

Vol. 22 / No. 9 / October 2023

ASBMB TODAY

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



SAN ANTONIO | MARCH 23-26

Discover BMB | 2024

American Society for Biochemistry and Molecular Biology



Do you have a great idea for a scientific event?

**You pick the topic, the sessions and the speakers,
and we'll do the rest.**

The ASBMB will manage registration, market the event to tens of thousands of scientists, and handle all logistics so you can focus on the science.

**Learn more about proposing an event:
asbmb.org/propose-event**



NEWS

2

PRESIDENT'S MESSAGE

Getting your name out there

4

MEMBER UPDATE

7

IN MEMORIAM

9

NEWS

2023 ASBMB election results

11

STUDENT CHAPTERS

Desire to share science revives a chapter

12

RESEARCH SPOTLIGHT

Margaret Kanipes: Serving students with passion

15

LIPID NEWS

Celebrating 100 years of the term 'lipid'

17

JOURNAL NEWS

17 *Mechanisms of a gut bacterium — and how to stop them*

18 *SARS-CoV-2 variants remodel cellular landscapes*

19 *Is cholesterol a disease link?*

20 *From the journals*



FEATURES

25

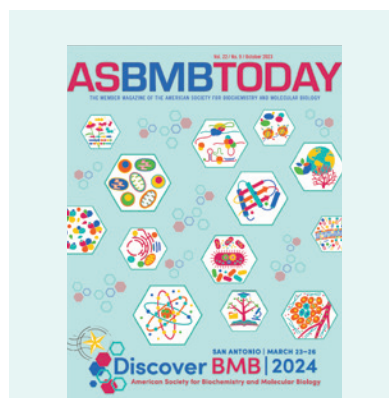
A PANDEMIC PIVOT IN TEACHING

COVID-19 accelerated innovation in science classrooms, and much of it may be here to stay

35

MEET PHILIP COLE

This JBC associate editor probes the posttranslational modifications of proteins



40

DISCOVER BMB 2024

41 *ASBMB names 2024 award winners*

45 *#DiscoverBMB spotlight talks to showcase members' findings*

SYMPOSIA

47 *Building natural products*

48 *Enzymes: Still cool after all these years*

49 *Teaching and engaging Gen Z: Two sides of the same coin*

50 *Lipids hold it all together*

51 *Biochemists face the climate challenge*

52 *Stressed out? The cancer playbook may help*

53 *MCSs stick the landing*

54 *Biochemistry of the multitudes*

55 *The specialized metabolism and trafficking of cellular subcompartments*

56 *Our coolest superpower: Seeing all the atoms*

57 *Dancing with metals: Iron, copper and reactive sparks*

58 *Processing and translating RNA in health and disease*

59 *Out with the old, in with the nucleus*

60 *Titles and abstracts: How to tell a clear and engaging story*

Symposia icons on the cover and on pages 47–59 were designed by Luciana Giono.

PERSPECTIVES

62

WHO DID IT?

A DNA crime scene investigation and high school field trip

64

CELEBRATING DNA DAY WITH A NEW MUSEUM EXHIBIT

66

FOCUS ON THE FUNCTIONS OF SERINE PROTEASES



OFFICERS

Ann Stock
President

Joan Conaway
President-elect

George Carman
Secretary

Russell DeBose-Boyd
Interim treasurer

EX-OFFICIO MEMBERS

Benjamin Tu
Vanina Zaremborg
Co-chairs, 2024 Annual Meeting Program Committee

Saumya Ramanathan
Chair, Education and Professional Development Committee

Vahe Bandarian
Chair, Meetings Committee

Lea Vacca Michel
Chair, Maximizing Access Committee

Christina Swords
Chair, Science Outreach and Communication Committee

Ann West
Chair, Public Affairs Advisory Committee

Ed Eisenstein
Chair, Membership Committee

Susan Baserga
Chair, Women in Biochemistry and Molecular Biology Committee

Sandra Weller
Chair, Publications Committee

Alex Tokar
Editor-in-chief, JBC

A. L. Burlingame
Editor-in-chief, MCP

Nicholas O. Davidson
Editor-in-chief, JLR

Kerry-Anne Rye
Editor-in-chief, JLR

COUNCIL MEMBERS

Suzanne Barbour

Joan Broderick

Charles Craik

Catherine Drennan

Matt Gentry

Kayunta Johnson-Winters

Audrey Lamb

James M. Ntambi

Kelly Ten Hagen

ASBMB TODAY EDITORIAL ADVISORY BOARD

William J. Sullivan
Chair

Jeanine Amacher

Paul Craig

Jennifer DuBois

René Fuanta

Danielle Guarracino

Ken Hallenbeck

Jen Quick-Cleveland

Ayantika Sen

Binks Wattenberg

Qiou Wei

ASBMB TODAY

Angela Hopp
Executive Editor
ahopp@asbmb.org

Comfort Dorn
Managing Editor
cdorn@asbmb.org

Paula Amann
Science Writer
pamann@asbmb.org

Marissa Locke Rottinghaus
Science and Policy Communications Specialist
mlocke@asbmb.org

Ed Marklin
Web Editor
emarklin@asbmb.org

Allison Frick
Multimedia and Social Media Content Manager
africk@asbmb.org

Patrice Gallagher
Designer
patrice@patricegallagher.com

Stephen F. Miller
Executive Director
smiller@asbmb.org



www.asbmb.org/asbmbtoday
PRINT ISSN 2372-0409

Articles published in ASBMB Today reflect solely the authors' views and not the official positions of the American Society for Biochemistry and Molecular Biology or the institutions with which the authors are affiliated. Mentions of products or services are not endorsements.

PRESIDENT'S MESSAGE

Getting your name out there

Networking opportunities for job seekers at Discover BMB 2024

By *Ann Stock*

People attend scientific meetings for many reasons. Some want to present their hard-earned findings. Some want to reconnect with colleagues they haven't seen in a while. Some want to find collaborators who can help them solve a problem or take their work in a different direction. And some want to find their next jobs.

When the American Society for Biochemistry and Molecular Biology held its 2023 annual meeting, called Discover BMB, in Seattle, the most-attended workshop was "Building professional relationships." The second and third most attended workshops were about career exploration and making a CV that stands out. Furthermore, the most popular career hub talk covered job-search strategies.

The Discover BMB organizers know how important career-related programming and networking opportunities are to attendees, and our 2024 meeting in March in San Antonio is being designed to meet this demand.

When job seekers walk up to the registration booth in the convention center to pick up their meeting badges, they'll be invited to also take a ribbon with a message that cuts to the chase: "HIRE ME." (Hiring managers can wear one that says "I'M HIRING.")

From that point on, opportunity awaits. Every interaction at a session, during a mixer or even while waiting in line for a cup of coffee at

the snack bar has the potential to change the trajectory of your career.

But, just in case that perfect chance encounter doesn't come your way, I want to point to a handful of programmed activities and tools that are meant to help you make meaningful connections.

Interest group sessions: These events attract people with similar research and pedagogical interests. You don't have to be an expert on the topic or even have a track record of work related to it. You merely need to share an interest, show up, listen to the presentations and have conversations with other attendees. These are low-pressure events intended to help you broaden and deepen your professional network.

Meetups: These networking gatherings have multiple goals. One is to give people with shared research interests an opportunity to get acquainted or reconnect. Another goal is to set aside time for networking among affinity groups. At the meeting in Seattle, the most-attended meetup was for educators, and the other two most-popular meetups were for historically marginalized scientists. There are no presentations during these events, and you can move from meetups as you like.

Career hub events: Now, you might be thinking that sessions at the career hub will be filled with other job seekers who are competing with you for jobs. And you'd be partially

right. But, there will also be lots of speakers, mentors at different career stages and hiring managers on hand to answer your questions and talk to you about your options. So, on top of getting good advice about, for example, how to tailor your application materials for biotech or science communication jobs, you'll be making inroads with people already in those jobs. Chat them up, connect with them on LinkedIn and let them know you would be interested in conducting an informational interview with them later to help you prepare for your next steps.

Receptions: Don't skip out on these events designed specifically for mingling. While it might be tempting to stick to a bistro table filled with people you know, this really is the time for you to, as they say, work the room. It's not at all weird to approach that person whose work you admire or to strike up a conversation with someone wearing one of those "I'M HIRING" ribbons; it's expected. That's exactly why these events exist. Take advantage of them.

Exhibitor booths: You don't have to be the person with the lab credit card to talk to exhibitors. Many of them were once just like you: a scientist wondering what kinds of jobs are out there. They're expecting to answer questions from job seekers about career paths and openings at their companies or organizations. And, trust me, exhibitors are just as nervous as attendees; only they're worried that people won't be interested in their products and services. You'll be doing them a favor if you go up to chat. They want to report back to their bosses that their booths had traffic.

Workshops: These events are meant to be interactive. You won't be passively absorbing information. You'll be do-



Discover BMB attendees check out the jobs board at the meeting hall in Seattle.

ing hands-on stuff with others. But, don't forget to look for connection opportunities during these activities. If you meet someone who might know things or people you'd like to know, exchange contact information or arrange a time to talk more later during the meeting. Group work builds bonds!

Mobile app: Yes, the meeting is full of opportunities for chance interactions, but remember the saying about making your own luck. You can use the meeting app to chat with or arrange an in-person meetup with hiring managers. Again, this is totally normal and expected at a professional conference; don't hesitate to use the tools available to you. Be sure to complete your profile on the mobile app to indicate your career interests.

Job board: Sometimes a low-tech option is the most effective one, so be sure to stop by the job board in the exhibit hall. Employers will be posting their openings with the hope of meeting up with potential candidates during the meeting.

One-on-one mentoring: Maybe you don't quite feel ready to start applying for jobs yet and just need to bounce some ideas off someone with

more experience before taking the plunge. If that's the case, schedule a session with a mentor. The one-on-one mentoring sessions in Seattle drew more than 100 attendees. In San Antonio, we'll have mentors on hand who can help you no matter where you are on your path. They'll look at your CV, teaching statement, specific aims and anything else you might have questions about.

These are just some of the programmed activities meant to help job seekers learn about career paths and meet the people who can hire them or help them get hired. There are many more opportunities — so many, in fact, that I strongly recommend making a schedule once the full meeting program is available.

And remember: It's OK to ask for help. We are a community, and we come together at our annual meeting to advance not only our field but also one another. People want to help. You just have to ask.

Ann Stock (stock@cabm.rutgers.edu) is a professor of biochemistry and molecular biology at the Robert Wood Johnson Medical School at Rutgers and resident faculty member at the Center for Advanced Biotechnology and Medicine. She is the ASBMB's president.



AAA&S names 2023 members

The American Academy of Arts & Sciences has announced its 2023 class of nearly 270 new members. Among the class are American Society for Biochemistry and Molecular Biology members Ruma Banerjee, Emmanuelle Charpentier, Daniel Herschlag, Ramón Latorre, Andre Nussenzweig and Sandra Wolin.



Ruma Banerjee is a professor of biological chemistry at the University of Michigan Medical School. Her lab studies the chemical biology of hydrogen sulfide signaling, mammalian sulfur metabolism and the structural enzymology of human B12 proteins. Banerjee is a member of the ASBMB Maximizing Access Committee and was an associate editor of the *Journal of Biological Chemistry* from 2011 to 2022. She was elected an ASBMB fellow in 2021, and she received the ASBMB Merck Award in 2019.



Emmanuelle Charpentier is the director of and a scientific member at the Max Planck Unit for the Science of Pathogens. She was awarded the 2020 Nobel Prize in Chemistry and the Wolf Prize in Medicine with Jennifer Doudna for their work on CRISPR gene editing. Her lab continues to study RNA- and protein-mediated regulatory mechanisms in the bacterial pathogen *Streptococcus pyogenes*, which were the basis for the CRISPR discovery. She has more than 50 patents and her honors include the Harvey Prize, Kavli Prize in Nanoscience, Breakthrough Prize in Life Sciences, Warren Alpert Foundation Prize and the Novozymes Prize.



Daniel Herschlag is a professor of biochemistry at Stanford University. His lab focuses on unraveling the physical and chemical principles that underlie RNA and protein behavior in the context of enzymology, RNA folding and the evolution of molecular interactions and catalysis. Herschlag is a fellow of the American



Association for the Advancement of Science and a member of the National Academy of Sciences. He won the ASBMB William Rose Award in 2010 and received the 2022 Stein and Moore Award from the Protein Society.

Andre Nussenzweig is a National Institutes of Health distinguished investigator and chief of the laboratory of genome integrity at the NIH National Cancer Institute. His research examines genome stability as well as DNA repair pathways and their roles in cancer prevention. Nussenzweig is a member of the European Molecular Biology Organization and the National Academy of Medicine and the National Academy of Science.



Sandra Wolin is a senior investigator and chief of the RNA Biology Laboratory at NCI. She studies the machineries that chaperone noncoding RNA biogenesis and ribonucleoprotein assembly as well as the cellular mechanisms by which defective RNAs are recognized and handled. She is a fellow of the American Association for the Advancement of Science and the American Academy of Microbiology. In 2021, Wolin received the American Society for Cell Biology Sandra K. Masur Senior Leadership Award.



The newly elected AAA&S members were honored in September at a formal induction ceremony held at the academy's headquarters in Cambridge, Massachusetts.

2023 Watson fellows announced

Three student members of the American Society for Biochemistry and Molecular Biology are among the 42 college seniors named to the 55th class of Thomas J. Watson Fellows. **Paige Bristow** of Ursinus College, **Jocelyn Velasquez Baez** of Wesleyan University and **Benjamin Oelkers** of Rhodes College will receive the fellowship, which supports a year of travel abroad for a focused exploration of world issues.

Bristow, who has a triple major in biochemistry, politics and international relations, will examine how crises — from COVID-19 to climate change — impact women leaders in India, Japan, Italy and Switzerland.



BRISTOW

Baez, who has a double major in molecular biology and biochemistry and science in society, will study ethical understandings of traditional medicine within indigenous and ethnic communities in New Zealand, the Philippines, Nepal, Ghana, Ecuador and Canada.



VELASQUEZ BAEZ

Oelkers, a biochemistry and

Jeanette K. Watson, the widow of Thomas J. Watson, an early leader of IBM, established the Watson

Foundation in 1961. Since the fellowship program began in 1969, the foundation has chosen over 3,000 fellows, based on nominations from 41 participating colleges and universities. The fellowship offers \$40,000 for 12 months of travel and college loan assistance as needed.

This year's Watson fellows hail from 20 states and four countries and represent a variety of academic areas and backgrounds. They will travel to 54 countries to explore such issues as climate refugees, coastal resilience, disability care improvement and entrepreneurial inclusion.

Mann receives Otto Warburg Medal

Matthias Mann, a director at the Max Planck Institute of Biochemistry in Martinsried, Germany, has won the German Society for Biochemistry and Molecular Biology's 2023 Otto Warburg Medal. Mann also directs the Novo Nordisk Foundation Center for Protein Research at the University of Copenhagen.

The award recognized Mann for his discoveries in the field of mass spectrometry-based proteome analysis. His recent studies include work on deep visual proteomics, which melds artificial intelligence-powered analysis of cell phenotypes with automated single-cell or single-nucleus laser microdissection and ultra-high-sensitivity mass spectrometry.

The medal honors the legacy of Otto Heinrich Warburg, a German biochemist who won the Nobel Prize for Medicine in 1931. To date, seven Warburg medal recipients have also

won a Nobel Prize. Winners receive a prize of 25,000 euros, or close to \$27,000, courtesy of Elsevier and its journal *Biochimica et Biophysica Acta*.

Mann also received the 2017 Lennart Philipson Award, the 2015 Barry L. Karger Medal in Bioana-



MANN

lytical Chemistry and, in 2012, both the Körber European Science Award and the Louis-Jeantet Foundation Prize for Medicine. The author of more than 800 publications, Mann is the most widely cited researcher in Germany, with more than 310,000 citations.

Spiegel recognized as a top female scientist

The biochemist who discovered sphingosine-1-phosphate (S1P) — a molecular signal of cancer metastasis, cardiovascular disease and inflammation — is among the world's top 1,000 women scientists of 2022, as named by research.com.

Sarah Spiegel, who chairs the biochemistry and molecular biology department in the medical school at



SPIEGEL

Virginia Commonwealth University, clinched the No. 96 slot in the U.S. and was ranked 146th for female scientists worldwide. The research portal noted Spiegel's 454 publications and 63,933 citations, as well as her multidisciplinary approach to cancer research.

Spiegel earned her Ph.D. in

MEMBER UPDATE

biochemistry from the Weizmann Institute of Science in Rehovot, Israel. She carried out postdoctoral studies at what is now the National Institute of Neurological Disorders and Stroke at the National Institutes of Health. Her recent research grapples with the biological role of S1P and sphingosine kinases, the enzymes that catalyze its formation.

In 2021, Spiegel was named one of the American Society for Biochemistry and Molecular Biology's inaugural fellows. She has served on the editorial board of the *Journal of Lipid Research* for more than a decade and was a member of the *Journal of Biological Chemistry* editorial board from 2010 to 2018. She won the ASBMB's 2009 Avanti Award in Lipids.

Shobade wins agriculture award

Samuel Shobade has received the Iowa State University inaugural Dhamu and Kanchana Thamodaran Innovation in Agriculture Student Award. This award supports students in the College of Agriculture and Life Sciences who have innovative scientific, technological or business ideas for solving today's challenges in agriculture.



SHOBADA

Shobade is a graduate student at Iowa State studying biochemistry. He conducts research with Marit Nilsen-Hamilton, a professor of biochemistry, biophysics and molecular biology. Shobade is investigating chitinases in the rhizosphere, the area of soil surrounding plant roots, which plant roots use to fend off patho-

American Academy of Microbiology fellows named

Four members of the American Society for Biochemistry and Molecular Biology are among the 65 scientists named fellows of the American Academy of Microbiology earlier this year. The new fellows include Clare Bryant, Isaac Cann, Matthew Chapman and James Keck.

Clare Bryant, a Queens' College professor at the University of Cambridge, studies the biochemistry of allergens and how hosts detect bacteria with the aid of pattern recognition receptors. She has dual appointments in the departments of medicine and veterinary medicine.



Isaac Cann, a professor of animal sciences at the University of Illinois at Urbana-Champaign, explores DNA replication in archaea, host-microbiome impacts on health and biofuel-related enzymes. He works in the microbiome metabolic engineering and biocomplexity themes at the Carl R. Woese Institute for Genomic Biology.



Matthew Chapman, a professor of molecular, cellular and develop-

mental biology at the University of Michigan, uses curli — extracellular organelles found in certain microbes — to study the formation of amyloid fibers found in disorders such as Alzheimer's and Creutzfeldt-Jacob disease. His lab examines the role of curli in governing developmental pathways.



James Keck, a professor of biomolecular chemistry at the University of Wisconsin-Madison, probes the structural mechanisms behind DNA replication, replication restart, recombination and repair reactions. His research melds structural approaches with biochemical and cell biological methods to address basic structure-function issues in genome biology.



This year's honorees join more than 2,600 AAM fellows. Based in the United States, the academy draws fellows from around the world. This year's class comes from 11 nations, including Argentina, Australia, China, Germany, India and Israel.

gens. His research may lead to novel biological fungicides that contain chitinases to reduce crop loss from disease.

In a press release, Carmen Bain, associate dean for academic innovation at Iowa State, said the selection committee for the award agreed Shobade's

research was innovative and cutting-edge in its approach to enhance crop growth, crop yields and food quality: "His work exemplifies our college's belief that identifying and developing solutions to complex problems in agriculture requires interdisciplinary thinking and practice."

James Whitlock, Jr.

James Palmer Whitlock Jr., a professor emeritus at Stanford Medicine who had studied the toxic chemical in the herbicide Agent Orange, died Feb. 16 at age 80. He had pancreatic cancer.



Born June 18, 1942, to James Palmer Whitlock Sr. and Barbara Jane Smith in Elizabeth, New Jersey, Whitlock received a B.S. from Princeton University in 1964 and an M.D. from Temple Medical School in 1969. He completed a pediatric residency at Columbia Presbyterian Medical Center and was a senior staff fellow at the National Institutes of Health.

Whitlock joined the Stanford School of Medicine in 1978 and taught pharmacology until his retirement in 2007. He was the chair of the molecular pharmacology (now chemical and systems biology) department in the early 1990s. He taught for seven years after he retired, even after ceasing active research. His lab at Stanford worked almost exclusively on dioxin.

Dioxin is a highly toxic pollutant found in herbicides including Agent Orange, which was used extensively by U.S. troops to defoliate crops and forests during the Vietnam War. Exposure can cause cancer and reproductive or immunological defects in animals and humans.

Whitlock provided structural and mechanistic insights into the interaction between dioxin and its aromatic hydrocarbon receptor in cells. He also discovered the core DNA sequence in the enhancers that binds to the dioxin–receptor complex. He uncovered molecular mechanisms by which dioxin regulates gene expression in the body, leading to health problems.

Whitlock received the Agnes Axell Moule Faculty Scholarship in 1980 and the American Cancer Society’s Faculty Research Award from 1981 to 1986. He had been an American Society for Biochemistry and Molecular Biology member since 1977.

An avid soccer player, Whitlock continued playing into his 50s. He contributed to charitable causes and created an endowment for faculty members at his preparatory school alma mater. In his retirement, he became a photographer and created a calendar of photos with themes such as “Pollinators” and “Butterflies” for Christmas presents.

He is survived by his wife of 25 years, Lynn Pulliam, a professor at the University of California; two children and two stepchildren; seven grandchildren; a sister and two brothers; and his ex-wife, Rosalie.

— Kanika Khanna

Thomas Hollocher

Thomas Clyde Hollocher Jr., an emeritus biochemistry professor at Brandeis University who joined the American Society of Biochemistry and Molecular Biology in 1966, died Nov. 3, 2022, in Sudbury, Massachusetts. He was 91.



Hollocher was born June 6, 1931, to Thomas Hollocher Sr. and Catharine Emma (Bernhard) Hollocher in Norristown, Pennsylvania. He spent his youth in the area northwest of Philadelphia, then earned a bachelor’s degree in chemistry from Worcester Polytechnic Institute. While there, he met Pamela Ann Moon, who was studying to become a nurse, and the two were later married.

Hollocher earned a doctorate in biochemistry from the University of Rochester. After a three-year postdoctoral fellowship at Washington University in St Louis, he became an assistant professor of biochemistry at Brandeis University in 1961. He taught there for 38 years, becoming a full professor in 1981.

Hollocher studied enzymes in the global nitrogen cycle, with a focus on bacterial denitrification reactions with nitrate, nitrite and nitric oxide. His work held relevance for farming and also laid the groundwork for the discovery of nitric oxide as a cardiovascular signaling molecule in mammals. Science magazine declared nitric oxide “Molecule of the Year” in 1992.

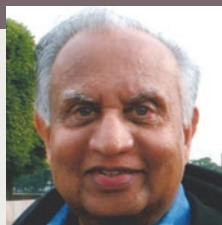
After retiring in 1999, Hollocher launched investigations into the chemistry and mineralogy behind the fossilization of early dinosaurs. For these studies, he teamed up with one of his sons, a geologist. He also traveled with his wife to dig sites in the Ischigualasto Formation in Argentina and the Badlands of South Dakota. Over his career, Hollocher authored some 112 scientific publications.

Hollocher had a lifelong passion for mountain climbing. He scaled Mount Monadnock in New Hampshire more than 100 times and led friends and family up all of that state’s 4,000-foot peaks and most of Maine’s. He also tapped his biochemical knowledge to produce bumper crops from his fruit and vegetable gardens. Long after retiring, he remained a regular at his department’s faculty lunch seminars.

Hollocher is survived by his wife, Pamela; his children, Kurt, Bruce and Susan; and eight grandchildren.

Nagendra Nath Reddy

Kantabattina Nagendra Nath Reddy, a blood researcher-turned-criminalist who joined the American Society for Biochemistry and Molecular Biology in 1979, died on April 12, 2023, after battling cancer. He was 85.



Reddy was born on Nov. 18, 1937, to K. Rami and Gnanamma Reddy in Bangalore, India, one of nine children in the family. He earned a Bachelor of Science degree from V.R. College–Nellore, India, in 1955, a Master of Science in organic chemistry from the University of Saugor in 1959 and a Ph.D. in biochemistry from the Indian Institute of Science in 1971. He completed his postdoctoral research at the Roswell Park Memorial Institute and then became an assistant professor at the University of Cincinnati College of Medicine. After seven years at UC, Reddy moved to the University of Southern California School of Medicine.

Reddy was the first person to describe the mechanism of action of streptokinase's activation of plasminogen in the *Journal of Biological Chemistry* in 1972. In addition, he contributed seminal research to the field of fibrinolysis, the process that limits the growth of blood clots, and authored over 20 publications in this area. He received a career development award from the National Institutes of Health and was a member of the Federation of American Societies for Experimental Biology.

After retiring from academic research in 1990, Reddy joined the Los Angeles County Scientific Services Bureau and worked as a senior criminalist from 1991 to 1998. According to a family obituary, he enjoyed riding along with sheriffs, testifying in court and teaching courses to LA County district attorneys and police officers.

Reddy enjoyed arts, photography, stamp collecting, reading and travel. He spoke or read many languages including English, Telegu, Kannada, Tamil, Hindi and Sanskrit, his obituary states. He was married to Saraswati Reddy, who died in 2006.

Reddy is survived by two children, Kalpana and Sandip, and three grandchildren.

George Kalf

George F. Kalf, an emeritus professor at Thomas Jefferson University and a member of the American Society for Biochemistry and Molecular Biology for nearly six decades, died March 1 from congestive heart failure at his home in Ann's Choice Senior Living Center in Warminster, Pennsylvania. He was 92.



Born Dec. 22, 1930, in New Britain, Connecticut, Kalf earned a B.S. in chemistry at Upsala College in 1952 in New Jersey, an M.S. in biochemistry at Pennsylvania State University in 1954 and a Ph.D. in biochemistry from Yale University in 1957.

After graduate school, Kalf completed a postdoc in glycobiology and enzymology supported by the National Polio Foundation and received advanced immunology training from the U.S. Department of Agriculture National Animal Disease Laboratory.

Kalf got his first faculty position in 1959 at the New Jersey College of Medicine and Dentistry in Newark, where he stayed for seven years. During this period, Kalf established his research program characterizing mitochondrial enzymes and also had an appointment as an adjunct professor of pharmacology and toxicology at Rutgers University.

In 1966, Kalf moved his research program to Thomas Jefferson University's medical school, where he had a productive and fulfilling 40-year career and served as associate dean of scientific affairs, overseeing research and biosafety, from 1995 to 2005. Kalf's two most-cited primary research articles were published in the *Journal of Biological Chemistry*: A 1967 paper documented a method to minimize ribosomal contamination in mitochondrial preparations and demonstrated mitochondria contain ribosomes, and a 1968 paper reported the discovery of mitochondrial DNA polymerase and a method to isolate the enzyme from rat mitochondria.

Kalf was passionate about access to education. His personal connection to this cause came from his own dependence on scholarships to support his undergraduate education. He and his wife, Jeanne Williams Kalf, who had been his high school sweetheart, established two undergraduate scholarships in their names and contributed to another fund specifically for first-generation students, all at Bay Path University, a private bachelor's-granting school in Massachusetts for women and Jeanne Kalf's alma mater.

Kalf's wife died in 2010. He is survived by his two children, four nieces and nephews and four grandchildren.

— Christopher Radka

2023 ASBMB election results

By Marissa Locke Rottinghaus

Members of the American Society for Biochemistry and Molecular Biology have elected several new leaders, including the society's next president. One member of the ASBMB Council was re-elected, and two new members were chosen. The Nominating Committee has new members, and one member of the Publications Committee was re-elected.

President-elect

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

Joan Conaway is a professor of molecular biology and the vice provost and dean of basic research at the University of Texas Southwestern Medical Center. The Conaway lab studies the molecular mechanisms by which transcription factors and regulatory protein complexes control transcription. Conaway is a past ASBMB Council member, member and chair of the Meetings Committee, Finance Committee member and, most recently, treasurer.



"(I) welcome the opportunity to work with ASBMB's Council, committee members, staff and leadership to grow and sustain the society through initiatives to enhance recruitment of the next generation of its members and support its journals, meetings, educational and profession-

al development, scientific outreach and other programs," Conaway said. "I believe I am well positioned to help the society meet its challenges and seize opportunities as we transition to the new world of open access publishing and independent annual meetings."

Interim treasurer

The ASBMB Finance Committee assists the Council in fulfilling its financial oversight responsibilities by monitoring financial resources, including budgeting and financial planning, financial reporting, internal controls and accounting policies, and investment strategies. Upon Conaway's election, the ASBMB president appointed an interim treasurer to serve until the 2024 election.

Russell DeBose-Boyd is a professor of molecular genetics at the University of Texas Southwestern Medical Center. He will serve as interim treasurer until July 2024. During this election cycle, DeBose-Boyd ran for and won a seat on the Nominating Committee. Read more about him below.



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 society's mission. Councilors are

elected for three-year terms and can be re-elected or reappointed to serve one additional term.

One Council member was re-elected, and two new members were elected.

Cathy Drennan is a professor of chemistry and biology and a Howard Hughes Medical Institute investigator at the Massachusetts Institute of Technology. In addition to her research on education, Drennan also studies the structural biology of metalloenzymes. She received the ASBMB's 2023 William C. Rose Award for her outstanding contributions to biochemical research and commitment to training younger scientists. As a postdoctoral fellow, she started the ASBMB's annual undergraduate poster competition.



"My goal as a Council member would be to ensure that the ASBMB continues to promote undergraduate research; lead on diversity, equity and inclusion; and showcase the power and value of biochemistry and molecular biology," Drennan said.

Kayunta Johnson-Winters is an associate professor of chemistry and biochemistry at the University of Texas at Arlington. Her research focuses on enzyme kinetics and mechanisms as well as reaction intermediates. She has served on the Maximizing Access Committee and



currently serves on the Nominating Committee. In addition, she has written for ASBMB Today and received an award for her essay “Being Black in the ivory tower.”

“The ASBMB has not only supported my growth as a scientist and faculty member but has more importantly been very intentional about diversity, equity and inclusion and has shown unwavering support for all, including people of color and the LGBTQIA+ community,” Johnson-Winters said. “Such support through programs, mentorship, outreach and engagement is critical for the future of STEM professionals.”

Charles Craik, a professor of pharmaceutical chemistry at the University of California, San Francisco, was re-elected to serve on the Council. His research aims to define the roles and the mechanisms of enzymes and other challenging proteins in complex biological processes and develop technologies to facilitate these studies.



“I have benefited greatly from a productive relationship between my lab’s discovery research in academia and practical applications in industry that help translate the work from the bench to the patient,” Craik said. “Providing ASBMB leadership with a perspective of how healthy, transparent, productive partnerships can be established with industry is a primary goal of mine during my tenure on the ASBMB Council.”

Publications Committee

The ASBMB Publications Committee oversees the society’s scholarly publishing activities, advises the Council on policy and ethical issues that may arise and advises jour-

nal editors about editorial matters, including the approval of associate editor appointments. Committee members are elected for five-year terms and can be re-elected or reappointed to serve one additional term.

ASBMB voters re-elected one member of the committee.

Evette Radisky, a professor of cancer biology at the Mayo Clinic and the associate dean of the Mayo Graduate School of Biomedical Sciences, was re-elected to the committee. Her long-term research focus is on the molecular recognition between proteases and protein protease inhibitors, and the role of proteases in tumor progression and metastasis. She previously served on the Meetings Committee.



“I will advocate for shaping the composition of our teams of associate editors and editorial boards to reflect the broad scientific, geographical and individual diversity of our membership,” Radisky said “I seek to ensure that the journals will always be a sought-after and welcoming home for the best science produced by our society members of all career stages.”

Nominating Committee

The ASBMB Nominating Committee nominates regular members of the society to stand for election for president, the Council, the 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.

ASBMB members elected two new committee members this year.

Karen Allen is a professor and chair of the chemistry department at Boston University. She co-founded

the society’s Women in Biochemistry and Molecular Biology Committee and is serving her second term as a member of that committee. She co-chaired Discover BMB 2023 in Seattle. Her lab investigates the structure, function, mechanisms of catalysis and evolution of enzymes to aid in drug discovery.



“As a member of the Nominating Committee, I will work toward tapping the full extent of our scientific community to allow broad participation in positions at all levels in our society,” Allen said. “My work will be guided by the principle that our committee membership should reflect the true ideals of the society.”

Russell Debose-Boyd is a professor of molecular genetics at the University of Texas Southwestern Medical Center. His research focuses on cholesterol synthesis and metabolism. He is a Journal of Lipid Research associate editor and a Journal of Biological Chemistry editorial board member. He has also served as a mentor for the ASBMB Maximizing Opportunities for Scientific and Academic Independent Careers, or MOSAIC, K99/00 program.

“As a member of the ASBMB Nominating Committee, I will strive to ensure that the ASBMB leadership remains inclusive and continues to be represented by scientists from an array of racial, ethnic, gender, sexual, class and scientific backgrounds,” Debose-Boyd said.

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



Desire to share science revives a chapter

By *Andrea S. Pereyra*

Growing up in Wayne County, Kentucky, Michael Buoncristiani witnessed firsthand the disproportionately high cancer rates and limited access to health care in his native Appalachia. But when his grandfather was diagnosed with cancer, Buoncristiani was heartened to see the advanced medical care provided at the University of Kentucky Markey Cancer Center.

“The exceptional care that my grandfather received during his illness drove my desire to pursue medicine and research as a career, particularly at the University of Kentucky,” he said. And he’s on his way. Buoncristiani just graduated from the University of Kentucky with a triple major — neuroscience, biology and agricultural and medical biotechnology — and a minor in microbiology. He recently joined the M.D. program at the UK College of Medicine.

As a freshman, Buoncristiani joined the Appalachian Career Training in Oncology program, known as ACTION, under Nathan Vanderford, an associate professor at UK. “Dr. Vanderford has been a wonderful leader,” Buoncristiani said. “He guided me into a great research group, and I got heavily involved in cancer metabolism research, initially studying Appalachian and non-Appalachian patients affected by lung cancer.”

Buoncristiani has put his passion for research and medicine into service. Since 2019, he’s been involved in community outreach activities to



COURTESY OF MICHAEL BUONCRISTIANI

Inspired by the medical care his grandfather received, Michael Buoncristiani got involved in cancer metabolism research at the University of Kentucky.

raise cancer awareness and divulge medically accurate information in rural Kentucky. He also served as the undergraduate research ambassador and president of outreach for the University of Kentucky Appalachian Health Initiative.

Vanderford serves as the faculty adviser for the UK’s American Society for Biochemistry and Molecular Biology Student Chapter, and from 2022 to 2023, Buoncristiani was the chapter’s president. “Much of that time was spent initiating the program and recruiting more students, getting the chapter moving again,” he said.

The chapter had been active in the past, but due to the pandemic and other factors, “it went cold,” Buoncristiani said. “The desire to attend the 2022 ASBMB annual meeting to share our scientific work was the necessary motivation to bring the chapter

back to life.”

Seven students from the UK Student Chapter presented their work at the 2022 ASBMB meeting (then part of the Federation of American Societies for Experimental Biology meeting) in Philadelphia, with the help of ASBMB scholarships and travel grants secured through the chapter.

“Attending an internationally renowned scientific conference like Experimental Biology can change an undergrad student’s career trajectory,” Buoncristiani said. “There are lots of professional development opportunities and lots of premeeting nerves. It’s a big deal.

“This was the highlight of the chapter because we were able to attend our first large conference together as undergraduates,” he said. “We were all very thankful for ASBMB’s support.”

Buoncristiani has stepped away to attend medical school, but he’s confident the UK Student Chapter is in good hands. “Because of the positive experience so far, lots of students are eager to continue it,” he said. “The university is really supportive of undergrad research, so the chapter should only get bigger and stronger from now on.”

Andrea S. Pereyra (pereyaa18@ecu.edu) is a postdoctoral scholar at the East Carolina Diabetes and Obesity Institute. She earned her M.D./Ph.D. at Universidad Nacional de La Plata in Buenos Aires, Argentina. Follow her on Twitter: @ASPereyra



Serving students with passion

By *Elisa Marie Wasson*

Growing up in North Carolina, Margaret Kanipes spent her summers exploring rocks, minerals and animal specimens in her father's junior high earth science classroom. These early encounters with science inspired her to study chemistry with the goal of becoming a dentist, a dream her father had been unable to pursue due to financial limitations.

Kanipes enrolled in North Carolina Agricultural & Technical State University planning to transfer in two years to Howard University for a joint chemistry and dentistry program. However, after her first year at NC A&T, her chemistry professor and chair of the department, Walter Wright, urged Kanipes to pursue research with Lynda Jordan, an associate professor of chemistry. In Jordan's lab, Kanipes worked on isolating and characterizing phospholipase A2 from the human placenta.

Her research experience in Jordan's lab led Kanipes to participate in the Maximizing Access to Research Careers, or MARC, program in her junior year and set her on an unexpected path.

"How I ended up getting my Ph.D. at the end of the day was really because of great mentors along my pathway," she said. "Our MARC director, Dr. James Williams, would call us Mr. and Ms. in the classroom to help solidify our identities as future scientists and that this is a real serious business, and I liked that."

Kanipes also tutored other students in chemistry and found she had a true passion for teaching. Attending



COURTESY OF MARGARET KANIPES

Margaret Kanipes earned her bachelor's degree at North Carolina Agricultural & Technical State University and then returned in 2004 to join the faculty.

her first research conference, where she was able to exchange ideas with academics from all over the country, cemented Kanipe's new goal of becoming a professor.

"I was excited to follow this path," she said. "This is where I saw myself fitting in — and of course, I thought I was a little professor anyway."

She pursued her Ph.D. in biological sciences in Susan Henry's lab at Carnegie Mellon University, where she moved from chemistry to molecular biology.

"I thought to myself, I must be the craziest person in the world to make this transition," Kanipes said. "But then I realized that chemistry is the foundation of everything, and having a chemistry background really helped me with work that I did in my Ph.D."

Kanipes studied phospholipid biosynthesis, which involved genet-

ics, cloning and purification. "I had a number of skills that really served me well and would be considered interdisciplinary work," she said. "I would like to think I was ahead of the time in being able to cross these different fields and work in different areas to solve a problem."

The power of mentorship

Kanipes went on to do a postdoctoral fellowship in lipid biochemistry at Duke University. After facing several challenges, she considered leaving her postdoc early. Ready to call it quits, she called Williams, her former MARC adviser.

"He wasn't mean, but he also wasn't nice," Kanipes said. "He said, 'You are not leaving. You have two options, you either finish this postdoc out or you need to go find another.'"

Williams encouraged Kanipes to call Henry, her Ph.D. adviser, to talk about what she was going through. Henry helped her to plan out projects to finish her postdoc as well as ones she could take with her when applying for junior faculty positions. With a renewed sense of confidence, Kanipes returned to her postdoc and was invited to present her work at the international Endotoxin Society meeting where she received a Young Investigator's Award. Upon completing her postdoc, she had four offers for faculty positions.

The power of mentorship was one reason Kanipes wanted to be a professor. "Here I was at a time that was really challenging to me, and I wasn't alone, I had someone to go to," she said. "They knew what my purpose

and passion were, they understood my potential and knew that I was going in the right direction. Great mentors see you for who you are and help you to realize your full potential.”

Kanipes became an assistant professor in biology at Fayetteville State University and then joined NC A&T as an associate professor in chemistry in 2004. “I love my alma mater and I wanted to help students that look like me,” she said.

She was awarded grants through the National Science Foundation, the National Institutes of Health, the Department of Defense, and the Department of the Army. She received the NC A&T Young Investigator of the Year Award in 2007. From 2011 to 2015 she served as interim chair of the chemistry department where she worked with other faculty to develop a curriculum designed to help students matriculate in their programs and be successful.

In 2016, Kanipes was named director of the STEM Center of Excellence for Active Learning where she continued to help faculty develop pedagogy and curricula that would retain students in STEM programs and enable them to succeed in STEM careers. For her efforts, she received the College of Science and Technology Merit Teaching Award and the Department of Chemistry Teaching Excellence Award in 2017.

Realizing your true passion

In 2017, Kanipes received an offer to become the director of the University Honors Program at NC A&T. Initially, she was unsure whether it was the right role for her. She had her own lab, students, grants and classes. As one of the few African American woman professors on campus, she felt an obligation to continue in research, and she struggled with the decision to shut down her research lab. She



Margaret Kanipes, left, pursued her Ph.D. in biological sciences in the lab of Susan Henry, right, at Carnegie Mellon University, where she moved from chemistry to molecular biology.

reflected on her strengths as a person and as a leader and asked herself what she really loved to do.

“My passion is serving students, and I am good at it,” she said. “I enjoy developing programming and making policies that support students outside of the classroom and lab. So, after really thinking about it I accepted, and it’s one of the best decisions I have made in my life.”

As director of the UHP, Kanipes increased the number of honors students from 450 to over 850, developed the Cheatham-White Scholarship Enrichment Program, and increased Honors Lecture Series participation by 150%. In 2022, she became the first dean of the inaugural Honors College at NC A&T.

While she no longer works in the lab, Kanipes still makes big waves in STEM. As dean, she mentors STEM and non-STEM students and develops programs to increase STEM participation, diversity and retention. She is the principal investigator of an NIH-funded grant called Enhancing Science, Technology, Engineering, and Math Educational Diversity, or ESTEEMED, which aims to enhance the diversity of the biomed-

ical research workforce by preparing first- and second-year students to pursue advanced STEM degrees. She also serves as principal investigator on an NSF-funded collaborative grant called the Center for the Advancement of STEM Leadership, which supports the professional development of leaders at historically black colleges and universities and helps them to broaden student participation on their campuses. Kanipes continues to publish research in peer-reviewed journals focused on structural and institutional transformation in higher education.

Along with her career success, Kanipes is a mother to three boys. She credits her family and support network with helping her achieve balance, something she stresses with the students and faculty she mentors.

“What are you doing to take care of yourself?” she asks her mentees. “You can’t pour from an empty cup. We must take care of ourselves so that we can do the work that we are meant to do.”

Kanipes also stresses the importance of having a mentor who will advocate for and support you even if they don’t look like you. And she says to always keep moving forward.

RESEARCH SPOTLIGHT

COURTESY OF MARGARET KANIPES



As director of the University Honors Program at North Carolina Agricultural & Technical State University, Kanipes almost doubled the number of honors students within five years. In 2022, she became the first dean of the school's inaugural Honors College.

“Don't play the whole game of I wish I had done X Y, and Z,” she said. “Focus on the lessons learned along the way. You take those lessons, and you use what you learned in the next part of your life.”

At the end of the day, Kanipes keeps her focus on students. “That is my purpose and passion, what I look forward to every day when I come to work,” she said. “What I think about deeply is student success.”

Elisa Marie Wasson
(ewasson1@gmail.com)
is a materials engineer at Lawrence Livermore National Lab in the Bioengineering and Advanced Fabrication group, where she works on cell microencapsulation and tissue engineering. She earned her Ph.D. at Virginia Tech.



Upcoming ASBMB events and deadlines

OCTOBER

- 1 Student Chapter Outreach Grant fall deadline
- 1 ASBMB Today wellness issue submission deadline
- 12 Discover BMB early-decision abstract submission deadline
- 19 Teaching enzymology with the Protein Data Bank: From pandemic to Paxlovid webinar
- 20 ASBMB fellows nomination deadline
- 31 Science Outreach and Communication Grant deadline
- 31 Serine proteases conference regular registration deadline

NOVEMBER

- 1 ASBMB Virtual Career Expo
- 2–3 Serine proteases conference
- 28 Student Chapter renewal deadline
- 30 Discover BMB abstract and travel award submission deadline

DECEMBER

- 1 Discover BMB T-shirt competition begins
- 14 Discover BMB late-breaking abstract submission site opens
- 31 Renew your ASBMB membership!



Celebrating 100 years of the term ‘lipid’

By Félix M. Goñi

Humans have recognized and used fats and oils since pre-historic times. But it was not until the 19th century that progress in chemistry and physics allowed for the discovery of biological molecules that we now understand as structurally and/or functionally related to fats, such as cholesterol, waxes and phospholipids. One hundred years ago, a French pharmacologist united all these molecules under a common name, lipides.

Gabriel Bertrand put forward the idea in his paper “Projet de reforme de la nomenclature de Chimie biologique,” published by the Bulletin de la Société de Chimie Biologique. The society approved Bertrand’s suggestion, with the French spelling “lipide,” in its session on July 3, 1923.

The term lipide is derived from the Greek λίπος (fat) and ἰδης (descendant of). Lipides are the progeny of λίπος just as, in the Iliad, Nestorides refers to the sons of Nestor or Telemonides to the sons or descendants of Telamon. The English-speaking world readily adopted the name lipides, in the sense defined by Bertrand, mainly in the form “lipids” (although the French spelling was kept by some authors well into the 1950s, particularly in America).

Bertrand enjoyed a long and productive scientific life. He discovered the oxidases, as well as the oligoelements, or “infiniment petits

chimiques,” at the Institut Pasteur, where he worked for most of his life, even after his official retirement, until he died in 1962 at the age of 95.

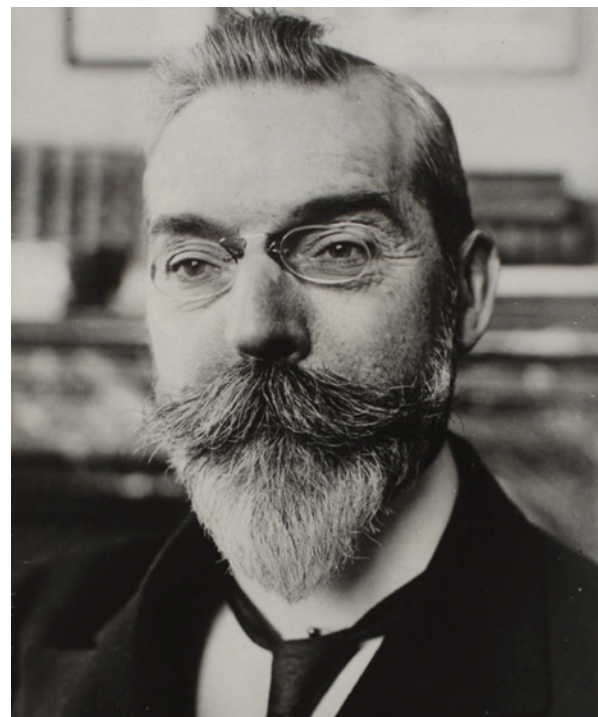
On this 100th anniversary, it is perhaps pertinent to reflect on the qualities of lipids.

Definition

Among the various groups of biomolecules, lipids are unique in that they are not defined by a chemical property. Unlike in sugars (polyhydroxy aldehydes or ketones) or proteins (lineal polymers of amino acids) or nucleic acids (polymers of nucleotides), no single chemical property will fit all lipids. Instead, they are usually defined by a physical property, namely hydrophobicity.

This leads immediately to conceptual problems. For example, many membrane proteins are totally insoluble in water and soluble in chloroform–methanol mixtures, yet they are universally considered proteins, not lipids. At the opposite end of the solubility spectrum, lipids as important as the gangliosides are soluble in water and almost insoluble in organic solvents. And, in another twist, physiologically essential lipids, such as the membrane lipids, are amphipathic; that is, they contain both a hydrophobic and a hydrophilic moiety.

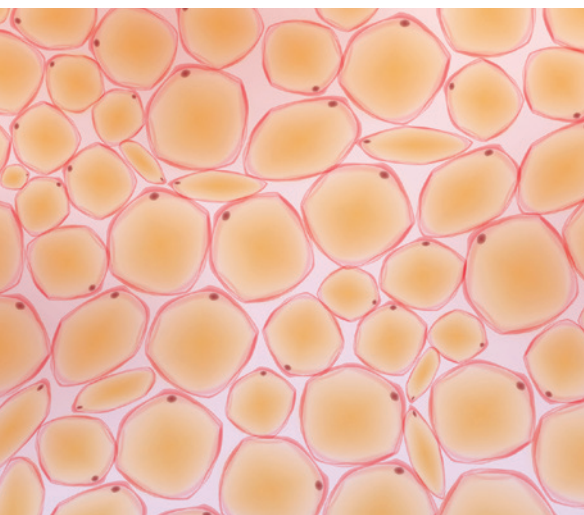
This complexity may explain the erroneous definitions in highly revered dictionaries and encyclopedias, or even scientific textbooks. Let me



French pharmacologist Gabriel Bertrand (1867–1962) coined the term “lipids,” and it was approved by the Société de Chimie Biologique in 1923.

be bold enough to give, in English translation, the definition that my mentor J. M. Macarulla and I jointly proposed in our 1984 textbook “Bioquímica Humana”: “Lipids constitute a group of heterogeneous substances, sharing physical rather than chemical properties. They are sparingly or not soluble in water, and usually soluble in organic solvents” (stress not in the original text).

This somewhat fuzzy definition can be completed or clarified by a brief classification of the substances that are usually considered lipids. Two main groups must be distinguished, those of fatty acid—or fatty acid derivative—containing lipids



BENJAMIN TOOTH

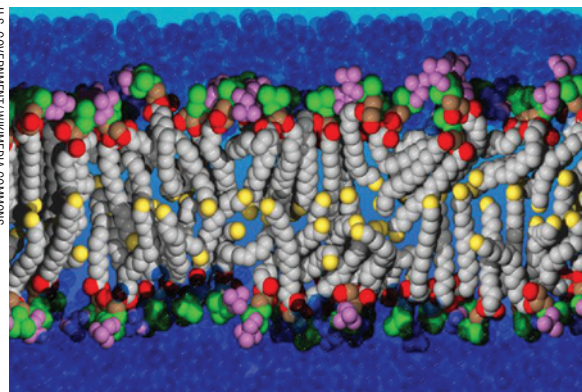
Fat tissue is a connective tissue that extends throughout the body.

and those broadly unrelated to fatty acids.

The first group contains the fatty acids themselves, the neutral fats or acylglycerides, the waxes, the prostanooids, the phospholipids and all the sphingolipids since sphingosine is synthesized from a fatty acid, usually palmitic.

The second group is even more heterogeneous, containing, on one side, the isoprenoids such as terpenoids, carotenoids and steroids (the latter including sterols like cholesterol, bile salts, steroid hormones, vitamin D

A diagonal molecular slab from a lipid bilayer simulation: phosphate is green, trimethylamine is violet, water is blue, terminal methane is yellow, oxygen is red, glycol C is brown and chain C is grey.



U.S. GOVERNMENT / WIKIMEDIA COMMONS

and several plant and animal alkaloids) and, on the other, the pyrrole-related lipids such as porphyrins, heme, chlorophylls, bilifucsin and bilirubin.

Note that the latter group of lipids is usually presented in textbooks as prosthetic groups of several proteins or as degradation products, ignoring their clearly lipidic nature according to most definitions.

Landmarks

In the history of this puzzling group of biomolecules, I identify three eras, namely the unraveling of the chemical structures, the description of the metabolic pathways and the chemical–physiological correlations.

The chemical structures of most lipids had already been described by 1923, in fact, many of them were published in the 19th century. For example, Michel Eugène Chevreul isolated cholesterol in 1816, calling it cholestérine. The chemist Marcelin Berthelot discovered in 1859 the alcohol function in C3 and proposed calling it cholestérol. Aleksandr P. Borodin, a chemist and composer—known for the symphonic poem “In the Steppes of Central Asia” and the Polovtsian Dances from the opera “Prince Igor”—first isolated and described cholesterol esters in 1871. Cobalamine, or vitamin B12, resisted characterization until 1956 when Dorothy C. Hodgkin mapped its structure.

The era of the lipid metabolic pathways corresponds to the years 1942–1967. In a classical example of how the method opens the way to knowledge, the availability of

carbon-14, the essential isotope for metabolite labeling, in about 1940, allowed the rapid unraveling of the main lipid pathways, completed with the biosynthesis of fatty acids, by Feodor Lynen, and of cholesterol, by Konrad Bloch, in the 1960s.

We now live in the era of the chemical–physiological correlations of lipids. Even the briefest description of the subject requires again the distinction between new techniques and new concepts.

Among the techniques that have deeply changed the fields of lipidology and lipidomics, we should mention gas-phase chromatography, thin-layer chromatography, lipoprotein electrophoresis and liquid-chromatography–mass spectrometry, which were first applied to lipids in about 1952, 1964, 1968 and 2000, respectively. It goes without saying that LC–MS has revolutionized the field of lipid analysis in physiology and pathology at the cell, tissue and organ levels.

The novel ideas that these techniques have brought to our understanding of lipids are too important to be dealt with in a few lines. A naked enunciation of the findings should include, at the very least, phospholipids as the structural basis of membranes, in 1972; the role of diacylglycerols, in 1979, and of ceramides, in 1986, in cell signaling; adipose tissue as an endocrine tissue, in 1995; and brown fat lipids in adult-life thermogenesis, in 2009. Many other discoveries could be added to this list, but these examples are enough to illustrate the seemingly infinite capacity of lipids to dazzle us once and again.

Félix M. Goñi (felix.goni@ehu.eus) is an emeritus professor of biochemistry at the University of the Basque Country and at the Instituto Biofísica in Leioa, Spain.



Mechanisms of a gut bacterium – and how to stop them

By *Aswathy N. Rai*

The human gastrointestinal tract is one of the most diverse and complex ecosystems, comprising trillions of microbes. Bile acids produced by the liver and secreted into the intestines not only aid in the digestion of food but also protect against pathogenic microorganisms in the gut. To survive the hostile environment of the GI tract, bacteria must develop strategies for resistance.

Vibrio parahaemolyticus, a Gram-negative bacterium that causes food-borne diseases can sense and use bile acids as a signal to activate harmful toxins that cause diarrhea. Understanding how pathogenic bacteria evade host defense mechanisms is critical in developing new treatments to prevent or cure gastrointestinal diseases.

Kim Orth, at the University of Texas Southwestern Medical Center, leads a team that researches virulence mechanisms used by *V. parahaemolyticus* to survive in the GI tract. In a recent study published in the **Journal of Biological Chemistry**, graduate student Angela Zhou and colleagues show how *V. parahaemolyticus* differentially senses bile acids to activate toxin production.

A major pathogenic factor of the organism is a type III secretion system called T3SS2. T3SS2 comprises bacterial structures that help inject effector proteins that enable the *V. parahaemolyticus* to invade the host and establish infection. “When *Vibrio parahaemolyticus* is ingested and en-

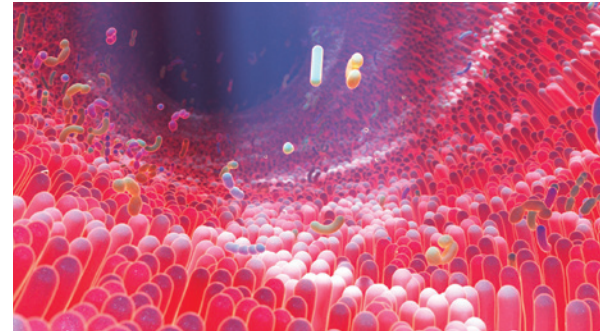
ters the intestines, it senses bile acids and activates the T3SS2,” Orth said. “The T3SS2 secretion system injects toxins from the bacteria into cells lining the intestine, causing disease.”

Two membrane proteins in the bacteria, VtrA and VtrC, form a complex to control production of the T3SS2. The VtrA–VtrC responds to the host GI tract bile acids to induce VtrB, another membrane-bound protein that activates the T3SS2. Bile acids, such as taurodeoxycholate or TDC, trigger VtrB expression and T3SS2 activation, while others like chenodeoxycholate, or CDC, do not.

Using X-ray crystallography, isothermal titration calorimetry and green fluorescent protein reporter assays, Zhou and colleagues determined why TDC, but not CDC, activates the T3SS2 upon binding VtrA–VtrC. They found that the differences in sensing bile acids were due to the subtle differences in the molecular structures of CDC and TDC. They showed that two amino acids, histidine50 and serine123, were vital for determining whether TDC and not CDC activates the T3SS2.

“These bile acids act like a card reader for a locked door,” Orth said. “If a person has access to the room behind the door, inserting their card into the card reader will unlock the door, and if a person who does not have access inserts their card, the door will remain locked,” Orth added.

The team was excited to find that CDC also binds to VtrA–VtrC within the same pocket in the protein as TDC. However, a closer examination



of the structure's atomic-level interactions showed that CDC and TDC bind to VtrA–VtrC differently.

“Our research reveals how enteric bacteria use environmental cues to cause gastrointestinal disease and provides clues on why certain people are more susceptible to disease than others,” Orth said. “Researchers recently found bile acids are modified by good bacteria that live in the intestines, which can protect against harmful bacteria by changing the makeup of the bile acid pool in the intestines.”

The researchers performed the X-ray crystallography and ITC experiments on only a part of the VtrA and VtrC proteins, the periplasmic domain. In the future, the team will focus on determining the molecular mechanism of differential activation of the T3SS2 by TDC and CDC using the entire VtrA and VtrC proteins.

DOI: 10.1016/j.jbc.2023.104591

Aswathy N. Rai
(aswathy.raai@msstate.edu) is an assistant teaching professor and undergraduate coordinator at Mississippi State University's department of biochemistry, molecular biology, entomology and plant pathology.



SARS-CoV-2 variants remodel cellular landscapes

By *Christian McDonald*

Viruses rely on the cellular machinery within their hosts to replicate and assemble new virus particles. They have evolved sophisticated ways to hijack and alter cells while simultaneously overcoming an arsenal of immune defenses activated by viral infection.

Christian Münch, Sandra Ciesek and a team of scientists at Goethe University in Germany study how viruses can rewire their host cells. “We are keen on understanding cellular signaling responses to stress stimuli, such as viral infection,” Münch said.

Coronaviruses infect many species, especially mammals and birds. Experts believe severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2, crossed the species barrier and entered the human population to cause the COVID-19 pandemic. Since its detection in Wuhan, China, SARS-CoV-2 has mutated numerous times. The resulting variants may behave distinctly from one another, which can lead to reduced efficacy of antiviral treatments.

The appearance of SARS-CoV-2 variants “definitely tickled our curiosity to examine host cellular antiviral responses,” Münch said. The team’s recent study of these variants was published in the journal **Molecular & Cellular Proteomics**.

Led by Melinda Metzler and Rebecca Tharyan, the researchers began this investigation by infecting cells from lung tissue, the primary target of the virus in humans. They inoculated

these lung cells with three viruses: the ancestral SARS-CoV-2 strain, the delta variant, and the omicron variant. The team discovered that the omicron variant replicated remarkably slower within these lung cells than the delta variant or ancestral strain. This was the first experimental indication of a unique cellular response to omicron infection.

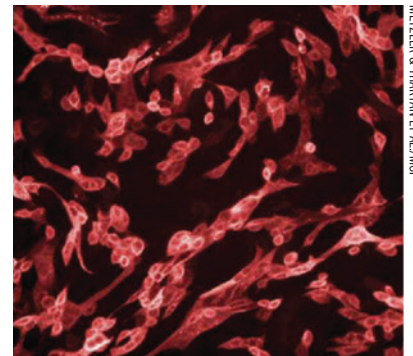
Inside every cell are millions of proteins collectively known as the proteome. The scientists next sought to uncover what changes occurred in the proteomes of both the lung cell and the virus during infection.

“To study these time-resolved processes, we developed novel proteomics methods and set up a platform for cellular proteome profiles upon infection,” Tharyan said.

The researchers extracted the proteins from samples and then used mass spectrometry to identify and measure differences in protein quantities among cells infected with the three SARS-CoV-2 strains.

The proteomic analyses showed major cellular changes in all three infected samples, but cells infected by the omicron variant consistently exhibited alterations absent from the other strains. The viral proteome was significantly reduced in omicron-infected cells as well. The researchers also saw striking immunological delays in how cells responded to omicron.

Interferon, or IFN, proteins are a first line of defense against viruses. Omicron-infected cells took much longer to induce IFN proteins than



METZLER & THARYAN ET AL./MCP

Red staining shows SARS CoV-2 spike protein in lung cells 24 hours after infection with the omicron variant.

the ancestral SARS-CoV-2 strain or delta variant, suggesting that the omicron virus was able to impede immune activation in these lung cells.

“It was intriguing to unravel such individuality in cellular responses at both proteome and molecular level,” Tharyan said.

Medical records indicate that compared to other variants, omicron infection results in milder cases of COVID-19. Despite its diminished disease burden, the omicron variant is significantly more contagious. Considering these facts, along with their findings on the lagging immune response to this particular variant, Tharyan and her colleagues concluded that in the case of omicron, “slow and steady wins the race.”

DOI: [10.1016/j.mcpro.2023.100537](https://doi.org/10.1016/j.mcpro.2023.100537)

Christian McDonald (cmdonald@miami.edu) is a Ph.D. candidate in microbiology and immunology at the University of Miami–Miller School of Medicine. Follow him on Twitter: @cmdonald



Is cholesterol a disease link?

By Brianna Alexander

Each of the 11 major organ systems in the human body has a unique function that cooperates with the next to mediate homeostasis. These systems work together efficiently when a person is healthy; just think of how lightning-fast neural signals deliver cues from the brain to the muscles so you can move your hand off a hot stove. But, how do your systems affect one another in disease states? This is a question that researchers have begun to explore.

For example, researchers reported in 2004 that patients with chronic kidney disease, or CKD, were at an increased risk for cardiovascular disease, or CVD, with CVD being the leading cause of mortality in CKD patients. The kidneys filter waste from the blood, which is excreted as urine, and CKD is characterized by progressive loss of kidney function. The cardiovascular system pumps oxygenated blood to the organs and can be perturbed by diet, stress and other diseases, including CKD. But why would a patient with CKD be at an increased risk for CVD? How are these two systems related?

For more than 40 years now, researchers have demonstrated that low levels of high-density lipoprotein, or HDL—which carries low-density lipoprotein, or LDL, out of the arteries—is a risk factor for coronary heart disease, a type of CVD, in the general population. However, scientists know little about the mechanistic role of HDL cholesterol in CVD onset in CKD patients.

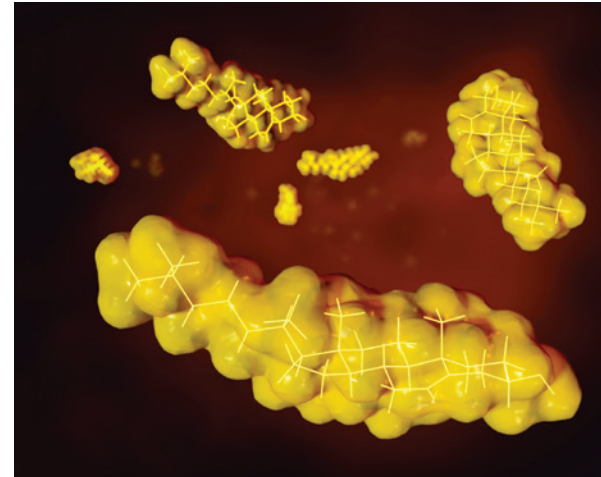
Baohai Shao from the University of Washington, Subramaniam Pennathur from the University of Michigan and

colleagues recently published a study in the **Journal of Lipid Research** investigating several HDL metrics to determine how this lipid correlates with CVD risk in CKD patients.

The researchers examined two cohorts of CKD patients: 92 from the Clinical Phenotyping and Resource Biobank Core, 46 with incident CVD and 46 without, and 91 from the Chronic Renal Insufficiency Cohort, 34 with incident CVD and 57 without. In the baseline samples from these patients, they compared levels of HDL cholesterol, cholesterol efflux capacity and concentrations of HDL particles of sizes ranging from extra-small to extra-large. In both cohorts, levels of most of these metrics were not different in CKD patients with or without incident CVD; however, levels of medium-sized HDL—but not other sizes—were lower in CKD patients with incident CVD. This indicates that medium-sized HDL particles might have a cardioprotective function.

Different-sized HDL particles contain different combinations of proteins, the team noted, and medium-sized particles may house proteins with more protective functions, such as PON1, an enzyme that they previously showed was associated with incident CVD in CKD subjects when at low levels.

According to Shao, their current study “demonstrated that reduced levels of medium HDL particles, but not other sized HDL particles, can predict future CVD events in CKD patients. In addition to being an accurate marker to predict future CVD events, it raises the possibility that therapies



that augment levels of medium HDL particles might be important to prevent CVD in CKD subjects.”

Overall, Shao’s group investigated why CKD patients are at increased risk for CVD, given the severity of both diseases. “If kidney disease worsens, waste can build up to high levels in your blood and make you feel sick, and it may eventually lead to kidney failure,” Shao wrote in an email. Moreover, “heart disease is the primary cause of death for all people with CKD.” This investigation may improve efforts to treat and prevent CVD in CKD patients. “Medium-sized HDL can be an attractive marker,” Shao wrote, “that can be clinically useful to predict future events as well as potentially serving as a therapeutic target.”

DOI: 10.1016/j.jlr.2023.100381

Brianna Alexander (bea469@live.com) recently obtained her Ph.D. in biomedical sciences from Rutgers University and is now a medical writer.



From the journals

By Inayah Entzminger, Ken Farabaugh & Meric Ozturk

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

Lysosomal proteins differ across cell lines

Lysosomes are the main organelles responsible for degrading and recycling compounds in mammalian cells. Lysosomal malfunction can result in rare diseases and has been shown to impact more common diseases, including cancer. However, all lysosomes are not the same between cell types. In a new study in the journal **Molecular & Cellular Proteomics**, Fatema Akter, Sara Bonini and Sriganesh Ponnaiyan from the University of Bonn, in collaboration with researchers from the University of Kiel, identified a distinct population of lysosomal proteins over six cell lines and discovered many potentially novel lysosomal proteins.

Using superparamagnetic nanoparticles enabling the enrichment of intact lysosomes, the researchers identified lysosomal proteins in the cell lines HEK293, HeLa, HuH-7, SH-SY5Y, MEF and NIH3T3 with mass spectrometry, Western blotting and immunostaining techniques. Most of the identified proteins were detected across all the cell lines, forming a core proteome that is highly conserved among the lysosomes of different lines, with differences in individual protein abundance. SH-SY5Y cells were the most similar to other cell lines, and NIH3T3 cells were least similar. The researchers analyzed protein abundance across

functions as well, finding patterns in the abundance of transporter proteins, the mammalian target of rapamycin complex and hydrolysis of glycosidic bonds.

DOI: 10.1016/j.mcpro.2023.100509

The role of sex in regulating heat

Thermogenesis, or heat production, can be regulated by the hypothalamus and is an important component of regulators of energy homeostasis. Reduced thermogenesis cuts energy consumption during energy deficiency, known as negative energy balance. In the hypothalamus, pro-opiomelanocortin, or POMC, neurons are essential to regulate the negative energy balance and regulate lipogenesis in brown and white adipose tissues. Toll-like receptor 4, or TLR4, also regulates lipogenesis; a part of its signal is produced in the hypothalamus, and activation of this signal inhibits the anorexia signal that triggers lipid production. Although POMC cells and TLR4 are associated with the anorexia signal, researchers have not yet proved a POMC–TLR4 relationship.

Yongxiang Li, Shuqing Zhu and a team of scientists in China investigated this question and published their findings in the **Journal of Lipid Research**.

The group genetically altered mice with POMC cells lacking TLR4 receptors to observe metabolic changes. In the male mice, this affected lipogenesis in brown adipose tissue and increased thermogenesis, resulting in reduced body weight. In female mice, deleting TLR4 in POMC neurons

decreased energy expenditure and increased body weight, which affects lipolysis of white adipose tissue. These sex-dependent effects indicate that sex should be considered when developing treatments for obesity.

DOI: 10.1016/j.jlr.2023.100368

A new player in mRNA polyadenylation

RNA-binding proteins directly bind to RNAs to regulate various biological processes, including RNA stability, localization and translation. One such protein, ZC3H11A, belongs to the transcription–export complex that binds capped, polyadenylated and N6-methyladenosine–modified messenger RNA molecules and mediates their nuclear export. ZC3H11A is also vital for the replication of some viruses, such as adenoviruses, and can modulate inflammatory nuclear factor kappa light chain of activated B cells, or NF- κ B, signaling in addition to its role in nuclear export. However, researchers have not yet detailed the biochemical features of ZC3H11A that mediate these functions.

In a recent paper in the **Journal of Biological Chemistry**, Katharina Kases, Erik Schubert and colleagues at Uppsala University in Sweden used mass spectrometry–based proteomics, co-immunoprecipitation and immunofluorescence to characterize the ZC3H11A interactome. They found that ZC3H11A binds to the nuclear poly(A)-binding protein PABPN1, mostly via its most N-terminal zinc finger motif, suggesting that ZC3H11A could play an additional role in mRNA 3'-end processing.

Small interfering RNA inhibition of ZC3H11A revealed that this protein is recruited to PABPN1-bound mRNA species and functions at the polyadenylation step to fine-tune the length of the mRNA poly(A) tail. Finally, the authors showed that while multiple monopartite and bipartite nuclear localization sequences maintain ZC3H11A in the nucleus, PABPN1 interaction was necessary for its localization to nuclear speckles, which are thought to regulate gene expression and RNA processing.

Taken together, these findings identify ZC3H11A as a novel regulator of polyadenylation of nuclear mRNA, which enhances our understanding of gene expression in both animals and viruses.

DOI: 10.1016/j.jbc.2023.104959

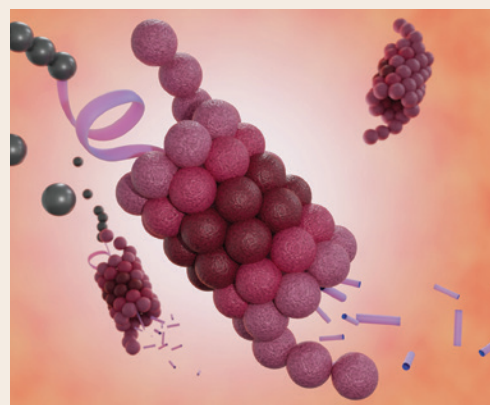
Reducing background in protein identification

When a cell is exposed to stimuli or stress, the pattern of messenger RNA expression and protein synthesis changes. Newly synthesized, or nascent, proteins can provide important information on what biochemical processes are occurring when the cell responds. Profiling these proteins in the presence of preexisting cellular proteins requires specific labeling and purification protocols. Nancy J. Phillips and the team from the University of California, San Francisco, optimized a method for nascent protein detection by incorporating a cleavable linker molecule, as described in a recent paper in the journal **Molecular & Cellular Proteomics**.

To selectively label nascent proteins, the researchers introduced

Creating the ideal PROTAC

Proteolysis-targeting chimeras, or PROTACs, are drug molecules that consist of an E3 ubiquitin ligase-recruiting moiety and a target protein-binding moiety connected by a linker. These molecules work by binding a target protein and triggering ubiquitylation and subsequent degradation of that protein via the ubiquitin–proteasome system. Targeting molecules have been extensively developed, but the degradation moieties responsible for recruiting E3 ubiquitin ligases primarily target only two ligases, von Hippel-Lindau and cereblon, which limits the effectiveness of the PROTAC to specific cell and tissue types.



Ubiquitin (green)-conjugated proteins (purple) are degraded by the proteasome (red).

Jianchao

Zhang, Caibing Ma and colleagues at the Southern University of Science and Technology and the Shenzhen Institute of Advanced Technology in China describe in a recent article in the **Journal of Biological Chemistry** a modified PROTAC that takes advantage of the N-end rule degradation pathway, which ties a protein's stability to the identity of its N-terminal amino acid. They show that the addition of a single basic or hydrophobic amino acid attached via a linker to BCR-ABL ligand dasatinib was able to recruit E3 ubiquitin ligases of the UBR1 family. They also demonstrated the arginine–linker–dasatinib PROTAC had antitumor effects in a mouse that was surgically implanted with chronic myeloid leukemia cells.

These findings show that the addition of a single amino acid can effectively induce target protein degradation, which may improve drug efficiency and alleviate the development of drug resistance. They may also have implications for future PROTAC therapies that could even maintain protein concentrations within a given range by recruiting various tiers of E3 ubiquitin ligases.

DOI: 10.1016/j.jbc.2023.104994

— Ken Farabaugh

the antibiotic analog O-propargyl-puromycin, or OPP, to the cell. It entered the A-site of the ribosome and was incorporated randomly at the C terminus of the polypeptide chain. This resulted in truncated, OPP-labeled nascent proteins.

The researchers then used click chemistry to attach a biotin molecule with a cleavable linker. This biotin molecule could be captured on streptavidin beads. The beads could then be washed and the nascent proteins selectively released by chemical cleavage, leaving behind nonspecific binders. Purified

proteins were then characterized by liquid chromatography–mass spectrometry. This method greatly reduced background protein levels and enabled analysis of nascent proteins at low concentrations.

DOI: 10.1016/j.mcpro.2023.100497

A tale of two proteins in cardiovascular disease

Serum amyloid A, or SAA, protein is a marker of inflammation linked to cardiovascular disease, or CVD, such as atherosclerosis in humans. In mice, SAA promotes

development of atherosclerosis. One study has shown that SAA is elevated in obese mice that are genetically altered to be deficient in apolipoprotein E, or ApoE, an enzyme critical to lipid metabolism and cholesterol circulation.

SAA is carried by high-density lipoprotein, or HDL, in the blood. Researchers have reported that binding of cholesteryl ester transfer protein, or CETP, to HDL results in lipid-free SAA and leads to the transfer of SAA from HDL to other cholesterols. However, no one has yet shown whether SAA contributes

Stress-related differences in protein sugars

Protein glycosylation is the enzymatic addition of sugars, or glycans, to a target protein after translation that influences how the protein folds and functions. The extent of protein glycosylation can change in an organism during different developmental stages. Iain Wilson from the University of Natural Resources and Life Sciences in Vienna, Austria, and an international team of researchers discovered that the way the nematode *Caenorhabditis elegans* is cultivated also influences the level of glycosylation in its cells. In a recent paper in the journal **Molecular & Cellular Proteomics**, the researchers described their findings on the range of N-glycans, linked to the asparagine amino acids of proteins, in *C. elegans* from embryo to larva.

C. elegans contains only about 1,000 body cells and has a complex glycosylation profile, or glycome, including over 200 different N-glycan structures. Previous studies have investigated the level of RNA transcripts of glycosylation enzymes. While the set of glycan structures found in *C. elegans* does not correlate with the number of enzyme transcripts, researchers have found evidence that glycosylation-relevant genes are expressed in a coordinated way.

To profile glycomes, Wilson's team cut the glycans from collected proteins using enzymes called peptide-N-glycosidases, or PNGases. The researchers discovered no difference in the embryonal glycome of wild-type *C. elegans* and two mutants with



HENRI PAINES

C. elegans is a 1 mm-long nematode that reproduces sexually. Fertilized zygotes develop into embryos and then enter four stages of larval growth before adulthood.

developmental defects. However, they found a clear difference in the glycome between liquid- and plate-grown worms in the fourth larval stage, known as L4. Liquid-grown L4 larvae have about three times more structures with a galactose sugar in an alpha position linked to mannose, and/or methylation of other sugar units, than plate-grown larvae. The researchers hypothesize that this shift is stress related, having to do with the different conditions under which the *C. elegans* is grown; being shaken in liquid is unlike their natural soil habitat!

DOI: 10.1016/j.mcpro.2023.100505

—Inayah Entzminger

to the pathologic effect of CETP in mice. Ailing Ji at the University of Kentucky and a group of researchers published their study on this question in the **Journal of Lipid Research**.

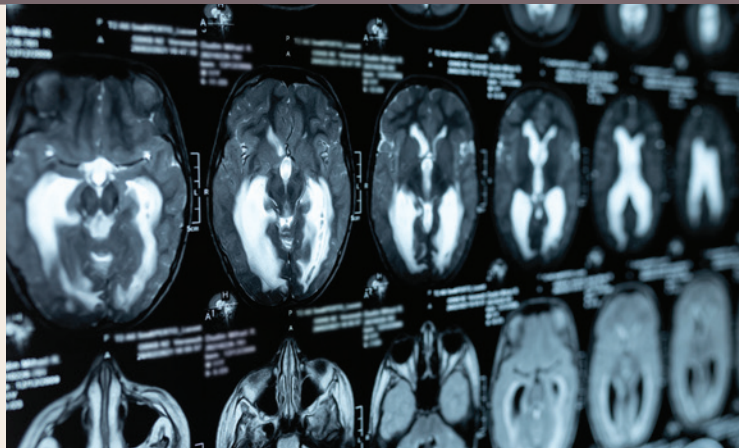
To investigate whether SAA contributes to the pro-atherogenic effect of CETP, the group generated what they called “only apoE lacking mice” as well as apoE-lacking mice deficient in SAA with and without expressing CETP. They found that the effect of CETP was SAA dependent; remodeling of normal HDL lacking SAA did not stimulate CETP-dependent inflammation. However, the pathologic effect of SAA was increased by CETP expression. The scientists state that CETP inhibition may have therapeutic benefits in patients with high SAA levels.

DOI: 10.1016/j.jlr.2023.100365

Improved inhibitors of hGH signaling

Human growth hormone, or hGH, is a secreted protein that regulates organ growth during development and is still expressed to a lesser degree through adulthood. Suppression of hGH binding to its receptor can protect against multiple diseases such as cancer and diabetes; however, the Food and Drug Administration has approved only one antagonist of the hGH receptor and no antagonists of hGH binding to the prolactin receptor, or PRLR, highlighting a need for additional therapeutic options.

A new generation of antagonists was designed recently to inhibit hGH binding to both the hGH receptor and PRLR. These antagonists, consisting of compounds G, G', and D, are PEGylated, or bound to polyethylene glycol, to increase their half-life in the blood, but researchers have not yet characterized the location and size of the PEG conjugation



LARI BAI

Can DHA curb Alzheimer's memory loss?

A major consequence of Alzheimer's disease is memory loss. The area of the brain called the entorhinal cortex, or EC, is a hub for memory, navigation and time perception. In Alzheimer's, decreased EC thickness correlates with memory impairment. In the past, researchers have noticed that docosahexaenoic acid, or DHA, supplements can increase thickness and repair these cognitive abilities in humans. A high DHA level correlates with low levels of brain inflammation.

Carrying an apolipoprotein ε allele 4, or APOE4, gene is also a marker for Alzheimer's. This gene produces the ApoE4 enzyme, which impairs metabolism of polyunsaturated fatty acids such as DHA. Researchers have reported that increased ApoE4 activity results in decreased DHA in plasma and cerebrospinal fluid, or CSF. They have hypothesized that DHA circulation is provided by lipid species such as phosphatidylcholines, cholesteryl esters and triglycerides, or TGs, and that ApoE4 affects metabolism of these lipids and circulation of DHA.

Researchers still did not know which lipid species is important for DHA and which is affected by ApoE4, however. Mikaila Ann Bantugan, Haotian Xian and Victoria Solomon of the University of Southern California and a research team investigated this question and published their study in the **Journal of Lipid Research**.

The transport of DHA on plasma TGs is significant in Alzheimer's. The team observed that APOE4 had the strongest effects on the DHA containing TG lipids and that increased DHA within TGs was suppressed in APOE4 carriers compared to noncarriers in CSF and plasma. Also, supplementing with algal TG-based DHA for six months increased EC thickness in human study participants independent of ApoE4 presence.

This study used a small sample and did not consider body mass index and sex. However, their findings indicate that DHA supplements may be an alternative treatment for memory loss in Alzheimer's and provide another approach to understanding the role of ApoE4 in the disease.

DOI: 10.1016/j.jlr.2023.100354

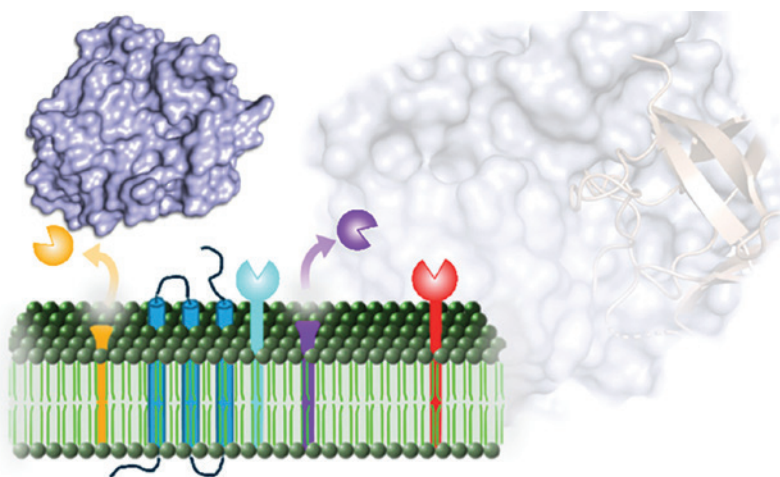
— Meric Ozturk

Serine proteases

Nov. 2–3 | VIRTUAL

The 2023 virtual meeting on serine proteases in pericellular proteolysis and signaling continues the tradition of the ASBMB special symposium on membrane-anchored serine proteases with the expanded focus on other related serine proteases that function in the pericellular environment.

Oct. 31: Regular registration deadline



asbmb.org/meetings-events/serine-proteases-2023



which have variable effects on inhibitor efficacy.

In their new study published in the **Journal of Biological Chemistry**, Reetobrata Basu, Rich Brody, Uday Sandbhor and colleagues at the Edison Biotechnology Institute, Infinix Bio LLC and Ohio University describe the synthesis and purification of these compounds, as well as their affinities for disrupting both the hGH-to-receptor and hGH-to-PRLR interactions, using matrix-assisted laser desorption/ionization with time-of-flight mass spectrometry, size exclusion chromatography and thermostability assays. Furthermore, they show that treatment with compounds D and G improved the therapeutic efficacy of doxorubicin treatment in cancer cells, while compound G' reduced levels of circulating insulin-like growth factor 1 in mice.

These dual antagonists of hGH signaling activity may have the potential for clinical applications after further development. They represent a promising strategy for treating growth hormone-associated pathologies.

DOI: 10.1016/j.jbc.2023.105030

Inayah Entzminger

(ientzminger@gradcenter.cuny.edu) is a doctoral student at the City University of New York Graduate Center, researching the positive RNA strand barley yellow dwarf virus.



Ken Farabaugh (kfarabaugh@asbmb.org) is the ASBMB's science editor.



Meric Ozturk (ozturk@iastate.edu) is a first-year Ph.D. student in biochemistry at Iowa State University.



A pandemic pivot in teaching

COVID-19 accelerated innovation in science classrooms,
and much of it may be here to stay

By Paula Amann

In early 2021, Mara Livezey launched a virtual course, Chemistry in Society: How Drugs Work. Forced by the COVID-19 pandemic to move her teaching online, Livezey, an assistant professor of chemistry and biochemistry at the University of Detroit Mercy, hung this class for nonmajors on a practical peg.

Her undergraduate students, she believed, could relate to the topic of drugs, licit or not. “Drugs are the easy ‘in’ for students when they’re thinking about the impact of science on society,” Livezey said.

With that as a starting point, the class would go on to explore topics from the basic biochemistry of drugs to pharmaceutical development and the action of drugs on the brain, the body and disease.

Livezey detailed these efforts — and their impact — in a 2021 study in the *Journal of Chemical Education*. She had already been revamping her chemistry classes before the pandemic to better serve her diverse students. COVID catalyzed her fresh approach.

Team-based learning was a hallmark of Livezey’s new chemistry course. Small groups of students met regularly to grapple with drug case studies, which included such elements as data on marijuana use and policing, trends in Adderall abuse on college campuses, and comparative costs of name-brand and generic drugs. They used such techniques as process-oriented, guided-inquiry learning, which makes groups of three to four students the focal points of the science classroom, exploring guided activities with support from the teacher.

Livezey also turned to the jigsaw method, by which the small groups become experts on a topic in the curriculum. Each student group has a day in class to present their piece of the knowledge puzzle. These techniques helped students perform better academically, as they found science more understandable and relevant to everyday life, Livezey reported. She has since adapted elements of the Chemistry in Society approach into her biochemistry classes for majors. She presented her new course design at Discover BMB, the 2023 meeting of the American Society for Biochemistry and Molecular Biology.

Beyond course innovations, the COVID-19 crisis also drove a fresh set of academic supports to fit a new educational context. Aubrey Smith teaches



COURTESY OF MARA LIVEZEY

Mara Livezey, an assistant professor of chemistry and biochemistry at the University of Detroit Mercy, developed a virtual chemistry course for nonmajors during the COVID pandemic, which led her to innovate in her other courses.



COURTESY OF AUBREY SMITH

Aubrey Smith, biology professor at Montgomery College in Rockville, Maryland, center, checks in with students Kyra McDonald, left, and Diana Urtecho Alvarado, right, as they complete an in-class exercise in May 2023.

biology at Montgomery College, a two-year institution in Rockville, Maryland, some of whose students move on to the University of Maryland–College Park and other state universities.

During the pandemic, Smith and his colleagues used academic coaches to provide support in most biology courses. Students who had successfully finished science, technology, engineering and mathematics courses became learning assistants. They earned a stipend for holding study sessions, assisting other students with labs and teaching study skills.

More broadly, the public health emergency gave educators a new look at the daily challenges faced by some of their students. It was taxing to teach remotely, Smith noted, when so many students declined to turn on their cameras. Yet, as the pandemic unfolded, he came to appreciate some of the reasons why.

One biology student joined an online class from her workplace. “She was not scheduled to work that day but needed the money,” Smith wrote in an email.

“Another student of mine logged into class from her hospital bed one day after giving birth!” Smith wrote. “Teaching on Zoom gave another perspective on student resilience and determination.”

Reporting new practices

Across the field, the COVID pandemic accelerated educational innovation, as reflected in recent studies in the journal *Biochemistry and Molecular Biology Education*, or *BAMBE*d, edited by Phillip Ortiz.

“I think most modern faculty members recognize that instead of being the sage on the stage, we need to be the guide on the side,” Ortiz said. “We’re guiding student learning but are not necessarily the only source of intelligence in the room.”

Concerns about equity may have pushed some earlier innovations, as with Livezey and Smith. Yet, the public health crisis intensified efforts to revamp the teaching of science. The pandemic made plain that virtual learning would require qualitative — as well as technical — updates in science instruction.



PHILLIP ORTIZ

Kristen Procko, associate professor of instruction at the University of Texas at Austin, was the lead author of “Moving biochemistry and molecular biology courses online in times of disruption: Recommended practices and resources — a collaboration with the faculty community and ASBMB.” This editorial appeared in *BAMBE*d and the *International Union of Biochemistry and Molecular Biology Journal* early in the pandemic, in April 2020. Procko also was on a team of science educators who readied

Changing pedagogy for changing students

As the COVID pandemic drove learning online at institutions of higher learning worldwide, some U.S. professors sought to reflect the new face of undergraduates, more diverse than ever.

Demographic changes (see chart) have led some to rethink the way they teach undergraduate science. Take Sara Brownell of Arizona State University, who received a Faculty Teaching Achievement Award this year.

Brownell recalls the 2012 workshop that upended her science instruction. Kimberly Tanner, a professor and biology education researcher at San Francisco State University, took educators through a mobile-making exercise.

Brownell's team made an artful mobile with strings and labels. Other projects lacked crucial pieces. The Stanford-trained biologist felt smug until she realized her group's success stemmed from a deliberate disparity in mobile parts.

"Different people had different resources," she said. "This one moment made me realize how privileged I am in many ways and how that affected my lens on the world."

Brownell refocused her teaching and research. "After that, all I cared about was equity, diversity and inclusion," she said. "My goal is to change who gets to grow up and be a scientist."

She ditched her 50-minute biology lectures for five-minute mini-lectures, punctuated with small-group work on course-related questions.

"A good outcome of active learning is that it builds friendships that can lead to study partnerships and community," Brownell said.

Early in each course, her students take an anonymous survey on gender, race, ethnicity, career goals and mental health.

"The next week, I show them the histograms," Brownell said. The class graph, she believes, counters the isolation some undergraduates feel. "If you thought you were the only one, that's not true."

Brownell tailors instruction to the class

surveys. If students are struggling with mental health, she might describe how the human body processes antidepressants.

Brownell also shares a bit about herself, including her LGBTQ+ identity and her struggles with depression. Her students appreciate this.

"If you only discuss the topics in the class, it's hard for the students to connect with their professor," said Ren Dixon, a biomedical science major at ASU. "Having that bravery and sharing her own personal story really helped the students relate to her."

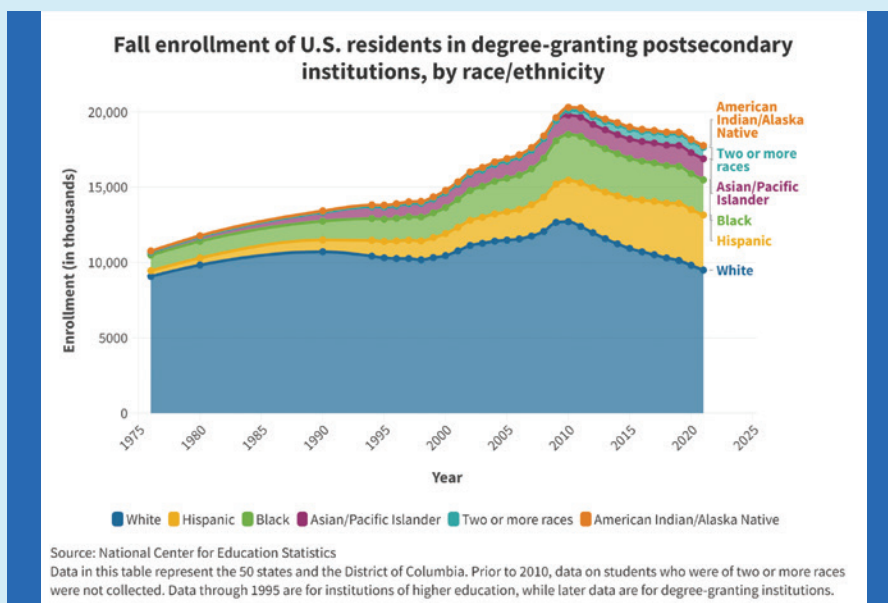
At the Research for Inclusive STEM Education Center, led by Brownell, Dixon is studying how multiracial students like him perform in biology. Supportive faculty can mitigate their challenges, he believes.

"We may or may not remember a topic learned in class 20 years later," Dixon said, "but we'll remember the impact someone has made in building us as people."

Bryan Dewsbury, an associate professor of biology at Florida International University, is co-author of the "Norton Guide to Equity-Minded Teaching" and the principal investigator of FIU's Science Education and Society research program. He urges educators to consider both science content and student experiences.

"If we want to move the needle on equity-minded issues, we have to change what we consider teaching," Dewsbury said. "It's about an appreciation of the students in front of you and being a facilitator of their hopes and dreams."

— Paula Amann





Daniel Dries, associate professor of chemistry at Juniata College in Pennsylvania, engages in the classroom with students in 2018, before the pandemic.

resources for American Society for Biochemistry and Molecular Biology colleagues teaching through the pandemic.

From the start, Procko and her colleagues believed techniques tailored to the pandemic would endure beyond the initial crisis and enhance student experiences over the long term.

“We anticipate that, when the community returns to the classroom, they will be enticed to adopt lessons learned from remote teaching to reinvent their face-to-face teaching into more blended learning environments,” Procko wrote in the editorial.

Beyond grappling with COVID constraints, she wrote, “a secondary goal of this article is to expand the teaching toolkit of BMB educators to invigorate their teaching and actively engage students in their learning.”

For his part, Ortiz realized that virtual instruction would involve more than simply shifting the traditional biology or chemistry lecture online. Delivering education when teachers and students were apart meant redesigning the building blocks of a college science course.

“When I started teaching online

after many years in a traditional classroom, I discovered that creating coursework for an online setting is not a transcriptional process, in which only the medium by which the content delivery differed, but a translational one in which I needed to use an entirely different set of tools,” Ortiz wrote in an April 2020 BAMBED editorial.

Ortiz advocates replacing lectures with a varied set of readings, audio or video mini-lectures, open access resources and, crucially, “frequent assessments with rapid feedback.”

Daniel Dries, associate professor of chemistry at Juniata College in central Pennsylvania, thinks such innovations can do more than deliver science content to undergraduates in a crisis. COVID-friendly teaching tools have the potential to boost STEM learning for all students.

Take active learning, an educational approach in which teachers encourage students to play a major role in the classroom through planned small-group discussions, activities or presentations.

“There’s a wealth of literature that shows that active learning narrows achievement gaps,” said Dries, who studies science education.

Dries pointed to a March 2020 study in Proceedings of the National Academies of Sciences of the United States of America, which makes the case for student-centered teaching. The authors of “Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math” sifted through test scores from 9,238 students and failure rate data from 44,606 others.

On average, active learning reduced achievement gaps in exam scores by 33% and shrunk gaps in passing rates by 45%. The percentage of time students spent on in-class

activities also mattered: Only classes that introduced high-intensity active learning reduced achievement gaps.

What's more, given an engaging course design, students would learn STEM content both online and in person, as teachers across continents would show.

Transforming science education worldwide

The tidal wave of instructional change was global. Recent studies in BAMBEd and other indicators reflect the rethinking of science teaching during the pandemic from Europe to the Middle East and Asia.

Dries gave the keynote speech at a virtual symposium in July 2020, hosted by the College of Biochemists of Sri Lanka. The IUBMB and the Federation of Asian and Oceanian Biochemists and Molecular Biologists co-sponsored the event.

In "The Push We Needed: How the Global Pandemic Forced Us to Reconsider How We Deliver a BMB Curriculum," Dries made his case for change.

"The argument was that we should have been doing a lot more in our classrooms and the pandemic freed us to shift how we can teach, assess learning and ... engage and motivate our students," Dries said.

A flipped classroom, for instance, reverses the traditional order of instruction. Instead of an in-class lecture followed by related homework, teachers deliver content via video or other online formats outside the classroom. Students then spend their class time engaged in related discussions, exercises, projects and other activities.

Keith Wheaton, an assistant professor in the biochemistry, microbiology and immunology department of the faculty of medicine at the University of Ottawa, "flipped"

his fourth-year undergraduate class, "Biology of Aging," in 2020–2021. Wheaton threw four formal lectures into a prerecorded format; then small groups of students led two workshops on molecular, cellular or evolutionary determinants of aging. Students, surveyed anonymously, reported a heavy workload but found it manageable, often looked forward to class and never mentioned Zoom fatigue, according to Wheaton's BAMBEd study last May.

Melissa Hills, an associate professor at MacEwan University in Edmonton, Canada, championed small-group learning for science during the pandemic in a BAMBEd article that appeared in January 2023.

"Team-based learning (TBL) is useful for in-person, hybrid, or online learning and is flexible enough to accommodate pivots between these modalities," Hills wrote. "TBL can foster classroom community and improve student satisfaction. This is especially valuable during a pandemic that has isolated students and impacted their mental health."

In Sokota, Nigeria, researchers chronicled their virtual bioinformatics course for biochemistry majors at Usmanu Danfodiyo University. "Active and collaborative learning was encouraged due to their positive effects on learning," Rabi'u Umar Aliyu and coauthors wrote in an April 2021 study in BAMBEd.

Despite spotty internet service and power supply, the model worked. The usual in-class lectures went online. Over 15 weeks, 15 students grappled with such tasks as analyzing a DNA sequence and pinpointing the bacteria it came from.

"Overall, the students were thrilled by the course," the authors wrote, despite technical problems with Zoom access. What's more, the academic results were so strong that the Sokota

“The argument was that we should have been doing a lot more in our classrooms and the pandemic freed us to shift how we can teach, assess learning and ... engage and motivate our students.”

DANIEL DRIES



Regina Stevens-Truss, a distinguished professor of chemistry at Kalamazoo College, fields questions after winning ASBMB's Award for Exemplary Contributions to Education in 2023, at Discover BMB, the society's annual meeting in Seattle.

teaching team plans to offer virtual bioinformatics more widely at their university.

A Turkish researcher, Filiz Avci, documented how instructors at Istanbul University turned to virtual lab simulations to teach about acids and bases. In the April 2022 issue of BAMBEd, Avci wrote that the hands-on, online activities helped future science teachers master basic biochemistry.

A class of 36 fourth-year undergraduates read an article on acids and bases and discussed it in small groups via Zoom. Then students studied video simulations, crafted apt hypotheses, tested their hypotheses using their own simulations and reported on their findings. Throughout the process, the teacher furnished help as needed through Google Classroom. At the end of the course, students reported they liked and learned from their virtual lab.

Personalizing the classroom

The COVID pandemic exposed the vulnerability of instructors and

students, as many struggled with illness — their own and family members' — as well as child care or jobs. In the process, teachers became more attuned to student needs that could impact academic performance.

"We realized we could not be our best selves in our classrooms at all times, and that extended to our students," Dries said. "Pre-pandemic, instructors were quick to criticize students as lazy, disinterested and unprepared, but I'd like to think after the pandemic, we understood that those were distractions, symptoms of other problems they carried into the classroom."

Roderico Acevedo, an assistant professor of chemistry at Westfield State University in Massachusetts, found COVID changed the way he saw the young faces in his Zoom room.

"We, student and teacher, were all affected by the pandemic," Acevedo said. "As teachers, we had to consider how and what our students could do and modulate our expectations."

As a former first-generation college student, he began to pay more attention to the out-of-class demands on his own students.

"In my student career, I don't recall my professors taking my limitations (or work schedule) into consideration when handing out assignments," Acevedo said. "The pandemic changed that."

At the University of Texas, Procko noticed as her faculty colleagues came to view student health problems as shared realities that required accommodation.

"Don't come to class if you're ill: That flexibility has endured," Procko said. "If a person isn't feeling well, we'll just Zoom them in."

COVID also seemed to shrink the emotional gulf between lecturing professors and quiet, note-taking students that already had been closing in some

science classrooms. Professor Sara Brownell of Arizona State University, a neuroscientist turned educational researcher, observed that shift.

“I think the pandemic led to instructors being more accepting of mental health challenges for students and trying to be more accommodating to students,” Brownell said. “More instructors seem to be willing to talk about mental health and are considering the mental health of their students.”

As the COVID crisis built empathy, some faculty changed their style of advising. Regina Stevens–Truss, a distinguished professor of chemistry at Kalamazoo College in Michigan, suddenly had to find new ways to counsel her students.

“My authentic being walks into every class, every day, every year: I only know how to be me,” said Stevens–Truss, winner of the 2023 ASBMB Award for Exemplary Contributions to Education. “At the core of my work are community and relationships.”

The pandemic threw up barriers to both. As public health concerns rose, Kalamazoo faculty pushed their advis-

ing and office hours online. When the COVID threat subsided, the positive response from students led Stevens–Truss and some of her colleagues to retain the new approach.

“We noticed that students were more likely to attend,” she wrote in an email. “Many of us have added at least one virtual session to our classes now.”

Adapting to a virtual lab

In central Massachusetts, Acevedo and his colleagues had to update their models for laboratory coursework. They began by grappling with their own assumptions about college science.

“The pandemic made wet lab science impossible,” Acevedo said. “It made us rethink what was important about experimental science: the experimenter.”

Before COVID constraints, Acevedo and his colleagues put more of an emphasis on hands-on laboratory practice, such as using a pipette or setting up a gravity column. Faced with limits on in-person activities, the faculty turned to basic principles.

“The pandemic forced us to see things clearly: Science is about critical thinking. So we redesigned our general chemistry course to nurture critical thinking (why controls are necessary, how to set up an experiment, and what to do when things do not turn out).”

RODERICO ACEVEDO



COURTESY OF RODERICO ACEVEDO

Roderico Acevedo, assistant professor at Westfield State University in Massachusetts, talks with biology majors (now graduates), from left, Hibo Hussein and Emmanuela Frimpong, in a college laboratory in spring 2019.



Sara Brownell, professor of biology at Arizona State University, center, catches up with students Ren Dixon and Vincent Truong in early 2023.

“The pandemic forced us to see things clearly: Science is about critical thinking,” Acevedo said. “So we redesigned our general chemistry course to nurture critical thinking (why controls are necessary, how to set up an experiment, and what to do when things do not turn out).”

Back at Montgomery College in Maryland, Smith is still seeing inventive use of the prerecorded lectures that were fixtures of the early COVID period.

“Since many STEM faculty members recorded their Zoom lectures, those who wanted to use the flipped classroom model implemented it when we returned to campus,” Smith wrote in an email. “Students view the prerecorded lectures, and class time is used for problem-solving and discussions.”

Educators have also found creative ways to recycle the virtual lab modules prepared during the pandemic’s early days. “The lab tutorials that were prepared for remote instruction are now used as

pre-lab assignments,” Smith wrote.

Moving forward and back

After changes powered by the COVID pandemic, observers see shifts in the models of undergraduate science teaching.

“At my university, we’re moving back to the way things were: the traditional in-person classroom,” Procko said of her Austin campus.

Yet, as COVID fears subside, Procko and her colleagues are also melding old and new instruction in a way that reflects the lessons of the past several years.

“I’m going to a half-flipped model: traditional lecture one day and interactive problem-solving the next,” she said. Many of the professors she knows are now using some version of a flipped classroom, she noted.

Advocates for reforming college science do face some obstacles in changing the long-term patterns of undergraduate education. The makeup of the faculty at most institutions does not reflect the growing heterogeneity of the students.

“More recently, student demographics are becoming more diverse; however, faculty demographics have not followed suit at the same rate,” Stanley Lo wrote in an abstract for the 2023 ASBMB meeting.

Lo, a professor of cell and developmental biology at the University of California San Diego, studies science-based education; the junction of student identity, experience and learning; and faculty ideas on diversity, mentoring and teaching.

A key indicator of teaching style emerges in a teacher’s syllabus and first-day message to students. “How do you frame the work in the course: Is it a journey we’re all

on together or is it us versus them?” Lo asked.

Lo studies higher education history and points to its roots as training for white, male aristocrats. He attended a U.S. Ivy League university with many legacy students whose relatives had been alumni. It was an uneasy fit for Lo, an Asian American immigrant from Vancouver, Canada.

“Students who come from different communities and backgrounds may have different ways of living, learning, conflict resolution, making friends,” Lo said. “We’re still not quite there where the university ... belongs to all of us who come to higher education.”

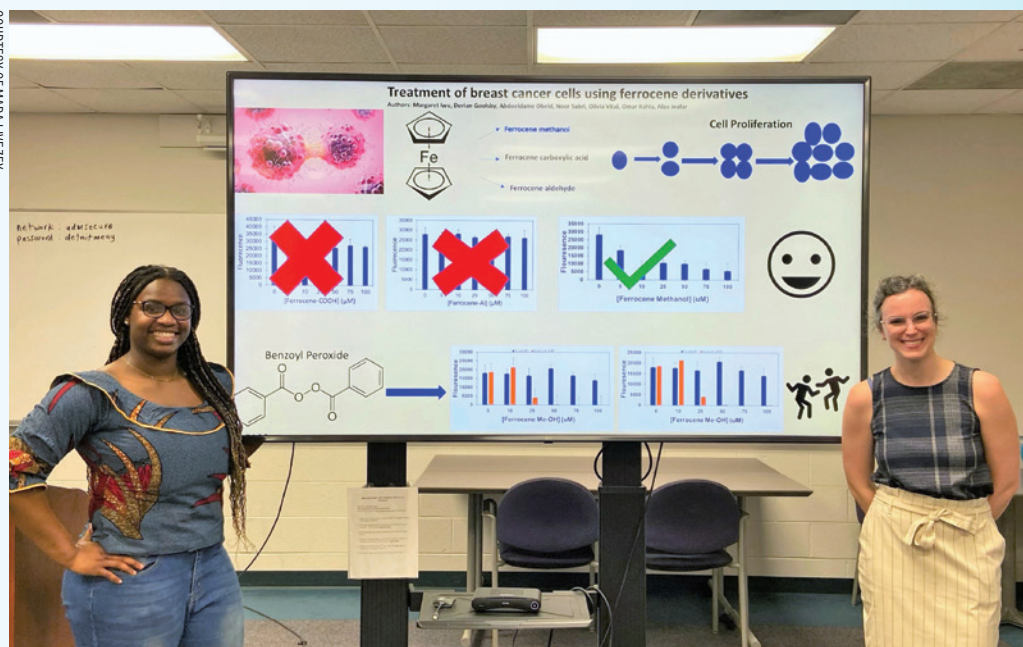
Vincent Truong, an ASU sophomore who wants to become a psychologist or psychiatrist, lauds Brownell’s use of small-group discussions.

“It challenges you to explain things to others, and I think that’s the best way to solidify knowledge,” Truong said. “It’s building a moment in time, and I think we remember moments better than concepts.”

Lo views student-centered learning within the framework of recent education theories. “Working in small groups to solve problems is aligned with constructivism and social constructivism, key theories on how people learn,” he wrote in an email. “The jigsaw model in particular is powerful because it fosters interdependence while also providing opportunities for students to engage with one another in relation to course content.”

In or out of a pandemic, much evidence points to the benefits of such engaging methods of education, noted Rou-Jia Sung, an assistant professor at Carleton College in Minnesota. “Active learning is a practice that lifts all boats,” Sung said. “There’s been a few decades of

COURTESY OF MARA LIVEZEY



Margaret Iwu, a recent graduate of University of Detroit Mercy, and Mara Livezey, assistant professor of chemistry and biochemistry, show off a hands-on class project in spring 2023.

data on student outcomes.”

Livezey believes that student-centered pedagogy can counter the common notion that chemistry and other sciences are “unreasonably difficult and only for the smartest students.” If some in academia still are skeptical about the value of her educational approach, she has another data-based argument that could outlast COVID classroom concerns.

“Do we want to be creating the best scientists who are doing the most creative, impactful work?” Livezey said. “If the answer to that is yes, we need to make sure that scientists of all identities feel welcome in our classrooms and welcome in our fields, because we already know that diversity leads to success.”

“Do we want to be creating the best scientists who are doing the most creative, impactful work? If the answer to that is yes, we need to make sure that scientists of all identities feel welcome in our classrooms and welcome in our fields, because we already know that diversity leads to success.”

MARA LIVEZEY

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





ASBMB FELLOWS

Nominate the 2024 ASBMB fellows

Selection as a fellow of the American Society of Biochemistry and Molecular Biology is an honor bestowed on members who have a history of sustained and substantial service to the society and a distinguished record of professional accomplishment in the fields of scientific research, diversity and inclusion, education, outreach, mentorship, leadership or public service.

The program encourages nominations that reflect the breadth and diversity of the society's membership. Nominees must be regular, industry, emeritus or affiliate members of the ASBMB.

Submit a nomination by Oct. 20.

asbmb.org/fellows

Meet Philip Cole

This JBC associate editor probes the posttranslational modifications of proteins

By Paula Amann

Philip Cole first encountered the Journal of Biological Chemistry in an airport. Then a Yale University undergraduate, he was flying to Maryland to visit Johns Hopkins University. The M.D./Ph.D. program director had promised to meet Cole at the airport with a telltale prop: “a JBC under his arm” — the latest issue of the journal.

Decades later, from 2016 to 2022, Cole would serve on the JBC editorial board. He joined the ranks of JBC associate editors in May 2022.

Cole earned a bachelor’s degree in science at Yale University, then a postgraduate certificate in chemistry as a Churchill Scholar at England’s University of Cambridge. He completed a medical degree and a doctorate in bioorganic chemistry at Johns Hopkins University School of Medicine. Cole did clinical and postdoctoral training at Harvard Medical School and Brigham and Women’s Hospital, then a stint at Rockefeller University as a junior lab head.

In 1999, Cole joined the Johns Hopkins faculty as a professor and director of pharmacology until 2017, when he returned to Boston. He has served for about six years as a professor of medicine, biological chemistry and molecular pharmacology at Harvard Medical School and has been interim chief of the Division of Genetics at Brigham and Women’s Hospital since early 2022.

Cole and his lab study the chemical biology of protein posttranslational modifications, or PTMs, with an eye to signaling, epigenetics and cancer. The team devises and uses such chemical methods as protein semisynthesis and small-molecule probes to explore protein phosphorylation, acetylation, ubiquitination and other PTMs in cell networks and enzymes.

In addition to his work for JBC, Cole has reviewed studies for 29 research journals, notably Science, Nature, Cell and the New England Journal of Medicine.

Cole spoke with Paula Amann, ASBMB Today’s science writer, about his research career and his history with JBC. The interview has been edited for clarity and length.

Q: How did your early research set you on your path in biochemistry?

My Ph.D. project concerned an enzyme called aromatase, which converts androgens to estrogens. At that time, there was a lot of enthusiasm for developing inhibitors of aromatase for the treatment of breast cancer.

I was trying to understand the chemical mechanism of aromatase, which involves a series of hydroxylations and then an aromatization step catalyzed by the cytochrome P450 enzyme. That

project was really influential in making me think about complex enzymatic transformations, how enzymes catalyze difficult reactions and how one could develop innovative approaches to study such complicated reactions.

I also immersed myself in steroid hormones and endocrinology and learned about their fascinating metabolic pathways, their various effects on tissues and the pharmacology related to steroid transformations and therapeutics. Learning about hormones laid the



Philip Cole is a professor at Harvard Medical School and interim chief of the Division of Genetics at Brigham and Women’s Hospital.

“ I didn't know what a JBC was, but I asked around. I was an undergraduate at Yale and I remember asking some people in my little circle there. We deduced that it was probably the Journal of Biological Chemistry.”

PHILIP COLE

foundation for my future training in endocrinology at Brigham and Women's Hospital.

Q: As a postdoc, you worked with Christopher T. Walsh. What drew you to his lab, and what did you take away?

I chose to work with Chris Walsh because he was one of the leaders of mechanistic enzymology at the time. He was also located at an institution, the Harvard Medical School, where I wanted to train both clinically and in research. When I met him, he was a larger-than-life figure. I remember spending several hours with him during my transition from my M.D./Ph.D. training to residency training, and he was extremely welcoming and encouraging.

I'd actually met him two or three years before when I was still a student at Hopkins and he was a visiting lecturer. He told us about this new department of biological chemistry and molecular pharmacology that he was founding at Harvard.

The Walsh lab was populated by an amazingly strong series of trainees, mostly postdoctoral fellows from all over the world, very accomplished people. They covered a lot of different areas of science, from hardcore chemistry to sophisticated biochemistry and genetics. It was an atmosphere filled with energy, ideas and collegiality. Chris really set the tone: encouraging people to interact with each other and to work together, to share problem-solving and learn from each other.

Chris just passed away in January, which has been a profoundly sad thing for myself and many, many of his trainees in the field.

Q: You've published papers in the JBC, starting early in your career.

What did that mean for you?

My impression of the Journal of Biological Chemistry was formed when I first heard of the journal as an undergraduate.

I was applying for M.D./Ph.D. training, and one of the institutions I was interested in was Johns Hopkins. The program director at Hopkins, who was on the JBC editorial board, said he would pick me up from the airport. This was quite a nice gesture, considering I was just an undergraduate and he was a senior faculty member at Johns Hopkins. He said I'd be able to spot him as I walked off the plane because he'd be the guy with a JBC under his arm.

I didn't know what a JBC was, but I asked around. I was an undergraduate at Yale. and I remember asking some people in my little circle there. We deduced that it was probably the Journal of Biological Chemistry. I saw that he had this big blue book under his arm. That's how we connected, and that was my first introduction to the JBC.

When I did ultimately join Johns Hopkins for training, I learned that the department I was working in, pharmacology, was founded by a towering figure in biomedical science named John Jacob Abel. Among many achievements, he was the founding editor, along with Christian Herder, of the JBC in the early 1900s.

The Journal of Biological Chemistry had a very important place in the history of Johns Hopkins and the pharmacology department and became a destination journal for the best science you can publish. I was fortunate to publish two papers in JBC, as a postdoc in Chris Walsh's lab, on tyrosine kinase mechanisms.

I was really proud of these two papers, one of them related to the kinetic mechanism of tyrosine kinases,



After a number of large pharmaceutical companies started working on kinase inhibitors, Philip Cole's lab pivoted to working on histone-modifying enzymes.

and the other on their chemical mechanism. These were papers that helped to shape my thinking about how these kinases could be studied and what the challenges were in thinking through their mechanisms. It really helped to lay the foundation for my future lab.

On the strength of those two JBC papers, I was able to get a faculty position at Rockefeller, so those papers were clearly pivotal for me.

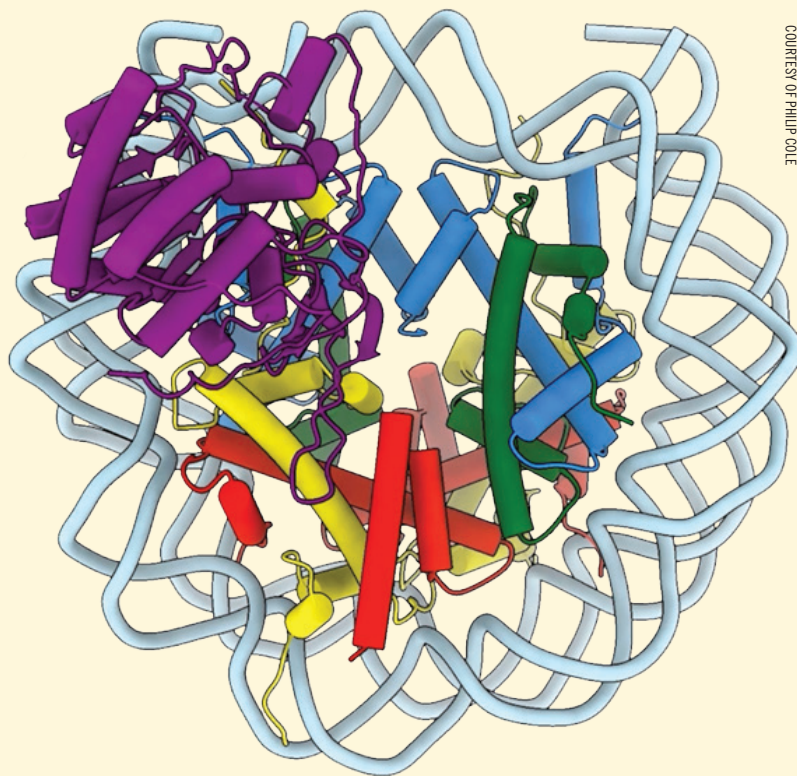
Q: Your group has designed kinase and other enzyme inhibitors. What's happening with those, and what are the potential applications?

Our lab has had a long-standing interest in developing inhibitors using mostly design approaches — as opposed to screening for the identification of enzyme inhibitors and targeting enzymes that are potential therapeutic targets. These

enzymes, including kinases, have over the last 20 years been clearly demonstrated to be important, pharmacologic targets in medicine.

Our work in the area of kinases has been less about leading directly to therapeutics and more about understanding the structure regulation and substrate selectivity of protein kinases. The kinase area quickly became populated by large pharma after we started working on our early-stage compounds. We felt that trying to develop our own kinase inhibitors in our small academic lab would be superseded by the amazing talent and resources brought to bear by many pharmaceutical companies.

We shifted over to histone-modifying enzymes. We've worked on two main classes of targets: the histone acetyltransferase area, and particularly a pair of enzymes called p300 and CBP, CREB-binding protein. These efforts ultimately led to high-quality small molecule inhibitors



COURTESY OF PHILIP COLE

Philip Cole's lab studies sirtuin 6, or Sirt6, a stress-responsive protein deacetylase and mono-ADP ribosyltransferase enzyme. Research suggests that Sirt6 has a role in mammalian biochemical pathways linked to DNA repair, glycolysis, inflammation and telomere maintenance. Here, Sirt6 is bound to a nucleosome in a model created by cryogenic electron microscopy.

and the founding of a small biotech company called Acylin Therapeutics Inc, which improved upon our initial work and led to candidate compounds for clinical development. The compounds and this technology were acquired by the major pharmaceutical company, AbbVie.

A second, recent area of work has concerned targeting histone deacetylase enzymes. In particular, we're making compounds that can target specific histone deacetylase complexes. One of our compounds, called corin, shows promise in a number of cancer applications.

Q: How did you come to join the JBC editorial board and then serve as an associate editor?

As far as becoming a member of the editorial board, I remember jumping at the chance. I had been an editor for other journals, but I had such a profound respect for the JBC that it was something that I

embraced.

The JBC has an excellent and deserved reputation for rigor and novelty. I consider it elite without being elitist, meaning that it's very high quality and among the best science that is published, but it doesn't have a certain quota of papers that it can publish. It allows for all sorts of very high-quality science to be published.

I think that's what we strive for. I also liked the fact that it's affiliated with the American Society for Biochemistry and Molecular Biology, and the society supports really important initiatives in science, communication and training—helping both academic and industry labs.

Q: Of all the projects underway in the Cole lab, what is most intriguing to you?

I'm very excited about the work we're doing on designer chromosomes to try to understand how modifications on the histones can influence the structure of the nucleosome, chromatin and its binding partners. These dynamic interactions and changes lead to increased exposure of DNA and increased gene expression, and govern things like cell proliferation, differentiation of cells and disease processes involving gene expression.

Chromatin is composed of building blocks called nucleosomes. Each has approximately 147 base pairs that have double-stranded DNA that wraps around eight proteins, an octamer of core histone proteins. The nucleosome becomes the architecture around which our chromatin is based.

Designer nucleosomes involve modifying histones so that they include specific posttranslational

modifications and using a range of techniques to introduce modifications in the nucleosomes. These modifications include lysine acetylation, lysine methylation, lysine ubiquitination, serine phosphorylation and arginine methylation.

We have been developing strategies to prepare chromosomes with specific modifications. We're trying to determine whether there's cross talk between chemical modifications on nucleosomes, the building blocks of chromosomes. It's a very vibrant area of research: figuring out if one modification on a nucleosome can affect what's going on with another. We believe that the designer nucleosomes that we make can be employed to help us understand how to best target epigenetic enzymes to treat cancer and other diseases.

Q: Research can be a long slog. How do you stay motivated when progress is elusive?

It takes stick-to-it-ive-ness and grace in the face of challenge. My siblings, my parents and my kids — one's a medical student and the other is pursuing show business — have modeled these qualities.

When my daughter was starting high school, she wanted to participate in a computer app competition with a group of girls, but this activity did not exist at our local school. She helped create a branch of a computer science club that received regional recognition and went on to be highly successful for years after she founded it.

Talking to and learning from many different kinds of people in and out of the lab can also help. For example, our research team had been trying to trap a nucleosome bound to an enzyme, Sirt6. This trapping can be really helpful to

obtain a high-resolution structure of the nucleosome-enzyme complex. Unfortunately, the strategy we thought would work was not panning out. Then my postdoc read other studies, especially a key one from a lab in China led by another former postdoc of mine, and figured out a new trapping approach that worked.

Q: Given your many interests, what's kept you engaged with our society?

The ASBMB has touched on many of the topics that I consider most near to my scientific heart: biochemical studies on enzymes, gene expression and molecular biology. Rigor and the emphasis on mechanism: That is embodied by the ASBMB.

The society meetings that I attend have always been highlights for me. Now, my trainees both attend and present there. I can network with all sorts of wonderful colleagues that I rarely get to see otherwise. These are really valuable experiences.

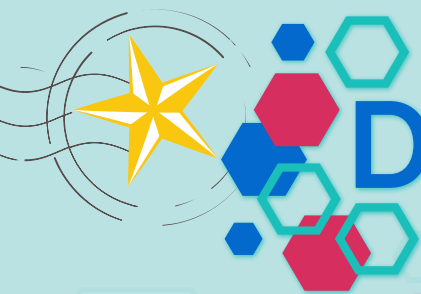
Being in the ASBMB has also been about professionalism. We're focusing on how scientists should treat each other, and how they should share the highest ethical standards in their work. In recent years, I've appreciated its focus on diversity, equity and inclusion—the need to recognize historical marginalization that's happened in the scientific community and efforts to remedy that through important initiatives.

“ The ASBMB has touched on many of the topics that I consider most near to my scientific heart: biochemical studies on enzymes, gene expression and molecular biology. Rigor and the emphasis on mechanism: That is embodied by the ASBMB.”

PHILIP COLE

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





SAN ANTONIO | MARCH 23–26

Discover **BMB** | 2024

American Society for Biochemistry and Molecular Biology

41 | ASBMB names 2024 award winners

45 | #DiscoverBMB spotlight talks to showcase members' findings

SYMPOSIA

47 | Building natural products

48 | Enzymes: Still cool after all these years

49 | Teaching and engaging Gen Z: Two sides of the same coin

50 | Lipids hold it all together

51 | Biochemists face the climate challenge

52 | Stressed out? The cancer playbook may help

53 | MCSs stick the landing

54 | Biochemistry of the multitudes

55 | The specialized metabolism and trafficking of cellular subcompartments

56 | Our coolest superpower: Seeing all the atoms

57 | Dancing with metals: Iron, copper and reactive sparks

58 | Processing and translating RNA in health and disease

59 | Out with the old, in with the nucleus

60 | Titles and abstracts: How to tell a clear and engaging story

ASBMB names 2024 award winners



Don't miss their lectures at #DiscoverBMB in March in San Antonio

The American Society for Biochemistry and Molecular Biology recently announced the winners of its annual awards. Colleagues and other leaders in the field nominated the winners 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 2024 annual meeting, Discover BMB, slated for March 23–26 in San Antonio.

In addition to cash prizes ranging from \$2,000 to \$35,000, each ASBMB award consists of a plaque and transportation expenses to the ASBMB annual meeting.



Avanti Award in Lipids

Recognizes outstanding research contributions in the area of lipids.

Tamás Balla is a senior investigator at the Eunice Kennedy Shriver National Institute of Child Health and Human Development. He leads the Section on Molecular Signal Transduction, which studies the spatial and temporal organization of cellular membrane lipid composition that serves as a platform for intracellular signals that mediate the actions of cell surface receptors.



Balla earned his medical degree from Semmelweis University School of Medicine in Hungary in 1979 and his Ph.D. from the Hungarian National Academy of Science in 1987. He completed postdoctoral training at the NICHD and was on the faculty of Semmelweis before joining the NIH.

He is an external member of the Hungarian Academy of Sciences and was on the 2022 Annual Meeting Program Planning Committee.

Balla has been an ASBMB member since 2001.

Bert & Natalie Vallee Award in Biomedical Science

Awarded to an established scientist for outstanding accomplishments in basic biomedical research.

Hao Wu is a professor at Harvard Medical School. Wu's lab uses cryo-electron microscopy and other biophysical methods to understand molecular complexes involved in innate immunity, including signalosomes and pore-forming complexes like



gasdermin D.

She is a fellow of the Biophysical Society and the American Association for the Advancement of Science, a Pew scholar, and a 2015 recipient of the NIH Pioneer Award. Wu studied medicine at Peking Union Medical College, earned her Ph.D. at Purdue University and was a postdoc at Columbia University. She started her faculty career at Weill Cornell Medical College before moving to Harvard Medical School.

Wu has been a member of the ASBMB since 2018.

Earl and Thressa Stadtman Distinguished Scientist Award

Awarded to a distinguished scientist for their outstanding achievement in basic research in the fields encompassed by the ASBMB.

Bruce Stillman is president and chief executive officer of Cold Spring Harbor Laboratory. Stillman's lab studies the process by which DNA is copied within cells before they divide. Working with yeast and human cells, his team has identified many cellular proteins that function at the DNA



replication fork during the S phase, the portion of the cell-division cycle when DNA synthesis occurs. Among these are proteins that facilitate the assembly of chromatin. Stillman and colleagues also determined the mechanism and control of the initiation of DNA replication in eukaryotic cells.

Stillman earned a Ph.D. from the John Curtin School of Medical Research at the Australian National University and then moved to Cold Spring Harbor Laboratory as a postdoctoral fellow in 1979. He was appointed director in 1994 and president in 2003.

He has been elected to the Royal Society, the U.S. National Academy of Sciences, the American Academy of Arts and Sciences and the Australian Academy of Science. He is a fellow of the American Association for Cancer Research.

Stillman has been a member of the ASBMB since 1991.

Herbert Tabor Research Award
Given for outstanding, innovative accomplishments in biological chemistry and molecular biology and contributions to the

community of scientists.

Margaret Phillips is chair of the biochemistry department at the University of Texas Southwestern Medical Center, where her research focuses on metabolism in protozoan parasites. Her lab studies essential enzymes controlling pyrimidine biosynthesis in the parasite that causes malaria and polyamine synthesis in the trypanosome that causes sleeping sickness. Her lab has used structural-guided drug design to optimize and develop pyrimidine synthesis inhibitors with the potential to become antimalarial drugs.



Phillips earned her Ph.D. from the University of California, San Francisco, where she was also a postdoctoral fellow.

She served on the Journal of Biological Chemistry editorial board for 10 years and chaired the selection committee for the ASBMB's Alice and C.C. Wang Award in Molecular Parasitology for 10 years. Phillips, a member of the National Academy of Sciences, was named an ASBMB fellow in 2022.

Phillips has been a member of the society since 1993.

ASBMB Mildred Cohn Young Investigator Award

Recognizes outstanding research contributions to biochemistry and molecular biology.

Nozomi Ando is an associate professor at Cornell University's chemistry and chemical biology department. Her lab works on new structural biology methods, such as diffuse scattering analysis of X-ray diffraction images of protein crystals to obtain information about movement within proteins.



The lab has found that there are two types of correlated motion in protein crystals: those within a single protein, and those that connect two or more individual protein units. The finding has implications for our understanding of how allostery works.

Ando, who presented her work at the ASBMB annual meeting in Philadelphia in 2022, also works to advance structural biology education and diversity in STEM.

Ando earned her Ph.D. at Cornell University and completed postdoctoral training at the Massachusetts Institute

of Technology. She won the American Crystallographic Association's Margaret C. Etter Early Career Award in 2020 and the Protein Society's Protein Science Young Investigator Award in 2022.

Ando has been a member of the ASBMB since 2021.

Ruth Kirschstein Diversity in Science Award

Honors an outstanding scientist who has shown a sustained commitment to breaking down local and/or systemic barriers against scientists and students from historically marginalized or excluded groups.

Shana Stoddard is an associate professor of chemistry, the founding director of the STEM Cohort Mentoring Program, and in 2021 was the inaugural director of student mentoring at Rhodes College. Stoddard's lab, which hosts about 10 undergraduates each year, does protein structure modeling and analysis, structural biology and drug design. Her team is developing novel therapies for autoimmune disorders such as primary membranous nephritis, an incurable, kidney-specific condition that can lead to end-stage renal disease. Additionally, she develops bio-tools to study protein structure–function relationships.



Stoddard holds a Ph.D. in chemistry from the University of Mississippi as well as a master's in education from Freed–Hardeman University. She did a postdoctoral stint at St. Jude Children's Research Hospital and joined Rhodes College in 2015 as a William Randolph Hearst Teaching fellow before taking an assistant professor position two years later.

Stoddard said the mentoring she received as an undergrad at Prairie View A&M University served as a launching point for her to realize that she had to have a career combining research, teaching and mentoring. At Rhodes, Stoddard founded and leads the STEM Cohort Mentoring Program, which boasts a 96% graduation rate; has led multiple initiatives dedicated to making the STEM training experience and workforce more diverse and inclusive; and organizes events for chemists of color. She also directs the ASBMB Student Chapter there. Stoddard said she believes that each opportunity she has to serve as a mentor is an opportunity to draw out a student's potential. It is her

goal to not only “change the fabric of STEM” through her research endeavors but also by “taking the doors off the hinges, creating gateways” so that system barriers don't prevent access for anyone to pursue a STEM career.

Stoddard has been a member of the ASBMB since 2016.

Walter A. Shaw Young Investigator Award in Lipid Research

Recognizes outstanding research contributions in the area of lipids by a young investigator.

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



Simcox earned her Ph.D. and completed a postdoctoral fellowship at the University of Utah, where she took several leadership and mentoring positions to promote diversity in STEM. She is credited, for example, with helping build the university's internship program for emerging Native American scientists.

She joined the faculty at Madison in 2019 and has continued outreach and service that has earned her national recognition. She was named a junior associate editor for the *Journal of Lipid Research* in 2021 and is a recipient of the HHMI Freeman Hrabowski Scholars Award.

Simcox has been a member of the ASBMB since 2020.

ASBMB William C. Rose Award for Exemplary Contributions to Education

Recognizes an individual who demonstrates an exceptional contribution to the teaching of biochemistry and molecular biology.

Peter J. Kennelly is a professor at the Virginia Polytechnic Institute and State University, where he also serves as interim head of the biochemistry department.



Kennelly earned his Ph.D. from Purdue University in 1985 and completed postdoctoral research at the University

of Washington School of Medicine with support from the Howard Hughes Medical Institute.

He started his faculty career in 1989 at Virginia Tech, where his research program focused on protein kinases and signaling in Archaea, about which he published seminal studies. He later transitioned to academic leadership, served as head of the biochemistry department for a decade, until 2016, and again took up the mantle on an interim basis in 2022. His first term as head also witnessed a deepening commitment to and interest in teaching and learning fueled to a large degree by interactions with ASBMB's growing community of scientist-educators.

He is a past chair of the ASBMB Education and Professional Development Committee and Membership Committee and has been pivotal to the success of the ASBMB accreditation program and certification exam. He served on the editorial board of the *Journal of Biological Chemistry*.

Kennelly has been a member of the ASBMB since 1986.

ASBMB Sustained Leadership Award
Recognizes individuals with a strong commitment to advancing the careers of women in biochemistry and molecular biology along with demonstrated excellence in research and/or service.

Adele J. Wolfson is a professor emerita of chemistry and natural and physical sciences at Wellesley College. Her lab studied proteases and peptidases with a focus on the enzyme thimet oligopeptidase, which terminates the signal of bioactive peptides. Her recent educational research focuses on concept inventories in biochemistry and on understanding how students connect learning in science and nonscience courses.

Wolfson earned her Ph.D. at Columbia University and did postdoctoral work at the University of Paris. During her many years at Wellesley, she advocated for women and other historically marginalized groups to diversify the STEM workforce. She held numerous leadership positions — she was both a dean and director several times over — and implemented programs for mentoring and other means of ensuring student success.



Wolfson served as co-chair of what was formerly the ASBMB Committee on Equal Opportunities for Women. She also led the ASBMB Programmatic Accreditation Committee, on which she still serves, and the Education and Professional Development Committee. She also organized the society's first women's mentoring session at the annual meeting.

She is a fellow of the American Association for the Advancement of Science. In 2021, she was named an ASBMB fellow.

Wolfson has been a member of the society since 1986.

Alice and C.C. Wang Award
in Molecular Parasitology
Recognizes established investigators who are making seminal contributions to the field of molecular parasitology.

David S. Roos is a professor of biology at the University of Pennsylvania. His laboratory studies the biochemistry, cell biology, molecular genetics, genomics and evolutionary biology of protozoan parasites and host-pathogen interactions, with special interest in *Toxoplasma*, a prominent opportunistic infection associated with immunodeficient states, and *Plasmodium*, which causes malaria. His group has also pioneered the development of integrated genomics database resources, including VEuPathDB.org (the Eukaryotic Pathogen, Vector and Host Informatics Resource), the ortholog database OrthoMCL.org and ClinEpiDB.org epidemiology resources, making large-scale datasets accessible to tens of thousands of investigators worldwide.



Roos earned his Ph.D. at The Rockefeller University in 1984 and completed postdoctoral training at Stanford University. His work has been recognized by a Presidential Young Investigator Award from the National Science Foundation, the Burroughs Wellcome Scholar Award, the Ellison Medical Foundation Senior Scholar Award in Global Infectious Diseases and a National Institute of Health MERIT award. His group's database resources have been recognized as a Global Core Biodata Resource, an Elixir affiliate, and by a Dataworks! prize from the Federation of American Societies for Experimental Biology.

#DiscoverBMB spotlight talks to showcase members' findings

Vahe Bandarian, chair of the ASBMB Meetings Committee, offers advice for making your abstract competitive and other tips

By Marissa Locke Rottinghaus

Discover BMB 2024, the American Society for Biochemistry and Molecular Biology's annual meeting in San Antonio in March, will feature 12 thematic symposia centering on the hottest scientific topics in the field and other matters of great concern to the BMB community. The symposia will feature invited speakers and will be complemented by spotlight talks by speakers — most of whom will be trainees and early-career investigators — who submitted abstracts to related categories.



VAHE BANDARIAN

(Read all about the 2024 thematic symposia on pages 47 to 59.)

ASBMB Today talked to Vahe Bandarian, a professor of biological chemistry at the University of Utah and chair of the ASBMB Meetings Committee, about the purpose of the spotlight talks, how organizers select the speakers, how to make your abstract stand out from the crowd and more.

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

How do spotlight talks work?

Spotlight talks began a few years ago, and we have continued hosting them to round out the program.

Historically, the ASBMB annual meeting has been focused on 10 to 12 major areas of biochemistry and molecular biology. We obviously can't cover all of the subtopics and focus areas as part of the main program.

The spotlight talks are a way to extend the program and add a bit of color by allowing more members to present. These talks are selected from submitted abstracts rather than from invitations. For the most part, these talks are given by postdocs, graduate students or junior faculty.

This year they will be closely associated with the themes of the symposia.

Who selects abstracts for spotlight sessions?

We get a ton of submitted abstracts, and it is a big job to evaluate all of them. Everyone has a role to play, including the meeting co-chairs, theme organizers and the Meetings Committee. There's a lot of programming to be planned so the theme organizers can't do it alone.

What makes an abstract competitive for a spotlight talk?

You have to tell people what is important and why it's important. The abstract must address an interesting problem, be novel and may tell a bit about where the project is headed. The authors need to try to engage the reviewers of the abstract. Good abstracts are general enough that anyone in BMB can understand them; jargon can make the science difficult to decipher.

Two tips for spotlight talk hopefuls

Spotlight talks give grad students, postdocs and early-career investigators a platform for communicating their research.

While in previous years these talks were scheduled in the afternoon, the 2024 meeting will feature them in the morning and afternoon during thematic symposia sessions. This elevates the spotlight talks and reduces scheduling conflicts so more people can attend them.

Below are two tips for abstract submitters who wish to compete for spotlight talk spots:

1. Pick your theme thoughtfully: Spotlight talks will be integrated into thematic symposia this year, and this will give presenters greater visibility. Naturally, the reviewers will be looking for abstracts related to those themes. When you submit your abstract, you'll be asked to indicate which theme you think embraces your work. If your work isn't a perfect match, that's OK. But do try to select the theme that comes closest.

2. Sell your work for all it's worth: Meeting attendees are expecting to learn about new findings and innovative approaches. Reviewers will be prioritizing fresh and exciting research. Make sure to convey in your abstract why what you're working on is both timely and relevant.

Any advice for first-time attendees?

Look at the program a few days beforehand to plan what parts you want to attend. There are so many sessions during the day so you're not going to be able to go to every talk. But we try to schedule the talks close enough together that you can hop around.

Meetings are expensive. How does the society make them financially accessible?

There are a number of awards available to undergraduates involved in the ASBMB Student Chapters, graduate students, postdocs and early-career faculty. Undergraduate faculty also can apply for support.

The Maximizing Access Committee has put together an award to help out historically marginalized graduate students who want to attend the meeting. Plus, we have an award for those with dependent-care obligations.

These awards are available for ASBMB members only, and the deadline to apply is Nov. 30, the on-time abstract submission deadline.

What do you enjoy most about #DiscoverBMB?

I go to the meeting every year. The science is great. I like going to the scientific sessions. But, for me, there are benefits of the meeting that go further than the science.

I enjoy a lot of the other activities I'm involved with at the meeting, such as the Maximizing Access Committee events and receptions where I get to meet folks such as the travel-award recipients, MOSAIC scholars and IMAGE grant-writing workshop participants.

I really like catching up with people I don't usually see. As chair of the Meetings Committee, I have a lot going on, and I almost never sit in any session for very long because I'm always nervous about what's going on everywhere else. I tend to walk around a lot from session to session, just making sure things are good and looking at what sessions are the most popular.

I look forward to many aspects of the meeting. I love the personal connections with colleagues and making new connections.

Travel award categories

The ASBMB offers several types of travel awards to make the meeting financially accessible. Applications for travel awards must be submitted at the time of abstract submission. Below are the award types:

- Dependent-Care Grant
- Early-Career Faculty Award
- Graduate Student Diversity, Equity and Inclusion Award
- Graduate Student or Postdoctoral Researcher Award
- Student Chapters Award
- Undergraduate Faculty Award

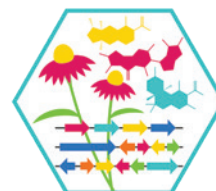
Marissa Locke Rottinghaus (mlocke@asbmb.org) is the science and policy communications specialist for the ASBMB.



ADVANCES IN NATURAL PRODUCTS BIOCHEMISTRY AND TECHNOLOGY

Building natural products

By *Yi Tang & Katherine Ryan*



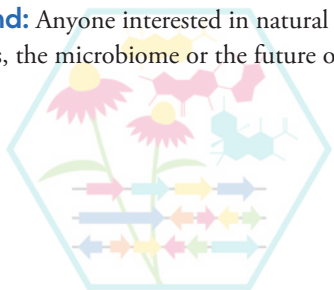
Natural products are molecules produced by living organisms and include some of our most powerful drugs. Emerging discoveries in this field have allowed scientists to deepen our understanding of how natural products are assembled and how they can be harnessed for widespread applications.

This program at Discover BMB 2024 is focused on recent advances in natural product biochemistry and biotechnology. The first session focuses on the emerging area of natural products from higher eukaryotes and animals; the second session focuses on natural products from microbiomes and symbionts; and the final session focuses on the biochemistry and biotechnology of natural product genome mining.

We'll hear about the amazing discoveries in this field, some of which were powered by major technological advances. We'll also hear how discoveries in natural products biochemistry are now in turn powering new applications in biotechnology related to biocatalysis, agriculture and sustainable chemical production.

Keywords: Natural products, biocatalysis, microbiome.

Who should attend: Anyone interested in natural products, biocatalysis, the microbiome or the future of biotechnology.



Yi Tang (yitang@g.ucla.edu) is a chancellor professor in the chemical and biomolecular engineering department at UCLA. Follow him on Twitter: @yitang_ucla.



Theme song: "White Rabbit" by Jefferson Airplane

This session is powered by alkaloids.

SPEAKERS

Natural products from higher eukaryotes and animals

Chair: Yi Tang

Bradley Moore, University of California, San Diego

Rebecca Butcher, University of Florida

Emily Derbyshire, Duke University

Jing-Ke Weng, Whitehead Institute for Biomedical Research

Natural products from microbiomes and symbionts

Chair: Katherine Ryan

Jason Crawford, Yale University

Nancy Keller, University of Wisconsin—Madison

Alessandra Eustaquio, University of Illinois Chicago

Mohammad Seyedsayamdost, Princeton University

Biochemistry and biotechnology of natural product genome mining

Chair: Alessandra Eustaquio

Jamie Link, Princeton University

Katherine Ryan, University of British Columbia

Gerald Wright, McMaster University

Yi Tang, University of California, Los Angeles

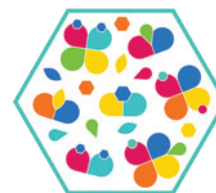
Katherine Ryan (ksryan@chem.ubc.ca) is a professor in the chemistry department at the University of British Columbia in Canada.



COOL AND NOVEL ENZYMES

Enzymes: Still cool after all these years

By *Shelley D. Copley & Hung-wen (Ben) Liu*



The first enzyme was discovered in 1833, almost 200 years ago and long before the nature of proteins was appreciated. The field of enzymology came into its own in the 20th century. Technological advances in the hands of creative enzymologists led to an ever-growing understanding of how enzymes achieve enormous rate accelerations as well as the structural basis for substrate specificity and allosteric regulation.

Enzymologists continue to break new ground as we enter the 21st century. Our session at Discover BMB will feature new work on enzyme functions, mechanisms and applications.

Our first group of speakers will focus on enzymes that deal with problems caused by misbehaving metabolites. They will describe how enzymes can protect unstable intermediates and repair damaged metabolites. Our second group will explore the potential of using enzymes for biodegradation and green biosynthesis of chemicals currently produced from petrochemicals. Our final group will focus on enzymes that catalyze novel reactions, pushing the boundaries of chemistry accessible through biocatalysts.

Keywords: Substrate channeling, metabolite repair, biodegradation, green chemistry, natural product biosynthesis, radical chemistry.

Who should attend: Anyone who appreciates the awesome power of enzyme catalysis.

Theme song: “Still Crazy After All These Years” by Paul Simon, because enzymes are crazy-efficient catalysts

This session is powered by the ribosome, which produces the enzymes that make life possible.

SPEAKERS

Enzymatic control of problematic intermediates

Chair: Hung-wen (Ben) Liu

Shelley D. Copley, University of Colorado Boulder

Tom Niehaus, University of Minnesota, Twin Cities

Shelley Minteer, University of Utah

Carole Linster, University of Luxembourg

Enzymes for a sustainable future

Chair: Shelley D. Copley

Gregg Beckham, National Renewable Energy Laboratory

Larry Wackett, University of Minnesota

Michelle Chang, University of California, Berkeley

Raquel Lieberman, Georgia Institute of Technology

New and unusual enzymatic transformations

Chair: Michelle Chang

Hung-wen (Ben) Liu, University of Texas at Austin

Aimin Liu, University of Texas at San Antonio

Sara O'Connor, Max Planck Institute for Chemical Ecology

Wenjun Zhang, University of California, Berkeley

Shelley Copley (shelley.copley@colorado.edu) is a professor in the molecular, cellular and developmental biology department and a fellow of the Cooperative Institute for Environmental Sciences at the University of Colorado Boulder.



Hung-wen (Ben) Liu (h.w.liu@mail.utexas.edu) is a professor in the College of Pharmacy and chemistry department of the University of Texas at Austin.



EDUCATION AND PROFESSIONAL DEVELOPMENT

Teaching and engaging Gen Z: Two sides of the same coin

By *Saumya Ramanathan*



I received a text message on January 1, 2020. The text said, “Happy New Year Dr. R, can’t wait to see you and take your Biochemistry class!”

Since then, no such message has come through. A lot has happened in the meantime. Our world has been changed by many things since that new year, not the least of which has been the COVID-19 pandemic.

Gen Z has been affected significantly by the pandemic. Gen Z is more racially and ethnically diverse than all the previous generations and is more likely to go to college, and their tech-savvy knows no bounds.

The American Society for Biochemistry and Molecular Biology’s Education and Professional Development Committee and Student Chapters Committee will present a symposium at Discover BMB with the overarching theme of “Teaching and Engaging Gen Z.” One session will focus on curriculum and assessment, with the lens turned on equitable and engaging practices. Another will look at the challenges and opportunities presented by the emergence of artificial intelligence in the classroom. The third will address challenges and best practices for running research programs primarily with undergraduate students.

Keywords: Artificial intelligence, assessment, education, inclusive teaching, research with undergraduates, time management, professional development, mentoring.



Who should attend: Faculty, postdoctoral trainees, undergraduate and graduate students, educators, and those interested in the ethics of AI.

Theme songs: “Titanium” by David Guetta/Sia and “Unstoppable” by Sia

This session is powered by Gen Z.

For information on speakers, go to discoverbmb.asbmb.org/program

Saumya Ramanathan (sramanathan@fisk.edu) is an assistant professor at Fisk University and chair of the ASBMB Education and Professional Development Committee.



Craig Streu (cstreu@albion.edu) is a professor of biochemistry at Albion College. He is a co-organizer of this session.



Nancy Rice (nrice@southalabama.edu) is a professor and chair of the biomedical sciences department at the University of South Alabama and a southeast director for ASBMB Student Chapters. She is a co-organizer of this session.



LIPID METABOLISM

Lipids hold it all together

By *Maria Fedorova & Neale Ridgway*

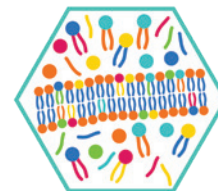
Arguably, life on this planet began in earnest with the appearance of lipid-like molecules that could encapsulate and concentrate the critical biochemical reactions that formed a primordial cell. This property of lipids to self-associate into the membranes that compartmentalize a cell and its organelles is indeed essential, but it's just one aspect of the many and varied roles played by these versatile molecules. In addition to structural roles, lipids are integrated into signaling pathways that control such activities as cell survival, differentiation, motility and immune responses.

The eclectic functions of lipids are due to their structural diversity built into a common framework, resulting in hundreds of distinct species. It is the metabolism of lipids, their biosynthesis and degradation, that ultimately creates this diversity.

Our symposium at Discover BMB will highlight recent advances in lipid metabolism by exploring where and how lipids are made in cells, their contributions to cell survival and the impact of lipid diversity on cell and membrane function.

Keywords: Ferroptosis, lipid droplets, lipidomics, mitochondria, nucleus, plasma membrane.

Who should attend: The session will be attractive to those wanting an initiation to the field of lipid metabolism as well as those with a focused interest in specific topics.



Theme song: “Fat Dance” by the Red Hot Chili Peppers, in appreciation of greasy molecules everywhere

The session is powered by the seemingly endless and unexpected biological functions of lipids.

SPEAKERS

Cellular topology of lipid metabolism

Neale Ridgway, Dalhousie University
Miriam Greenburg, Wayne State University
Greg Fairn, Dalhousie University
Shirin Bahmanyar, Yale University

Lipid quality control in cell survival and death

James Olzmann, University of California, Berkeley
G. Ekin Atilla-Gokcumen, University at Buffalo, the State University of New York
Toni Petan, Jozef Stefan Institute
Maria Fedorova, Technical University Dresden

Spatial lipidomics — tracing lipids in cells at the molecular level

Theodore Alexandrov, European Molecular Biology Laboratory
Kandice Levental, University of Virginia
Arun Radhakrishnan, University of Texas Southwestern Medical Center

Maria Fedorova (maria.fedorova@tu-dresden.de) is a group leader at the Center of Membrane Biochemistry and Lipid Research at Technical University Dresden. Follow her on Twitter: @FedorovaLab.



Neale Ridgway (nridgway@dal.ca) is a professor at Dalhousie University. Follow him on Twitter: @nealeridg.



MAXIMIZING ACCESS COMMITTEE: BIOCHEMISTRY MEETS CLIMATE CHANGE

Biochemists face the climate challenge



By *Karla Neugebauer & Kayunta Johnson–Winters*

Everyone knows coral bleaching occurs when seawater gets hot. Biochemists ask: How?

Corals die when their photosynthetic algal symbionts experience heat stress and exude hydrogen peroxide, causing coral tissue to expel the algae. Thus, coral bleaching is a biochemical process that we can understand and engage with, imagining new solutions to climate changes that degrade our planet.

The Centers for Disease Control and Prevention have long embraced “One Health,” the concept that a healthy planet is required for human health. Recently, the National Institutes of Health launched their Climate Change and Health Initiative. Biochemistry is central to preserving the natural world and developing fully renewable building materials, novel foods and health care solutions.

This session will explore how the living world experiences changes in temperature, pH, salt, nutrients, desiccation and other conditions. The speakers will illuminate the cell and molecular mechanisms underlying coral symbiosis, thermal adaptations of

marine organisms, temperature-dependent mutagenesis and transposition in the fungal pathogen *Cryptococcus neoformans* and the endocrine underpinnings of environmental influences on human health. This session is for the next generation of biochemists who will meet the climate challenge.

Keywords: One Health, thermal adaptation, symbiosis.

Who should attend: The next generation of biochemists who will save the planet.

Theme song: “Imagine” by John Lennon

This session is powered by the courage to face humanity’s greatest challenge.

SPEAKERS

Asiya Gusa, Duke University

James A. DeMayo, University of Colorado–Denver

Yixian Zheng, Carnegie Institution for Science

Teresa Horton, Northwestern University



Karla Neugebauer (karla.neugebauer@yale.edu) is a professor of molecular biophysics and biochemistry at Yale University.

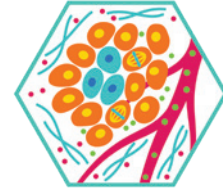


Kayunta Johnson–Winters (kayunta@uta.edu) is an associate professor of chemistry and biochemistry at the University of Texas, Arlington.



MAXIMIZING ACCESS COMMITTEE: STRESS ADAPTATIONS IN TUMOR PROGRESSION

Stressed out? The cancer playbook may help



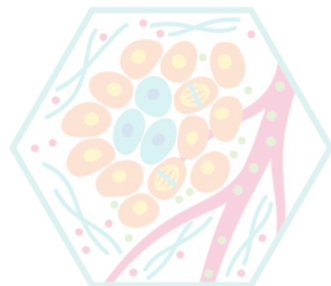
By Jonathan A. Kelber

We often associate the concept of stress with deadlines, emergencies, traffic or hardships. For those who study biological and biochemical processes of disease in cell and organismal models, the idea of stress adaptation is recognized as one mechanism by which malignant and nonmalignant cells survive and thrive within environments that, at times, are hostile.

Are there ways that we think about environmental stress adaptations at an organismal level that may help scientists develop new perspectives on combatting cancer to improve patient outcomes? Indeed, cancer cells may even engage in molecular decision-making activities that differentiate between fight-or-flight responses in the face of environmental stress.

This session will consider the mechanisms by which cancer cells adapt to intrinsic and extrinsic stressors and how defining these adaptative mechanisms may lead to improved treatment strategies. Topics will include nutrient access/use, aging, subcellular compartments, micro-environmental influences and tissue reprogramming.

Keywords: Cancer biology, molecular crosstalk, biochemical signaling, tissue homeostasis, aging, subcellular transport, local and global adaptations, tumor micro-environment.



Who should attend: Cancer researchers, cell biologists and biochemists interested in considering how aging, biochemistry and multi-scale adaptations cooperate to shape the stress landscapes of tumors.

Theme song: “Stressed Out” by A Tribe Called Quest

This session is powered by cortisol and catecholamines.

SPEAKERS

Jonathan Kelber (chair), Baylor University

Elda Grabocka, Thomas Jefferson University

Christina Towers, Salk Institute for Biological Studies

Mark LaBarge, Beckman Research Institute of City of Hope

Jonathan A. Kelber (jonathan_kelber@baylor.edu) is an associate professor of biology at Baylor University. Follow him on Twitter: @jakelber and @DevoOncoLab.



MEMBRANE CONTACT SITES

MCSs stick the landing

By Christopher Beh & Jen Liou



“The cell, too, has a geography, and its reactions occur in colloidal apparatus, of which the form, and the catalytic activity of its manifold surfaces, must efficiently contribute to the due guidance of chemical reactions.”

— Sir Frederick Gowland Hopkins (Nobel Prize in Physiology or Medicine, 1929)

Membrane contact sites, or MCSs, represent the ultimate intracellular duct tape — binding organelles together within eukaryotic cells to promote growth. Enabled by tethering proteins, MCSs are a coordinating nexus that fosters intermembrane exchange and signaling.

As conduits for lipid and small metabolite transfer between organelle membranes, MCSs are key regulators of metabolism. As structural elements linking intracellular membranes, MCSs control membrane organization and protect against membrane stresses. As platforms for important signaling receptors, MCSs initiate cellular responses to regulatory or environmental cues.

The recognition of MCSs as key regulators of cell growth is underscored by new discoveries of MCS function in cellular disease and infection.

Keywords: Membrane contact sites, membrane stress, mitochondrial regulation, nonvesicular transport, lipid transport, membrane structure, lipid metabolism, lipid regulation.

Who should attend: Molecular cell biologists and

membrane biochemists who marvel at how membrane dynamics regulates metabolic function and organelle organization.

Theme song: Dave Fenley cover of “Stuck on You” by Lionel Richie

This session is powered by the unsung heroes of membrane and lipid research.

SPEAKERS

Regulation of lipid transfer and metabolism at membrane contact sites

Hongyuan Yang, University of Texas Health Science Center at Houston

Jen Liou (chair), University of Texas Southwestern Medical Center

Alexandre Toulmay, University of Texas Southwestern Medical Center

Arash Bashirullah, University of Wisconsin–Madison

Membrane signaling at membrane contact sites

Thomas Simmen (chair), University of Alberta

Jay Tan, University of Pittsburgh

Alissa Weaver, Vanderbilt University

Chi-Lun Chang, St. Jude Children's Research Hospital

Specialized membrane contact site functions

Isabelle Derré, University of Virginia

Aaron Neiman, Stony Brook University

Christopher T. Beh (chair), Simon Fraser University

Christopher Beh (ctbeh@sfu.ca) is a professor of molecular genetics and cell biology at Simon Fraser University, Burnaby, Canada.

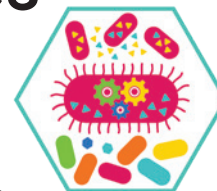


Jen Liou (jen.liou@utsouthwestern.edu) is a scholar in medical research at the University of Texas Southwestern Medical Center, Dallas, Texas.



Biochemistry of the multitudes

By Peter Chien & Jade Wang



Bacteria have thrived for eons in a wide range of environments, showcasing their remarkable evolutionary success. The survival of these ancient microbes requires a variety of molecular mechanisms, some shared with humans and others singular to bacteria. Bacteria in natural settings and host environments impact health, agriculture and environmental science. Significant advances have been made recently in understanding signaling pathways, metabolism, macromolecular biosynthesis processes and community behavior of these microbes.

Our symposium at Discover BMB aims to create a collaborative synergy between biologists studying various aspects of microbiology and those conducting mechanistic studies in the fields of molecular biology and biochemistry.

Our focus centers on three significant themes that have substantially advanced in mechanistic understanding in recent years. In the first, we explore how bacteria make, break and listen to small molecules that allow them to communicate and respond to each other and the environment. In the second, we investigate how macromolecular machines operate in bacteria, coordinating massively complex regulatory and responsive strategies. Finally, we highlight the vast web of interactions among bacteria, their viruses, the host cells they infect and their fellow bacteria, as we come to appreciate the communities of living systems that are present around us.

Keywords: Bacteria, signaling, nucleotide, regulation, interaction, community, macromolecular complexes,

structure, microbes, environment.

Who should attend: Those intrigued by the realm of microbes.

Theme song: "We're spending most of lives living in a microbe's paradise" (based on Coolio)

This session is powered by the overwhelming number of bacteria compared to us.

SPEAKERS

Signaling nucleotides in microbes

Vincent T. Lee, University of Maryland, College Park

Ming Chen Hammond, University of Utah

Emily E. Weinert, Pennsylvania State University

Jade Wang (chair), University of Wisconsin–Madison

Microbial machines

Peter Chien (chair), University of Massachusetts Amherst

Erin Goley, Johns Hopkins University

Monica Guo, University of Washington

Briana Burton, University of Wisconsin–Madison

Microbial communities

Erin Goley (chair)

Stavroula Hatzios, Yale University

John Whitney, McMaster University

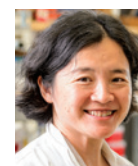
Christopher S. Hayes, University of California, Santa Barbara

Ami S. Bhatt, Stanford University

Peter Chien (pchien@umass.edu) is a professor of biochemistry and molecular biology in the College of Natural Sciences at the University of Massachusetts–Amherst.

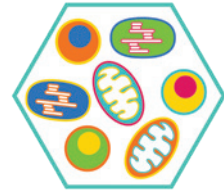


Jade Wang (wang@bact.wisc.edu) is a professor of bacteriology in the College of Agricultural and Life Sciences at the University of Wisconsin–Madison.



MITOCHONDRIA, PEROXISOMES AND CHLOROPLAST METABOLISM

The specialized metabolism and trafficking of cellular subcompartments



By *Greg Moorhead & Pere Puigserver*

Your first biology course probably defined eukaryotes in part as having a group of specialized organelles. These membrane-bound subcompartments of the eukaryotic cell are unique in many ways, especially their specialized biochemistry and metabolism.

The three sessions we have organized for Discover BMB will cover several topics focused on the novel biology and biochemistry of the mitochondria, peroxisome and chloroplast. These sessions will address current research on specific metabolic pathways, with important new insights into the protein structure and trafficking that support the integrity and function of these organelles.

These multidisciplinary talks will provide information not only on the specific biochemical functions of these organelles but also on their integrative architecture and physiology. In the three sessions, new information will be integrated into general principles of organelle biogenesis and metabolic function.

Keywords: Mitochondria, chloroplast, peroxisome, metabolism, covalent modifications, organelle biogenesis, protein structure and trafficking.

Who should attend: Anyone interested in metabolism, organellar proteomes and the specialized biology of organelles.

Greg Moorhead (moorhead@ucalgary.ca) is a professor at the University of Calgary, Canada.



Theme song: “The Cell” by Gojira, because it is such a high-energy song — mitochondria, chloroplasts ...

This session is powered by ATP.

SPEAKERS

Protein covalent modifications and chloroplast metabolism

Chair: Greg Moorhead

Greg Moorhead, University of Calgary

Glen Uhrig, University of Alberta

R. Paul Jarvis, University of Oxford

Paula Mulo, University of Turku

Peroxisome biogenesis/metabolism

Chair: Tom Rapoport

Francesca Di Cara, Dalhousie University

Brooke Gardner, University of California, Santa Barbara

Tom Rapoport, Harvard Medical School; Howard

Hughes Medical Institute

Irfan Lodhi, Washington University in St. Louis

Mitochondria energetics/metabolism

Chair: Erin Goley

Pere Puigserver, Dana–Farber Cancer Institute;

Harvard Medical School

Lena Pernas, Max Planck Institute for Biology of Ageing

Alexey Amunts, Stockholm University

Rebecca Voorhees, California Institute of Technology

Pere Puigserver (pere_puigserver@dfci.harvard.edu) is a professor at Harvard Medical School/Dana–Farber Cancer Institute. Follow him on Twitter: @puigserver_lab.



Our coolest superpower: Seeing all the atoms



By Jose A. Rodriguez & Hosea Nelson

Wouldn't it be great if we could just see all the atoms of all the molecules, any time we wanted?

If we were able to sample something — anything — and just tell what it's made of? Where all its atoms were? Which ones were connected or ready to react?

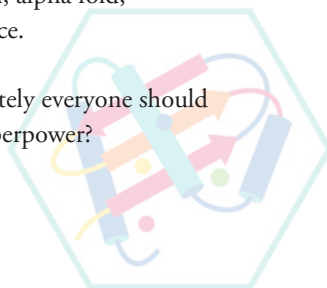
In about the span of a century, scientists have learned more about molecules and their components than we ever thought possible. In some cases, we can already pick up a bit of dust or a tiny droplet and see where the atoms of its resident molecules are. Or we can calculate predicted structures that are so accurate they can be used to predict function.

In old comic books, this kind of X-ray vision was the stuff of superheroes. Someday, in the not-too-distant future, we might all have it.

Join us for a glimpse into the challenges and opportunities of building that future, so we can all scrutinize, predict, build, target and react to all the molecules.

Keywords: Structure, cryo-electron microscopy, microcrystal electron diffraction, alpha fold, tomography, artificial intelligence.

Who should attend: Absolutely everyone should attend. Who doesn't want a superpower?



Theme song: “Mosaic” by Art Blakey and the Jazz Messengers

This session is literally powered by electrons and photons.

SPEAKERS

The rise of molecular assemblies

Chair: Rebecca Vorhees

Sarah Shahmoradian, University of Texas Southwestern Medical Center

Lorena Saelices, University of Texas Southwestern Medical Center

New approaches enabling structural science

Chair: Jose Rodriguez

Roger Castells–Graells, University of California, Los Angeles

Hosea Nelson, California Institute of Technology

Hong Zhou, University of California, Los Angeles

Seeing the chemistry of life

Chair: Hosea Nelson

Lindsey R. F. Backman, Whitehead Institute for Biomedical Research

Douglas Rees, California Institute of Technology

Jose A. Rodriguez (jrodriguez@mbi.ucla.edu) is an associate professor of chemistry and biochemistry at UCLA.



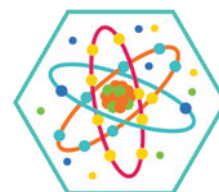
Hosea Nelson (hosea@caltech.edu) is a professor of chemistry at the California Institute of Technology. His group focuses on new synthetic methods and structural elucidation tools.



REDOX AND METALS IN BIOLOGY

Dancing with metals: Iron, copper and reactive sparks

By Gina DeNicola & Siavash Kurdistani



“Sola dosis facit venenum” or “the dose makes the poison.” This timeless adage holds particularly true in the realm of metals and oxidants, where the delicate balance between sufficiency and excess is paramount. Inadequate levels render an organism incapable of proper functioning, while excessive quantities can inflict irreversible harm. However, at the precise dosage, a harmonious symphony resonates within cellular systems.

While iron and copper play crucial roles in the functioning of numerous cellular proteins, excessive amounts can trigger the cell death mechanisms of ferroptosis and cuproptosis, respectively. Although oxidation is essential for vital cellular processes such as protein folding and signal transduction, excessive oxidation can harm cellular components, leading to cell death. How does a cell effectively regulate the availability of these factors and mitigate their toxic effects?

This compelling question will be addressed at our symposium. Esteemed investigators in the fields of iron, copper and redox biology will cover topics that include organellar redox metabolism and vulnerabilities, mechanisms of metal-induced cell death and metal stress, as well as metal acquisition and dependencies.

Keywords: Copper, iron, redox, metals, reactive oxygen species.

Who should attend: Metalheads and redox biologists, along with individuals keen on delving

into the realms of iron, copper and selenium and the intricacies of oxidative stress.

Theme song: “Iron Man” by Black Sabbath. No explanation necessary.

This session is powered by the Fenton reaction.

SPEAKERS

Advances in redox homeostasis in biology and disease

Kivanç Birsoy, Rockefeller University

Jessica Spinelli, University of Massachusetts Chan Medical School

Urbain Weyemi (chair), National Cancer Institute

Elena Piskounova, Weill Cornell Medicine

Iron in redox biology: mechanisms and regulation

Adam Hughes, University of Utah

James Wohlschlegel, UCLA

Sarah-Maria Fendt, VIB-KU Leuven Center for Cancer Biology

Gina DeNicola (chair), Moffitt Cancer Center

Copper in redox biology: From fundamental chemistry to cellular function

Katherine Franz, Duke University

Peter Tsvetkov, Broad Institute of MIT and Harvard

Deborah Fass, Weizmann Institute of Science

Siavash Kurdistani (chair), UCLA

Gina DeNicola (Gina.DeNicola@moffitt.org) is the interim chair of the metabolism and physiology department and leader of the metabolism program at Moffitt Cancer Center. Follow her on Twitter: @LabDeNicola.



Siavash Kurdistani (skurdistani@mednet.ucla.edu) is the chair of the biological chemistry department at UCLA. Follow him on Twitter: @VashKurdistani.



Processing and translating RNA in health and disease



By *Katrin Karbstein & Jeremy Wilusz*

The field of RNA biology has yielded some of the most widely popularized scientific findings in the last two decades. Not only are many researchers using small interfering RNAs and CRISPR on a daily basis, but we wonder how we ever could have not known about their existence. Yet, these are only the tip of the iceberg of exciting RNA-dependent regulation in biology that will be addressed in depth in this session.

Tracing the life of an RNA, including how it is transcribed, processed and spliced in the nucleus in association with chromatin is one focus. A second topic will be around translation into protein, with a particular focus on the underlying molecular mechanisms, ribosome specialization and gene-specific effects. Finally, several talks will discuss how these RNA regulatory mechanisms are dysregulated in neurodegenerative diseases and cancer.

These studies, presented by leading experts in RNA biology, will provide not just a global overview of an important field, with enormous potential for future discoveries, but also explain why RNA is considered one of the most promising drug targets and platforms.

Keywords: Ribosomes, translation, RNA processing, RNA and disease, splicing, chromatin, CRISPR and immunity.

Who should attend: Students and postdocs who want to hear about one of the most rapidly expanding fields in biology, educators who want to make sure what they are teaching is current and curious people who want to know what all the hype is about. And, of

course, RNA junkies who can't get enough.

Theme song: "Friend like me" from "Aladdin," because RNA can do it all.

This session is powered by ATP and other ribonucleotides.

SPEAKERS

RNA biogenesis and processing

Chair: Olga Anczukow

Tracy L. Johnson, University of California, Los Angeles

Hiten D. Madhani, University of California, San Francisco

Jeremy E. Wilusz, Baylor College of Medicine

Joshua T. Mendell, University of Texas Southwestern Medical Center

Ribosomes and translation

Chair: Katrin Karbstein

Shu-ou Shan, California Institute of Technology

Ruben L. Gonzalez, Columbia University

Homa Ghalei, Emory University

Amy S.Y. Lee, Dana-Farber Cancer Institute and Harvard Medical School

RNA and disease

Chair: Jeremy E. Wilusz

Blake Wiedenheft, Montana State University

Shuying Sun, Johns Hopkins University

Olga Anczukow, Jackson Laboratory for Genomic Medicine

Katrin Karbstein, UF Scripps Institute for Biomedical Innovation & Technology

Katrin Karbstein (katrin.karbstein@ufi.edu) is a professor at UF Scripps in Jupiter, Florida, where she also works on education outreach and diversity, equity and inclusion issues. Follow her on Twitter: @KarbsteinL.



Jeremy Wilusz (jeremy.wilusz@bcm.edu) is an associate professor at Baylor College of Medicine. Follow him on Twitter: @JeremyWilusz.



SIGNALING MECHANISMS IN THE NUCLEUS

Out with the old, in with the nucleus

By *Glen Liszczak & Aaron Johnson*

Are you tired of bingeing reruns on Netflix? Maybe you need a break from reality TV but you're not sure where to turn for high-quality entertainment? Look no further — the nucleus has it all. There's mystery, murder, machines of extraordinary complexity and visually stunning landscapes.

Stories in nuclear signaling are unraveling at an unprecedented pace thanks to technological and conceptual advances in chemistry, biochemistry and cell biology. Our speakers will address long-standing questions about organism development, cellular identity and the genetic basis for disease.

You will hear about how cutting-edge interdisciplinary approaches are being used to uncover new regulatory mechanisms underlying transcription, genome structure and other phenomena in the nucleus. We will also discuss how rapid progress in the field is inspiring new therapeutic approaches for diseases related to dysfunctional nuclear processes.

You don't want to miss this — even the cytosol junkies will be on the edge of their seats.

Keywords: Enzyme mechanism, genetics and disease, chemical probes, transcription regulation, chromatin modifications, genome structure.

Who should attend: You. Our speakers span a wide breadth of biological phenomena, scientific disciplines and technologies. We have something for everyone. Current projections: standing room only.



Your session's theme song:

"Journey to the Island" by John Williams
This song is about the most important genetics experiment ever performed.

This session is powered by "hot, nasty, bad-*ss* speed." — Eleanor Roosevelt, Talladega Nights

SPEAKERS

Chemical strategies to study nuclear processes

Chair: Aaron Johnson

Anna Mapp, University of Michigan

Glen Liszczak, University of Texas Southwestern Medical Center

Oliver Bell, University of Southern California Keck School of Medicine

Minkui Luo, Memorial Sloan Kettering Cancer Center

Chromatin organization, replication and repair

Chair: Katharine Diehl

Aaron Streets, University of California, Berkeley

Aaron Johnson, University of Colorado Anschutz Medical Campus

Carl Wu, Johns Hopkins University

Serena Sanulli, Stanford University

Chromatin modifications in the nucleus

Chair: Glen Liszczak

Alex Ruthenberg, University of Chicago

Katharine Diehl, University of Utah

Tim Stasevich, Colorado State University

Phil Cole, Harvard University

Glen Liszczak (glen.liszczak@utsouthwestern.edu) is an assistant professor in the biochemistry department at the University of Texas Southwestern Medical Center.



Aaron Johnson (aaron.m.johnson@cuanschutz.edu) is an associate professor in the biochemistry and molecular genetics department at the University of Colorado School of Medicine.



Titles and abstracts: How to tell a clear and engaging story

By *Emily Ulrich*

Writing compelling titles and abstracts is a key skill for scientists at any career stage. These highly visible elements of a manuscript or conference submission must draw readers in while also showcasing your whole project.

With the Nov. 30 deadline for submitting abstracts for Discover BMB 2024 just a couple of months away, you may be asking yourself: How do I boil down the details of my research into something concise, clear and approachable to read?

As the technical editor for the publications department at the American Society for Biochemistry and Molecular Biology, I help scientists perfect the clarity and reach of their titles and abstracts. The most engaging ones effectively convey the project as a story — with every piece of the abstract fitting together to enhance a central narrative.

Here I provide a few suggestions on how to construct titles and abstracts that are easy to read and will appeal to a broad biochemistry/molecular biology audience. My main take-home message is to put yourself in the reader's shoes and think about what you find eye-catching when quickly skimming a publication website or conference agenda. I am guessing it is NOT a super-long, jargon-heavy title. (Always remember to check the character/word limits!)

Titles

1. State the main finding of your study as a sentence (for example, “Overexpression of the kinase ABC promotes ...”). This style may not fit every project, but it can be easier for the reader to quickly grasp where your story is going.

2. Provide context for field-specific terms. The reader may not know if “ABC” is a protein, a small molecule or something else entirely. If you have space, give some general information such as “phosphatase ABC” or “amino-glycoside ABC.” The full definition is not crucial.

For a list of abstract categories, go to discoverbmb.asmbmb.org/abstracts/categories.

Abstracts

1. Convert your project into a story you would tell a colleague. Cohesiveness is more critical than completeness.

- A. Start with why your research topic is important, including relevant background information needed to follow other pieces of the abstract.
- B. State what knowledge is missing.
- C. Relay your results to build a story about filling this gap in knowledge. Avoid stringing together sentences about each individual experiment without emphasizing how they relate to each other and the broader goal.
- D. Describe the key method(s) that would help the reader assess your conclusions. Work these methods into your summary of results.
- E. Conclude with a statement that relates back to the broader biological significance.

2. Use the active voice. This style makes the abstract feel more like a story. For example, say “We found that ...” instead of “X was found to be ...”

3. Read your draft out loud. I find this strategy helps to catch sentences that pack in too many details and are hard to follow.

4. Ask a colleague to read your abstract. Choose someone who is not too familiar with your project, maybe someone in another field of biochemistry or molecular biology. Ask if they can understand the gist of your project after one quick reading.

5. Finally, adapt any of these suggestions to fit your personal writing style and instructions from your adviser. These are guidelines, not rules, from the perspective of someone who reads tons of abstracts.

Emily Ulrich (eulrich@asmbmb.org) is the ASBMB's technical editor.



We are inspiring the next generation of scientists.

We are driving knowledge
forward for our world
and for our future.

“Interactions with other ASBMB members convinced me that this incredibly welcoming education community was something that could really help me grow as a teacher-scholar – and it has.”

— Dan Dries

Researcher focused on achieving equitable student outcomes

*Associate professor, Juniata College
Student chapter adviser*



Renew your membership by Jan. 1.*

asbmb.org/renew

*ASBMB membership is based on a calendar-year cycle, from Jan. 1–Dec. 31.
Renew by Jan. 1 to enjoy the full benefits of your membership.

Who did it?

A DNA crime scene investigation and high school field trip

By *Chloe Kirk*

How do you get high school students excited about scientific research? Summer camps, after-school science clubs, science museums, science fairs, field trips — what works?

I'm a 4th-year Ph.D. candidate in biochemistry and molecular biology at the University of Miami, and I recently partnered with my fellow graduate students Christian McDonald and Jessi Hersh and the American Society for Biochemistry and Molecular Biology to host 60 high schoolers for a DNA crime scene investigation.

Some background

In recent years, we've been testing ways to engage local high school students in the fun of science. In fall 2021 we partnered with Miami Edison High, a school in the city's Little Haiti neighborhood with 100% enrollment of underrepresented groups, to volunteer at their after-school science club. In each session, a different graduate student came to talk about their research in general terms, and then we did a related science activity.

As we built rapport, the Miami Edison students asked more questions about what our research actually looked like. In spring 2022, we invited the 10 science club members to spend a day touring the University of Miami biochemistry labs and see science demonstrations such as a senior research scientist using various chemical compounds to change the color of flames. The high schoolers



COURTESY OF CHLOE KIRK

Organizer/suspect Christian McDonald, at left, shows a group of Miami high school students how bacteria is linked to the crime scene and how various bacteria grow on agar plates.

told us that removing barriers so they could see researchers are regular people in white lab coats helped them realize that they could pursue science as a career.

Their teacher told us that excitement around his science club and the recent field trip had spread, but many of the 1,000-some students at Miami Edison couldn't stay after school to attend because they needed to take the school bus home or had other activities. Together, we hatched a plan to bring more students for another field trip to the university.

In fall 2022, 60 high schoolers from Miami Edison came for a day of science demonstrations, lab tours and learning about graduate student research projects, and the only cost to the school was school buses. It was a resounding success, but some students said the parts of the day

felt disconnected from each other; it was learning and fun in small doses without an overarching theme or story. We resolved to fix that.

A new plan

Last spring, we received an ASBMB Science Outreach and Communication Grant and partnered with Alonzo & Tracy Mourning High School, also in Miami Dade County, to bring another 60 students to the university for a day of lab demonstrations, tours and talks — this time linked by a fictitious murder and gathering information from each activity to identify a culprit. The theme? Who did it? A DNA crime scene investigation.

Centering the event around the theme of DNA Day on April 25, we designed experiments we could incorporate into this murder scene

and worked backward to the poisons and culprit backgrounds we needed.

The crime

A body was discovered at 8:37 a.m. The person has been dead for no more than 12 hours, and the cause of death was determined to be poison. The victim was identified as Taylor Smith, an accountant for a local law firm. In a text message sent at 5:19 p.m. the previous evening, Smith wrote that he was working late to finish an important report. A colleague said that Smith was working on an embezzlement report for the FBI.

All employees and building staff had access to the office where Smith was working, and no security footage was recovered. Many people had the motive and opportunity to kill Smith. We narrowed it down to five suspects who had a possible motive and an unconfirmed alibi. Our main suspects were Chloe, Laura, Joey, Maddison and Tate.

We told the students we needed them to interview the suspects and use the information they gathered, combined with forensic evidence, to identify the murderer.

The science

The students rotated through six demonstrations.

1) DNA extraction and fingerprinting: Students learned how to extract DNA from a strawberry and differentiate types of fingerprints to eliminate potential suspects.

2) Organs and autopsy: Medical student volunteers brought preserved organs for students to hold and narrow down the possible poisons used in the murder.

3) Thin-layer chromatography: Students used TLC to further define the poison used in the murder.

4) Blood typing: Students learned how blood typing works and what kind of blood was found at the crime scene.

5) Bacteria plates: Students learned about bacteria linked to the crime scene and how various bacteria grow on agar plates.

6) Suspect interrogation with liquid-nitrogen ice cream: Students interviewed the suspects about their alibi and motive while also eating and learning how liquid nitrogen can make ice cream.

After these demonstrations, the students had a final opportunity to interrogate suspects before a pizza lunch where they learned about high school summer research opportunities through the University of Miami and heard three-minute thesis presentations by Ph.D. students.

At the very end, we revealed the culprit.

Feedback and looking forward

This activity combined elements of the scientific process and application of scientific techniques with humanizing the people in lab coats and showing how science can be applied. Student feedback included “I loved being able to be in a lab and actually get to touch a real organ” and “a great experience and a look into something that I want to potentially study in the near future.”

To answer the question I posed at the start of this article — how do you excite kids about science research? — our answer is bringing students to see firsthand how research is done and humanizing the people behind the science — removing the misconception that only geniuses can do research and instilling the excitement of discovery and trying new things.

When I was in high school, my

COURTESY OF CHLOE KIRK



Suspects Laura Pelaez, Joey Shulz, Tate Pollock and Maddison Marshall prepare liquid nitrogen ice cream before being interrogated by students.

science classes seemed daunting and boring — reading dry textbooks to prepare for multiple-choice exams. That’s not how real-world science looks, and we aim to change that misconception. We plan to repeat this field trip with other local high schools, and we’ve already applied for university funding to cover a long-term investment in bringing the community to see what University of Miami research looks like.

More than 30 University of Miami undergrad, master’s, Ph.D. and medical students volunteered for this event, along with the organizing team of Jessica Hersh, Christian McDonald, Gili Lokiec and me.

One of the attendees told us, “I’d like to say to everyone who was a part of the crime scene investigation that they were all nice people and made the field trip way more astonishing.”

Chloe Kirk (cck22@miami.edu) is working toward her Ph.D. in biochemistry and molecular biology at the University of Miami. Her interests are science research, communication and outreach. Follow her on Twitter: @chloekirk.



Celebrating DNA Day with a new museum exhibit

By Emmett Smith

“Communicate science to a broad audience via written and oral methods.”

That’s a learning goal for my class Biol351: Human Genetics and Genomics. Since I started working at Earlham College, I’ve wanted to create a DNA exhibit for the school’s Joseph Moore Museum. When I saw an advertisement in late 2022 for the American Society for Biochemistry and Molecular Biology’s Science Outreach and Communication Grant, I immediately thought of a way to integrate DNA Day, the museum and my course.

On April 25, 2023 (DNA Day), 15 Earlham College undergraduates opened and established a permanent DNA exhibit at the museum, funded by the SOC grant. The students created posters and interactive activities to showcase this impressive nucleic acid.

I’m delighted that the ASBMB and my students made that happen.

The exhibit includes an atomic-level 3D DNA model, which will help teach undergraduates in introductory genetics classes, and a DNA-building activity with foam nucleotides and informational posters prepared by the Biol351 students. One poster provides basic information about DNA.

At the request of the museum director, Heather Lerner, two other posters dive deeper into MC1R, a gene related to hair color. These posters connect the gene to the



EMMETT SMITH

Senior Sean Ahn demonstrates DNA base pairing to a museum guest using a foam kit from 3D Molecular Designs. In the rear, sophomore Meredith McGraw and junior Cas Bowman describe the pros and cons of direct-to-consumer genetic testing companies.

mastodon skeleton in the museum and begin to introduce the concept of genetic evolution.

A final poster, which is not part of the permanent display, explains direct-to-consumer genetic testing and compares and contrasts some of the more popular services.

Meeting multiple needs

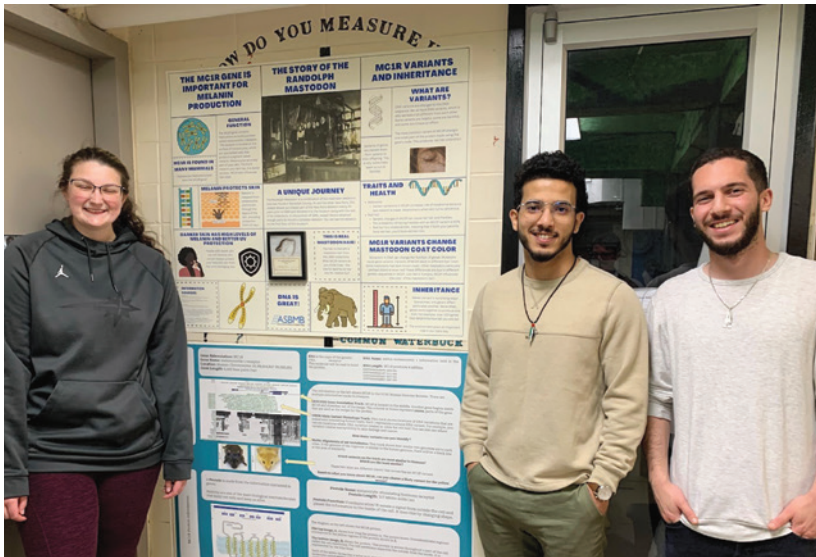
The Joseph Moore Museum provides needed scientific learning opportunities not only for Earlham students but also for the surrounding community of Richmond. As the only regional institution offering free science, technology, engineering and math programming, the museum serves about 13,000 visitors annually.

K–12 STEM proficiency has been dropping in Indiana. Scores from the local school corporation

ILEARN for 2021–2022 showed that only 19.2% of high school students demonstrated proficiency in biology. A field trip to the museum comprises a large portion of the science curriculum for many local K–5 students. Adding a DNA exhibit targets a fundamental gap in the museum’s offerings.

To pull off the new exhibit, I ordered the model and foam building blocks from 3D Molecular Designs. Then the students got involved. I had them complete a museum critique before they began creating their own posters. They visited the museum, and each dissected the effectiveness of one exhibit.

Students signed up for specific posters or activities and worked together in small groups (2–3 students) to complete them. We sent drafts of the posters to museum employees for



EMMETT SMITH

Junior Amy Stewart and seniors Ramzi Jaadan and Omar Aref show off their MC1R posters.

review and feedback. They told us that girls are more likely to engage with exhibits that display faces, so we tried to include photos and graphics of human faces on the posters.

On DNA Day, the museum held an open house for the community. Most visitors that day were students enrolled in Biol112: Cells, Genes and Inheritance, who used the opportunity to study for their final exam and earn extra credit by filling in a worksheet. This class is one of the target audiences for this exhibit; the DNA model and posters

will be used to help instruct Biol112 students in the future. Community members who saw our Facebook post also attended.

A good beginning

We learned some valuable lessons. We agreed that more interactive stations would improve visitors' understanding of the posters and provide opportunities for conversation. For a future DNA Day Open House, we could add a DNA extraction station or include a microscope showing an animal cell's nucleus.

Biol351 students said they wanted more time to work on their posters. The initial plan was to have two rounds of feedback, not just one, but that changed as the semester progressed. We were unable to have a classroom visit from a museum representative, which would have helped us better understand how to design the posters and what kind of language to use. However, we are happy with the first iteration of the exhibit and look forward to improvements in version 2.0.

Version 2.0 will include a long spool of DNA — the sequence of MC1R — that museum guests can unroll (and hopefully re-wind). I want people to appreciate how long a gene actually is and then be amazed at how the genome is efficiently packaged into our cells. We didn't have time this semester to pull off that idea, but we'll make it happen for the next iteration of the exhibit.

Emmett Smith (smithem3@earlham.edu) is an associate professor teaching molecular biology and studying environmental and ancient DNA at Earlham College and a member of the ASBMB Science Outreach and Communication Committee.



Want to increase science understanding in your community?

ASBMB Science Outreach and Communication Grant

Grantees receive up to \$1,000 for new or existing activities related to biochemistry and molecular biology.

Deadline: October 31

Learn more: asbmb.org/outreach-grant



Focus on the functions of serine proteases

Meeting organizers discuss using these molecules ‘as allies’ for drug development

By *Marissa Locke Rottinghaus*

In November, scientists will gather online to share their latest research at the American Society for Biochemistry and Molecular Biology’s meeting on serine proteases in pericellular proteolysis and signaling.

The meeting, to be held Nov. 2–3, will center on one class of molecules: serine proteases. The organizers said they wanted an opportunity for researchers across the globe, in industry and academia, whose work involves serine proteases to come together to see how all their research intersects. They also said they wanted to provide a venue for graduate students and postdoctoral researchers to present their work and have opportunities to meet with more experienced investigators.

The meeting will cover biosynthesis, trafficking and posttranslational modifications, endogenous and pharmacological inhibitors, developmental and other physiological functions, mechanisms of dysregulation and pathological consequences and more.

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

Anthony O’Donoghue is an associate professor of pharmacy and pharmaceutical sciences at the University of California, San Diego. His research is focused on the detection and characterization of proteolytic enzymes associated with disease in infectious organisms, cancerous tissues, immune cells or human biofluids.

Grant Blouse is the former chief scientific officer at Catalyst Biosciences, a biopharmaceutical company focused on protease thera-

peutics to address unmet medical needs in disorders of the coagulation systems.

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

Q: What is your history with and general impression of serine protease meetings?

O’Donoghue: I have attended two of these serine protease meetings. The first meeting I attended was in Washington, D.C., and it was probably my first time meeting Grant. It was an excellent meeting. I gave a talk and was able to get a lot of traction as a junior faculty member. It definitely gave me exposure.

The following meeting was virtual, and I was invited, again, to give a talk. For a virtual meeting, I thought it was very well run and very well organized.

Blouse: I’ve attended the same serine meetings that Anthony listed. In 2019, the organizers reached out to me to present on something from the industry perspective. I gave a talk about one of our programs that we eventually sold to Vertex. In 2021, I also gave a talk on another one of our programs.

One thing I like about these meetings is being able to give the alternative career perspective to the students, postdocs and junior faculty.



COURTESY OF ANTHONY O'DONOGHUE

Anthony O’Donoghue studies proteolytic enzymes associated with disease in infectious organisms, cancerous tissues, immune cells or human biofluids.

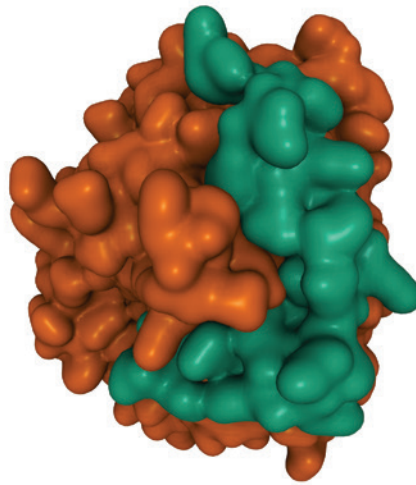


COURTESY OF GRANT BLOUSE

Grant Blouse’s work has focused on protease therapeutics to address unmet medical needs in disorders of the coagulation systems.



Thrombin is a serine protease that promotes blood clotting.



In addition, these meetings are an opportunity for young people to get exposure and talk to experienced people, so they can guide their careers and research as well as provide opportunities for collaborations.

I've been part of the serine protease field for almost 25 years. These meetings are great places to reconnect with individuals you might not have seen or had a chance to chat with in several years, rekindle new collaborations and get new ideas.

Q: Tell me about the theme of the meeting.

Blouse: The meeting presents a broad perspective of serine proteases and their catalytic mechanisms. We tried to incorporate talks from industry, the clinical perspective and academia. There's a big focus in the field on things we can translate to the clinic or target therapeutically as well as basic discovery. We hope this means there will be something for everyone.

O'Donoghue: We feel that a two-day meeting focusing on just serine proteases is perfect. I think that the world is sitting up and taking notice of developing drugs against specific serine proteases. During the COVID-19

pandemic, this field has exploded.

Q: How is this different from previous years?

Blouse: We tried to focus on having younger scientists present and interact in the meeting. We tried to balance having seasoned investigators as well as young faculty and selecting talks from the abstracts that come in, which are generally from Ph.D. students and postdocs. In addition to the science, we want this meeting to be a mentorship opportunity for the young crowd.

O'Donoghue: Since Grant and I are very social people, we have a social hour built into our program to get people connected.

Q: What are some of the sessions that excite you?

Blouse: I like the industry-focused talks, but I am also excited about talks on platforms that enable characterization of proteases and substrates. There is a lot of great work on this topic from speaker Paulina Kasperkiewicz, professor of chemistry at the Wroclaw University of Science and Technology. Because in industry, we need to understand

the specificity of protease substrates to figure out how to mimic that interaction or make targeted therapeutics.

O'Donoghue: One of the topics that I'm very interested in is developing drugs against specific serine proteases. Grant has been doing this kind of work for a while, but I think, because of the COVID-19 pandemic, the field has kind of exploded. Even nonscientists know a lot more now about targeting proteases.

Our opening speaker, James Janetka, professor of biochemistry and molecular biology at Washington University in St. Louis, will tell us about his work developing COVID-19 drugs that target a serine protease in the host cell.

Q: How did you select your speakers?

O'Donoghue: We were interested in having a good mix of senior and junior faculty member speakers. For example, Matthew Bogyo, professor of pathology at Stanford University, is a very well-established protease researcher. In that same session, we are featuring a young faculty member named Sonya Neal, associate professor of cell and developmental biology at UCSD, and she has really started to make a name for herself.

Serendipitously, we have a nice gender balance just by selecting the best people. It is nice to see that there's a lot of female representation on our speaker list.

Q: Any final thoughts you'd like to share?

Blouse: I think there are a lot of great discoveries and momentum in the serine protease field these days. From the industry perspective, there are a lot of targets that are proteases,

Serine proteases in pericellular proteolysis and signaling

The 2023 virtual meeting on serine proteases in pericellular proteolysis and signaling continues the tradition of the ASBMB special symposium on membrane-anchored serine proteases with an expanded focus on other related serine proteases that function in the pericellular environment.

SPEAKERS

Matthew Bogyo, Stanford University

James Janetka, Washington University in St. Louis

Paulina Kasperkiewicz, Wrocław University of Science and Technology

Karin List, Wayne State University

Lorraine Martin, Queen's University Belfast

Sonya Neal, University of California, San Diego

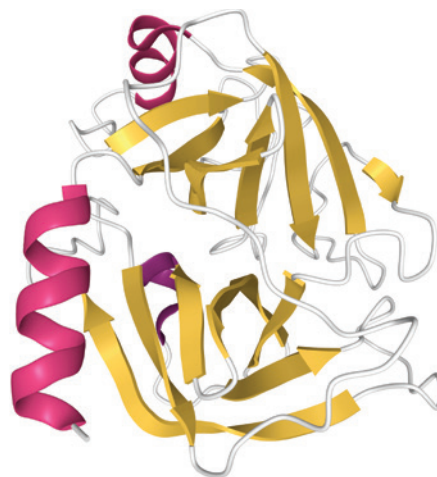
Joann Trejo, University of California, San Diego

Steven Verhelst, Leiden University

Liangliang Hao, Boston University

The registration deadline is Oct. 31.

Learn more at asbmb.org/meetings-events/serine-proteases-2023.



Human trypsin IV is a serine protease expressed in the brain.

either because we want to inhibit them or capitalize on their regulatory ability. I think this meeting is very translational to the clinic, and this work is fantastic for the advancement of science and medicine.

Boris Turk wrote a paper years ago where he claimed that proteases are the quintessential signaling molecule. They are like the body's key light switch.

O'Donoghue: Historically, people have been targeting serine proteases for cancer. But now, like Grant said, people see value in using a protease, that happens to be present in an inflamed tissue or in a cancer, to activate a drug or therapeutic. I see a lot of startup companies in this field right now.

It's exciting to see that in addition to inhibiting proteases, we are now using them as allies. This kind of phenomenon has really doubled the work in the field.

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



VIRTUAL ISSUE

Recent advances in lipid research

The Journal of Lipid Research is proud to present a compilation of research articles that delve into cutting-edge topics in lipid research – ranging from lipoprotein biology to cholesterol metabolism and lipidomics.

jlr.org/recent-advances-in-lipid-research

JLR | JOURNAL
OF LIPID
RESEARCH

ASBMB
JOURNALS



Seeking a new editor-in-chief

The ASBMB welcomes nominations and applications for the position of editor-in-chief of Molecular & Cellular Proteomics.

MCP publishes original research that makes a substantial contribution to the understanding of any area of proteomics. The next editor-in-chief should be a public-facing thought leader, a committed advocate for authors and readers, a leader who listens and delegates, and an active researcher of significant accomplishment.

The editor-in-chief will serve a five-year term, with the possibility of reappointment, beginning Jan. 1. ASBMB will provide administrative support and a stipend. A search committee appointed by the president of ASBMB will review nominations and applications. Nominations and applications will be reviewed until the position is filled.

Please send to the ASBMB Editor-in-Chief Search Committee c/o
ASBMB Director of Publications Isabel Casas (EICSearch@asbmb.org)

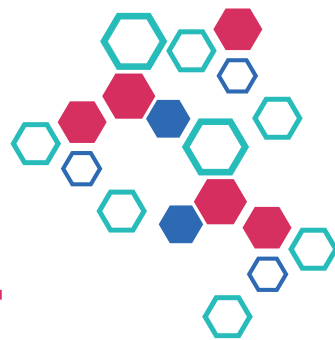
ASBMB
JOURNALS
MCP | MOLECULAR
& CELLULAR
PROTEOMICS



American Society for
Biochemistry and Molecular Biology

Discover BMB | 2024

SAN ANTONIO | MARCH 23-26



Save the date!

#DiscoverBMB is a gathering that creates connections and catalyzes new and exciting opportunities for collaboration and networking.

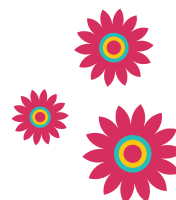
Plan to join us March 23-26 in San Antonio for:

- Scientific symposia
- Spotlight talks
- Award lectures
- Poster sessions
- Workshops
- Interest groups
- Career programming
- Exhibits
- And more!



Symposia themes include:

- Advances in natural product biochemistry and biotechnology
- Cool and novel enzymes
- Lipid metabolism
- Membrane contact sites
- Microbial signaling, communication and metabolism
- Mitochondria, peroxisomes and chloroplast metabolism
- New frontiers in structural biology
- Redox and metals in biology
- RNA biology
- Signaling mechanisms in the nucleus
- Diversity, equity, accessibility and inclusion
- Education and professional development



Visit discoverbmb.asbmb.org.