

Vol. 20 / No. 9 / October 2021

# ASBMB TODAY

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



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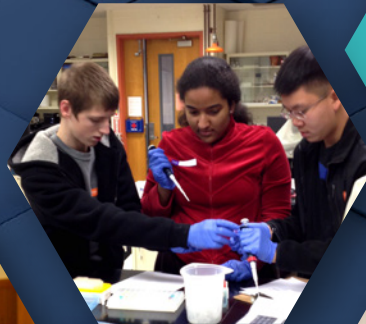
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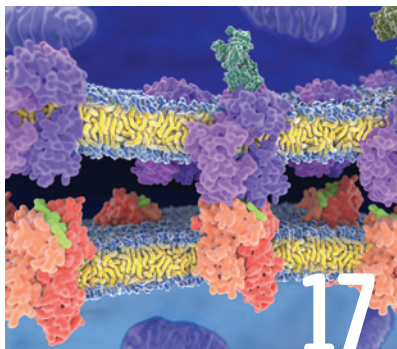
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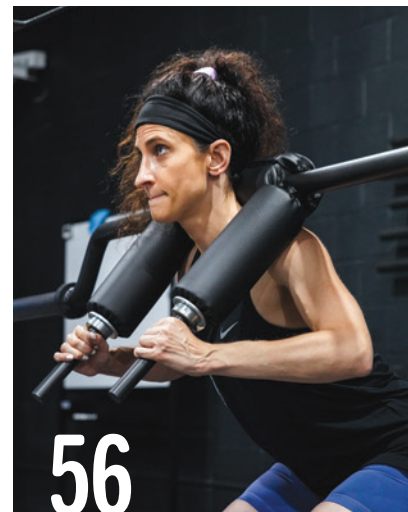
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## EDITOR'S NOTE

# Six months

*By Comfort Dorn*

**W**e've all seen a lot of changes in the past six months. And we can expect to see more in the months ahead. I believe these will be mostly changes for the better as more and more people are vaccinated and boosted against COVID-19 and we inch toward something resembling our pre-pandemic lives. The world might never be quite the same, but that's not entirely a bad thing. The last six months (and the 12 months before that) have taught us a lot about who we are both individually and as a society, about what we can do — and what's just not sustainable.

Six months from now, the American Society for Biochemistry and Molecular Biology will meet in person, along with four other scientific societies, for Experimental Biology 2022 in Philadelphia. In addition to being the first in-person meeting since 2019, this will be the last combined EB. In 2023, the ASBMB and other participating societies will part ways to hold individual meetings.

So the 2022 annual meeting will be a one-of-a-kind event. Here at ASBMB central, we're getting excited.

In this issue of ASBMB Today, we pull out all the stops with a terrific letter from the co-chairs of the ASBMB meeting, descriptions of our 10 themed symposia and introductions to the society's 16 award winners. In coming months, we'll provide

more details about events, programming, speakers and things to do in the host city.

And to celebrate the return of the annual meeting as an in-person event, we're holding a special essay contest. Here are the details:

*Have you made a friendship or connection, forged a collaboration, gleaned insight or had another meaningful experience at a scientific meeting? If so, tell us about it.*

We invite you to write about your own meeting connection in 300-500 words. The deadline is Dec. 1. We'll publish the best stories in our March issue.

Prizes:

- First place: Free ASBMB membership, free registration to the 2022 ASBMB annual meeting and a \$100 Amazon gift card.
- Second place: Free registration to the 2022 ASBMB annual meeting and a \$50 Amazon gift card.
- Third place: \$25 Amazon gift card.

Email your submission to [asbmbtoday@asbmb.org](mailto:asbmbtoday@asbmb.org) using the subject line "Meeting connections."

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



**CORRECTION:** The article "Nautilus founder unspirals a new approach to proteomics" in the September issue should have stated that Parag Mallick's title is the founder and chief scientist and that the name of Nautilus' partner company is Genentech, and that in addition to \$200 million raised selling stock, the company reports \$145 million raised through a merger.

## Roeder wins Kyoto Prize

Robert Roeder, a professor of biochemistry and molecular biology at the Rockefeller University in New York City, has received the 2021 Kyoto Prize in the life sciences. He is recognized for his work on gene transcription mechanisms in eukaryotic cells.

Roeder has been involved in transcription research for 50 years. He earned his Ph.D. in biochemistry in 1969 from the University of Washington and spent over a decade as a professor at Washington University School of Medicine before joining the Rockefeller faculty in 1982.

Roeder's best known earlier discovery was that there are three distinct RNA polymerases, known as P<sub>ols</sub> I, II and III, that transcribe different types of genes in eukaryotes. He later developed cell-free systems to study transcription and used them to identify transcription factors required for polymerases to work. His lab also identified transcription regulators, such as gene- and cell-specific activators and coactivators, whose biological functions and mechanism of action are the focus of his current research.

The Kyoto Prize consists of a medal, a calligraphic diploma and 100 million yen (about \$910,000). The foundation and prize were established in 1984 by a donation from Kyocera corporation founder and CEO Kazuo Inamori to recognize research in basic sciences, technology, and the arts and philosophy that contribute to the betterment of society. Ordinarily, laureates present

an award lecture in Kyoto; this year, their lectures will be livestreamed.

## Murolo promoted at Wesleyan

Michelle Murolo has been promoted from associate to full professor of the practice in molecular biology and biochemistry at Wesleyan University. (Professor of the practice is a title for full-time non-tenure-track teaching faculty.)

Murolo teaches the introductory biology lecture and runs all of the lab courses at Wesleyan. In addition, she advises and coordinates about 15 teaching assistants each semester and advises the molecular biology and biochemistry student group the Major Groove, which is Wesleyan's Student Chapter of the American Society for Biochemistry and Molecular Biology.

After receiving a bachelor's degree in molecular science from Clarion University of Pennsylvania, Murolo earned her Ph.D. in microbiology at Yale University studying bacterial cell morphogenesis.



MUROLO

## Chacón receives Stiefel award

Kelly Chacón, an assistant professor of chemistry at Reed College in Portland, Oregon, has received the 2022 Stiefel Award from the Gordon Research Conference's Metals in Biology community. Chacón shares the prize with Joey Cotruvo, an assistant professor at Pennsylvania State University.

Chacón's research focuses on metal ion trafficking, seeking to characterize newly discovered metalloproteins and

to understand on a structural level how metal ions are passed from one metalloprotein to another. She has studied the structures and activities of bacterial copper/silver efflux pumps, which are involved in removing toxic metal ions, and iron transport



CHACÓN

proteins, which acquire iron-sulfur clusters from the environment and can potentiate virulence.

Chacón earned a GED and started at community college before matriculating at Portland State University. She earned her Ph.D. at Oregon Health and Sciences University, then joined the faculty at Reed College. She is a member of the ASBMB Today editorial advisory board and a vocal advocate for diversity in science and support for underrepresented and nontraditional students.

The Stiefel Award honors the late Edward Stiefel, a professor at the Princeton Environmental Institute and ASBMB member who died in 2006. Stiefel's 30-year research career spanned many areas of bioinorganic chemistry, including contributions to the cleanup of the 1989 Exxon Valdez oil spill. Chacón and Cotruvo will receive the award at the 2022 Metals in Biology Gordon Research Conference in January.

## Schultz to head Ambrx scientific board

Peter Schultz, a professor of chemistry and the president and CEO of Scripps Research, has been named chair of the newly formed scientific advisory board of biopharmaceutical company Ambrx.

The company, which plans to develop antibody-based biological

## MEMBER UPDATE



SCHULTZ

as a spinoff from Schultz's lab, where its chief executive officer, Feng Tian, worked as a postdoc. The company has collaborated with larger pharmaceutical companies to develop biological drugs and went public in June.

Schultz's research career has covered a broad range of biological chemistry and synthetic biology. He is known for investigating nonnative amino acids to incorporate new chemistry into proteins in engineered microbes. He also has extensive immunology experience, having helped to develop phage-display libraries and other high-throughput techniques, and does some research into mitochondrial origins.

Schultz has headed Scripps Research since 2015. Among his awards and honors are the Wolf Prize, Solvay Prize and Cope Award; he is a member of the National Academy of Science and the National Academy of Medicine and has founded nine companies including Ambrx. He is a former Howard Hughes Medical Institute investigator and has acted as the founding director of several research organizations, including the Genomics Institute of the Novartis Research Foundation and the California Institute for Biomedical Research. He earned his bachelor's and doctoral degrees at the California Institute of Technology and completed postdoctoral research at the Massachusetts Institute of Technology before joining the faculty at the University of California, Berkeley.

drugs including antibody–drug conjugates, bispecific antibodies and immuno-oncology conjugates to treat solid tumors and other diseases, was founded in 2003

### Hudson wins ORAU scholarship

Olivia Hudson, an undergraduate at Tennessee Technological University, has received one of five 2021–2022 William G. Pollard scholarships from Oak Ridge Associated Universities.

Hudson, a sophomore, is an aspiring cardiologist. She is a member of her university's ASBMB Student Chapter and also participates in the school's Chemical Medical Club and Remote Area Medical Clinic. Additionally, she is a writer, with a published collection of poems and a finished novel draft that she hopes to sell.



HUDSON

ORAU is a consortium of schools based in Oak Ridge, Tennessee. It was founded in 1946 as the Oak Ridge Institute of Nuclear Studies, a project of 14 universities that aimed to provide training and workforce preparation in support of nearby Oak Ridge National Laboratory. Over time, the consortium has shifted to a broader focus on science and education. The Pollard Scholarship honors of the consortium's founder and supports accomplished undergraduates whose parents are ORAU employees.

### Cortez named department chair

David Cortez, who has served as the interim chair of Vanderbilt University's biochemistry department since the start of this year, recently became the permanent chair.

Cortez's research group takes a multidisciplinary approach to study the biochemistry of proteins that respond to DNA damage and initi-

ate repair. Using techniques from genetics, proteomics, cell biology and structural biology, his lab has studied replication stress, DNA damage responses and other pathways that control genome stability. One



CORTEZ

protein that they identified and have focused on recently is RADX, which regulates the forward movement of the DNA replication fork. If the DNA replication complex encounters damaged template DNA, the lab has shown, RADX promotes fork reversal. Conversely, if the template is undamaged, RADX inhibits fork reversal. The lab also works to develop cancer therapeutics that target DNA damage pathways.

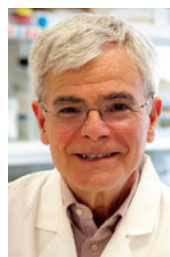
Cortez received his Ph.D. from Duke University and conducted postdoctoral research at the Baylor College of Medicine. He joined the faculty at Vanderbilt in 2002. He is a fellow of the American Association for the Advancement of Science and has received awards from the Pew Charitable Trust, the National Cancer Institute and MD Anderson Cancer Center.

### Gottesman to retire from DDIR post at NIH

The National Institutes of Health office of the director has announced that Michael Gottesman, the deputy director for intramural research, or DDIR, will step down after 28 years on the job, leaving as soon as a replacement can be in place.

Gottesman is credited with developing postbaccalaureate and graduate training programs at the NIH, developing an intramural tenure track, and leading programs in research integrity, diversity and equity.

During this service, Gottesman also has run a lab in the National Cancer Institute, to which he will return full time after stepping down as DDIR. His research has focused recently on how cancer cells resist chemotherapy by pumping out drugs using a transmembrane ABC transporter protein called P-glycoprotein or the multidrug transporter. Gottesman's lab identified this gene in 1986 and has used the finding to identify drugs that are subject to this type of efflux, study how multidrug transporter expression is regulated, and find out how mutation and changes



GOTTESMAN

to expression in the other 47 human ABC transporters contribute to chemotherapy resistance.

Gottesman's lab also notably discovered while studying P-glycoprotein

mutants that noncoding mutations, which do not affect a protein's amino acid sequence, still can change protein conformation and activity, perhaps

by altering folding kinetics during translation.

Gottesman earned his M.D. at Harvard Medical School and studied internal medicine as an intern resident at Peter Bent Brigham Hospital in Boston. He also conducted postdoctoral research in molecular genetics at the NIH. He was an assistant professor at Harvard Medical School before moving to the NIH in 1976. He has been a member of the American Society for Biochemistry and Molecular Biology for more than 40 years and received the ASBMB's Bert and Natalie Vallee Award in Biomedical Science in 2014. He is also a member of the American Academy of Arts and Sciences, the American Association of Physicians, the National Academy of Medicine, and the National Academy of Sciences.

## DiFrancesca is dean at Liberty University

Heidi DiFrancesca, who until recently was an associate scientist and executive director of academic

affairs at Johns Hopkins' Bloomberg School of Public Health, has joined the faculty of Liberty University as its new dean of the school of health sciences.



DiFRANCESCA

DiFrancesca earned her Ph.D. in molecular biology at Duquesne University, where she studied hormone-modifying enzymes in breast cancer biology. More recently, as an administrator at the University of Mary Hardin-Baylor and at Hopkins, she has focused on pedagogical research, assessing team-based learning and flipped classroom models.

Liberty University's provost, Scott Hicks, said that DiFrancesca "has a strong track record of developing new academic programs, growing program enrollments, and enhancing curricula based on student needs and market demands. Her professional experience in the natural sciences and her strong Christian values will lead Liberty's program into the future."

## CALL FOR SUBMISSIONS



## Meeting Connections

**Have you made a connection, forged a collaboration, gleaned insight or had another meaningful experience at a scientific meeting? If so, tell us about it.**

Write about your own meeting connection in 300–500 words. We will publish the best stories in the March issue of ASBMB Today and award prizes.

Email your submission to [asbmbtoday@asbmb.org](mailto:asbmbtoday@asbmb.org) with the subject line "Meeting connections."

**Deadline: Dec. 1.**

**ASBMBTODAY**

## Edward W. Westhead

Edward W. Westhead, a member of the American Society for Biochemistry and Molecular Biology for more than 55 years, died from cancer on June 1 at age 90.

Two areas dominated Westhead's research: discovering structure and function relationships of the enzyme enolase at the heart of energy metabolism, and the activity of chromaffin cells known for their role in the fight-or-flight response. These cells secrete adrenalin and other hormones. Goals here included describing the mechanisms of cell loading and secretion.

Westhead was born in Philadelphia on June 19, 1930. His early scholarly interests evolved through chemistry, which he studied at Haverford College, receiving bachelor's and master's degrees in 1951 and 1953, respectively; polymer science, for which he earned his Ph.D. in 1955 from the Polytechnic Institute of Brooklyn; protein biochemistry, which he studied as a postdoctoral fellow at the University of Uppsala from 1955 to 1957; and enzyme catalysis, which he studied during his second postdoctoral fellowship at the University of Minnesota from 1958 to 1960.

Westhead established his own biochemistry laboratory at Dartmouth Medical School in 1960. The University of Massachusetts recruited him to Amherst in 1966 to form a biochemistry department. He served from 1988 to 1992 as the first director of the UMass Ph.D. program in molecular and cellular biology. In 1982, he established the Symposium on Chromaffin Cell Biology.

In an article on the UMass Amherst website, professor and department head Jennifer Normanly said, "I feel fortunate to have overlapped with Ed for a few years prior to his retirement. Ed graciously downsized his lab space to make room for my research program, and he was a great source of wisdom and perspective for me as a new assistant professor."

Westhead mentored many Ph.D. students and postdocs and hosted many visiting faculty. He held visiting professorship positions at the California Institute of Technology, Oxford University, the University of Innsbruck and the University of Milan.

Travel was a particular love, and Westhead knew people almost everywhere he went. With his wife, Evelyn A. Villa, he especially enjoyed exploring Italy's history and culture and savoring its cuisine.

*(submitted by Victoria Westhead and Maurille Fournier)*



## Shelby Kashket

Shelby Kashket, a member of the American Society for Biochemistry and Molecular Biology for almost 30 years, died Nov. 29, 2020, in Tucson, Arizona. Kashket was known for his research on the formation and prevention of dental cavities. He was 89.

Born Feb. 1, 1931, in Montreal, Canada, Kashket received his undergraduate and graduate degrees from McGill University. He conducted his graduate research under the direction of O.F. Denstedt in the biochemistry department. His research focused on the preservation of red blood cells, which became particularly important during World War II when the need for blood transfusions increased in civilian and military hospitals. The work was funded by the National Research Council of Canada and the Defense Research Board of Canada.

Kashket subsequently conducted research at the Harvard Medical School and School of Dental Medicine in the 1960s before joining the Forsyth Institute in Boston, an independent research institute affiliated with Harvard School of Dental Medicine that focused on oral health.

There, Kashket's research focused on how the products of cellular metabolism impact bacteria in the oral cavity and periodontal disease state. His most recent research described how the anaerobic Gram-negative periodontal pathogen *Bacteroides forsythus* produces toxic levels of the metabolite methylglyoxal in response to glucose exposure and how methylglyoxal accumulation in the periodontal pocket may contribute significantly to pathogenesis. He also wrote several review articles on the relationship between food starches and tooth decay, and he periodically collaborated with his late wife, microbiologist Eva Kashket, who died in 2011.

Kashket was awarded two patents, one for a device used to locate and identify dental microorganisms and one focusing on the development and preparation of flavor compositions.

He is survived by his wife, Judith Manelis; children, Julie Mackley and Michael Kashket; grandchildren, Rebecca Mackley, Michael Mackley and Toby Kashket; and great-grandchild, Jacob Mackley.

*—Courtney Chandler*





## Guido Guidotti



Guido Guidotti, a professor of biochemistry at Harvard University who studied the functions of proteins within membranes in transport and signal processing, died April 5 in Newton, Massachusetts. He was 87.

Born Nov. 3, 1933, in Florence, Italy, Guidotti spent most of his early life in Naples. After World War II, he visited Illinois as an American Field Service student. He returned to do premedical studies at Milliken College and then earned an M.D. at the Washington University School of Medicine in St. Louis. He was an intern and resident at Barnes Hospital before earning a Ph.D. in biochemistry from the Rockefeller University. He took a position at Harvard in 1963 and remained there until his death.

In his early research, Guidotti used his own blood to determine the sequence and biochemical properties of hemoglobin before moving on to the study of membrane proteins. He identified structures and topologies of numerous proteins and enzymes as well as studying hormone regulation of membrane protein activity. He discovered that the protein CD39 in the cell membrane hydrolyzes extracellular adenosine triphosphate, ensuring that this extracellular ATP is present at an appropriate concentration.

A member of the American Society for Biochemistry and Molecular Biology since 1968, Guidotti served on the editorial board of the *Journal of Biological Chemistry* from 1971 to 1976 and published 120 papers in *JBC*. He also served on the editorial boards of the *Journal of Membrane Biology* and *Molecular Biology of the Cell*.

Nancy Kleckner, a Harvard colleague, wrote in a remembrance, “From the perspective of the outside world, Guido’s scientific work was seminal in many respects. . . . Guido’s research was motivated only by his intellectual curiosity, his delight in figuring out how life works, and his joy in enabling the work and lives of the people he trained and with whom he worked. Scientific credit was not a priority.”

## Earl Mitchell



Earl Mitchell Jr., Oklahoma State University’s first Black tenured professor, died June 2 at age 83. He had pancreatic cancer.

Born May 16, 1938, in New Orleans to Earl Mitchell Sr. and Mary Duncan–Mitchell, Mitchell took an early interest in science. He earned a bachelor’s degree from Xavier University and a Ph.D. in biochemistry from Michigan State University.

Mitchell joined the Oklahoma State staff as a research associate in the biochemistry and molecular biology department in 1967, became the university’s first Black tenure-track faculty member in 1969 and received tenure in 1982. He went on to lead the biochemistry department and served as assistant dean of the graduate college and associate vice president for multicultural affairs. He retired from OSU in February 2009.

Mitchell’s research focused on metabolic enzymes in plants, especially crops. He developed approaches for culturing cotton cells *in vitro*; investigated how mevalonic acid metabolism, a precursor to many plant-specific natural products, differs between chloroplast and cytoplasm; and isolated amylases, sugar breakdown enzymes, from bacteria and malted barley.

At OSU, Mitchell was a leader in the fight for diversity and inclusion, known for his advocacy for underrepresented students. Jason Kirksey, OSU’s vice president for institutional diversity, said in an article in *The O’Colley*, “Students were able to see themselves in him. He was the success story and was able to communicate the importance of so many things, just by having a conversation.”

Mitchell married his high school sweetheart, Bernice Compton, in 1959, and she died less than a month before he did. According to a family obituary, the couple “worked diligently to weave a network, a tapestry, sewn with the fabric of equality and celebration of culture.”

Mitchell is survived by his three children, six grandchildren and one great-grandchild.

## New MCP AE Jyoti Choudhary

Jyoti Choudhary joined Molecular & Cellular Proteomics as an associate editor in

August.

Choudhary is the head of the proteomics core



facility at the Institute of Cancer Research in London. She studies the organization dynamics of protein networks in cancer progression and resistance. Her group is also interested in understanding the impact of genetic variations on the proteome using mass spectrometry.

## On-demand webinars

Access recently added member content, including the following titles:

- Mentoring from both sides: How to find, be and utilize a great mentor
- Using 3D to teach structure-function relationships
- Inclusive teaching: Supporting undergrads and grads in in-person and remote classrooms and labs
- Workshop and networking for inclusive practices and inclusive course content
- Improving visual literacy using AR and LEGO® bricks in biology classrooms
- Science policy and advocacy for early-career researchers

Explore the full library at [asbmb.org/on-demand](https://asbmb.org/on-demand).

## Tabor award nominations due Oct. 31

The JBC Herbert Tabor Early Career Investigator Awards recognize the rising stars of biological chemistry. These talented scientists are the first authors of the most high-quality, impactful papers published in the Journal of Biological Chemistry each year. Help us find this year's awardees by nominating the authors on your favorite 2021 JBC papers! Send your list to George N. DeMartino, the award committee chair, at [george.demartino@utsouthwestern.edu](mailto:george.demartino@utsouthwestern.edu) by Oct. 31. See past winners at [jbc.org/tabor-awards](https://jbc.org/tabor-awards).



## Join the Art of Science Communication mailing list

Did you miss out on the most recent Art of Science Communication course? Do you want to have priority notification the next time we host the course? Join the ASC mailing list to receive access to the course application two days before it is widely available. Mailing list recipients also receive information about relevant science communication offerings from the ASBMB. Stay in the know by signing up at [asbmb.org/career-resources/communication-course/mailling-list](https://asbmb.org/career-resources/communication-course/mailling-list).



## *Real, reliable and recognizable: Building your personal brand*

For National Postdoc Appreciation Week, the ASBMB hosted a workshop on building your personal brand. If you missed it, you can access the tips and tricks on demand at [asbmb.org/meetings-events/on-demand](https://asbmb.org/meetings-events/on-demand). Erica Gobrogge of Van Andel Research Institute was the speaker.

**Call for ASBMB fellows nominations**

We are now accepting nominations for ASBMB fellows. Selection as a fellow is an honor bestowed on our most distinguished members. Fellows are recognized for their meritorious efforts to advance the molecular life sciences through sustained outstanding accomplishments in areas such as scientific research, education, mentorship, commitment to diversity and service to the society and scientific community. The deadline for nominations is Nov. 12. Learn more at [asbmb.org/about/asbmb-fellows](https://asbmb.org/about/asbmb-fellows).

## Advocacy team eyes FY22 appropriations

In late September, Congress passed a short-term continuing resolution that will extend fiscal 2021 spending levels through early December. The ASBMB public affairs staff is working to make the case for fiscal 2022 appropriation that increases baseline funding for science funding agencies.

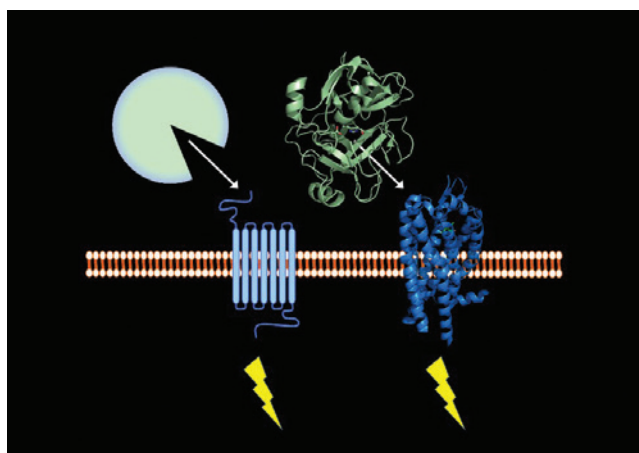


## Society veteran retires

Longtime ASBMB staff member Maria Hernandez retired in July. She joined the society in 1982 and held various positions over the years. She served on the Journal of Biological Chemistry, membership and accounting teams.

## Let us advertise your postdoc positions

Posting on the ASBMB job board is free for members. Please use this platform to get the word out about your open positions. Go to [careers.asbmb.org](https://careers.asbmb.org).



## Oct. 28–30: Serine proteases in pericellular proteolysis and signaling

This meeting continues the ASBMB tradition of bringing together membrane-anchored serine protease enthusiasts — this year entirely online and with an expanded focus on other related proteases with overlapping substrates and functions in the pericellular environment. Register by Oct. 27. Learn more at [asbmb.org/meetings-events/serine-proteases-2021](https://asbmb.org/meetings-events/serine-proteases-2021).



## Improving federal scientific integrity policies

In response to a White House Office of Science and Technology Policy request for information on improving integrity policies, the ASBMB submitted comments in July recommending that OSTP strengthen whistleblower protections, refine conflict-of-interest policies, remedy funding inequities and make scientific integrity matters public. Read the letter and others at [asbmb.org/advocacy/letters](https://asbmb.org/advocacy/letters).

## Student chapter applications and renewals due Nov. 30

Join a national community of undergraduate students and faculty members promoting BMB research, education and outreach. Chapter students are eligible for a number of benefits, including travel awards to support attendance at the ASBMB annual meeting, summer research funding, and selection for the ASBMB Honor Society, XΩΛ. Chapters also can apply for funding to organize regional meetings or support outreach initiatives. Renewals and applications for new chapters are due Nov. 30. Learn more about student chapter benefits at [asbmb.org/education/student-chapters](https://asbmb.org/education/student-chapters).



# More MOSAIC scholars named

*By Angela Hopp*

**T**he American Society for Biochemistry and Molecular Biology welcomes five new scholars to the society's inaugural cohort for the Maximizing Opportunities for Scientific and Academic Independent Careers, or MOSAIC, program.

In August 2020, the society received a cooperative agreement with the National Institute of General Medical Sciences to develop and execute a program that will support postdoctoral fellows and new investigators from diverse backgrounds embarking on careers at research-intensive institutions. These K99/R00 awardees will

receive individualized coaching and networking and presentation opportunities.

In February and April, the society welcomed seven MOSAIC participants. The five participants below complete the cohort.

Kirsten Block, the ASBMB's director of education, professional development and outreach, is coordinating the program. "We are thrilled to welcome MOSAIC scholars in our first-year cohort," she said. "It will be exciting to watch these incredible scientists grow professionally as they tap into a full suite of ASBMB resources."

## Junior Arturo Gonzales–Arevalo

Junior Arturo Gonzales–Arevalo is a research associate in the lab of Thomas Reiner at the Memorial Sloan Kettering Cancer Center, where he is using fluorescent and radioactive synthetic probes to image the peripheral nervous system and cancer.

Gonzales–Arevalo was born in Iquitos, Peru, and grew up in the neighborhood of Bushwick in the Brooklyn borough of New York City. He began his college education at Queensborough Community College and went on to earn his bachelor's degree in biochemistry from Hunter College of the City University of New York. He then earned a Ph.D. in chemistry at the Graduate Center of CUNY.

Gonzales–Arevalo is co-founder of the company Rinclo, which produces dye for chelations and fluorescence imaging. Earlier this year, he was one of 30 early-career scientists recognized as "Ones to Watch" by the Society of Nuclear Medicine and Molecular Imaging.

"This (MOSAIC) grant offers a fantastic opportunity to interface with other talented researchers who are similarly motivated to support the growth of underrepresented populations in the biomedical fields," Gonzales–Arevalo said. "The award is an equalizer of merit that will provide me the chance to start my autonomous research program, boost a bio-natural laboratory, and allow me to support minority students on their way to becoming minority scholars."



Gonzales–Arevalo's research project is titled "Development of multimodal agents from natural spider peptides for prostate cancer via sodium-channel NaV1.7."

## Alfa Herrera

Alfa Herrera is a postdoctoral researcher in the lab of Karla Satchell at Northwestern University. She is studying *Vibrio vulnificus*, a bacterium present in marine environments that can cause life-threatening infection.

Herrera was raised in Rock Island, Illinois, and earned her bachelor's degree in cellular and molecular biology from the University of Illinois at Urbana–Champaign. During her undergraduate years, she worked in the microbiology lab of Rachel Whitaker. She then earned her Ph.D. in microbiology and immunology at the University of Iowa.

"I am excited to join the community of MOSAIC scholars and to receive the mentoring and training provided through the program to become a better scientist and an independent researcher," Herrera said. "I look forward to working with scientists from a wide variety of backgrounds and applying the skills I will learn and my experiences to serve as a mentor for future scientists, in particular the underrepresented, to promote inclusion and equality in science."

Herrera's research project is titled "Small host GTPases: Direct targets of *Vibrio vulnificus* MARTX toxin effectors."



## Cassandra Hayne

Cassandra Hayne is a postdoctoral fellow at the National Institute of Environmental Health Sciences in North Carolina. She is studying RNA processing factors linked to rare neurodevelopmental and neurodegenerative diseases.

Hayne grew up in the Midwest and had a rare cancer as a child. Her oncologist later learned of her interest in science and invited her to work in her lab when she was old enough — and Hayne did just that during a summer of high school. She went on to earn two bachelor's degrees, one in biology and one in biochemistry, from the University of Northern Iowa and a Ph.D. in biochemistry at the University of North Carolina at Chapel Hill. She is a mentor for underrepresented scientists and active in various public outreach activities.

"I am so humbled and excited to get to be a part of the ASBMB MOSAIC cohort. I am particularly looking forward to building a scientific community and networking with other MOSAIC scholars as well as members of the ASBMB community," she said. "I look forward to growing through this career transition and as I establish my own position with the help of the professional-development activities provided through the ASBMB program."

Hayne's project is titled "Structural and functional characterization of pontocerebellar hypoplasia associated nucleases."



## Marco Messina

Marco Messina is a postdoctoral fellow in the lab of Chris Chang at the University of California, Berkeley. He is developing molecular probes for the activity-based sensing of reactive oxygen species and small molecules involved in biological signaling and oxidative stress.

A native of Corpus Christi, Texas, Messina earned his bachelor's degree in chemistry from Texas A&M University-Corpus Christi. He then earned his Ph.D. in organic chemistry at the University of California, Los Angeles, where he held officer positions at multiple organizations dedicated to increasing diversity in STEM. He remains a member of the Científico Latino Mentorship Program.

"I am thrilled to be joining a talented cohort of researchers in the MOSAIC program. I look forward to expanding



my network within the program and ASBMB and to take advantage of the ample career-development opportunities offered," Messina said. "I am excited to continue mentorship efforts and to develop programs to promote diversity within STEM as I transition into my independent career."

Messina's research project is titled "An activity-based biomolecule labeling platform for the imaging of cells and tissues under oxidative stress."

## Iris Nira Smith

Iris Nira Smith is a postdoctoral fellow in the lab of Charis Eng at the Genomic Medicine Institute at the Cleveland Clinic in Ohio.

She is studying the structure–function mechanism of germline mutations in the tumor suppressor PTEN, which lead to outcomes including cancers, autism and sometimes both.

The Houston native's own diagnosis of endometriosis at age 19 prompted Smith to pursue a life in science. She earned her bachelor's and Ph.D. in biochemistry at the University of Houston, where she studied PTEN somatic mutations leading to endometriosis and cancer. Smith has led STEM outreach and mentoring programs including Cleveland Clinic's partnership with the Cuyahoga County Division of Children and Family Services for children and teens.

"I am so honored to be a part of such a wonderful program, and I look forward to engaging with my fellow MOSAIC scholars," Smith said. "The NIH MOSAIC award will be invaluable to my career development, not only giving me the foundation to transition into a successful independent investigator but also the knowledge and skills to enrich the scientific education of students from underrepresented backgrounds and inspire them to pursue careers in STEM-related research."

Smith's research project is titled "Unraveling the PTEN interactome: Modeling structural and functional dynamic network architecture for therapeutic modulation in cancer and autism."



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



# 2021 ASBMB election results

*By ASBMB Today Staff*

**M**embers of the American Society for Biochemistry and Molecular Biology have elected several new leaders. The society has a new president-elect. Three members of the Council and the treasurer were re-elected. And the Nominating Committee has two new members. (Read their full profiles at [asbmb.org/membership/election](http://asbmb.org/membership/election).)

## President-elect

The ASBMB is governed by an elected Council that is led by the president. The elected person serves for one year as president-elect, two years as president and one year as past-president.

**Ann Stock**, a distinguished professor at Rutgers University–Robert Wood Johnson Medical School, is the new president-elect. Stock has been a member of the society since 1991.



**STOCK**

She has served on Council, Finance Committee, Education and Professional Development Committee and the society's accreditation application review subcommittee.

"I view the society as a collective voice for members of our discipline to define and promote core values and standards of excellence, while also serving as a force to drive change," Stock wrote. "I applaud the society's past successes in providing an inclusive community for members, establishing and maintaining

the highest standards in scientific publishing, disseminating scientific advances, recognizing achievements of members, promoting best practices in education and training, furthering scientific communication and outreach, and advocating for research and science policy. There is always more to do in these areas, and I believe they should continue to be the foundation of society activities."

## Council

The ASBMB Council serves as an advisory board to the president and the executive director for setting priorities and strategic directions, overseeing resource allocations and ensuring that all activities align with the mission of the society. Councilors are elected for three-year terms and can be re-elected or reappointed to serve one additional term.

The members re-elected to Council are **Audrey Lamb**, **James Ntambi** and **Kelly Ten Hagen**.

Lamb is a professor and chair of the chemistry department at the University of Texas at San Antonio. She has been a member of Council since 2018 and a member of the society since 2011.

"I recently moved my research program from an R1 Association of American Universities institution to an R2 Hispanic-serving institution," Lamb wrote.



**LAMB**

"I would like the new perspective that comes from my new home environs to be reflected on Council as we make the decisions that could have differential outcomes for underrepresented scientists and society members with increased teaching and service responsibilities."



**NTAMBI**

Ntambi is a professor at the University of Wisconsin–Madison biochemistry department. He has been a member of Council since 2018 and a member of the society since 2007. He is an editorial board member for the *Journal of Biological Chemistry* and won the ASBMB's Award for Exemplary Contributions to Education in 2013.



**TEN HAGEN**

"In addition to teaching several graduate and undergraduate courses at UW–Madison, I have been involved in international teaching and research for several years," Ntambi wrote.

He continued: "I strive to translate basic science research into treatment and prevention strategies and share the validated treatment and prevention tools to the communities in developing countries and across the world."

Ten Hagen is a senior investigator and chief of the Developmental Glycobiology Section at the National Institute of Dental and Craniofacial Research. She has served on Council and ASBMB Women in Biochemistry and Molecular Biology committee since 2019. Before that, she was a member of the Meetings Committee and Journal of Biological Chemistry editorial board. She has been a member of the ASBMB since 2006.

## Treasurer

The ASBMB Finance Committee assists the Council in fulfilling its financial oversight responsibilities by monitoring the society's financial resources, including budgeting and financial planning, financial reporting, internal controls and accounting policies, and investment fund strategies. The treasurer leads the committee over a three-year term and can be re-elected or reappointed to serve an additional term.



CONAWAY

**Joan Conaway** of the University of Texas Southwestern Medical Center at Dallas ran for re-election unopposed.

"It has been an honor to contribute to the ASBMB as its treasurer since 2019, and I am interested in continuing to serve in that role to work with the Council and staff leadership to keep the society on a firm financial footing so that it can sustain and grow its journals, meetings, educational and professional development, and other programs for many years to come," Conaway wrote.

Conaway is a professor, vice provost and dean at UT Southwestern. She has been a member of the ASBMB since 1988 and has served in several leadership positions. She's been on the Nominating Committee, Annual Meeting Program Planning Committee, Meetings Committee, Council and Finance Committee. In addition, she has served as an editorial board member and associate editor for the Journal of Biological Chemistry.

## Nominating Committee

The ASBMB Nominating Committee nominates regular members of the society to stand for election for president, Council, Publications Committee and the Nominating Committee. Committee members are elected for three-year terms and can be re-elected or reappointed to serve one additional term.

Both of the candidates for the Nominating Committee were elected this year.

**Kelly Chacón** is an associate professor at Reed College's chemistry department. She has been on the ASBMB Today editorial advisory board since 2019.

"The ASBMB has continually pushed for visibility, representation and wellness of minoritized groups in the biochemical sciences while also highlighting our amazing science! As a proud member of the committee, I would be in a position to scout for, promote and amplify diverse voices of our organization and provide opportunities for those folks to become more involved with the society," she wrote.



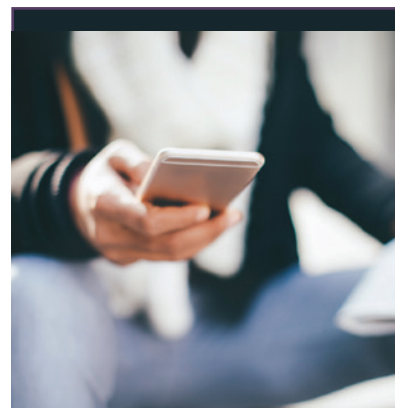
CHACON

**Kayunta Johnson-Winters** is an associate professor in the University of Texas at Arlington's chemistry and biochemistry department. She has been a member of the society's Minority Affairs Committee since 2017.



JOHNSON-WINTERS

"As a member of the ASBMB Nominating Committee, I hope to cast a wider net to attract a broader group of people to the society, while enhancing that sense of belonging for women scientists of all backgrounds. A concurrent goal would be to increase overall membership and participation at annual meetings, while creating career-development workshops for members at all career levels," she wrote.



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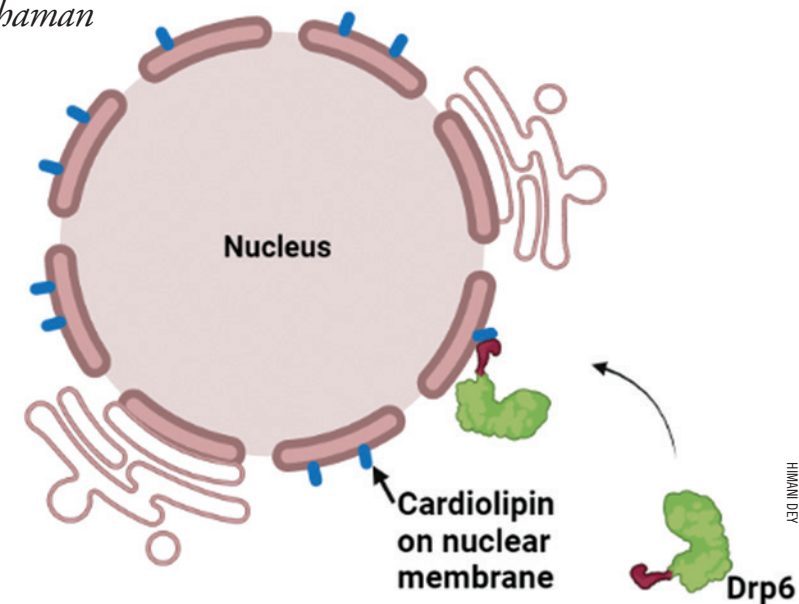
# A molecular determinant of membrane protein targeting

By Himani Dey & Abdur Rahaman

**S**pecific membrane lipids serve not only as constituents of membrane architecture but also as modulators of membrane-interacting proteins during diverse cellular processes such as cell signaling, receptor-mediated endocytosis, apoptosis, mitochondrial fusion and maintenance of mitochondrial potential. Primarily due to their varying acyl side chains, these lipids assume various shapes including cylinders and cones.

Most proteins residing in or on membrane bilayers are targeted to their destination co-translationally, whereas specific proteins involved in membrane remodeling — such as clathrin, caveolin, BAR-domain carrying proteins, Arfs, epsin, flotillin and dynamins — are recruited to their sites of action post-translationally. The latter proteins are known to interact with their target membranes by electrostatic interaction or by inserting their hydrophobic domains or amphipathic helices into the membrane bilayer.

Dynamin superfamily proteins are large GTPases that rely on their ability to form uniformly organised self-assembled structures to generate a scaffold to remodel their underlying membranes. These proteins facilitate the generation of membrane curvature required for membrane fission or fusion. Targeting of dynamins to their target



The diagram shows targeting/partitioning of Drp6 to the nuclear membrane. The membrane binding domain (red) of Drp6 specifically interacts with cardiolipin (blue) present on the nuclear membrane.

membranes depends on the recognition and clustering of specific lipids. For example, dynamin1 recognizes PI(4,5)P<sub>2</sub> in binding to endocytic vesicles on the plasma membrane, while OPA1 recognises cardiolipin on the opposing inner mitochondrial membranes to cause membrane fusion.

These processes require a dedicated stretch of membrane-binding residues. Binding of classical dynamins to the membrane is mediated by a conventional membrane-binding domain called a pleckstrin homology, or PH, domain. However, a subclass of dynamin family members known as dynamin-related proteins lacks a PH domain and instead contains a B-insert for membrane recognition.

In a recent study, the nuclear envelope-localized dynamin-related protein Drp6 in *Tetrahymena* has been shown to depend on cardiolipin for the translocation to its target membrane. Though Drp6 interacts with three distinct phospholipids (phosphatidic acid, phosphatidylserine and cardiolipin), mutation of a critical isoleucine residue (Ile553) in the membrane-binding domain of Drp6 inhibits its interaction specifically with cardiolipin and abrogates nuclear membrane recruitment. This study establishes a role for a single amino acid residue in determining target membrane specificity through interaction with a specific lipid. Though the membrane-binding domain (PH domain or B-insert) and



interacting lipid of several dynamin family proteins have been identified, researchers do not yet know the mechanism by which these proteins determine target membrane specificity.

Partitioning of proteins to different compartments is emerging as a robust mechanism for spatiotemporal regulation of protein function. Although a large number of studies demonstrate the importance

of hydrophobic and electrostatic interactions in determining target membrane binding, researchers have not yet determined how proteins discriminate different phospholipids. Detailed structural analysis of protein–lipid complexes using techniques such as high-resolution cryo-electron microscopy or X-ray crystallography is likely to shed light on the precise mechanism of membrane protein targeting.

**Himani Dey** (dey\_himani@niser.ac.in) is a Ph.D. student in Abdur Rahaman's lab in the School of Biological Sciences at the National Institute of Science Education and Research in India.



**Abdur Rahaman** (arahaman@niser.ac.in) is a Reader F in the School of Biological Sciences at the National Institute of Science Education and Research in India.

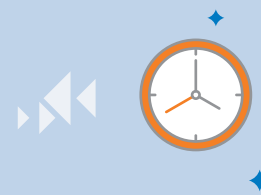


## Upcoming ASBMB events and deadlines

### OCTOBER

#### OCTOBER

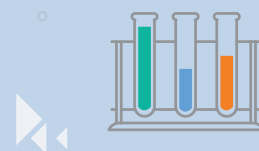
- 1 ASBMB accreditation program deadline
- 1 Student Chapters Outreach Grant deadline
- 1 Registration deadline for *Emerging roles of the nucleolus*
- 4 **Breast Cancer Awareness Month**
- 6–9 *Emerging roles of the nucleolus meeting*
- 10 **World Mental Health Day**
- 15 ASBMB annual meeting priority abstract deadline
- 15 ASBMB Outreach Grant deadline
- 16 **World Food Day**
- 12 **Bone and Joint Health Action Week**
- 18 **Disability Employment Awareness Month**
- 25 **National Eczema Awareness Month**
- 25–29 *Society for Advancing Chicanos/Hispanics & Native Americans in Science National Conference*
- 27 Registration deadline for *Serine proteases in pericellular proteolysis and signaling*
- 28–30 *Serine proteases in pericellular proteolysis and signaling meeting*



### NOVEMBER

#### NOVEMBER

- 8 **National STEM Day**
- 10–13 *Annual Biomedical Research Conference for Minority Students*
- 12 ASBMB fellows nomination deadline
- 18 **LGBT in STEM Day**
- 20 Student Chapters renewal deadline
- 27 Student Chapters Travel Award Deadline
- 30 ASBMB 2022 annual meeting abstract deadline



### DECEMBER

#### DECEMBER

- 6 DEUEL early registration deadline
- 7 ASBMB annual meeting travel award deadline
- 15 ASBMB annual meeting last-chance abstract submissions open

 **ASBMB**

# A better way to make RNA

By Daegan Miller

**R**esearchers at the University of Massachusetts Amherst recently unveiled their discovery of a new process for making RNA. The resulting RNA is purer, more copious and likely to be more cost-effective than any previous process.

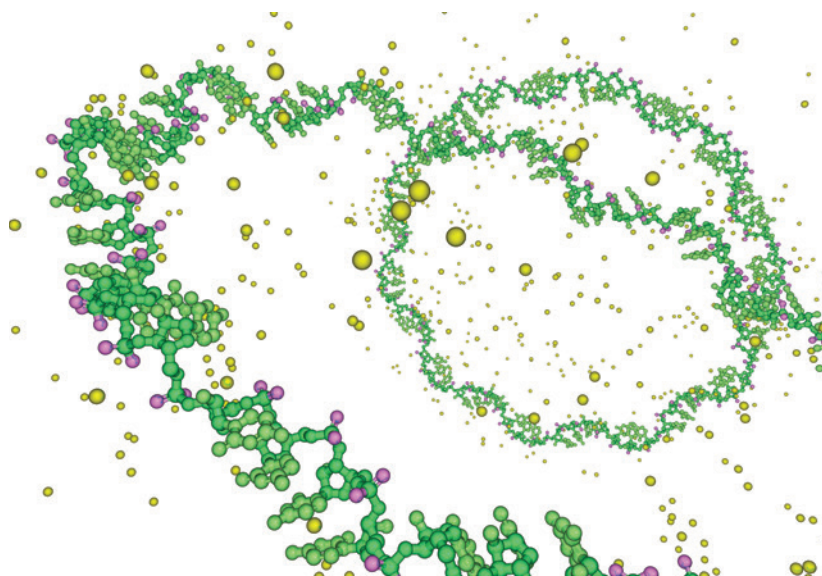
If DNA is the blueprint that tells the cells in our bodies what proteins to make and for what purposes, RNA is the messenger that carries DNA's instruction to the actual protein-making machinery within each cell. Most of the time, this process works flawlessly, but when it doesn't, serious illness can result.

One method for treating such protein deficiencies is with therapeutics that replace the missing proteins. But researchers have long known that it's more effective when the body can make the protein it needs itself. This is the goal of an emerging field of medicine — RNA therapeutics. However, current methods of producing lab-made RNA can't deliver RNA that is pure enough in enough quantity in a way that's cost-effective.

Elvan Cavaç, an MBA student and a recent Ph.D. graduate in chemistry at UMass, is lead author of a paper about this technique in the **Journal of Biological Chemistry**.

"We need lots of RNA," Cavaç said. "We've developed a novel process for producing pure RNA, and since the process can reuse its ingredients, yielding anywhere between three and 10 times more RNA than the conventional methods, it saves time and cost."

Impure RNA can trigger reactions, such as swelling, that can be



harmful and even life-threatening. For example, impure RNA can cause inflammation in the lungs of a patient with cystic fibrosis. Conventionally manufactured RNA has to undergo lengthy and expensive purification.

Craig Martin, the paper's senior author and a professor of chemistry at UMass, said, "Rather than having to purify RNA, we've figured out how to make clean RNA right from the start."

The process that Cavaç, Martin and their co-authors detail involves first increasing the salinity of the solution in which the RNA is generated, which inhibits the runaway production of RNA that leads to impurity. In this process, an enzyme called T7 RNA polymerase is tethered to a microscopic magnetic bead alongside a DNA promoter template — a specific sequence of DNA that codes for a specific RNA. Once the polymerase and DNA promoter interact, they produce RNA whose purity is ensured by the surrounding saline solution.

"Our method," Martin said, "can be more than 10 times better at producing pure RNA than current processes."

Cavaç, Martin and their colleagues now are turning to experiments that will allow them to scale up the production of RNA to satisfy society's needs. "The real goal here," Martin said, "is to have a 'flow reactor,' or a continuous pipeline into which you can slowly feed the ingredients and have pure RNA continuously come out the other end."

DOI: 10.1016/j.jbc.2021.100999

*(The original version of this article was published on the UMass Amherst website.)*

Daegan Miller (drMiller@umass.edu) is the associate news editor for science in the news and media relations office at the University of Massachusetts Amherst. He holds a Ph.D. in environmental history and the history of science from Cornell University.



# Inflammation alters antigens

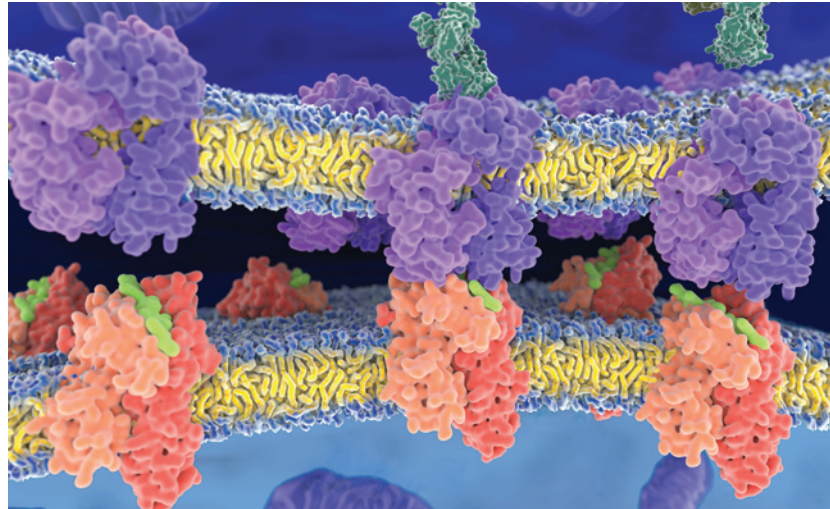
By Laurel Oldach

Amid the complexity of the immune system, where many highly specialized cell types perform particular functions, it can be easy to overlook the contribution of ordinary cells. Healthy or not, non-immune cells routinely present tens of thousands of peptides at a time on their surface for inspection by roving T cell sentinels. The peptides, originating from the proteins being expressed and degraded inside each cell, give a window into a cell's state of health.

Arie Admon, a biochemist and emeritus professor at the Technion-Israel Institute of Technology in Haifa, studies these peptides, known as the immunopeptidome. “The peptides alert the immune system about pathogen infection,” Admon said. “Without them, we would be dead in a matter of minutes.”

Peptides arrive on the surface of a non-immune cell in the embrace of proteins called class 1 human leukocyte antigens, or HLAs. (Class 2 HLAs are expressed in immune cells.) HLAs bind short peptides and present them on the membrane. Thanks to high genetic variation in HLA genes, which affects binding preferences, and to variation in protein degradation, each individual's immunopeptidome has a dizzying variety of peptides. Still, T cells can recognize nonself peptides at low abundance — as few as five or 10 viral or cancerous peptides out of thousands on one cell's surface can trigger its destruction.

For a long time, immunopeptidome researchers couldn't match that sensitivity. “Before, we were analyzing



Interaction between a T cell and an antigen-presenting cell (below). The lower cell's MHC receptors are shown in orange, with antigens in the immunopeptidome shown in green.

one peptide at a time,” Admon said. “Suddenly we can analyze thousands, tens of thousands within hours.”

In a recent article in the journal **Molecular & Cellular Proteomics**, part of a special issue on the immunopeptidome, Admon and trainees, including first authors Liran Komov and Dganit Kadosh, report on how an interferon released during viral infection changes the immunopeptidome.

Interferons alter protein synthesis and degradation and boost antigen processing for display. To determine the overall effect of these changes, the authors used isotope labeling to infer each protein's rates of synthesis, degradation and incorporation into the immunopeptidome.

They found two protein populations. Some, dubbed retirees, were degraded long after synthesis; others were made and turned over even before they matured. Interferon treatment caused an uptick in the latter, which Admon compared to industrial quality control.

“It's like a factory,” he said. “Some-

body along the production line ... is standing there, and at every step they're taking some parts from the production line, breaking them apart as a quality-control approach.”

Increasing turnover during infection may help cells present viral peptides for faster detection. The immunopeptidome showed the researchers traces of increased turnover in protein complexes, such as the ribosome and the proteasome. The physiological effect of that increased churn in subunits is unclear. In addition, viral infection in a real organism is much more complex than interferon treatment of cultured cells, so the impact of greater turnover in a true infection remains to be seen.

DOI: 10.1016/j.mcpro.2021.100105

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



# Itching for answers about lipids and psoriasis

By *Leia Dwyer*

**W**hile we often dwell on the importance of the heart and brain, the human skin is the largest organ in the body and vital to our survival. It serves as a barrier to water, guarding the body against dehydration, temperature extremes and harmful chemicals. Lipids in the skin are critical to its function as a water barrier since fat and water don't mix.

Christopher Thomas is a lecturer and researcher at the School of Pharmacy and Pharmaceutical Sciences at Cardiff University whose research focuses broadly on oxidized lipids and their role in human health and disease, particularly in the skin. Thomas became interested in the skin when he was pursuing a Ph.D. in chemistry and working on developing topical treatments for rheumatoid arthritis.

"We were trying to put fatty acids and fish oils through the skin," Thomas said.

Bigger research questions arose for Thomas regarding skin physiology and how products are metabolized once they enter the skin. His postdoctoral studies then focused on lipoxygenase, or LOX, enzymes within platelets in blood. Thomas' current research is a marriage of his previous work; he now investigates the role of LOX enzymes in the skin.

In a recent paper in the **Journal of Lipid Research**, Thomas and collaborators describe studying a biosynthetic pathway in the skin that is vital to formation of the complex mammalian skin barrier. In this pathway, ceramide



lipids containing a fatty acid, linoleic acid, are oxidized by LOX enzymes. Ceramides of varying carbon lengths are oxygenated by LOX. Following some intermediate steps, a final hydrolysis step yields a terminal product called 9,10,13-trihydroxy-10E-octadecenoic acid, which has been found at higher than normal levels in patients with eczema.

Researchers know little about the exact location in skin layers of these intermediate and terminal species and their roles in health and disease. Thomas developed methods to study the quantity and location of these species, using liquid chromatography with tandem mass spectrometry. Method development for any kind of lipid system can be quite challenging, he said, because the lipids are repelled by any solutions containing water.

As part of this research, the team analyzed human psoriatic skin samples and showed that the linoleic acid oxygenation pathway was highly dysregulated. Unoxidized intermediates in the pathway were elevated significantly relative to nonpsoriatic

skin samples, and oxygenated species were reduced.

The researchers also used a publicly available data set from the Gene Expression Omnibus to compare the gene profile of skin from psoriatic lesions to that of unaffected skin in patients with psoriasis. They found that the genes for the entire biosynthetic pathway for oxygenated species described here are expressed more in the skin from human psoriatic lesions. This suggests that the regulatory machinery to control even unaffected skin lipid metabolism is abnormal in psoriasis patients.

Thomas' next avenues of research will use an exciting new addition to the lab: a 3D printer to generate novel skin models. This is a project shared with several other researchers at Cardiff who are interested in studying printed skin from a variety of research angles.

"It's a collaborative feel where we're all interested but we've all got our slightly different hats on," he said.

Thomas added that he also views 3D-printed skin as a way to advance the goal of producing representative human healthy and diseased skin models, which could help to reduce animal testing in the pharmaceutical and cosmetics industries.

DOI: 10.1016/j.jlr.2021.100094

**Leia Dwyer** (leia.dwyer@gmail.com) is a Boston-area biotech and pharmaceutical industry professional.



## From the journals

By Heather Masson–Forsythe, Vaishnavi Muralikrishnan & Anand Rao

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

### Endosomal cAMP alters the phosphoproteome

G protein–coupled receptors, or GPCRs, comprise the largest and most versatile class of cellular receptors, controlling nearly all essential mammalian physiological processes. Recently, researchers have realized that GPCRs can be activated to generate cyclic AMP, a second messenger that plays a critical role in GPCR-mediated signaling cascades, from endosomal membranes. Moreover, recent evidence suggests that this endosomal signaling may underlie important physiological and pharmacological phenomena, such as selective drug responses. Yet researchers' knowledge of the functional consequences of this signaling is incomplete.

In a paper published in the **Journal of Biological Chemistry**, Nikoleta Tsvetanova of the University of California, San Francisco, and colleagues combined an optogenetic approach for site-specific generation of cAMP with unbiased mass spectrometry–based analysis of the phosphoproteome. Using this method, the authors identified unique sites whose phosphorylation is changed in response to cAMP elevation. They also found a strong endosomal bias for a subset of proteins that are dephosphorylated in response to cAMP and

implicate localized cAMP production in defining distinct phosphoresponses. DOI: 10.1016/j.jbc.2021.100907

### A new protein biomarker for acute spinal cord injury

According to the World Health Organization, as many as half a million individuals worldwide experience spinal cord injury, or SCI, each year. In recent years, researchers have identified numerous treatments for SCI that have been successful in preclinical studies. However, most of these treatments fail in clinical trials, because preclinical trials are conducted on lab animals and researchers cannot predict accurately their relevance to humans.

To gain a deeper understanding of SCI, Michael Skinnider and colleagues from the University of British Columbia in Canada performed a targeted proteomic analysis on the cerebrospinal fluid and blood serum samples from 111 SCI patients. They also compared evolutionarily conserved changes in pigs and humans with SCI to identify biomarkers that define baseline after injury and neurological recovery six months after injury. In their recent study published in the journal **Molecular & Cellular Proteomics**, the researchers describe using these studies to identify glial fibrillary acidic protein, or GFAP, as a biomarker that acts as a cross-species outcome measure. The results of this study demonstrate a new opportunity to investigate the biology of acute SCI.

DOI: 10.1016/j.mcpro.2021.100096

### Minimizing side effects of atherosclerosis treatment

High levels of very low-density protein, or VLDL, and low-density lipoprotein, or LDL, which is produced from breaking down VLDL, are associated with the buildup of fats within arteries, causing atherosclerotic cardiovascular disease, or ASCVD, a leading cause of death worldwide. Overproduction of VLDL can result from hereditary disease, obesity and insulin resistance, while inhibition of VLDL secretion significantly reduces ASCVD development. Available strategies to inhibit VLDL secretion from the liver typically result in the accumulation of fat inside the liver along with subsequent complications.

In a recent study published in the **Journal of Lipid Research**, Bingxiang Wang and colleagues at the Shandong Academy of Medical Sciences, along with collaborators from the University of Alberta, demonstrated in mice that deficiency in cargo receptor Surf4, or Surf4, not only reduces VLDL secretion and ASCVD development but does so without fat accumulation and liver damage. Additionally, the team found that knockdown of Surf4 reduced plasma cholesterol levels but did not affect the secretion of PCSK9, an enzyme that increases LDL cholesterol plasma levels by degrading a key receptor involved in clearing plasma LDL. The work contributes to researchers' growing understanding of lipid

## DNase therapy for COVID-19 recovery

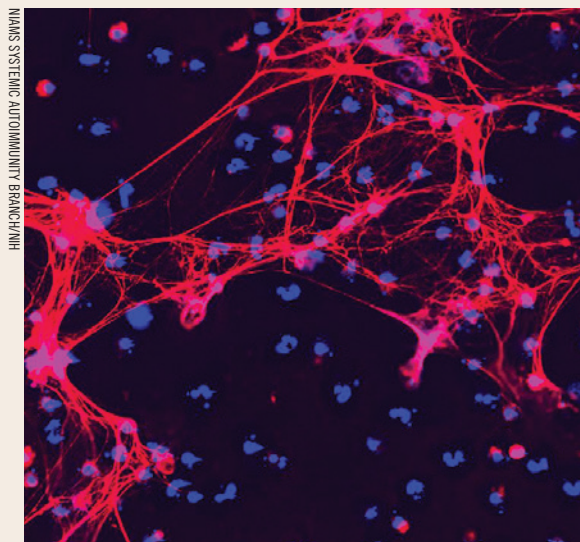
COVID-19 can cause symptoms such as pneumonia and acute respiratory distress syndrome, or ARDS. In patients that develop ARDS, the disease usually is characterized by hypoxemia, a below-normal blood oxygen level; neutrophilia, an elevated count of neutrophils (a type of white blood cells); and thick mucus buildup in the air passages of lungs. When these symptoms occur, patients' breathing becomes labored, and they may require oxygen therapy using mechanical ventilators or extracorporeal membrane oxygenation, commonly known as life support. These methods have harmful side effects, however, and ventilators have been in limited supply during the pandemic.

In ARDS, excessive buildup of gelatinous and viscous sputum in the lungs can obstruct the airways. Based on knowledge of similar symptoms in patients with ARDS and cystic fibrosis, or CF, researchers have hypothesized that the viscous sputum production in COVID-19 is due to neutrophils. In ARDS and CF, neutrophils produce extracellular DNA bound to granular proteins known as neutrophil extracellular traps, or NETs, which are released in response to bacterial or viral infection, causing the sputum to become viscous. In previous studies, blood plasma of COVID-19 patients showed molecular signatures of NETs. Researchers did not yet know the molecular composition of sputum in COVID-19 patients.

In a recent study published in the journal **Molecular & Cellular Proteomics**, Jane Fisher and colleagues at Lund University in Sweden confirmed the presence of NETs in sputum and plasma samples from COVID-19 patients using techniques such as data-independent acquisition mass spectrometry, or DIA-MS, and immunofluorescence. Using a strategy previously tested in patients with CF, they treated a small group of patients with severe COVID-19 symptoms with enzyme recombinant human deoxyribonuclease I, or rhDNase, which degrades extracellular DNA in the sputum. They analyzed the sputum and blood plasma after treatment and found both a marked reduction of NETs and reduced dependency on external high-flow oxygen therapy in these patients. Thus, targeting NETs using rhDNase may have potential therapeutic advantages in treating severe COVID-19 patients.

DOI: 10.1016/j.mcpro.2021.100113

— Vaishnavi Muralikrishnan



DNase therapy can be used to target neutrophil extracellular traps, such as the ones pictured here, to treat patients with severe COVID-19 infections.

metabolism regulation and how to minimize side effects of ASCVD treatment.

DOI: 10.1016/j.jlr.2021.100091

## Exploring a link between TBK1 and mTORC2

TANK-binding kinase 1, or TBK1, responds to infiltrating microbes by initiating cellular pathways critical for host innate immune defense. In previous work, Diane Fingar's lab at the University of Michigan Medical School discovered that TBK1 phosphorylates the mechanistic target of rapamycin complex 1, or mTORC1, on serine 2159, or S2159, increasing mTORC1 signaling and mTORC1-mediated cell growth as well as the production of type 1 interferons such as interferon-beta. As part of this work, it was observed that knockout of TBK1 in mouse embryonic fibroblasts, or MEFs, led to a reduction in phosphorylation of Akt serine 473, an important metabolic kinase and target of phosphoinositide 3-kinase and an established target of mTORC2. However, researchers do not yet know the link between TBK1 and mTORC2.

In a recent study published in the **Journal of Biological Chemistry**, Aaron Seth Tooley and colleagues in the Fingar lab explored the existence of a direct functional relationship between TBK1 and mTORC2. Using MEFs lacking TBK1, wild-type MEFs and mice bearing an Mtor S2159A knock-in allele, the authors demonstrated that TBK1 activates mTORC2 directly to increase Akt phosphorylation. The researchers found that TBK1 and mTOR S2159 phosphorylation boosts mTOR-dependent phosphoryla-

tion of Akt in response to several growth factors. Immunoprecipitation experiments demonstrated TBK1–mTORC2 coimmunoprecipitation, and kinase assays showed that TBK1 and mTOR S2159 phosphorylation increase mTORC2 intrinsic catalytic activity.

These findings suggest the existence of crosstalk between TBK1 and mTOR and, as both TBK1 and mTOR contribute to tumorigenesis and metabolic disorders, future work may identify new pathways that contribute to disease pathology.

DOI: 10.1016/j.jbc.2021.100942

## How environmental exposures affect male reproductive functions

Seminal vesicles are an important part of the male reproductive accessory system and are involved in the secretion of seminal plasma, a viscous fluid containing several bioactive molecules that support male reproductive function after ejaculation. The components of seminal plasma are critical to regulating conception and fetal health. Thus, researchers think environmental insults that affect male reproductive function also may affect the seminal vesicles and thereby have an impact on the composition of its secretions.

In a recent study published in the journal **Molecular & Cellular Proteomics**, David A. Skerrett–Byrne and colleagues at the University of Newcastle, Australia, completed the first proteomic assessment of mouse seminal vesicles and assessed the impact of the reproductive toxicant acrylamide on this tissue. They identified a to-

## Predicting drug-induced lysosomal fat buildup

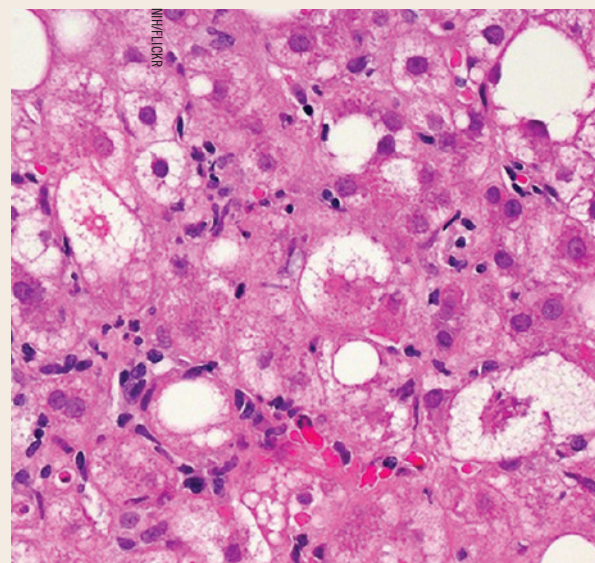
The accumulation of phospholipids in lysosomes, called drug-induced phospholipidosis, or DIP, is associated with more than 50 FDA-approved drugs, making it one of the most common forms of drug toxicity. Typically impacting the lungs, liver or kidney, DIP is involved with diseases including pulmonary fibrosis and fatty liver disease.

Due to the serious implications of DIP, physicians terminate drug treatment when it is detected, limiting interventions that might be critical to a patient’s recovery. Despite its prevalence, researchers do not yet clearly understand DIP’s causes and implications, making it difficult to predict if a drug will cause the condition and to separate specific drug targets from downstream effects.

A recent study in the **Journal of Lipid Research** by Vania Hinkovska–Galcheva and fellow researchers at the University of Michigan Medical School and the University of Michigan identified lysosomal phospholipase A2, or PLA2G15, as a key target of cationic amphiphilic drugs such as amiodarone, which regularly are implicated in phospholipidosis. After assaying libraries of compounds known to cause phospholipidosis as well as drugs not previously reported to do so, the team found that inhibition of this enzyme’s activity, measured by a decrease in 1-O-acylceramide formation, was an excellent candidate for predicting DIP.

While inhibition of PLA2G15 is clear, the researchers do not propose direct enzyme binding as the cause but rather the interference of electrostatic charge interactions between positively charged regions of the enzyme’s lipid-binding domain and negatively charged phospholipid head groups. The team was able to make immediate use of this finding, demonstrating phospholipidosis in vitro for 36 PLA2G15-inhibiting compounds not previously known to cause phospholipidosis. They also identified several drugs known to cause phospholipidosis but not predicted to do so by other models. PLA2G15 inhibition provides a potentially robust tool for toxicity screening during drug development.

DOI:10.1016/j.jlr.2021.100089



A microscopic image of liver tissue affected by nonalcoholic fatty liver disease. The large and small white spots are excess fat droplets filling liver cells, or hepatocytes.

— Heather Masson–Forsythe

## Antacid may ease COVID-19 symptoms

Widely available vaccines have diminished the prevalence of severe illness and death due to COVID-19. However, the highly contagious delta variant has driven an increase in breakthrough infections among fully vaccinated individuals. While those vaccinated are still at lower risk for hospitalization and death, affordable and easily procurable therapeutic options remain limited for those suffering from the panoply of symptoms that accompany COVID-19. In a recent case series, the over-the-counter heartburn and ulcer medication famotidine, sold as Pepcid AC, rapidly relieved symptoms, including cough, fatigue, headaches and shortness of breath, in nonhospitalized COVID-19 patients, but researchers did not know the molecular and biological processes underlying these observations.

In recent work published in the **Journal of Biological Chemistry**, Rukmini Mukherjee of Goethe University and colleagues used biochemical, cellular and functional assays to assess the molecular actions of famotidine against SARS-CoV-2. While famotidine did not have an effect on viral replication or viral protease activities, the researchers showed that it does inhibit histamine-induced expression of toll-like receptor 3, or TLR3, a molecule that plays an important role in pathogen recognition and innate immune response.

Using Caco-2 cells, an immortalized line of human colorectal adenocarcinoma cells, infected with SARS-CoV-2, the scientists found that famotidine treatment

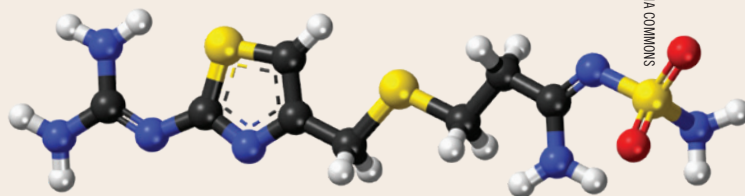
reduced TLR3-dependent signaling processes that culminate in activation of interferon regulatory factor 3 and the NF-kappa B pathway, altering antiviral and inflammatory responses. SARS-CoV-2-infected cells treated with famotidine displayed reduced expression levels of the inflammatory mediators C-C motif chemokine ligand 2 and interleukin 6, which drive cytokine storms, a potentially life-threatening symptom of COVID-19.

Pharmacokinetic studies have shown that famotidine can reach concentrations in blood sufficient to antagonize histamine H2 receptors expressed in numerous cell types, including mast cells, neutrophils and eosinophils. Thus, these findings explain how famotidine may reduce histamine-induced inflammation and cytokine release, in turn improving outcomes in COVID-19 patients.

DOI: 10.1016/j.jbc.2021.100925

— Anand Rao

This ball-and-stick model represents H2 histamine receptor antagonist famotidine, an over-the-counter heartburn medication commonly known as Pepcid AC that has relieved symptoms in nonhospitalized COVID-19 patients.



tal of 5,013 proteins in the seminal vesicle proteome and found that 311 of these proteins were altered due to acrylamide exposure. They showed that acrylamide caused oxidative stress in the seminal vesicles and surrounding smooth muscles, leading to a dysregulation in the proteins involved in cell proliferation, survival and death. In addition, acrylamide exposure led to a decrease in the protein content and the quantity of seminal vesicle secretion. In summary, this

study confirms that exposure to reproductive toxins affects male accessory gland functions and underscores the importance of studying the response of all male reproductive tissues when assessing the impact of environmental stressors on reproductive functions.

DOI: 10.1016/j.mcpro.2021.100107

## Disordered protein clusters promote stability

RNA-binding proteins play important roles in various cellular

functions and contain abundant disordered protein regions, which account for 50% of the RNA-binding proteome. Among these disordered regions are electro-negative clusters, or ENC, which contain acidic residues and/or phosphorylation sites and whose abundance and length exceed other known repetitive sequences. Yet, despite this abundance, researchers know little about the functions of ENC in RNA-binding proteins.

In a paper published in the



**Journal of Biological Chemistry**, Steve Zaharias of the University of Alabama at Birmingham and colleagues investigate the impacts of ENC on protein stability and RNA-binding affinity and specificity. Using the RNA-binding protein ribosomal biogenesis factor 15, Nop15, as a model, the researchers showed that Nop15 ENC increases protein stability, inhibits nonspecific RNA binding and regulates RNA binding via electrostatic interaction. The researchers grafted an ENC to another RNA-binding protein, Ser/Arg-rich splicing factor 3, and used RNA Bind-n-Seq — a high-throughput, cost-effective method for resolving sequence and secondary structure preferences of RNA-binding proteins — to show that the engineered ENC inhibits disparate RNA motifs differently, suggesting that one function of ENCs is to regulate RNA binding via electrostatic interaction.

DOI: 10.1016/j.jbc.2021.100945

## Lipids: The key to sepsis diagnosis and treatment

Sepsis is an inflammatory disease caused by the body's extreme reaction to a bacterial or fungal infection. Through a complex cascade of microcirculatory collapse and dysregulated immune response, sepsis rapidly causes tissue damage and organ failure, with mortality increasing by 4% each hour sepsis remains undiagnosed. The diversity of immune and vascular responses combined with multiorgan failure makes sepsis the most common cause of death in hospitalized patients and the biochemical basis extremely difficult to deconstruct. Sepsis treatment is

restricted to antibiotics and supportive care, and despite the critical need, researchers have yet to identify clinically relevant and specific diagnostic biomarkers. Lipids may be the answer to both diagnosis and treatment.

As a part of a thematic review series, Kaushalya Amunugama and colleagues at the St. Louis University School of Medicine recently published a review in the **Journal of Lipid Research** highlighting the importance of dysregulated lipid metabolism in sepsis pathology and of key lipid-regulating enzymes. Many bioactive lipids directly contribute to sepsis progression, while other lipids are byproducts of sepsis-associated metabolic changes. The authors summarize existing evidence of the lipid–sepsis connection in support of presenting lipids as candidates for diagnostic biomarkers as well as targets of therapeutics.

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# On-the-bench training

By Laurel Oldach & Sarina Neote

When people talk about the challenges college students at primarily undergraduate institutions face getting into laboratories, they usually mean socioeconomic or related barriers to access. But at Montgomery College, the main barrier is the airlock.

Swiping her badge to enter a biotechnology training facility during a virtual tour, Lori Kelman, a biotechnology professor at the community college in the Washington, D.C., suburbs, explained that the training lab was designed to mimic a pharmaceutical manufacturing facility certified by the Food and Drug Administration. After passing through an airlock with space to don sterile lab gowns, she swiped again to gain access to a row of closed biosafety cabinets with spray bottles of ethanol and disinfectant arrayed neatly alongside them and a pass-through cabinet in the wall to deliver media for cell culture from a clean room next door.

“Normally, when research scientists come in here, they say, ‘Wow, it’s so clean! It looks like you could eat off the floor!’” Kelman said. “And when industry scientists come in, they say ‘you’ve done a nice job’ — which means, ‘this is what we would expect an industry training place to look like.’”

Next door to the tissue culture room, the facility also includes a suite for isolating and purifying products from harvested cells.

“In case you were thinking community college meant the lowest level of available equipment,” Kelman said, pointing out benchtop instruments for droplet digital polymerase chain reaction and fast protein liquid chromatography in the downstream suite, “you would be wrong.”

**Apprenticeships offer a growing number of students pathways into biotech. Are they interested?**

Inside the mock good manufacturing practices suite at Montgomery College in Maryland.

## Internship, apprenticeship, co-op: formal and informal hands-on training

Apprenticeship is just one of many models for on-the-job technical training, with varying degrees of formality and overlap.

Most Americans are more familiar with internships, which are less structured, shorter-term and sometimes unpaid. For a highly regulated industry, according to the Biotechnology Institute's Timothy Fawcett, apprenticeships can be a better fit than internships, because they allow more time for training.

"If you're making something that's FDA-regulated, the intern spends their whole time reading standard operating procedures," Fawcett said.

At GlaxoSmithKline, which offers apprenticeships and paid internships, early talent attraction specialist Anna Eswood said that the main distinctions between these programs are their length and their relationship to classroom instruction. "Apprentices are attending school while they're working, and interns are taking the opportunity while on a break from school," she explained.

Another training model is a cooperative education, or co-op, in which students work for an employer, earning academic credit between stints as a full-time student. Co-op work experience is a graduation requirement in some degree programs, especially in engineering, but the model is not used widely in the sciences. GSK offers co-ops too; the program lasts six months to a year, in contrast to three-month internships. Some academics compare training in graduate school to an apprenticeship, noting that trainees learn to do research on the job over a course of years from masters of the trade.

Montgomery College has invested heavily in teaching biotechnology because the industry has become a significant economic driver in Maryland, a trend accelerated by the COVID-19 pandemic. Although the school has a large program, Kelman said, they're nowhere near meeting the demand for entry-level biotech workers.

A new apprenticeship program may be one way of bridging the gap. Montgomery College recently began offering apprenticeships in biomanufacturing in partnership with pharmaceutical giant GlaxoSmithKline. Such programs, while still uncommon, are gaining traction as the biotechnology industry grapples with a significant labor shortage. Meanwhile, policymakers focused on getting Americans back to work and increasing economic productivity have

proposed legislation that would invest billions in apprenticeships.

## Labor market pressures in biotechnology

An apprenticeship is a full-time job that combines classroom instruction with on-the-job training to offer a route into a skilled trade, typically to high school graduates.

The Department of Labor, which has administered the U.S.'s registered apprenticeship system since 1937, defines apprenticeship as "an industry-driven, high-quality career pathway where employers can develop and prepare their future workforce, and individuals can obtain paid work experience and classroom instruction."

In contrast to an internship, an apprenticeship is always paid, is usually registered with the government to ensure that it offers quality education, and lasts at least a year, usually several. Apprenticeships are common in manufacturing, construction, utilities, and health and safety industries.

Apprenticeships in the life sciences, on the other hand, are nontraditional. During a 16-year period when 1.5 million apprentices were trained, an analysis by researcher Daniel Kuehn and colleagues at the Urban Institute counted fewer than 950 apprentices in science, most of them learning horticulture.

But biotechnology and related fields are growing rapidly. Though the exact share of the economy varies among analyses, depending on what counts as biotech, the National Academies recently estimated that the bioeconomy generates 5.1 percent of U.S. gross domestic product, or almost \$960 billion annually. Analysts project a growing number of what are called middle-skill jobs in the sector.

Many of those jobs will be in biomanufacturing, the use of cells or

Opposite page: A worker in protective coveralls works in a sterile pharmaceutical manufacturing laboratory.

other living systems to generate products including food, nutraceuticals, biofuels, biologic medications, and cell and gene therapies. Once these products are discovered and proven effective, someone has to do the meticulous, repetitive work of producing them. The work requires excellent laboratory skills and troubleshooting but not a bachelor's degree.

According to Karla Talanian, the director of talent and workforce development at the Massachusetts non-profit MassBioEd, biomanufacturing “is an occupation that is fairly unique in the life sciences industry, where employers are already comfortable with hiring people who don't have a four-year college degree.”

In fact, according to Talanian and to community college professors who run biotechnology programs, a bachelor's degree in biology or biochemistry may not be the best preparation for entry-level industry jobs.

The purpose of a college education, and whether it should be the same as job preparation, depends on whom

you ask. But according to Collins Jones, Kelman's colleague on the biotech faculty at Montgomery College, “There need to be options for people who show an aptitude for science but maybe aren't going to meet every science requirement that you would want for med school or grad school.”

Meanwhile, he said, what students learn in traditional courses “isn't preparing them at all for industry.”

About half of the students in MC's biotechnology program already have a four-year degree in the life sciences, Jones said, but lack technical and regulatory knowledge that would make them competitive for industry jobs. By way of example, he said, “We tell you how to denature a protein: (sodium dodecyl sulfate), heat, all that stuff. But then we go to the next step and say, ‘But really, if you're making a monoclonal antibody, you want to avoid all that stuff.’”

The college then offers an



**“I think what GSK is doing is going to serve as a test case. If it’s successful, I think you will see more.”**

Lori Kelman

introduction to best practices in protein formulation.

College graduates, according to both Jones and Talanian, frequently expect to do independent research and can become dissatisfied with the routine daily tasks of biomanufacturing. Often, the outcome is rapid turnover. To fill the resulting gaps, companies fall back on temporary contract workers. The arrangement, Talanian said, “leads to a lot of inefficiency in the system.”

Meanwhile, she added, competition for experienced workers across the life sciences industry is ferocious. “They’ve got recruiters calling them all the time. If they decide to put themselves out on the market openly, they get five job offers in a week. There’s tremendous salary inflation; there’s title inflation; and it’s just really not sustainable.”

To fill the need for biomanufacturing technicians, some companies and workforce development organizations have begun to experiment with apprenticeships.

## Apprenticeships in biotechnology

Dolan Stimson had one goal when he was starting college: to earn his bachelor’s without going into debt.

At first, the Pennsylvania resident pictured himself as a high school chemistry teacher, and with his heavy-rimmed hipster glasses and easy smile, it’s not hard to imagine him at the front of a classroom. But as he worked through a teaching program at his hometown community college, he said, “It wasn’t a challenge that drove me. It wasn’t something I could see myself doing — maybe when I’m older.”

Instead, he considered becoming a pharmacist like his older brother. He took a few biotechnology courses and

enjoyed them. Then he heard from his professor, Margaret Bryans, about a lunch and learn with a GlaxoSmithKline recruiter who was looking for applicants to join a new apprenticeship program.

GlaxoSmithKline is based in the United Kingdom, where apprenticeship is common. The company had approached Bryans, a professor at Montgomery County Community College in Pennsylvania and director of a National Science Foundation–supported biotech training program, to inquire about adapting its UK apprenticeship model to American labor markets.

(Montgomery County Community College in Pennsylvania, where Bryans is a professor and Stimson a student, is not affiliated with Montgomery College in Maryland, where Kelman and Jones teach. Both community colleges offer GSK apprenticeships through their biotechnology departments.)

According to Bryans, GSK had difficulty filling its manufacturing positions without offering additional training. “This is one of their tactics to develop that workforce,” she said of the program. “In their experience, young people who came on as apprentices tended to stay on long-term at the company.”

Anna Eswood, an early talent attraction specialist at GSK, said, “The apprentice program was very successful in the UK.” That success inspired the US program, she said, as “an approach to stabilize the pipeline of future engineers.” Stimson applied and, about a year later, was accepted into the first cohort. The program is designed to support apprentices through a three- or four-year course of study during which they earn an associate’s degree in biotechnology, with tuition paid by the company. By the time Stimson started, he

had completed his associate's; the company supported his study for a bachelor's degree in pharmaceutical product development. He earned a full-time wage, taking six credit hours a semester and working 29 hours a week as a chemical compound operator in training.

"Chemists want to create a drug. They have a synthetic route they want to use; however, they aren't sure whether it can scale appropriately and safely," Stimson said. "My role was to do that actual scale-up, still within the research side of research and development. ... I've got to give a shout-out to Dr. Bryans, because her mock (good manufacturing practice) biotech lab was the single greatest experience in my education."

Two apprentices have completed training in the MCCC/GSK biotechnology program, with two more about a year into their studies. According to Stimson, two of the four chemical operator apprentices who started when he did decided that the career wasn't right for them.

"Since the program onset, we've had roughly 30 apprentices participate in the program across six GSK sites," many of whom are still in training, Eswood said. Among them were apprentices learning to work as lab analysts, biochemists, instrumentation or automation technicians, and in other business areas such as logistics. The company's biotechnology program is the oldest of five apprenticeship programs in biotechnology registered with the Department of Labor.

"I think what GSK is doing is going to serve as a test case," Kelman said. "If it's successful, I think you will see more."

The industry may not wait to learn the outcome of GSK's program. A flurry of additional

## Displaced workers

Last summer, Montgomery College in suburban Maryland expanded its biomanufacturing job training program into an eight-week boot camp for restaurant workers who had been laid off during the pandemic.

"There's been an added layer of available jobs due to the pandemic," Lori Kelman, a professor in the program, said.

She recalled seeing an appeal on the news in spring 2020 for scientists to help out at Qiagen. "I think what they were hoping for, and got, were a lot of lab workers who were suddenly at home, who went on in and assembled test kits for them, which got shipped out really, really quickly."

Meanwhile, her colleague Collins Jones watched the pandemic ravage the local restaurant industry through a Facebook group he belonged to. He recalled that an industry contact once had mentioned recruiting restaurant workers when short on labor, "because they know how to take orders, so they know how to document; they know how to clean; they know how to organize themselves; and they can follow directions," Jones said.

Jones put together a short, intensive training course in biomanufacturing for workers who had been laid off during the pandemic. It covered the highlights of the college's two-year associate's degree in just weeks. Of the 12 people who started the program, 11 completed it, and five went on to accept jobs in biomanufacturing.

The program is a test case for the kind of retraining policymakers hope an expanded apprenticeship system will offer. Because apprentices continue to earn an income and are guaranteed employment, Urban Institute researcher Daniel Kuehn said, apprenticeship "hasn't played a major role in services for displaced workers so far ... but I think it could be bigger, because it is ideal for a lot of these reasons."

biotech apprenticeships have launched or been announced in recent months. In North Carolina, a small company called KBI Biopharma announced a new program in pharmaceutical manufacturing. In Massachusetts, Talanian's organization, MassBioEd, welcomed its first cohort of 19 apprentices in biomanufacturing to the classroom on June 1 and launched a clinical trials apprenticeship program in August.

MassBioEd targeted midcareer workers in Boston who wanted to move into more lucrative biotech fields, recruiting applicants with experience in traditional manufacturing, commercial kitchens or other areas that might offer transferable

**“What is a research technician? I did not know. All I knew was that it was a better-paying job and I was going to be using my mind, instead of my hands.”**

Jean Smith

skills. After some prescreening, the organization forwarded promising applications to the five biopharmaceutical companies that sponsor the program. Candidates who made it through the companies' vetting processes were offered jobs contingent on completing a five-month training program in classroom and lab.

For companies, supporting apprenticeship programs such as MassBioEd's is a workforce development measure. They aim to reduce turnover and build local talent pools specifically trained for the jobs they are offering. Because apprenticeships tend to increase wages and employment, they also appeal to policymakers; the training model has seen an unusual degree of bipartisan support despite Washington's polarized atmosphere.

### Current and proposed legislation

“Registered Apprenticeships are this nation's most successful federally funded workforce development initiative,” according to a statement released by U.S. Rep. Robert C. Scott, D-Va., who chairs the House Committee on Education and Labor. “Investing in Registered Apprenticeships ... strengthens our economy and helps employers build pipelines of talented and dedicated workers. Yet, Congress has not reauthorized the National Apprenticeship Act since it was first passed in 1937.”

Advocates for increased funding cite benefits to both apprentices and their employers. The average starting salary for someone who has completed an apprenticeship is \$70,000, nearly twice the average salary for a high school graduate. One analysis found that for every

dollar spent on an apprenticeship, employers get an average of \$1.47 back in increased productivity, reduced waste and greater frontline innovation.

Policymakers are familiar with this economic case. In 2016, the Obama administration spent \$90 million to increase apprenticeship access nationwide. Most of the money went to state apprenticeship agencies, with about a third supporting workforce development organizations, industry associations and companies to start new programs. (GlaxoSmithKline joined an associated group called Leaders of Excellence in Apprenticeship Expansion, Development and Research in 2018.)

As members of Congress sought to boost economic recovery after pandemic-related shutdowns, H.R. 447, the National Apprenticeship Act of 2021, passed in the House of Representatives by a vote of 247–143 in February. The bill, which enjoyed an unusual degree of bipartisan support in a highly divided Congress, proposes to invest \$3.5 billion over five years to create nearly 1 million new apprenticeship opportunities, and includes language focused on dismantling barriers to employment for individuals impacted by the criminal justice system and individuals with disabilities.

In a statement released before the House passed H.R. 447, House Majority Leader Steny H. Hoyer, D-Md., said, “This legislation will help us provide opportunities to the millions of workers and their families who are out of a job due to COVID–19 and looking to reset their careers in order to reach for greater economic security.”

Since February, the bill has been under consideration in the Senate Committee on Health, Education,

Opposite page: A scientist works in a manufacturing clean room.



Labor and Pension, which has taken no action on it.

While the National Apprenticeship Act languished in the Senate, Rep. Rick Larsen, D-Wash., introduced another bill with a narrower scope, called the American Workforce Investment in Next Generation of Students Act, in late July. This bill specifically targets high school students who are interested in science, technology, engineering and math. If passed, it would establish a six-year pathway for high school students to go through community college and into registered STEM apprenticeships.

As this issue of ASBMB Today went to press, it appeared unlikely that either bill would be enacted before the end of the legislative term. Still, according to Kathleen Weiss, the interim head of a Baltimore training center called the BioTechnical Institute of Maryland, the prospect of expansion of funding for apprenticeships has many people in workforce development circles chattering.

## A pathway into STEM for underrepresented minorities

One policy argument in favor of apprenticeships is that they open opportunities for well-paid careers in the sciences to people who face high barriers to college education. According to statistics from the Urban Institute, the skilled technical workforce, a classification for jobs served by apprenticeship, is the most racially and ethnically diverse scientific workforce in the U.S.

The origin story of the BioTechnical Institute of Maryland, or BTI, showcases the role that on-the-job

training in lab skills can play in opening doors for underrepresented workers.

In 1998, Margaret Penno, a Johns Hopkins University School of Medicine professor, was experiencing high turnover among technicians in her research lab. Jean Smith, who worked in the building's housekeeping staff, applied for the job.

“What is a research technician? I did not know,” Smith recalled in a video produced by Hopkins. “All I knew was that it was a better-paying job and that I was going to be using my mind, instead of my hands.”

Without a college degree, Smith was an unusual candidate for the job — but she turned out to be an excellent one and worked as a lab technician for almost 30 years until she retired, earning a college degree

**According to statistics from the Urban Institute, the skilled technical workforce, a classification for jobs served by apprenticeship, is the most racially and ethnically diverse scientific workforce in the U.S.**

along the way. Her experience inspired Penno to start BTI as a way for other workers to transition into laboratories.

As a rule, apprenticeships, including in the sciences, skew heavily male. Most BTI trainees, however, are women of color; Weiss estimates that they are, on average, in their early 30s. Most work nights while taking morning classes in BTI's lab.

"The majority of people that come to us are older women who have been (geriatric nursing assistants) their whole career," said Tim Fawcett, the scientific director and an instructor at BTI. "That's a very tough business. They come in, their back is hurting, and they just can't do it anymore."

Many patient care workers see developing medicines as a logical next step after nursing becomes too physically taxing, Fawcett said. Jobs in biotechnology, he added, tend to offer higher pay and better benefits than elder-care jobs.

"When we first started, I think Dr. Penno's idea was that this would be for ... academic laboratories and medical schools," Fawcett said. "But we're getting a lot of people into industry now."

Of the more than 500 BTI graduates, some 78% have landed jobs, many in small biotechnology companies, of which Fawcett said Baltimore has dozens.

Some of BTI's efforts have not been as successful as hoped. When BTI partnered with Hopkins and the East Baltimore Development Initiative to offer training that would prepare neighborhood residents to work in a new research park the university developed, they found that academic spinoff companies overwhelmingly preferred to hire college graduates.

"Academic institutions ... are

degree-conferring institutions," Weiss said. "Even though our founder from Hopkins was pretty enlightened, sometimes it can be difficult to change the system within which you're working."

Unable to place many of the trainees in the research park, BTI staff helped them find biotechnology jobs elsewhere in the city. The episode illustrates a problem with job training. The Urban Institute's Daniel Kuehn, who focuses on workforce development, said, "The concern with job training is always: You've gotten your training; now is there a job at the other end? Apprenticeship just doesn't have that problem."

A company that hires an apprentice hopes to retain that person when their training is complete, he said.

Funding for BTI is a perennial problem. The prospect of increased federal apprenticeship dollars and guaranteed job placements is exciting for the organization. Weiss said leaders hope to partner with local companies to offer classroom instruction and handle apprenticeship registration and reporting requirements.

According to Kuehn, such a service will be welcome. Some small companies hesitate to offer apprenticeships, because registering a new program involves a lengthy application detailing a training plan and wage structure, which sometimes must be revised before it is accepted. "Intermediaries that can help guide (companies) through that process ... help a lot," he said. "The other strategy is group apprenticeship programs, where they can sign on to standards that already exist."

### Who are apprenticeships for?

The average American entering an apprenticeship program is about 29,

Opposite page: Biotechnology students at Montgomery College in Maryland learn to run a protein gel.

although Kuehn said the number of college-aged students entering these programs has increased modestly. “Youth apprenticeship seems like a successful strategy for bridging the gap between school and work, and catching people that haven’t had successful transitions,” he said.

According to Kuehn, some policymakers worry that expanding youth apprenticeships as an alternative to college will encourage tracking that, like academic tracking in K–12 schools, could reinforce unequal socioeconomic patterns. He argues, however, that apprenticeship doesn’t preclude college; many apprentices are students.

According to Kelman and Bryans, recruiting college-aged students into biotechnology apprenticeships can be a challenge. Kelman chalks this up to an emphasis on exploration in the American education system compared to European systems and pressure for students to seek four-year degrees, especially in her affluent and highly educated region near Washington, D.C.

“A lot of times I’ll meet with a student ... and think, ‘My program is perfect for this particular

student,’” Kelman said. “They’re telling me they want a job; they don’t have a lot of money for education; they don’t want a lot of student debt. But they don’t always choose it, and I’m not sure why.”

Meanwhile, according to Talanian, younger job seekers also can give hiring managers pause. “One of the things that employers tell us all the time is that they really want people with experience,” she said. In part, that was why MassBioEd designed a program to retrain mature workers. “They’re very hesitant to hire somebody who’s fresh out of high school.”

Irrespective of a worker’s age, Kelman said, an apprenticeship need not be their last educational experience.

**Apprenticeships in biotechnology are relatively unknown. But thanks to interest from policymakers and donors, and especially if the National Apprenticeship Act passes, their numbers are poised to grow.**

Many employers support continuing education, helping cover tuition as workers study part-time for bachelor's or master's degrees.

Stimson briefly considered such a step after completing his apprenticeship early in 2020 but ended up pursuing an educational opportunity within GSK. Although he was guaranteed a job as a journeyman chemical operator at a salary GSK reported to the Department of Labor as \$25 an hour, Stimson found that, like teaching, the job did not offer the challenge he was looking for. So he worked with a colleague to secure a secondment, a six-month assignment for permanent employees that, like apprenticeship, is more common in Europe than in the U.S. Working with a functional genomics research team, Stimson honed his molecular biology and tissue culture skills while applying for research positions at GSK and other companies.

Jones and Kelman both stressed that a person who gets into the biotech industry via a biomanufacturing apprenticeship need not stay on the production line forever. Along with opportunities for further education, both mentioned opportunities to grow into other roles within a company.

“What I’m trying to push everywhere I go is that there should be two paths that you can jump on and off,” Jones said. “Maybe, when you’re in industry, you’ll jump back on” to an academic path.

“Our big message now is that biotech is a career,” he added. “You’re not resigned to being a lab rat. ... It’s a career with lots of options that you can go into.”

## Poised to boom

After his secondment ended, Stimson started work as a contrac-

tor assigned to Merck, where he is a biochemist testing products for problems. Although he chose not to stay at GSK, he said his experience there made him a more competitive applicant.

“A lot of the people I work with, they have master’s degrees and this is their first job,” he said. “I feel ... honored, I guess you could say, to be considered with other students who had masters’ coming out of college.”

Asked whether he would recommend apprenticeships, Stimson gave an enthusiastic yes. “My whole goal when I graduated high school was to graduate college without debt,” he said. “That opened up options to do other large life choices — like, I was able to get married during that time.”

Apprenticeships in biotechnology are relatively unknown. But thanks to interest from policymakers and donors, and especially if the National Apprenticeship Act passes, their numbers are poised to grow.

According to Bryans, whether or not the bill passes, apprenticeships are likely to proliferate.

“The workforce needs are only expected to rise,” she said. “With or without the bill, there’s such a demand for these technicians that companies ... are going to be coming up with it themselves.”

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# ‘It goes both ways’

An interview with the organizers of the 2022 Deuel Conference on Lipids

*By Angela Hopp*



Russell DeBose-Boyd

In March, hundreds of scientists will gather in scenic Monterey, California, to present their most recent research and chew the fat at the 2022 Deuel Conference on Lipids.

The theme of the meeting begins with “location, location, location.” The meeting organizers, yes, are giving a nod to the pretty place where the meeting will be held.

But there’s more to it: “How lipid trafficking impacts cell signaling and metabolism.” The program they’ve designed focuses on place in the cell: the mitochondria, the lysosome, the endoplasmic reticulum.

ASBMB Today talked to the organizers about why they took this organelle-based approach and what they hope speakers and attendees will get out of it.

Russell DeBose-Boyd is a professor of molecular genetics at the University of Texas Southwestern Medical Center at Dallas. (He’s also an associate editor for the American Society for Biochemistry and Molecular Biology’s *Journal of Lipid Research*.)

Arun Radhakrishnan is an associate professor of molecular genetics at UT Southwestern too. (He’s also an editorial board member for the *JLR*.)

Though today they run separate labs and their research programs don’t overlap, they both were trained around the same time in the storied UT Southwestern lab run by Nobel laureates Michael Brown and Joseph Goldstein.

“Arun and I are really huge fans of this basic mechanistic biology, which some people find boring — but we really love it. We hope that the meeting reflects how important we feel it is,” DeBose-Boyd said.

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

In recent years, we have begun to gain deep insights into the mechanisms of lipid trafficking. We thought it would be great to have a meeting focusing on that aspect and what these new insights are telling us about cell signaling and metabolism.

— Arun Radhakrishnan



Arun Radhakrishnan

### Q. What is your history with and general impression of Deuel?

**Radhakrishnan:** I've gone to several Deuel meetings. The first time was when I was a postdoctoral fellow in 2009. And I've gone several times since then as a faculty member. It's an intimate meeting where you get to talk with all the people whose papers you've read. That was, first and foremost, the biggest draw for me when I was younger. I think the one-on-one interaction you can get with established scientists should be appealing to students, postdocs and early-career scientists.

**DeBose–Boyd:** I started attending regularly when I was an early faculty member. It's a small meeting, but it's still big enough and popular enough that more established investigators will regularly attend even if they're not presenting a talk. They're there because they want to go to the meeting.

I think this is a strength of Deuel: Junior investigators can have

that up-close interaction with experts in the field. That's what pulled me to attend the Deuel conference in the past. And then, as my career matured, I looked forward to not only seeing established colleagues but also interacting with incoming junior investigators.

### Q. What's the story behind "location, location, location"?

**DeBose–Boyd:** We wanted to give it a little bit of a different flavor than previous meetings. We wanted to infuse a little more diversity into the program with regard to the scientific topics.

I mentioned earlier that the key thing about Deuel is having leaders in the field present. Well, we don't want the same leaders presenting every two or three years. We want to bring in new people. We'd love to bring in people who might not have cut their teeth in the lipid metabolism field but have found their way to studying lipids. In many cases, that's where you get the most exciting, unusual and off-the-wall presentations, and that can spark collaborations that may have otherwise not have happened.

Lipids are everywhere, and they do different functions in various organelles. So that's where the "location, location, location" theme came from: We wanted to focus each session on a particular set of organelles and really dive into what are the latest new, cool stories that are coming out about various lipids and how their location might influence function and regulation.

We can break it down into the endoplasmic reticulum and mitochondria. We can talk about how lipids are either trafficked or signaled within the cell or between



cells. For example, understanding how lysosomes contribute to the uptake and processing of lipids has clinical implications as indicated by findings that dysregulation of the processes in lysosomes can lead to disease.

**Radhakrishnan:** We know a lot about the enzymes that make lipids that make up membranes and how proteins control the activity of these enzymes. But one of the black boxes of membrane biology is that there are many membranes within the cell, and lipids, despite being insoluble in the cytoplasm, move between these membranes quite efficiently.

For instance, cholesterol is made in the endoplasmic reticulum or acquired through the lysosome, but most of it ends up in the plasma membrane. The cholesterol needs to move from endoplasmic reticulum and lysosomal membranes to

the plasma membrane. The same thing goes for other lipids: They're made in different locations, and they need to be transported to other membranes to get their lipid composition just right and also for signaling purposes.

We don't know enough about how they move from one membrane to another, and that's kind of what got us to this location theme. In recent years, we have begun to gain deep insights into the mechanisms of lipid trafficking. We thought it would be great to have a meeting focusing on that aspect and what these new insights are telling us about cell signaling and metabolism.

### Q. How is this different from previous years?

**DeBose-Boyd:** Deuel has always focused on various aspects of lipid metabolism — atherosclerosis, fatty liver disease, the defects in

**I think this is a strength of Deuel: Junior investigators can have that up-close interaction with experts in the field. That's what pulled me to attend the Deuel conference in the past.**

— Russell DeBose–Boyd

insulin signaling, etc. In this meeting, we did not want to abandon these traditional topics, but we did want to expand the view of the physiological relevance of lipid metabolism. We wanted to have a broad take — not necessarily focusing on a disease.

Arun and I both really love mechanistic biology. We really love to understand how the cell works with regard to lipids. We are interested in how our various lipids are sensed. How does the cell monitor levels of lipids within various organelles? And then how does that lead to regulation of lipid synthesis and metabolism? There's got to be a machinery within various organelles that knows when the lipid levels are high or low and can respond accordingly. Because in many cases, defects in the sensing can lead to various diseases.

## Q. What are some of the sessions that excite you?

**DeBose–Boyd:** One of the sessions that I think is the epitome of our

theme is about a family of transcription factors called the sterol regulatory element-binding proteins, or SREBPs. Arun and I both worked on them when we were postdocs. He still works on that pathway.

Two speakers in that session are going to be talking about — mechanistically — how SREBPs are activated, and it's really through this protein called Scap that cells can actually sense the level of cholesterol within membranes. When cholesterol levels are low, it can activate these transcription factors. If cholesterol levels are high, then those transcription factors no longer activate. And it's beautiful mechanistically.

But then, taking a step back, you can see that these transcription factors are really key in various diseases. I mentioned fatty liver earlier. In many cases, the fatty liver is due to dysregulation of SREBP. This session is a means to really tell the community: This is the molecular basis whereby dysregulation of these transcription factors can lead to metabolic disorders.

Those are the kinds of things that we want to highlight — the importance of mechanistic biology to physiology.

## Q. How did you select your speakers?

**Radhakrishnan:** We made sure to select the many lipid scientists who are carrying out great research. But we also didn't just want to rehash the same old speakers over and over again.

**DeBose–Boyd:** We tried to pick really interesting stories. An appreciation for how different organelles contact each other and how they communicate is emerging. We have at least two talks about how the ER

## About the Deuel Conference on Lipids

For the better part of the past century, lipid researchers have gathered annually at various lovely locales on the American West Coast to share their research and socialize. Established in 1955, the Deuel Conference on Lipids over the decades has become a must-attend event for leading and emerging lipids investigators in academia and industry.

Usually situated in California, it is considered the longest-standing annual meeting on lipid metabolism in the United States.

The conference was named after one of its founders, Harry J. Deuel Jr., who authored the three-volume text “The Lipids: Their Chemistry and Biochemistry” in the 1950s.

In a brief obituary in the journal *Nature*, Alastair Campbell Frazer noted that Deuel, who was a Fulbright fellow, “had a wide knowledge and interest in all work in the lipid field, and many will recall happy hours of argument and discussion in which he took a leading part.”

Frazer added: “Harry Deuel took great delight in meeting people.”

The meeting is led by co-organizers selected by the Deuel board and managed by the American Society for Biochemistry and Molecular Biology.



## 2020 program highlights

### Tuesday, March 1

**Murielle M. Véniant**, Amgen's scientific executive director, will give the Havel Lecture. Her talk title is "Targeting dual mechanisms for treating obesity."

### Wednesday, March 2

Session 1: Lysosomes — Uptake and processing of exogenous lipids

Session 2: Plasma membrane — Lipid-mediated intra- and intercellular communication

### Thursday, March 3

Session 3: Endoplasmic reticulum and mitochondria — Central hubs for lipid synthesis, storage and metabolism I

Session 4: Endoplasmic reticulum and mitochondria — Central hubs for lipid synthesis, storage and metabolism II

### Friday, March 4

Session 5: Lipid sensing and trafficking in disease



contacts mitochondria and how the ER contacts lysosomes.

Even though those speakers aren't necessarily lipid biologists, they're studying something that's very important to lipid biology. ... Those are the kinds of things that we want to highlight by bringing in people who maybe aren't card-carrying lipid biologists. Because I think it goes both ways: It helps them a lot because they now can make new contacts, but it also helps those in the field by seeing something from a different set of eyes that they may otherwise never have.

### Q. How's it been working together?

**Radhakrishnan:** Russell is my scientific older brother, if you will. He was already a junior faculty member when I was a postdoc, and I have benefited from his counsel for a long time. It's been great working with him on this. We're just down the hall from each other, so that makes it very easy. It has been a lot of fun.

### Q. Any final thoughts you'd like to share?

**Radhakrishnan:** I think it wouldn't be a stretch to say that this is the premier lipid meeting that's around right now. So, anybody interested in lipid biology — and especially people who have maybe only thought about it peripherally — this is the meeting they should attend to learn more about lipids.

And hopefully next year in March we will be coming out of this pandemic. It may be one of the first meetings that a lot of people can come to in person. We're hoping for that. And with the program that we have assembled, we hope a lot of people will attend.

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



# Let's meet to celebrate our passion for science

A letter from the 2022 annual meeting co-organizers

*By Vahe Bandarian & Martha S. Cyert*



Philadelphia, Pennsylvania

**W**e all took a lot for granted before March 2020, including the mad-dash preparations for a scientific conference: rushing to get that last piece of data and print a poster or prepare a talk. The thrill of getting to the conference site, the registration desk, the goodie bags and the opening night mixer.

Scientists are not accustomed to the spotlight, but meetings made us feel like stars, if only briefly. We looked forward to that tap on the shoulder from an old friend or colleague, trying to get our attention to say hello, and the anticipation of connecting with people who could become our next life-long science friends. We were eager for the rowdy late-night science discussions followed by the next day's desperate search for early-morning coffee.

All this was taken from us abruptly in March 2020 when the world retreated into its shell. COVID-19 took a lot away from us. We lost friends and family. We lost touch. Many of us lost productivity and purpose. Some of us found new purpose in the challenges, however, and found a resourcefulness that might have evaded us our entire lives had it not been for the pandemic.

As co-organizers of the in-person 2022 American Society for Biochemistry and Molecular Biology annual meeting, we want to extend a huge welcome and urge you to put April 2-5, 2022, on your calendar. Get ready to dust off your carry-on luggage and use planes, trains or public transit to head to Philadelphia. It's time that we gather again to celebrate our passion for science in person. It's time for us to reconnect with old friends and make new ones. How appropriate that this inspiring city, named by William Penn from the Greek words for love (phileo) and brother (adelphos) will be our meeting place.

We are excited about the 10 themes we chose to structure the 2022 scientific sessions. These themes represent the incredible research breadth of ASBMB members and ensure that everyone will come away from the meeting reinvigorated and inspired for our next research adventure.

For protein mavens, the 2022 meeting themes include "Advances in enzyme structure and catalysis" and "From ordered machines to disordered condensates" as well as "Signaling from atoms to cell networks," with a focus on atypical signaling mechanisms.

Membrane, lipid and cell biologists will be excited by "Organizing membranes: Coordination of proteins and lipids as signaling platforms" and "Quality control in organelles" as well as our glycobiology theme highlight-

ing roles of glycans in cell biology and disease.

Everyone can engage with the latest discoveries in metabolism with the “Current advances in metabolism” theme and explore new insights into chromatin and regulation by noncoding RNA in the “DNA/RNA regulation of nuclear processes” theme.

The Minority Affairs Committee has assembled a diverse group of scientists to discuss the role of environment and adversity in health disparities. The Education and Professional Development Committee session focuses on inclusive and civil communication and the trends and future of assessment. Together, these sessions will allow us to engage with topical issues that challenge us to pull together as a community.

In the following pages, you can read all about these sessions, and be sure to check the ASBMB website for annual meeting updates.

We especially encourage early-career scientists and trainees to attend. As with past meetings, the 2022 conference will include poster sessions that span the range of scientific themes. Authors of selected abstracts will have an opportunity to give short platform talks, so we encourage all of you to submit a poster abstract. Poster sessions are often a student’s first foray into their broader field and an excellent opportunity to network. No amount of mentoring can supplant the confidence students gain by presenting their work to a broad audience. Presentation at a scientific meeting should be an essential component of every student’s individual development plan.

2022 attendees will have an

opportunity to participate in award symposia and hear from the ASBMB’s 16 award winners about their exciting research. The awardees, introduced on page 44, are all exceptional scientists whose contributions will be recognized in scientific sessions that punctuate the program.

The ASBMB welcomes scientists with a broad range of experiences and has a strong record of supporting the professional development of scientists at all career stages. Many of these efforts are showcased at the annual meeting. Undergraduate poster symposia are an excellent venue for young scientists to present their work and receive feedback. In addition, multiple career-oriented and networking sessions can help everyone find their own special community or communities within the conference.

The workshops we piloted at the last annual meeting were a hit, so they will be back this time. So will the afternoon Spotlight Sessions that give a platform to students and early-career scientists whose research intersects with the meeting themes. The exhibit space will be a vibrant hub of discovery where all can sample the wares and learn about new opportunities.

The annual meeting registration site is now open. Don’t wait for the reminders (there will be more than a few). Submit early and often. The society offers competitive travel awards for eligible students and postdoctoral fellows to help defray the cost of attending. Check [asbmb.org](http://asbmb.org) and future issues of ASBMB Today for additional details.

The biggest lesson we learned from COVID-19 is not how quickly we can develop effective vaccines; we scientists are resourceful and always have known that where there’s a will (and money), there’s a way. More importantly, the pandemic has reminded us that science is a community endeavor. We’ve learned that we are resilient in ways that we never dreamt possible but also that we crave the company of other scientists.

Many of us remember a meeting where we dropped in on an off-topic talk or had a chance encounter that led to one of our most creative and successful projects ever. These awesome benefits of an in-person event cannot be replicated over Zoom. As we emerge from the pandemic, let’s get together to discuss awesome data, hear great science, break bread together, and share our stories of resilience, loss and survival. It is a date!

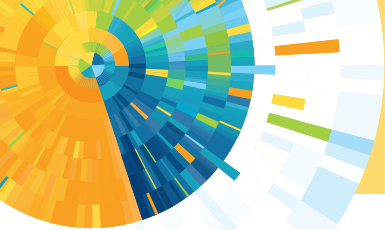
Our bags are already packed. Are yours?

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# ASBMB names 2022 award winners

By ASBMB Today Staff

The winners of the American Society for Biochemistry and Molecular Biology annual awards were nominated by colleagues and other leaders in their fields for making significant contributions to biochemistry and molecular biology and the training of emerging scientists. The recipients will give talks about their work at the society's 2022 annual meeting, which will be held in conjunction with the Experimental Biology conference April 2-5 in Philadelphia.

## ASBMB Award for Exemplary Contributions to Education

**Joseph Provost**, a professor and chair of the chemistry and biochemistry department at the University of San Diego, won the 2022 ASBMB Award for Exemplary Contributions to Education, which the society's Education and Professional Development Committee gives to a scientist who encourages effective teaching and learning of biochemistry and molecular biology through his or her own teaching, leadership in education, writing, educational research, mentoring or public enlightenment. Provost studies the role of transport protein in directed cell motility and tumor



progression. He is a member of the ASBMB Membership Committee.

## Early-Career Leadership Award

**Lea Vacca Michel**, an associate professor in the Rochester Institute of Technology School of Chemistry and Materials Science, won the 2022 Early-Career Leadership Award, which was established by the ASBMB Women in Biochemistry and Molecular Biology Committee to recognize individuals with a strong commitment to advancing the careers of women in biochemistry and molecular biology along with demonstrated excellence in research, discovery and/or service. Michel's lab studies dual oriented bacterial lipoproteins and crystallin proteins, which are localized in the eye lens.



## Midcareer Leadership Award

**Marlene Belfort**, a distinguished professor at the University of Albany's RNA Institute, won the 2022 Mid-Career Leadership Award, which was established by the



ASBMB Women in Biochemistry and Molecular Biology Committee to recognize individuals with a strong commitment to advancing the careers of women in biochemistry and molecular biology along with demonstrated excellence in research, discovery and/or service. Belfort's work focuses on the structure, function and regulation of introns and inteins.

## ASBMB–Merck Award

**Robert V. Farese Jr. and Tobias C. Walther** won the 2022 ASBMB–Merck Award, which recognizes outstanding contributions to research in biochemistry and molecular biology. The pair's joint lab studies lipid homeostasis and storage and neurodegeneration. Both are professors at Harvard Medical School and the Harvard T.H. Chan School of Public Health, and both are associate members of the Broad Institute of MIT and Harvard. Farese chairs the molecular metabolism department at the T.H. Chan School, and Walther is an investigator of the Howard Hughes Medical Institute.



## Mildred Cohn Award in Biological Chemistry

**Janet Smith**, Martha L. Ludwig Distinguished University Professor of Biological Chemistry at the University of Michigan Medical School, associate director of the UM Life Sciences Institute and scientific director of the GM/CA beamlines at the Argonne synchrotron, won the 2022 Mildred Cohn Award in Biological Chemistry, which honors scientists at all stages of their careers who have made substantial advances in understanding biological chemistry using innovative physical approaches. Smith's research group studies protein structure using X-ray crystallography.



## Avanti Award in Lipids

**Alex Toker**, associate director for the Cancer Research Institute at Beth Israel Deaconess Medical Center and professor at Harvard Medical School, won the 2022 Avanti Award in Lipids, which recognizes outstanding lipid research contributions. Toker is an expert in the signaling mechanisms that govern cancer progression. His lab specifically focuses on the PI3K signaling pathway in breast and other cancers and the mechanisms by which the protein kinase AKT promotes tumor cell survival and growth and the metabolic reprogramming of cancer cells. He recently was named editor-in-chief of the ASBMB's Journal of Biological Chemistry.



## Earl and Thressa Stadtman Distinguished Scientist Award

**Kathleen Collins**, professor and chair at the University of California, Berkeley, won the 2022 Earl and Thressa Stadtman Distinguished Scientist Award, which is awarded to an established scientist for outstanding achievement in basic research. Collins has studied telomerase structure and function for almost three decades. Collins' lab now is applying those insights to investigate eukaryotic retroelements, their reverse transcriptases, and the biogenesis and RNP assembly of processed RNA used as a template for nick-primed cDNA synthesis. She is a former chair of the ASBMB Publications Committee.



## William C. Rose Award

**J. Martin Bollinger Jr.**, a professor at the Pennsylvania State University, won the 2022 William C. Rose Award, which recognizes outstanding contributions to biochemical and molecular biological research and a demonstrated commitment to the training of younger scientists. Bollinger runs a joint research group with Carsten Krebs. They and Penn State colleagues Amie Boal and Alexey Silakov study enzymes that use metal ions to catalyze reactions involving oxygen.



## Ruth Kirschstein Diversity in Science Award

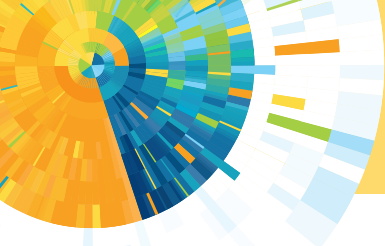
**Tracy Johnson**, dean of life sciences and a professor at UCLA and a Howard Hughes Medical Institute professor, won the 2022 Ruth Kirschstein Diversity in Science Award, which the ASBMB Minority Affairs Committee gives to an outstanding scientist who has shown a strong commitment to the encouragement of underrepresented minorities to enter the scientific enterprise and/or to the effective mentorship of those within it. Her lab studies the mechanisms of co-transcriptional pre-mRNA splicing in yeast. Johnson previously served as associate dean for inclusive excellence at UCLA. She currently leads UCLA's HHMI Pathways to Success Program, which offers an early opportunity for undergraduate summer research and extensive mentoring.



## Herb Tabor Research Award

**Susan S. Taylor**, a distinguished professor at the University of California, San Diego, won the 2022 Herbert Tabor Research Award, which is given for excellence in biological chemistry and molecular biology and contributions to the community of scientists. Taylor has done pioneering structural studies of protein





kinase A, revealing fundamental themes for all protein kinases. Taylor is a past president of the ASBMB and an elected member of the National Academy of Sciences, the National Academy of Medicine and the American Academy of Arts and Sciences. Earlier this year, she was named an ASBMB fellow.

### ASBMB Young Investigator Award

**Greg G. Wang**, an associate professor at the University of North Carolina School of Medicine and member of the UNC Lineberger Comprehensive Cancer Center, won the 2022 ASBMB Young Investigator Award, which recognizes outstanding research contributions to biochemistry and molecular biology and contributions to the community of scientists. Wang's lab studies how chromatin structure and epigenetic modifications contribute to gene regulation and cancer development.



### Walter Shaw Young Investigator Award in Lipids

**Michael Airola**, an assistant professor at Stony Brook University, won the 2022 Walter Shaw Young Investigator Award in Lipids, which was established by the ASBMB Lipid Research Division. Airola's lab studies the molecular details of lipid metabolism and transport and seeks to develop new pharmacologi-



cal tools that inhibit lipid-modifying enzymes for the treatment of cancer and fungal disease. Earlier this year, he was named a junior associate editor for the ASBMB's Journal of Lipid Research. He is a co-organizer of the ASBMB Lipid Research Division Seminar Series.

### Bert and Natalie Vallee Award in Biomedical Science

**Elaine Fuchs**, a professor at the Rockefeller University and a Howard Hughes Medical Institute investigator, won the 2022 Bert and Natalie Vallee Award in Biomedical Science. Established in 2012 by the Bert and Natalie Kuggie Vallee Foundation, this award recognizes outstanding accomplishments in basic biomedical research. Much of what we know about human skin's capacity to heal and regenerate — and, in cases of mutation, to succumb to diseases like epidermolysis bullosa — has been made possible by Fuchs' work. She is an elected member of the National Academy of Sciences.



### DeLano Award for Computational Biosciences

**Tatyana Sharpee**, a professor and chair at the Salk Institute for Biological Studies, won the 2022 DeLano Award for Computational Biosciences, which recognizes the most accessible and innovative devel-



opment or application of computer technology to enhance research in the life sciences at the molecular level. Sharpee's lab studies how the brain and other biological systems work while their components are developing and aging. Her team uses information theory to quantify the activity of neurons.

### Alice and C. C. Wang Award in Molecular Parasitology

**John Boothroyd**, a professor and administrator at Stanford University, won the 2022 Alice and C. C. Wang Award in Molecular Parasitology, which recognizes established investigators who are making seminal contributions to the field of molecular parasitology. Boothroyd leads a lab that studies the pathogenesis of parasitic infections, in particular *Toxoplasma gondii*. He has held numerous leadership positions at Stanford and is an elected member of the National Academy of Sciences.



Look for more about the 2022 award winners and their work in an upcoming issue of ASBMB Today.

### 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](mailto:asbmbtoday@asbmb.org) and include a photo!



## Connect with colleagues at an ASBMB meeting

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

### Upcoming ASBMB events and conferences

#### **Emerging roles of the nucleolus**

Oct. 6–9, 2021 | Virtual

#### **Serine proteases in pericellular proteolysis and signaling**

Oct. 28–30, 2021 | Virtual

#### **Deuel conference on lipids**

March 1–4, 2022 | Monterey, Calif.

#### **2022 ASBMB Annual Meeting**

April 2–5, 2022 | Philadelphia

#### **O-GlcNAc regulation of cellular physiology and pathophysiology**

July 7–10, 2022 | Athens, Ga.

#### **Evolution and core processes in gene expression**

July 21–24, 2022 | Kansas City, Mo.

#### **Mass spectrometry in the health and life sciences**

Aug. 14–18, 2022 | Cambridge, Mass.

#### **Transcriptional regulation: Chromatin and RNA polymerase II**

Sept. 29–Oct. 2, 2022 | Snowbird, Utah

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FRONTIERS IN ENZYMOLOGY

# Enzymes show off new moves

*Tadhg Begley & Cathy Drennan*

**E**nzymes are responsible for the chemical reactions that enable all forms of life. Whether it's the archaea living in hot springs, the bacteria deep in our soil, the plants harnessing energy from the sun or all animals, including us humans, we are all united in our reliance on enzymes.

Understanding enzymatic chemistry enables us to tackle critical health and environmental problems, such as designing new therapeutics for diseases or using unique enzymatic capabilities for bioremediation. However, we have only skimmed the surface of learning the full scope of chemical reactions that are enzymatically catalyzed, the mysterious and intricate mechanisms that can be performed, and the dynamic motions enzymes undergo to accomplish their chemical tasks.

The presentations in this session will cover many exciting developments in enzymology, including recently discovered enzymatic functions, evidence for trapping long-anticipated enzymatic intermediates, insight into how various cofactors can enable unique reactions, and cutting-edge experimental approaches enabling us to understand better how enzymes dynamically function. There's still a whole lot to learn about how enzymes get their jobs done.

**Keywords:** enzymes, enzyme mechanisms, structural biology, biochemistry, radical SAM enzymes, metalloenzymes, natural product biosynthesis

**Who should attend:** all who are fascinated by how enzymes can use some newly discovered tricks, handy cofactors and dynamic movements to carry out their chemistry

**Theme song:** "This is How We Do It" by Montell Jordan

*This session is powered proteins, cofactors and coffee.*

**Tadhg Begley** (begley@chem.tamu.edu) is a professor and chair of chemistry at Texas A&M University.



## TALKS

- Repairing enzymes using spare parts — **Cathy Drennan**, Howard Hughes Medical Institute and Massachusetts Institute of Technology
- Machinery in motion: New insights into mitochondrial proteostasis — **Gabriel Lander**, Scripps Research
- Structural biology of natural product biosynthetic enzymes — **Janet Smith**, University of Michigan
- An aerobic strategy for C–H bond functionalization — **Jennifer Bridwell–Rabb**, University of Michigan
- Riboflavin catabolism: The destruction of an icon — **Tadhg Begley**, Texas A&M University
- Correlated motions in enzymes — **Nozomi Ando**, Cornell University
- Nickel pincer nucleotide: Biosynthesis and function — **Robert Hausinger**, Michigan State University
- Bacterial biosynthesis of natural products — **Katherine Ryan**, University of British Columbia
- Radical SAMs and the vast unexplored chemistry of RiPP natural products — **Douglas Alan Mitchell**, University of Illinois Urbana–Champaign
- The biosynthesis of lipolic acid: A saga of death, destruction and rebirth — **Squire Booker**, Penn State University
- Unraveling the secrets of radical SAM mechanisms — **Joan Broderick**, Montana State University
- How do aerobic organisms solve the oxygen sensitivity problem of [4Fe–4S] in radical SAM enzymes? — **Hening Lin**, Howard Hughes Medical Institute and Cornell University

**Cathy Drennan** (cdrennan@mit.edu) is a Howard Hughes Medical Institute investigator and a professor of biology and chemistry at the Massachusetts Institute of Technology. Follow her on Twitter: @Drennan\_Lab





## EDUCATION AND PROFESSIONAL DEVELOPMENT

# Responding to the needs of educators post-COVID-19

*Victoria Del Gaizo Moore & Erin Sayer*

**A**s co-chairs for education and professional development programming at the 2022 annual meeting in Philadelphia, we are excited to bring you thematic sessions that capture the needs of educators living in a world defined by words like “pandemic,” “virus,” “vaccines” and “quarantine.” Educators are ready to move forward in their teaching and professional lives, and we are here to help.

ASBMB 2022 features two theme sessions to be held Sunday, April 3, and Monday, April 4. The Sunday session has panelists focused on inclusive communication — from developing collaborative environments to facilitating difficult conversations. The Monday session focuses on assessment — how we prepare and assess undergraduates for their future, using peer review to inform teaching and assessment of student learning.

**Keywords:** assessment, inclusive communication, education, professional development, faculty, teaching

**Who should attend:** teaching faculty, educators and higher education or department administrators

**Theme song:** “I’m Still Standing” by Elton John

Faculty and administrators are still standing after dealing with COVID-19 for the last year and a half. These education and professional development-focused sessions will cover some of the topics we need to respond to and keep moving forward in our ever-changing academic environment.

*This session is powered by forward thinking.*

**Victoria Del Gaizo Moore** (vmoores3@elon.edu) is an associate professor of chemistry at Elon University and serves on the ASBMB’s Accreditation and Exam Subcommittee.



## TALKS

- Developing a collaborative environment to facilitate inclusive departmental communication — **Todd Weaver**, University of Wisconsin–La Crosse
- What makes a competitive applicant? Assessing students for graduate/professional school applications — **Erin Sayer**, University of Nebraska–Lincoln
- Strategies for an inclusive faculty search: Views from the search committee and the applicant — **Anita Corbett**, Emory University
- Developing BMB assessment questions for use in the undergraduate classroom — **Victoria Moore**, Elon University
- Peer collaboration and review: A guide to iterative improvement in learning — **Dan Bernstein**, University of Kansas
- Creative approaches to perform an inclusive faculty search — **Wendy Gilbert**, Yale University

Additional talks will be announced; potential topics include “Trends in faculty assessment.” Check the annual meeting page at [asbmb.org](http://asbmb.org) for updates.

**Erin Sayer** (erin.sayer@unl.edu) is an associate professor of practice in biochemistry education and advising at the University of Nebraska–Lincoln. She serves on the ASBMB Student Chapter Steering Committee as co-director of the Northwest Region.



GLYCOBIOLOGY

# Sugar coating is, in fact, important

Valerie M. Weaver & Steve Withers

**L**ike people, whether they want to or not, cells need to interact with others around them. One way people interact is through the way they dress. Indeed, we often are judged by the clothes we wear. Cells are clothed in a specialised sugar layer known as the glycocalyx in which specific sugar structures are displayed on proteins and lipids. Based on this outer clothing layer, the cell is recognized by both friend and foe.

In this symposium, we will learn about new ways to identify, locate and quantitate the glycans present on different cells under specific conditions. We also will hear how we can dress cells for success through modification of their surface structures. In another section, we will learn how pathogens can recognize and invade cells through specific glycocalyx structures.

We also will hear several accounts of how cancer progression can be mediated through overexpression of glycans such as sialic acid and heparan. Apparently, as with people, inhibitions can be dampened by exuberance in cellular dressing. Learn about this and more at our symposium.

**Keywords:** glycosylation, glycocalyx, cellular interfaces, cancer, immunity, infection

**Who should attend:** anyone who is interested in understanding how cells function and interact with their environment through their surface glycan coat and anyone interested in cool new ways to modulate those interactions through carbohydrate chemistry and enzymology

**Theme song** (at least for the mucinophiles): “Born to Run” by Bruce Springsteen

*This session is powered by interdisciplinary science with a sweet touch.*

**Valerie M. Weaver** (valerie.weaver@ucsf.org) is the director of the Center for Bioengineering and Tissue Regeneration in the surgery department at the University of California, San Francisco, and also a Canadian.



## TALKS

- Nanoscale physical biology of the cellular glycocalyx — **Matthew J. Paszek**, Cornell University
- MALDI imaging mass spectrometry mapping of the glycocalyx — **Richard R. Drake**, Medical University of South Carolina
- Genetic and small molecule strategies to edit the glycocalyx — **Siriram Neelamegham**, State University of New York at Buffalo
- Enzymatic removal of cell surface antigens as a route toward universal O type blood and organs — **Steve Withers**, University of British Columbia
- Hypersialylation of tumor cells promotes pancreatic cancer progression — **Susan Bellis**, University of Alabama at Birmingham
- Receptor N-glycosylation links metabolism with signaling — **James Dennis**, Lunenfeld Tanenbaum Research Institute
- Modeling the mucinous glycocalyx to unravel receptor pattern recognition by influenza A viruses — **Kamil Godula**, University of California, San Diego
- Cell surface glycan engineering reveals that matriglycan alone can recapitulate dystroglycan binding and function — **Geert-Jan Boons**, University of Georgia
- The glycocalyx in tumor progression and metastasis — **Valerie M. Weaver**, University of California, San Francisco
- The heparanase/syndecan-1 axis in cancer progression — **Ralph D. Sanderson**, University of Alabama at Birmingham
- Reprogramming T cells to target glycans and overcome glycan-mediated immunosuppression for cancer therapy — **Avery Posey**, University of Pennsylvania
- Orchestrated intragranular restructuring of mucins during secretory granule maturation — **Kelly Ten Hagen**, National Institute of Dental and Craniofacial Research

**Steve Withers** (withers@chem.ubc.ca) is a professor of chemistry and biochemistry at the University of British Columbia.



## DIVERSITY, EQUITY AND INCLUSION

# Tackling adversity: Tales of the epigenome

Vahe Bandarian & Sonia C. Flores

**2020** was a horrendous year. As the pandemic raged, millions of people around the globe faced, in addition to the threat of COVID-19, the long-standing adversity of chronic health disparities. But as we watched these populations' disproportionate suffering, we also witnessed their resilience.

Our session will focus on how early-life adversity and stress at the genomic level influence susceptibility to diseases such as diabetes, metabolic syndrome and mental health that augment health disparities later in life. The sessions also will cover molecular resilience and how the genome is sufficiently dynamic to overcome these epigenetic roadblocks.

**Keywords:** epigenetic marks, health disparities, early-life stresses, nutrigenomics

**Who should attend:** anyone interested in learning how genomic and subgenomic stresses early in life lead to adversity and health disparities later in life and how the genome is dynamic and can overcome some of these roadblocks

**Theme song:** "Rain on Me" by Lady Gaga and Ariana Grande

"Rain on Me" is a beautiful tribute to going through adversity, not giving up, and coming out the other side stronger. This energizing dance song is all about embracing life, imperfections and all.

*This session is powered by the need to let everyone know that stress doesn't define us and that we are resilient in the face of adversity.*

**Vahe Bandarian** (vahe@chem.utah.edu) is a professor of chemistry at the University of Utah.



## TALKS

- Intergenerational inheritance of altered metabolism phenotypes after early-life stress in *Caenorhabditis elegans* — **Sarah Hall**, Syracuse University
- Programmed epigenetic risk: Can stress exposures in utero predispose infants to obesity and metabolic disease? — **Kristen Boyle**, University of Colorado, Anschutz Medical Campus
- A sex-specific role for long noncoding RNA in depression susceptibility and resilience — **Orna Issler**, Icahn School of Medicine at Mount Sinai
- Epigenetic mediators of risk for metabolic disease — **Mary Elizabeth Patti**, Harvard Medical School
- Rethinking the stress paradigm: Exploring new connections between epigenetic adaptation and cellular stress — **Kaushik Ragunathan**, University of Michigan Medical School
- The role of maternal factors in epigenetic programming of neurodevelopment — **Patrick McGowan**, University of Toronto
- Epigenetic marks identify asthma susceptibility in African Americans — **Ivana Yang**, University of Colorado Anschutz Medical Campus
- Chronic stress, omics and asthma — **Juan C. Celedon**, University of Pittsburgh
- Live fast, die young: The role of epigenetics in stress and aging — **Anthony Zannas**, University of North Carolina at Chapel Hill
- Sex-dimorphism in aging: Are we missing half of the picture? — **Berenice A. Benayoun**, University of Southern California
- Consequences of early-life starvation on adult lipid metabolism — **Ryan Baugh**, Duke University
- Early-life stress and epigenomic regulation of behavior — **Julie-Anne Balouek (Rodier)**, Princeton University
- Extracellular vesicles as stress signals: Identifying novel systemic mechanisms of trauma programming — **Tracy L. Bale**, University of Maryland School of Medicine

**Sonia C. Flores** (Sonia.flores@cuanschutz.edu) is a professor in the pulmonary sciences and critical care department at the University of Colorado School of Medicine and chair of the ASBMB Minority Affairs Committee.



MEMBRANES / LIPIDS

# Join the conversation on how cells talk to themselves and to each other

*Tamas Balla & Lois Weisman*

Cellular membranes are key to the compartmentalization of cellular processes and serve as platforms for the assembly of protein signaling complexes. Most human diseases can be traced to defects in signal generation and decoding caused by altered interaction of proteins with cellular membranes.

The unique lipid composition of different membranes defines organelle identity and is critical for protein–membrane interactions. How cells generate and maintain the specific lipid composition of their organelles against complex and highly dynamic vesicular transport pathways is a fundamental question at the intersection of lipid and cell biology. Moreover, nonvesicular lipid transfer and contact sites formed between various organelles, as well as transient spikes in signaling lipids, are critical for cell signaling and homeostasis.

This session is organized around these important questions, and the program features expert speakers covering a variety of exciting topics within this theme.

**Keywords:** lipid transfer proteins, membrane contact sites, lipid compartmentalization, lipid dynamics, cell signaling

**Who should attend:** both experts and novices who recognize that not all lipids are bad for your health — and also people who are interested in proteins, as we understand that membranes without proteins and proteins without membranes would not support life

**Theme song:** “Come Together” by the Beatles, the first allusion to the importance of organelle contact sites

*This session is powered by Palmolive — chasing lipids since 1898.*

**Tamas Balla** (ballat@mail.nih.gov) is a senior investigator in the Eunice Kennedy Shriver National Institute of Child Health and Human Development, leading the Section on Molecular Signal Transduction.



## TALKS

- Regulation of PIP2 homeostasis at ER–plasma membrane contacts by Nir proteins — **Jen Liou**, University of Texas Southwestern Medical Center
- Roles for interorganelle contacts in organizing metabolism — **W. Mike Henne**, University of Texas Southwestern Medical Center
- Systematic analysis of membrane contact sites — **Maya Schuldiner**, Weizmann Institute of Science
- Novel pathways of intracellular membrane lipid transport and neurodegenerative diseases — **Pietro De Camilli**, Yale University School of Medicine and Howard Hughes Medical Institute
- Chemical tools for understanding phospholipase D signaling — **Jeremy Baskin**, Cornell University
- Control of the cellular lipid landscape by inositol lipids — **Tamas Balla**, National Institutes of Health
- Volume electron microscopy analysis reveals a new type of membrane junction required for mixing of parental genomes after fertilization — **Orna Cohen-Fix**, National Institute of Diabetes and Digestive and Kidney Diseases
- Automatic whole cell organelle segmentation in volumetric electron microscopy — **Aubrey Weigel**, Howard Hughes Medical Institute Janelia Research Campus
- Regulation of membrane dynamics via phosphoinositide signaling cascades — **Lois Weisman**, University of Michigan
- Novel mechanisms in phosphoinositide turnover — **Raghu Padinjat**, National Centre for Biological Sciences
- Regulation of COPII dynamics in development and disease — **Anjon Audhya**, University of Wisconsin–Madison
- Intracellular trafficking during neutrophil chemotaxis — **Carole Parent**, University of Michigan

**Lois Weisman** (lweisman@umich.edu) is a member of the Life Sciences Institute and professor in the cell and developmental biology department at the University of Michigan whose research is focused on phosphoinositide lipid signaling and organelle inheritance.



## METABOLISM

# Connecting metabolism to development, disease and therapy

*Marian Walhout & Scott Dixon*

If you are wondering whether metabolism is important, consider the effect of holding your breath while you read through this introduction. Your genome will not change, and your RNA and protein expression patterns will not change much, if at all, but the abundance of numerous metabolites in your body will change substantially within seconds and ultimately produce a physiological response that restores homeostasis.

Metabolism is complex and dynamic, involving hundreds of enzymes and reactions. Versions of many enzymes are found in most living organisms on earth. In development, metabolic processes are central for growth; in diseased tissues, metabolism is altered and contributes to pathology. Symbiotic or competitive metabolic interactions between organisms govern a broad swath of important biology in the immune system and gut. How these interactions are regulated by and coordinated with DNA-based, RNA-based and protein-based mechanisms remains under investigation.

The metabolism field continues a rapid expansion. This session will explore a breadth of models and approaches being used to investigate how metabolism impacts development, homeostasis, disease and medicine.

**Keywords:** metabolism, metabolites, development, cancer, pathogen, drug action, lipids, cell fate

**Who should attend:** anyone interested in learning how metabolism impacts development, disease or therapy

**Theme song:** “Stayin’ Alive” by the Bee Gees, because it’s all thanks to metabolism

*This session is powered by ATP. What else?*

**Marian Walhout** ([marian.walhout@umassmed.edu](mailto:marian.walhout@umassmed.edu)) is a professor, chair of the systems biology department and a chair in biomedical research at the University of Massachusetts Medical School.



## TALKS

- Interplay between metabolism and gene expression — **Marian Walhout**, University of Massachusetts Medical School
- Identifying toxic metabolites and their roles in disease — **Dohoon Kim**, University of Massachusetts Medical School
- Transcriptional regulation of primary and specialized metabolism — **Siobhan Brady**, University of California, Davis
- Interorgan cross talk and metabolism regulation in *Drosophila* — **Norbert Perrimon**, Harvard University
- Metabolic adaptation to oxidative stress at the host-microbe interface — **Stavroula Hatzios**, Yale University
- Deconvoluting host-gut microbiota cometabolism — **Pamela Chang**, Cornell University
- The tiny pharmacists within: How the human gut microbiome impacts drug metabolism and disposition — **Peter Turnbaugh**, University of California, San Francisco
- Metabolic outliers in human disease — **Ralph DeBerardinis**, University of Texas Southwestern Medical Center
- Lipid metabolism and ferroptosis — **Scott Dixon**, Stanford University
- Too much and never enough: Synthetic excess and metabolic inefficiency of aneuploidy in tumorigenesis — **Emma Watson**, Harvard Medical School
- Uncovering conditional vulnerabilities in cancer — **Jason Cantor**, University of Wisconsin
- The genetics of tumor suppression by p53 — **Maureen Murphy**, Wistar Institute

**Scott Dixon** ([sjdixon@stanford.edu](mailto:sjdixon@stanford.edu)) is an associate professor in the biology department at Stanford University.



## ORGANELLES

# Cells beat stress — so can you!

*Jeffrey Brodsky & Elizabeth Vierling*

Organisms can't avoid stress, so it is not surprising that numerous cellular mechanisms have evolved to temper any toxic effects of stress. Stress responses are triggered within every cellular compartment to activate downstream signaling pathways. Distinct stress responses can lead to production of protective molecular chaperones, alter post-translational modifications and protein trafficking, activate pathways that degrade macromolecules, and change cellular and organellar function and architecture. Together, these responses maintain organelle and cellular homeostasis and, more specifically, protein homeostasis, also known as proteostasis.

Studies in model systems have uncovered the circuits that control these varied responses, the components that mediate cellular protection, and how disruption or changes in the efficacy of these responses can be linked to specific diseases. Speakers will describe, at the molecular level, how cellular and organelle homeostasis is maintained under normal conditions and when cells and organisms encounter stress.

**Keywords:** protein quality control, organelles, stress responses, heat shock proteins, endoplasmic reticulum-associated degradation, autophagy, unfolded protein response

**Who should attend:** everyone interested in the diverse mechanisms by which cells cope with stress related to environmental or disease insults, including how different cellular compartments signal stress or respond to restore cellular homeostasis

**Theme song:** "Under pressure" by David Bowie and Queen

*This session is powered by stressed-out cells and organelles.*

**Jeffrey Brodsky** (jbrodsky@pitt.edu) is a professor and the director of the Center for Protein Conformational Diseases at the University of Pittsburgh, where his laboratory studies how endoplasmic reticulum homeostasis is maintained and, in turn, disrupted in various disease states.



## TALKS

- The degradation of misfolded proteins in the ER — **Jeffrey Brodsky**, University of Pittsburgh
- Post-translational control of HMG CoA reductase, the rate-limiting enzyme of cholesterol synthesis — **Russell DeBose-Boyd**, University of Texas Southwest Medical Center
- Signaling principles, signal decoding and integration revealed by stress — **Diego Acosta-Alver**, University of California, Santa Barbara
- The role of rhomboid pseudoproteases in ERADicating misfolded membrane substrates — **Sonya Neal**, University of California, San Diego
- Mechanisms of membrane protein sorting — **Sichen (Susan) Shao**, Harvard Medical School
- Peroxisomal quality control in Arabidopsis — **Bonnie Bartel**, Rice University
- Mitochondrial-derived compartments protect cells from nutrient stress — **Adam Hughes**, University of Utah
- Regulation of mitochondrial genome synthesis in animal cells — **Samantha Lewis**, University of California, Berkeley
- Mechanisms of stress granule regulation by ribosome-associated quality control factors — **Stephanie Moon**, University of Michigan
- Control of translation by ubiquitin during oxidative stress — **Gustavo Silva**, Duke University
- Proteins directing lipid fluxes at the ER–lipid droplet continuum — **Elina Ikonen**, University of Helsinki
- The interconnected dynamics of ribonucleoprotein condensates and the endoplasmic reticulum — **Jason Lee**, Baylor College of Medicine

**Elizabeth Vierling** (vierling@umass.edu) is a distinguished professor of biochemistry and molecular biology at the University of Massachusetts Amherst who focuses on proteins that mitigate stress in plants, including molecular chaperones, mediators of nitric oxide homeostasis and mitochondrial proteins that alter stress responses.

## PROTEIN MACHINES AND DISORDER

# Tension between structured complexes and disordered assemblies

*Martin Beck & Tanja Mittag*

**H**ow are the many metabolic pathways and biochemical functions of cells spatially organized? In his early ideas of the organization of cells, Edmund Wilson stated that cells were packed with liquid (and by definition disordered) coacervates. Think oil droplets in vinegar. Then, membrane-bound organelles and structured complexes were discovered and took over the narrative thanks to the flourishing discipline of structural biology.

Recently, coacervates have found their way back into the narrative and now are known as membraneless organelles or biomolecular condensates. They compartmentalize cells extensively without membranes, and phase separation shapes many fundamental biological processes. Consequently, dysregulation of phase separation can result in disease. But the pendulum has swung back too far, and protein disorder now often is described as a necessary key ingredient for phase separation.

The highly structured complexes in and internal structure of biomolecular condensates are not getting the attention they deserve. In our theme, we will highlight the spectrum between ordered molecular machines with precise stoichiometry and nonstoichiometric condensates, the latter of which can be disordered completely or have a more defined network structure. Both are necessary and shape functions in our cells.

**Keywords:** molecular mechanisms, structural biology, biophysics, soft matter physics

**Who should attend:** everyone who likes molecular mechanisms and is not afraid of a bit of disorder

**Theme song:** Anything by Rage Against the Machine — or the Droplettes (just kidding)

*This session is powered by vinaigrette and other immiscible fluids.*

**Martin Beck** ([martin.beck@biophys.mpg.de](mailto:martin.beck@biophys.mpg.de)) is a director and scientific member at the Max Planck Institute of Biophysics and studies the structure, function and assembly of very large macromolecular complexes in their native environment.



## TALKS

- In situ structural analysis of the nuclear pore complex — **Martin Beck**, Max Planck Institute of Biophysics
- Molecular-scale structure of a high-curvature membrane — **Adam Frost**, University of California, San Francisco
- Structure and function of DNA transposition assemblies — **Orsolya Barabas**, University of Geneva
- Structural adventures in bacterial protein secretion and motility — **Susan Lea**, National Institutes of Health
- Building the microtubule cytoskeleton via phase transitions — **Sabine Petry**, Princeton University
- Structured and disordered proteins collaborate to drive membrane remodeling — **Jeanne Stachowiak**, University of Texas at Austin
- Understanding how oncogenic fusion proteins drive aberrant gene expression through phase separation — **Richard Kriwacki**, St. Jude Children's Research Hospital
- Decoding plasticity of the dark proteome — **Edward Lemke**, Johannes Gutenberg University and Institute of Molecular Biology
- Phase behavior of intrinsically disordered prionlike domains — **Tanja Mittag**, St. Jude Children's Research Hospital
- Regulation of translation and deadenylation via biomolecular condensates — **Julie Forman-Kay**, Hospital for Sick Children
- Polyubiquitin effects on phase transitions of shuttle protein UBQLN2 — **Carlos Castañeda**, Syracuse University
- The role of phase transitions in transcription — **Ibrahim Cissé**, California Institute of Technology

**Tanja Mittag** ([tanja.mittag@stjude.org](mailto:tanja.mittag@stjude.org)) is an associate member in the structural biology department at St. Jude Children's Research Hospital focusing on phase separation in biology and disease. Follow her on Twitter: @TanjaMittag.





RNA / DNA

# What's new with DNA and RNA?

*Karolin Luger & Chuan He*

**E**ukaryotic gene expression is regulated at multiple layers. This session will cover emerging new mechanisms of gene expression regulation, centered around DNA and RNA. We will hear updates on regulation at the nucleosome structure and chromatin conformation level, how noncoding RNAs could impact transcription, and RNA modifications in post-transcriptional gene expression regulation. This session also will introduce diverse modern imaging technologies to visualize transcription activity and spatial transcriptome.

**Keywords:** chromatin structure, noncoding RNA, RNA modifications, super-resolution imaging, spatial transcriptome

**Who should attend:** students, postdocs and anyone interested in gene expression regulation, nucleosome structure and chromatin conformation, noncoding RNA and RNA modifications, super-resolution imaging and spatial transcriptome

**Theme song:** “The DNA Song” by Jam Campus (parody of “Trap Queen” by Fetty Wap)

*This session is powered by nucleic acids.*

## TALKS

- Cracking the nucleus: Finding order in chaos — **Clodagh O'Shea**, Salk Institute
- EM structures of nucleosomes with chaperones — **Karolin Luger**, University of Colorado Boulder
- Structural mechanism of human telomerase holoenzyme — **Kelly Nguyen**, Medical Research Council Laboratory of Molecular Biology
- Studying DNA-related processes on DNA curtains — **Ilya Finkelstein**, University of Texas at Austin
- m6A in the action of regulating the regulators — **Kathy (Fange) Liu**, University of Pennsylvania
- Regulation of noncoding RNA in space and time — **John Rinn**, University of Colorado Boulder
- RNA methylation multitasking on chromatin — **Blerita Xhemalce**, University of Texas at Austin
- RNA methylation in gene expression regulation — **Chuan He**, University of Pennsylvania
- Visualizing RNA in life cells — **Timothy Stasevich**, Colorado State University
- Visualizing the dynamic genome during development — **Allistair Bottiger**, Stanford University
- 3D in situ RNA sequencing — **Xiao Wang**, Broad Institute and Massachusetts Institute of Technology
- Engineering the repetitive 3D genome in human disease — **Jennifer Phillis-Cremins**, University of Pennsylvania

**Karolin Luger** (karolin.luger@colorado.edu) is a professor and chair of biochemistry at the University of Colorado Boulder.



**Chuan He** (chualhe@chicago.edu) is a professor in the chemistry department and the biochemistry and molecular biology department at the University of Chicago.





## SIGNALING

# New kids on the signaling block

*Patrick Eyers & Anne-Claude Gingras*

**S**ignal relay in eukaryotes enables proper response to chemical or physical signals received by the cell. We now understand how many of the canonical components of signaling pathways exert their functions, including the mode of activation of many kinases and the relationships among receptors, scaffolds and downstream effectors. This understanding has been key to the development of therapeutics targeting signaling components. Yet, from receptors to enzymes such as kinases, phosphatases, ubiquitin ligases and deubiquitinases, the signaling machinery still holds many mysteries.

In this session, we will focus on atypical signaling mechanisms, from the discovery of new catalysis within the kinome superfamily and noncanonical ubiquitination to the role of metals such as copper in signaling. We also discuss the emergence of pseudoenzymes: These allosteric signaling scaffolds are defined by their structural and sequence homology to canonical enzymes such as kinases and phosphatases, but they lack catalytic activity and remain relatively unexplored biologically and as potential drug targets.

We also will discuss how improvements in phosphoproteomics, genetic screens, and affinity and proximity proteomics permit us to globally assess specific aspects of signal transduction and shine new lights on poorly characterized enzymes, scaffolds and substrates.

**Keywords:** signal transduction, phosphorylation, ubiquitination, post-translational modification, pseudoenzymes, mass spectrometry, CRISPR screens, structural biology, interaction mapping

**Who should attend:** everyone who likes taking the road less traveled and those interested in good detective stories

**Theme song:** “Halo” by Beyoncé

*This session is powered by ligands and receptors.*

**Patrick Eyers** ([patrick.eyers@liverpool.ac.uk](mailto:patrick.eyers@liverpool.ac.uk)) is a professor of cell signaling and head of the biochemistry and systems biology department at the University of Liverpool. His interests include all aspects of protein phosphorylation and sulfation.



## TALKS

- CRISPR sensors for signaling — **Stéphane Angers**, University of Toronto
- Tracing copper utilization by kinase signal transduction pathways: Implications for cancer cell processes — **Donita Brady**, University of Pennsylvania
- How do signaling pseudoenzymes work? — **Patrick Eyers**, University of Liverpool
- Proximity-dependent sensors for signaling — **Anne-Claude Gingras**, Mount Sinai Hospital
- Proteome-scale amino-acid resolution footprinting of protein-binding sites in the intrinsically disordered regions — **Yiva Ivarsson**, Uppsala University
- Structural basis for signaling by the HER3 pseudokinase — **Natalia Jura**, University of California, San Francisco
- Defining pseudoenzymes in glycosylation pathways — **Natarajan Kannan**, University of Georgia
- Cell signaling by protein tyrosine phosphatases — **Hayley Sharpe**, Babraham Institute, Cambridge
- Expanding the kinome — **Vinnie Tagliabracci**, University of Texas Southwestern Medical Center
- Pseudoenzyme classification — **Janet Thornton**, European Molecular Biology Laboratory
- A high-dimensional map of phosphorylation-dependent signaling in budding yeast — **Judit Villen**, University of Washington
- Noncanonical ubiquitination — **Satpal Virdee**, University of Dundee

**Anne-Claude Gingras** ([gingras@lunenfeld.ca](mailto:gingras@lunenfeld.ca)) is a senior investigator at the Lunenfeld–Tanenbaum Research Institute, Sinai Health, in Toronto and a professor of molecular genetics at the University of Toronto. She focuses on the development of proteomics approaches to study signaling and cellular organization.



# Deadlifts and deadlines

Strength training for Ph.D. studies

By *Melissa Tosiano*

I have adored both movement and science since I was a feral kid running around the north woods of New Hampshire, but I lacked role models for self-care and academic research. I only started working out regularly in my late twenties and didn't start my Ph.D. program until 2019, seven years after earning my M.S. I worked as a consultant for two and a half years before taking a technician position at the University of Pittsburgh to help me decide if pursuing a Ph.D. was the right choice for me. (Spoiler alert: It was, and I'm so happy to be back in research.)

When COVID-19 restrictions were enacted in March 2020, losing bench research and group fitness classes simultaneously was devastating. (I cried a lot.) I did what I could: building a foundation in bioinformatics and annoying my downstairs neighbors with Zoom workouts at odd hours.

As my qualifying exams approached, my anxiety sky-

rocketed. I knew I needed a bigger physical outlet than my living room. The only way I could gain access to a gym and stay within my city's COVID-19 safety measures was to train masked one-on-one with a personal trainer. I'm a petite five-foot-one-inch woman; weight training was an entirely foreign experience, and I loved it. It took me a little longer than others to discover my place in fitness and science, but I'm profoundly grateful for finding my passions.

I'm a Ph.D. candidate in Joel McManus' lab at Carnegie Mellon University happily researching post-transcriptional regulation of filamentation in the fungus *Candida albicans*. When I'm not in the lab, I pick things up and put them down again. Strength training enhances my research and quality of life. I find so many complementary parallels between the lab and the gym.

## Grit and resilience

According to numbers shared by USA Running and the National Science Foundation, about 10 times more people run marathons each year than earn science, technology, engineering or mathematics Ph.D.s, so let's retire the old canard that doing a Ph.D. is a marathon. It's harder. Scientific and physical training both demand tenacity.

When I started training, I couldn't do a bodyweight pistol squat (a squat on one leg) to save my life. I literally went splat. Slowly, with help from my coach, Maddie, I worked on my strength and mobility. Eight months after my first attempt, not only can I do a full pistol squat but I can do it with weights.

For my thesis, I've been trying to transform *C. albicans* with a fluorescent marker since early June. It's been more troubleshooting than I possibly could

"Everyone finds calm in their own way" according to Melissa Tosiano. "Some meditate, some knit, and I LOVE squats."



ERIK KAMINSKI/LEGION TRAINING & PERFORMANCE



Melissa Tosiano reaches for her goals with help of her coach, Maddie Wacker, at left. “Lab or gym — its all about the team.”

have imagined. I still have a long way to go with these experiments, but as I run my thumbs over the calluses on my palms from lifting, I have proof of my grit and resilience. I can do difficult things and succeed.

## The power of ‘Why not?’

When my coach asks me if I want to increase the weight or reps, I chirp back, “Why not?” Sometimes I can complete the movement; other times it’s just not happening, but I’m OK with that temporary setback — it leaves space for growth. I understand that a movement unavailable to me today may be achievable in a few weeks or months.

Four years ago, I was working as a technician in an HIV lab. We were having terrible issues with a protocol. With a hard deadline approaching, I had a last-ditch “Why not?” moment and changed the method significantly. Shockingly, it worked, ultimately leading to my inaugural first-author publication.

“Why not?” has become my rallying cry in the gym, the lab and life. Up the weight, do the experiment, apply for the grant — it could be amazing.

## It’s my journey

As a nontraditional, first-generation grad student, I struggle with imposter syndrome. In one instance, other graduate students were chatting innocently about their parents’ Ph.D. work and asked me where my family went to school. After I muttered “they didn’t,” the conversation awkwardly screeched to a halt, and I wanted to sink into the floor. I’ve been told directly and indirectly that I don’t belong in science more times than I can count. It’s exhausting.

I’ve never been intimidated by the professional and NCAA athletes at my gym, nor have I been anything less than wildly supportive of folks just starting out or rehabbing after injuries. Strength training shows me that everyone has their own journey and I simply need to do my own best research.

## Glow together, grow together

On the flip side, other people inspire me to be the best version of myself. Before she was my coach, Maddie and I both taught ballet barre classes. I was in awe of her skills as an athlete and instructor. Serendipitously, right as I was



ERIK KAMINSKI/LEGION TRAINING & PERFORMANCE

**“Training always puts a smile on my face and gives a me fresh perspective at the bench,” Tosiano says. “Stepping out of my comfort zone is the scariest and the best thing I’ve done.”**

looking into personal training to combat my qualifying exam jitters, Maddie passed her certification and began coaching at LEGION Training & Performance, a gym in Pittsburgh. Now I’m profoundly grateful to call this incredible woman my coach and friend.

During one of my rotations, I met a biomedical engineering postdoc with fierce drive and wildly creative research. While that lab wasn’t the right fit for me, Corine and I established a writing group. Every Thursday morning, we camp out in the library for a couple of hours, catching up on all the writing that gets away from us during the week. Accountability and support make writing group one of my most productive times during the week. Everyone has something to share, so I relish the opportunity to grow with people I admire.

## Tell us your wellness story

Have you started a new practice to care for your body, mind or spirit during the pandemic that you intend to continue into the future? What keeps you well? Exercise? Sleep? Faith? Family? Pets? Something else?

Write about what works for you and/or your wellness challenges for our annual Wellness Issue. We’ve extended the deadline to Oct. 29. Email your essay to [asbmbtoday@asbmb.org](mailto:asbmbtoday@asbmb.org), with the subject line “Wellness.”

## Do the scary thing

I can get a great workout on my own or in a group fitness class, but strength training is one of the most challenging things I’ve ever done. It’s a uniquely intense experience where discomfort is the goal. Imagine throwing your body weight over your head or stepping backward into a heavy lunge without seeing what’s behind you. Despite knowing my coach will keep me safe, I still feel a rush of “I’m going to die” adrenaline. I empty my mind, slow my breath and focus on how my body weight distributes across the soles of my feet. It’s a rehearsal for real-life scary moments.

These mindful practices came in clutch during my Zoom proposal defense. I’ve never experienced such an intense line of questioning. Concentrating on breathing with my diaphragm and connecting my feet to the kitchen floor helped me keep calm and carry on.

## Finding my joy

I’ve been asked a lot of silly questions. “Why are you going back to school?” “Why are you getting up at 6 a.m. to work out before lab?” “Why did you spend five months troubleshooting an arcane protocol that nobody has used since 2014?”

For me it’s all about joy. The pure elation of doing something new and challenging is how I live my best and most fulfilling life.

Strength training reflects everything

I love about research: the challenge, the people, the thrill of a new discovery. No matter what your physical practice, I firmly believe that any time spent on fitness directly benefits your research. I think we should all make time to take care of ourselves. Why not?



MARY BETH KRASNAS

**When she’s not at the gym, Melissa Tosiano studies post-transcriptional regulation as a Ph.D. student at Carnegie Mellon.**

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ASBMB FELLOWS

# Call for nominations: 2022 ASBMB fellows

**Deadline for nominations: Nov. 12**

Selection as a fellow of the American Society for Biochemistry and Molecular Biology is an honor to be bestowed upon our most distinguished members. Fellows will be recognized for their meritorious efforts to advance the molecular life sciences through sustained outstanding accomplishments in areas such as scientific research, education, mentorship, commitment to diversity and service to the society and scientific community.

The ASBMB Fellows Program encourages nominations that reflect the breadth and diversity of the society's membership.

[asbmb.org/fellows](https://asbmb.org/fellows)

## 'It's taken a lot of moves and reevaluations'

By *Laurel Oldach*

**A**ccuracy is vital in pharmaceutical manufacturing — even the reagents used to test new products must themselves be tested regularly. Donald Conover works in quality control at a Merck plant that manufactures vaccines. He talked to ASBMB Today about the strict regulatory environment and his experience trying a series of jobs before he landed where he is now. This interview has been condensed and edited.

### 1 What does it mean to work in quality control at a vaccine manufacturing plant?

I work with a very specific part of quality control, the critical reagents that are used to release vaccine products to the global market. Release testing uses set standards and known quantities; we maintain those materials and qualify new lots. My standard day is a lot of reading and writing reports and interpreting data from our testing labs.

### 2 How did you get involved in this kind of work?

I started working with Merck through a staffing agency, and later in a different group, under a temporary contract. Then I went to an oncology research company — but I really didn't like research. I like the structure of a GMP (good manufacturing practice) environment, where you have written procedures and you have to receive certain trainings before you do anything. The research position I was in didn't have a lot of that. So when Merck co-workers reached out to me



**Donald Conover**

#### CURRENT POSITION

Quality control specialist, Merck

#### CAREER PATH

B.S., molecular biology, University of Prince Edward Island

#### FIRST JOB OUTSIDE OF ACADEMIA

Consultant scientist, Aerotek (a staffing agency)

#### FAVORITE MOLECULE OR PROTEIN

Titin. It's the largest known protein, with the human version containing about 34,000 amino acids.

and said, "Hey, we have an open full-time position in our group — would you like to come back?" I was like, "Yes!"

### 3 Tell me about the training requirements for your job?

You get trained on systems for document retention, for recording laboratory events, reporting test results, basically everything. You're trained to properly review a document and check for errors. There are annual refresher courses and retraining any time one of the procedures gets updated. There's a whole group

dedicated just to managing the trainings.

### 4 I've read recently about labor shortages in biotech. Have you experienced that?

I've seen more the use of temporary or contract workers instead of full-time positions. One of the people I work with is on a contract. If she leaves or her contract isn't renewed, it'll take somebody four or five months to pick up her work. When I was with my current group the first time, as a contractor, I had knowledge of the franchises I was working on; then I left, and it fell to somebody else to figure out what was going on.

### 5 What's your next step?

That's a hard question. I like what I do and the people I work with. I might prefer a more lab-based role, but being in this role (this year) has been an absolute blessing — when I'm working from home, my daughter stays with me. Merck supports broadening your experience by trying out different departments; I might do that.

In the last 10 years, the longest I've stayed in one position was three years. It's taken a lot of moves and reevaluations of where I was before I finally got to this job. For now, I like where I'm at, and I'm not really looking at my next step.

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



# CLASSIFIEDS

## Tenure Track Investigator

NIH/NIDDK

The Laboratory of Biochemistry and Genetics (LBG) is



recruiting a tenure

track investigator with a demonstrated track record of research excellence in the life sciences. We are especially interested in individuals who use model organisms and novel approaches to study fundamental biological questions in areas such as cell and developmental biology, molecular structure and function, genome function and organization, and synthetic biology.

<https://careers.asbmb.org/job/tenure-track-investigator/58410246/>

## Deputy Office Director (Patient Safety and Product Quality)

US Food & Drug Administration

CDRH is seeking an experienced, dynamic, and innovative scientific and regulatory professional to serve as the



Deputy Office Director of OHT 7. In this position, reporting directly to the OHT VII Office Director, you will have the opportunity to universally impact and improve the health outcomes and the quality of life of the American people through the advancement of diagnostic medical products. You will be responsible for providing leadership, administrative management, and exercising sound scientific, clinical, and evidenced-based technical judgement in the review of in scope medical products throughout their lifecycle. You will advance the Office's strategic vision, core business objectives, long-range and short-term projects, and develop OHT VII's annual budget allocation request.

<https://careers.asbmb.org/job/deputy-office-director-patient-safety-and-product-quality/58372797/>

## Postdoc and Research Assistant in Chemical Biology and Biochemistry

Wayne State University

The Ahn Laboratory at the Department of Chemistry at Wayne State University seeks both Postdoctoral candidates and Research Assistants with a research background in Chemical Biology and Biochemistry. The candidate will carry out NIH-funded projects. We use the interdisciplinary approach to investigate protein cysteine glutathionylation. Candidates will focus on 1) the development and application of chemical probes for chemical proteomic analyses of protein cysteine glutathionylation in cellular and animal models, or 2) protein biochemistry and cell biology to study cell signaling and migration regulated by protein glutathionylation. The Ahn laboratory studies on protein cysteine glutathionylation in two biological models, 1) glutathionylation of cardiac proteins in ischemic stress and 2) glutathionylation of signaling proteins associated with cell migration. We use a wide variety of approaches, including chemical biology, proteomics, protein biochemistry, and animal models. See more information at the Ahn lab webpage (<https://s.wayne.edu/ahnlab/>).



<https://careers.asbmb.org/job/postdoc-and-research-assistant-in-chemical-biology-and-biochemistry/58358187/>

## Lab technician/manager

University of Pittsburgh

One Research Technician or Lab Manager position is available immediately at the Department of Pharmacology and Chemical Biology, University of Pittsburgh, to study protein kinase signaling in the areas of cancer biology and stroke. The major areas of investigation include signal transduction, gene regulation, characterization of mouse models, and identification and evaluation of potential drug candidates and drug combinations. The position may also include a supervisory role for training of junior fellows and students as well as a management role overseeing daily lab operations.



<https://careers.asbmb.org/jobs/view/lab-technicianmanager/58568177/>

To see a full list of jobs, please visit [careers.asbmb.org](https://careers.asbmb.org)



# 2022 ASBMB Annual Meeting

## APRIL 2–5 | PHILADELPHIA

### A place for you

When you present your research at the annual meeting, you get the recognition you've earned and the constructive feedback that you need to make your work even better.

**Empowering presenters.** Share your results on your own terms. If you want to give a short oral presentation at the podium, there are opportunities to do that. If you'd prefer to present a poster in the exhibit hall, that's fine too.

**Eliminating barriers.** ASBMB members save nearly **50% on registration**. Plus, the society gives more than **\$270,000 in travel and dependent care grants**.

#### Important deadlines:

Abstract deadline: Nov. 30

Travel award deadline: Dec. 7

[asbmb.org/annual-meeting](https://asbmb.org/annual-meeting)



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