated into protein molecules. These and other advances led to the invention of recombinant protein technologies: methods to insert into DNA the code for any protein that can be read by bacteria and other lab-friendly microorganisms. For the first time, our own molecules could be synthesized at large enough scale to be explored as therapeutics.

You might think that what followed was an explosion in the use of proteins as medicines. However, biologics (as they now are called) are challenging molecules to develop and administer to patients. They often suffer from stability or solubility problems, and countless small variations often are tested to find an

acceptable therapeutic profile. For example, the first versions of human insulin degraded so quickly that injections were required many times per day. Optimization took decades and continues today with the growing interest in automated insulin delivery systems.

One important class of biologics is antibodies. Antibodies are an essential part of the mammalian immune system, so when robust antibody production methods were invented in the 1970s, intensive research ensued. The result was the first approval of an antibody drug by the Food and Drug Administration in 1986: muromonab-CD3 to treat the rejection of kidney transplants. Other similar treatments soon followed. However, these first-

generation antibody therapies often induced immune reactions in patients because the hybridoma method used for their production takes advantage of a mouse antibody scaffold. Using human hybridomas was untenable, so researchers developed methods to graft human and animal scaffolds together in chimeras that reduced the immunogenicity of the resulting antibody molecule, all without compromising the portion that attacks the drug target. The resulting humanized antibodies now represent the most profitable and rapidly growing class of approved drugs in the United States.

Since the turn of the century, advances in protein-based medicines have continued. The push to sequence the entirety of the human genome led to large advances in DNA sequencing technology, which in turn enabled new ways to discover

proteins for use as drugs. DNA-encoded libraries now can screen vast numbers of protein variants (more than 10 billion), enabling the rapid discovery of antibodies or peptides with high affinity for drug targets. Paired with decades of production and humanization method development, the pipeline for turning an antibody into a drug candidate is faster than ever before.

The frontiers of biologic drug development now lie in new ways to engineer and modify proteins themselves. For example, antibodies can be made bispecific or have drug payloads conjugated directly to them. Small proteins and peptides can incorporate nonnatural amino acids and succeed where larger biologics fail — some are being tested in clinical trials now.

Over the last 50 years, basic research discoveries have transformed

proteins from mysterious biological machines to molecules we can use to treat disease. I firmly believe the next 50 years will bring breakthroughs of similar importance. As technological developments enable new ways to discover drugs, the effectiveness of the treatments we can develop will continue apace.

(This article was written to mark National Protein Day, Feb. 27. Find more science and health observances at asbmb.org/asbmbtoday.)

Ken Hallenbeck (k.hallenbeck@gmail.com) earned a Ph.D. in pharmaceutical sciences from the University of California, San Francisco, and now is an early drug discovery researcher. He serves on the board of directors of Relmagine Science and is the life sciences lead at TerraPrime. Follow him on Twitter @kenkhallenbeck.



Upcoming ASBMB events and deadlines

FEBRUARY

- FEBRUARY **Black History Month**
- 7 **Periodic Table Day**
- 11 **International Day of Women and Girls in Science**
- 14 Cancer testis antigens virtual event
- 22 Regular registration deadline for Proteinases and their inhibitors
- 24–26 Proteinases and their inhibitors
- 27 **National Protein Day**
- 28 **Rare Disease Day**

MARCH

- MARCH **Women's History Month**
- 15 Abstract deadline for PDB50: A special symposium celebrating the 50th anniversary of the Protein Data Bank
- 15 Early registration deadline for PDB50: A special symposium celebrating the 50th anniversary of the Protein Data Bank

APRIL

- APRIL
- 12 Early registration deadline for the 2021 ASBMB Annual Meeting
- 27–30 2021 ASBMB Annual Meeting



Learning to be a science superhero

By Alison Smith

When I was about 7 years old, I knew I wanted to be a superhero who uses science (specifically, I wanted to be able to shrink down really small and fight bad bacteria like the main character in my favorite movie, “Osmosis Jones”), even though I didn’t know what a scientist was. I thought there was nothing cooler than being able to be microscopic and fight the bacteria and parasites that plague us in real life.

I was fascinated by the natural world around me, but I believed that was the case for everyone. My parents had high school diplomas but could not afford to go to college. I was raised by a single mother in rural Massachusetts, and it was not until high school that I realized college was an option for anyone other than aspiring doctors or lawyers. As I went through a high school where most graduates went on to attend college, I began to understand what college was and why people decided to go, but I thought it was out of my financial reach.

The summer before my senior year in high school, I volunteered at Camp Sunshine, a place that provides respite for children with life-threatening illnesses and their families. There I met 18-month-old Andrew, a child with hypoplastic left heart syndrome, or HLHS. From working with Andrew (who is now in fourth grade and doing just



COURTESY OF ALLIE SMITH

Allie Smith poses with Andrew, a camper at Camp Sunshine in Casco, Maine, in 2015. Andrew has hypoplastic left heart syndrome, and after working with him, Smith wanted to become a cardiothoracic surgeon.

great), I became passionate about HLHS. I decided that I wanted to go to college and become a cardiothoracic surgeon to study the mechanisms of this congenital heart defect.

Not only was tuition expensive, but even applying for college was a financial burden; taking SATs and sending scores, requesting transcripts and submitting the Common App all cost money my family couldn’t spare. Even working 20-plus hours a week, I couldn’t afford to apply

to many schools on my own, and I didn’t feel as if my family was in a financial position to help. With this in mind, I narrowed down my choices by finding the successful teachers at my high school and applying to their alma maters. Thanks to my AP chemistry teacher, I applied to Stonehill College, a private college in Easton, Massachusetts, where I was accepted and received various scholarships such that I could afford to attend. It was there at Stonehill College that

I met Bronwyn Heather Bleakley, who introduced me to the world of research.

In my second semester at Stonehill, I took an introductory biology class with Dr. Bleakley. During a lesson about *Trypanosoma cruzi*, a parasite that causes a disease in humans that weakens heart walls, I asked why a similar mechanism couldn't be used to break down the heart muscle in cardiomyopathy patients. Instead of dismissing my question, Dr. Bleakley recommended I do some research. This led to a conversation about postgraduate plans. I told her I wanted to become a cardiothoracic surgeon to study the mechanisms of HLHS. She told me about other postgraduate careers in science that I didn't know existed. She told me about graduate school and earning a master's degree or Ph.D. and the many doors those degrees open — doors such as becoming a senior scientist in a laboratory, becoming a principal investigator or a lecturer at a university, or working in science policy. All careers where I



COURTESY OF ALLIE SMITH

Allie Smith, right, and Bronwyn Heather Bleakley at Stonehill College convocation in fall 2016. Bleakley had been awarded professor of the year and asked Smith to introduce her. This photo was taken after their speeches.

would be able to ask and answer questions by doing hands-on research. It was then that I decided I did not want to be a doctor. Instead, I became passionate about going into research and then academia, hoping that one day I could be even half as good a researcher and professor as Dr. Bleakley.

After I completed the intro biology class, Dr. Bleakley let me join her lab, studying

the genetics of social behavior in guppies, *Poecilia reticulata*. I spent three years and two full summers doing research in that lab, learning every technique and concept I could, quite literally, get my hands on. I had found a place where I could bloom as a scientist.

After graduation, I moved to La Romana, a coastal city in the Dominican Republic, for a year of service at the Hogar del Niño for the Patronato Beneficio Oriental. This school serves more than 1,700 of the most economically vulnerable children in La Romana, ranging in age from 14 days through high school. It is the only school in that entire region for people who are deaf; children who are deaf are taught Dominican Sign Language as well as all mainstream subjects so they can be integrated full time into the classroom in eighth grade. The children who can hear also learn Domini-

Juniors at Hogar del Niño learn English and science at the same time. They did an experiment with ooblek (a mixture of cornstarch and water), and Allie Smith had them describe the experiences of their five senses in English.



COURTESY OF ALLIE SMITH

COURTESY OF ALLIE SMITH



Allie Smith takes a selfie with a group of sophomores in the outside science classroom at Hogar del Niño.

can Sign Language to decrease the language barrier across peers as the children who are deaf are integrated into extracurriculars from preschool on. The school offers medical, dental, psychological and sociological services as well as three meals a day and clothing for each child.

At the Hogar del Niño, I taught English to more than 330 students

Allie Smith purchased household items to do experiments on Science Wednesdays at Hogar del Niño — such as dissolving the shell off an egg.

COURTESY OF ALLIE SMITH



from seventh to 12th grade at all levels of English proficiency. The intermediate level was my personal favorite; they had the passion for English and lots of room for growth. During this year, due to the economic demand in the city, the school increased its acceptance rate until the student-to-teacher ratio was about 35:1, squeezed in classrooms that didn't allow for much, if any, movement.

With the space constraints and little funding, hands-on science experiments were not an option. I thought back to my childhood when I had wanted to be a superhero who uses science. I had wanted to be a superhero because I didn't know that I really wanted to be a scientist. And now I couldn't stop thinking about the more than 1,700 children at the school. How many of them also wanted to be superheroes who use science?

With this in mind, I started Science Wednesdays in my English classroom of about 15 students. I wanted to give them access to

hands-on science while also reinforcing their English communication about science topics. I used my \$60-per-month stipend to buy household items we could use in our science experiments. On Wednesdays we would go outside to the playground area, where we extracted DNA from fruit, hypothesizing which fruit we would get the most DNA from (it was mangos), or dissolved the eggshell off an egg.

The 15 students in each of my classes soon were joined by all the science teachers and then by students outside of my classrooms. Random students I had never even met started telling me about their eggs at home and how someone from my class was showing everyone in their neighborhood the experiment. What started as a few students turned into a science revolution.

My year in La Romana quickly came to an end, and I moved to Bloomington, Indiana, to start my Ph.D. That was more than two years ago, but to this day, I am still searching for funding that will allow me and a few fellow graduate students to fly annually to the Dominican Republic to train science teachers how to do hands-on science experiments they can perform using everyday household items.

What's better than a world full of superheroes? A world full of superheroes who use science.

(This essay was written to mark the International Day of Education, Jan. 24. Find more observances at asmb.org/asmbtoday.)

Allison (Allie) Smith (ajs15@iu.edu) is a Ph.D. candidate in the Genome Cell and Developmental Biology Program at Indiana University Bloomington, in Justin Kumar's lab. Follow them on Twitter @EctopicEyeQueer.



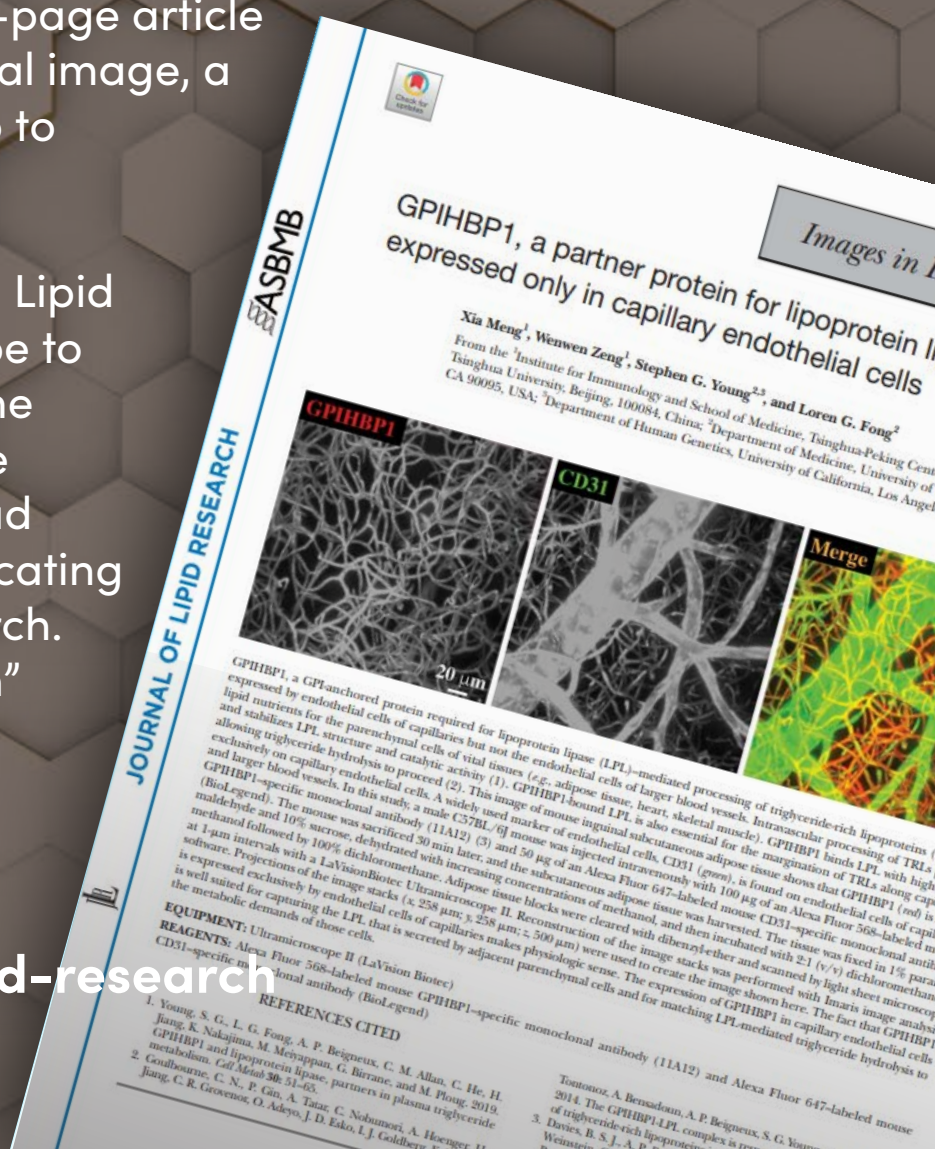
Images in Lipid Research

A new article format in the Journal of Lipid Research

The editors of the Journal of Lipid Research are pleased to announce the adoption of a new article format: "Images in Lipid Research." Each peer-reviewed, one-page article contains a single horizontal image, a 400-word caption and up to four references.

In creating the "Images in Lipid Research" format, we hope to celebrate scientists and the images they create. These articles will be easy to read and effective in communicating discoveries in lipid research. "Images in Lipid Research" will appear in PubMed and will be citable.

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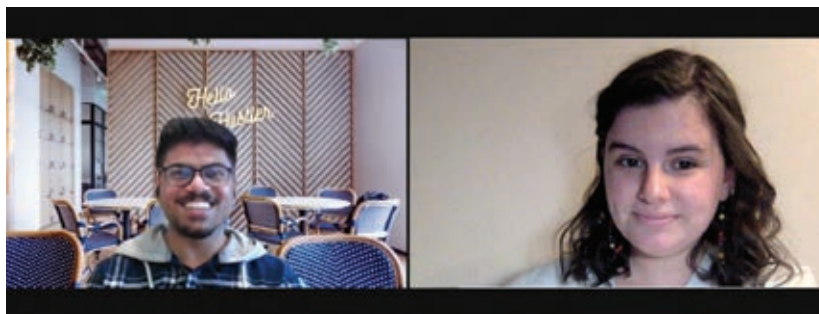
Project SHORT shares know-how

By *Lauren Fields*

I didn't have enough money to go through the Ph.D. application process more than once, so I set out to make my one-and-only application as competitive as I could. I spent hours watching videos, reading blogs, listening to podcasts and asking questions on social media until I felt versed enough to begin preparing my application. I learned about attending Ph.D. admission seminars, emailing professors and reaching out to current graduate students. It was a hands-on process and very time-consuming, so I did not want all my newfound knowledge to fall by the wayside once I began my Ph.D. journey.

Looking for ways to share my know-how with future graduate school applicants, I discovered Project SHORT, an organization founded in 2019 by Hannah Loo, a Ph.D. student at the University of Pennsylvania. The name stands for Student Health Opportunities and Research Training, and the program matches prospective graduate students with a mentor who provides free consulting to help navigate the application process. Mentees also get help with program selection, feedback on personal statements and mock interviews. As of December, the graduate school arm of Project SHORT had 374 mentors serving 378 mentees.

As a Project SHORT mentor, I have partnered with future graduate students at various stages in the application process to help them confirm that graduate school is right for them and work with them to become strong candidates for admission.



COURTESY OF LAUREN FIELDS

Lauren Fields meets with Jigar Sethiya, one of her mentees, via Zoom to work on preparing his grad school application.

My first mentee is a second-year undergraduate and already eager to prepare himself for a chemistry graduate program. Because he won't graduate for a couple of years, we crafted an email to a potential research advisor, asking about opportunities to gain undergraduate research experience, which will allow him to be a more competitive applicant for graduate programs. I told him about the National Science Foundation's Research Experience for Undergraduates. We also worked together to find conferences where he could present his work, such as the Society for Advancement of Chicanos/Hispanics and Native Americans in Science, better known as SACNAS.

Another mentee of mine balances being a single mother, working and attending school. I was a first-generation college student who worked full-time through much of my undergraduate education, so I could relate. We worked together to craft her personal statements in a way that highlights how professional experiences can be beneficial in a graduate school program. When the COVID-19 pandemic disrupted her undergraduate research, we

sought out computational and virtual research opportunities to compensate for the loss of in-person research she was counting on for her grad school application. I now am working with her to revise her personal statements as well as locate and apply for fee waivers.

Project SHORT's services provide my mentees with a contact who can answer questions readily, minimizing the often intimidating task of consulting with professors on the application process. I believe these relationships are helping students who otherwise might have been provided with little information about admissions to be better prepared to gain admission to grad school.

Undergraduate students interested in being mentored by Project SHORT and graduate students, postdocs and others interested in becoming mentors can find information and applications at project-short.com.

(Marya S. Sabir and Hannah K. Loo, both of Project SHORT, assisted with critical revision of this article.)

Lauren Fields (lawashburn@wisc.edu) is a chemistry graduate student studying genetically encodable sensors at the University of Wisconsin–Madison.

Giving labs the tools to be successful

By *Laurel Oldach*

For almost three decades, Douglas Storts has been developing tools for genetic amplification at the reagent supply company Promega in Madison, Wisconsin. “I’ve enjoyed working on lots of projects,” he said. “There’s been a huge variety over the years.”

According to Storts, the through-line that ties his group’s work on genetic changes in astronauts to cancer diagnostics is that they always are working to solve puzzles. ASBMB Today caught up with him for the latest in our series on industry careers. This interview has been condensed and edited.

1 As the head of research in nucleic acids at Promega, what do you work on?

I manage a group of about two dozen scientists working on projects related to nucleic acid amplification and genotyping. The products we develop are used for forensic testing, molecular diagnostics and also in the life science research community. We develop tools that we can give to laboratories across the world and enable them to be successful.

2 What’s most challenging about your work?

With some of these assays, we’re looking at 30 or more different targets in the genome in a single amplification reaction that has to be extremely robust and extremely efficient. We need to reliably detect copies of DNA every time, time after time. In forensic tests, the samples are almost unimaginable.

Whatever they find at a crime scene, in whatever quantity, they want to test it: telephones, bloodspots, bodies — anything.

3 How did you come to work at Promega?

I recognized early on that I was not interested in an academic position. After I received my Ph.D. and did a postdoc, I went to a small startup company in Austin, Texas, for about two years. I transferred to Promega in 1991 based on a recommendation from a recruiter. I have not looked back.

4 What traits do you look for in a potential hire?

No. 1 skill: communication. It would be great to have somebody come in with a technical background exactly aligned with what I need. That rarely happens. So what I want is somebody who has good communication skills who can take direction without being offended and can reach out for help when they have any questions. I can teach anyone to do almost anything. They have to be able to listen.

This second skill is being able to think outside the box. If somebody thinks A plus B must equal C, then if A plus B equals anything other than C, they’re totally flustered. When you show them they’ve walked into this with a box around their thoughts and the data clearly indicate the answer lies outside of the box, they begin to understand: You’ve got to think outside the box to solve complex problems.



Douglas Storts

CURRENT POSITION

Head of Research, Nucleic Acid Technologies, Promega Corporation

CAREER PATH

Ph.D., microbiology, Miami University, 1980
Postdoctoral research: University of Chicago

FIRST JOB OUTSIDE OF ACADEMIA

Ambion, a molecular biology startup in Austin, Texas

FAVORITE MOLECULE

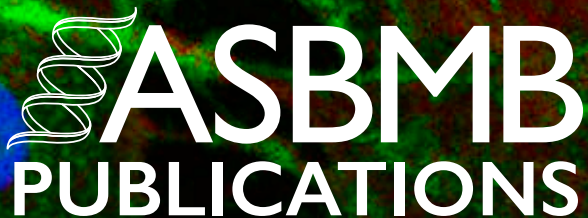
DNA

5 What career advice do you give young scientists?

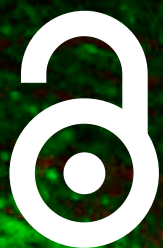
Work hard. Be creative. Be a team member. My perception is there are a lot of folks that have a big gap in one of those three areas.

Laurel Oldach (loldach@asbmb.org) is a science writer for the ASBMB. Follow her on Twitter @LaurelOld.





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JLR

JOURNAL
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RESEARCH

MCP

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CLASSIFIEDS

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Department of Tropical Medicine at Tulane University

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Requirements

- PhD degree in biochemistry or related discipline with a strong background in protein biochemistry, and metabolic signaling
- Research experience in metabolic studies
- Documented experience in biochemical techniques including western blotting, immunoprecipitation and immunofluorescence microscopy
- Excellent communication skills and ability to work independently as well as part of a team

To apply, submit a single PDF file to mmobilliot@tulane.edu with the subject Postdoc Application and include:

- (1) a cover letter describing research interests (no more than 1 page);
- (2) your curriculum vitae; and
- (3) contact information for three references.

Process Development Technician — Enzyme Manufacturing

Watchmaker Genomics

Watchmaker Genomics is an early-stage life science company based in Boulder, Colorado. Our



team is passionate about innovation and values collaboration, creativity and scientific rigor. We believe the intersection of biology, engineering and computer science presents exciting opportunities for developing novel technologies that promote research and improve human health. Watchmaker Genomics specializes in the design, development and production of DNA- and RNA-modifying enzymes that enable high-growth applications in genomics, molecular diagnostics and personalized medicine.

We are inviting applications for the full-time position of Process Development Technician — Enzyme Manufacturing. This position reports to the Production Manager — Enzyme Manufacturing, and will support existing enzyme manufacturing procedures and assist in the development of novel upstream and downstream techniques utilizing the latest advancements in chromatography and instrumentation. This position will interface directly across all aspects of production, including quality control, logistics and technical support.

<https://careers.asbmb.org/job/process-development-technician-enzyme-manufacturing/55716975/>

Proteomics Mass Spectrometry Chemist

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Primary Responsibilities:

- Lead analytical projects supporting internal teams developing cutting edge diagnostic tools and therapeutics
- Develop and optimize high-res LC/MS methods for protein, peptide, and metabolite identification / quantification
- Maintain and troubleshoot Thermo LC-MS instrumentation
- Process data, compile results, and present project findings

Candidate Qualifications:

- PhD or MSc in Analytical Chemistry, Biochemistry, Biology (or similar) with a background in mass spectrometry
- Experience in the use of LC-MS instrumentation; preferably Thermo
- Familiarity with peptide/protein assay development and informatics is a PLUS!
- MUST be self-sufficient and able to manage your own work, including instrument troubleshooting and maintenance

<https://careers.asbmb.org/job/proteomics-mass-spectrometry-chemist/55716861/>

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You will be a key leader within the David Geffen School of Medicine for the Immunogenetics Center, an internationally-respected center of clinical, academic and research innovation and excellence. Within our 24-hour laboratory environment, you will provide administrative, programmatic and personnel management while overseeing development, productivity, materials management and regulatory compliance. We're looking to you to promote interdisciplinary cooperation as you work closely and collaboratively with faculty to develop operating principles, goals and priorities. You will:



- Oversee daily laboratory operations
- Develop, implement and monitor budgets
- Ensure compliance with all relevant laws, regulations and standards for safety, human resources, accreditation, permitting, licensure, and certification
- Facilitate staff growth while also pursuing self-development
- Maintain and model technical expertise
- Ensure the delivery of high quality, efficient, cost effective clinical services

<https://careers.asbmb.org/job/immunogenetics-clinical-lab-manager/55190988/>

To see a full list of jobs, please visit careers.asbmb.org

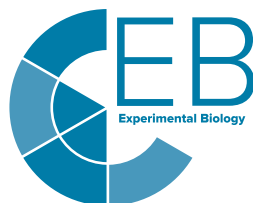


The 2021 ASBMB Annual Meeting will be virtual!

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Learn more at asbmb.org/annual-meeting



The ASBMB annual meeting is held in conjunction with Experimental Biology.