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ASBMB TODAY

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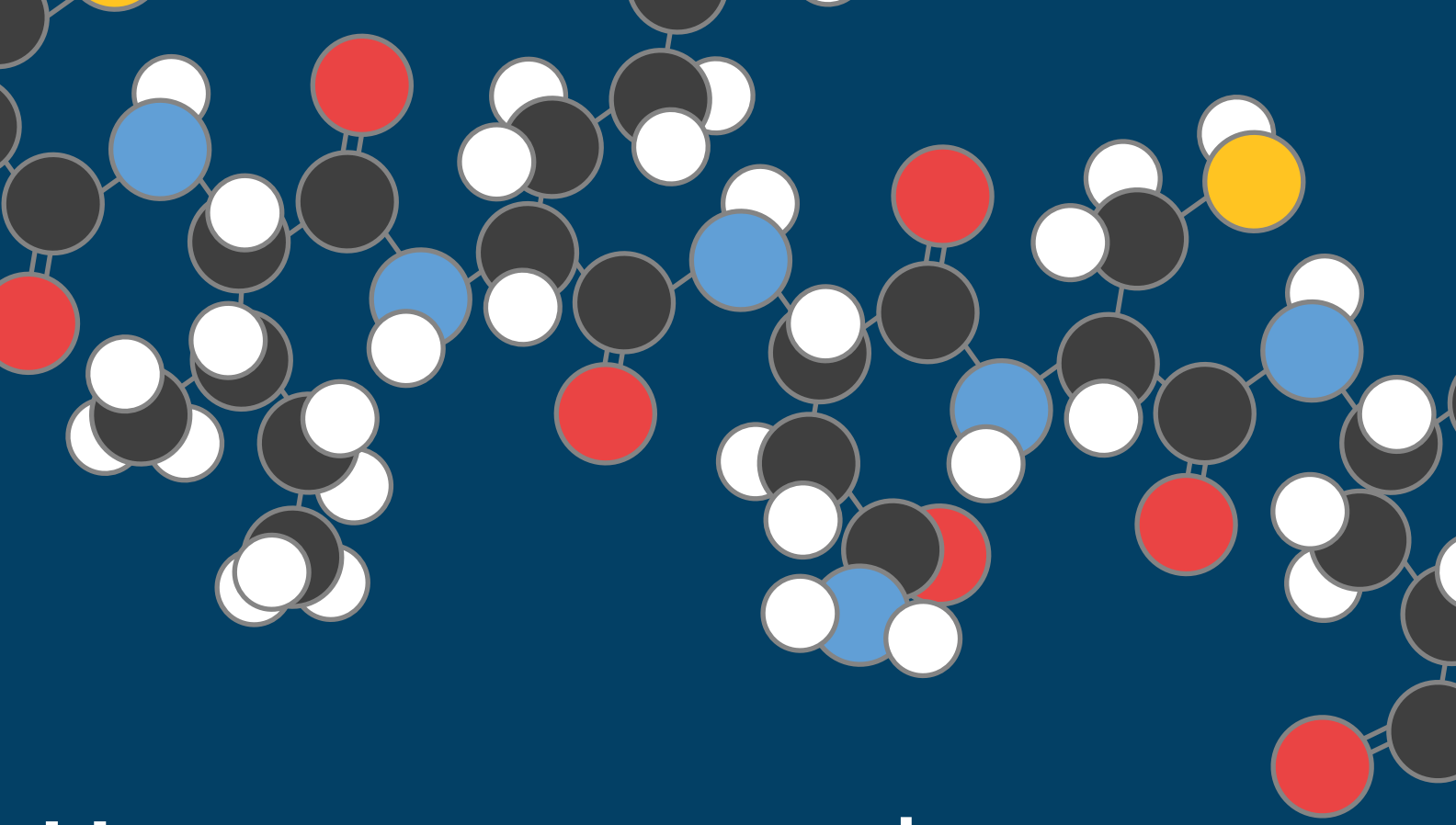

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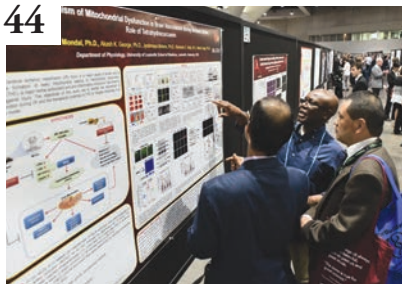

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Are we more than biochemists and molecular biologists?

By Gerald Hart

If you read the research interests of a faculty member at any university or medical school, it is nearly impossible to tell whether the scientist is a biochemist, molecular biologist, cell biologist or biophysicist. Some deans have used this fact to justify fusing basic science departments into single large units. This is a huge mistake.

The topics might look similar, but a biochemist, cell biologist and biophysicist all think differently about biological problems. For example, a biochemist studies biology at the molecular level and tries to understand the chemistry of living processes, whereas a cell biologist studies life processes typically at the organelle or more macroscopic level, and a biophysicist focuses on the atomic level.

At most universities and medical schools, basic science departments are small enough that all the faculty know in some detail what their colleagues are working on. This creates a highly interactive and intellectually stimulating environment.

Fusing basic science departments into one large unit can result in unexpected consequences. First, when staff and faculty no longer enjoy close interactions, administrative support suffers, making applying for grants and dealing with paperwork more difficult; the fusion of departments does not save any money, but it does muddy the reporting lines and accountability of the staff. Second, the larger unit fractures into unpredictable splinter groups, making it difficult to maintain collegiality and the overall intellectual environment.

I believe it is best to maintain small, focused basic science departments but create synergy with cross-departmental centers and institutes

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Corrections

In the March issue, the item title "Neuronal GIRK currents and blood cholesterol level" on page 17 should have stated that Anna Bukiya of the University of Tennessee Health Science Center and Avia Rosenhouse-Dantsker of the University of Illinois at Chicago led a team that published in the Journal of Lipid Research.

In the March issue, a profile article on page 34 misstated Fan Liu's professional positon. She is a new faculty member at the Leibniz-Forschungsinstitut für Molekulare Pharmakologie in Berlin.

Raise the caps one last time

By Benjamin Corb

The National Institutes of Health has seen a recent funding boom reminiscent of a period in the late 1990s and early 2000s when the agency's budget doubled. The NIH budget has increased by $9 billion since fiscal year 2015 (nearly 25 percent), and the American Society for Biochemistry and Molecular Biology, along with other scientific societies, is calling for a continuation of this growth in the coming year's budget.

Remarkably, the recent period of NIH budget increases has occurred at a time when legislative budget caps limit the federal government's annual discretionary spending.

In 2011, in response to a ballooning federal debt and deficit, President Barack Obama formed a bipartisan super committee to develop fiscal policies that would restrain federal spending. The effort resulted in adoption of the Budget Control Act of 2011, or BCA, which limited both defense and nondefense discretionary spending for the next decade. The caps were intended to control spending and ensure limits on both Republican and Democratic priorities (defense spending and social safety net programs, respectively).

The defense community criticized these caps as draconian, and the U.S. Congress immediately began talking about eliminating — or raising — the caps on defense spending. In response, thousands of organizations representing constituencies supported by nondefense discretionary, or NDD, spending (investments in science, for example), started a coalition named NDD United. The ASBMB is a leader in NDD United, and I am a national co-chair. NDD United's operations currently are managed by the ASBMB's public affairs staff.

For eight years, NDD United successfully has lobbied Congress to raise spending caps on both defense and nondefense priorities. Thanks to the coalition's Raise the Caps advocacy efforts, Congress has passed bipartisan budget agreements every two years for the past six years that resulted in steadily increasing nondefense discretionary caps.

The last budget agreement raised the caps for fiscal years 2018 and 2019. The caps from the original 2011 law are back for fiscal 2020 and 2021, and without a plan to raise them, continued increases to the NIH budget are at risk. Spending cap levels now in place for fiscal 2020 represent a $55 billion cut to nondefense discretionary spending from fiscal 2019 levels. This nearly 10 percent cut would be devastating for all domestic priorities, including investments at the NIH and National Science Foundation.

The NIH has benefited from the Raise the Caps effort. NDD United's latest letter to Congress (sent in March) made the case for a discretionary caps increase, highlighting recent investments in the NIH budget. "Previous bipartisan budget deals have provided spending cap relief that has allowed Congress to more adequately fund services essential to Americans nationwide. For example, funding for biomedical research has grown, allowing scientists to conduct research and discover life-saving treatments and cures," the letter states.

The ASBMB urges Congress to work toward a plan to raise the caps for the final two years of the BCA, allowing for sustained funding in priorities such as biomedical research. This deal would last through fiscal 2021 and end the threat of spending cuts that will be mandatory if the caps are not raised.

Benjamin Corb (bcorb@asbmb.org) is director of public affairs at the ASBMB. Follow him on Twitter @bwcorb.

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Member update

By Erik Chaulk

Weiss named Indiana U distinguished professor

Indiana University has appointed Michael A. Weiss, the Robert A. Harris professor of biochemistry and molecular biology, as a distinguished professor.


WEISS

Weiss is one of 10 IU faculty members who in December received distinguished professorships, the university's highest academic rank for educators or researchers.

Distinguished professors are chosen for their outstanding achievement in teaching, scholarship, innovation and leadership.

Weiss' research focuses on two areas: insulin signaling with application to diabetes mellitus and sex determination with application to genetic infertility syndromes.

In 2009, he founded Thermalin Inc., a biotechnology company that designs and develops novel insulin analogs.

Weiss and the other distinguished professors were honored in March at the university's distinguished professor symposia.

Glycobiology society honors Taniguchi

The Society for Glycobiology has given the 2018 Karl Meyer Award to Osaka University professor emeritus Naoyuki Taniguchi.

Established in 1990 in honor of German biochemist Karl Meyer, this award recognizes a scientist with an active research program who has made significant contributions to the field of glycobiology.

Taniguchi began his career on the faculty at Hokkaido University, where he first focused his research in glycobiology. In 1986, he was appointed professor and chair in the department of biochemistry at Osaka University School of Medicine, where his research group studied the structure and function of N-linked glycans.

After he retired from the university in 2006, Taniguchi continued his research as an endowed chair and professor emeritus. He also served as director of the systems glycobiology research group at the RIKEN research institute from 2007 to 2018.


TANIGUCHI

He is now the director of the research center at the Osaka International Cancer Institute and head of the department of glycooncology and medical biochemistry at the same institute.

Schulman wins Leibniz Prize

Brenda Schulman, director at the Max Planck Institute of Biochemistry, is among the 10 recipients of the 2019 Leibniz Prize.


SCHULMAN

Established in 1985 by the German Research Foundation, the Leibniz Prize recognizes outstanding achievement in the field of research.

Germany's most prestigious research award, the prize comes with $2.85 million (2.5 million euros) to support future research endeavors.

The foundation is honoring Schulman for her work in the fields of biochemistry and structural biology on the molecular mechanisms of the ubiquitin system.

Before joining the Max Planck Institute, Schulman served on the faculty at St. Jude Children's Research Hospital and as an investigator with the Howard Hughes Medical Institute.

In 2018, she was appointed an honorary professor with the Technical University of Munich.

In memoriam: Laszlo Lorand

Laszlo Lorand, professor emeritus at Northwestern University, died Dec. 6. He was 95 years old.


LORAND

Born in Győr, Hungary, in 1923, Lorand attended the University of Budapest, where he studied medicine. He earned a Ph.D. in biomolecular structure at the University of Leeds in 1951.

Lorand taught physiology and pharmacology at Wayne State University School of Medicine before joining the Northwestern University faculty in 1955.

At Northwestern, he was a founding member of the department of cell and molecular biology as well as the first director of an National Institutes of Health-funded biochemistry training program.

An author on more than 200 scientific publications, Lorand focused his research on thrombosis, protein

associations and calcium ions.

He was preceded in death by his wife, Joyce Bruner–Lorand, and is survived by his daughter, Michele Lorand.

In memoriam: Subir Bose

Subir Kumar Bose, professor emeritus of microbiology and internal medicine at St. Louis University, died July 25. He was 86 years old.

BOSE

Born in Gaya, India, Bose earned undergraduate and graduate degrees from the University of Lucknow. After moving to the United States in 1958, he completed a Ph.D. in molecular biology at Washington University in 1963.

Bose joined the St. Louis University School of Medicine's department of microbiology in 1965. He was appointed associate professor in 1968 and became a full professor in 1976. He served as interim chair of the department of microbiology from 1989 to 1991 and was appointed professor of internal medicine in 1991.

Bose's research focused on understanding cell-to-cell interactions in intracellular infections, for which he received the United States Public Health Service research career development award.

Highly regarded as an educator, Bose hosted many Indian students and postdoctoral fellows at his lab.

After retiring in 1993, he moved to Athens, Greece, to live with his wife and collaborator, Evangelia Vretou, research director at the Hellenic Pasteur Institute.

Erik Chaulk (echaulk@asbmb.org) is a peer-review coordinator and digital publications web specialist at the ASBMB.

In memoriam: Paul T. Englund

Paul T. Englund, Johns Hopkins University professor emeritus, died Jan. 12 of advanced Parkinson's disease. He was 80 years old.

Born in Worcester, Massachusetts, in 1938 to Theodore and Mildred Englund, he studied chemistry at Hamilton College, receiving a bachelor's degree in 1960. He earned a doctorate in biochemistry at Rockefeller University in 1966 before taking a postdoctoral position at Stanford University with Nobel laureate Arthur Kornberg.

Englund joined the faculty at Johns Hopkins as an associate professor in the department of physiological chemistry in 1968 and remained there until his retirement in 2010. He became a full professor in the department of biological chemistry in 1980.

He was known widely for his research on trypanosomes, parasitic organisms that cause African sleeping sickness.

Among his positions, Englund served as a visiting scientist at the International Laboratory for Research on Animal Diseases in Nairobi, Kenya, in 1980.

He was highly esteemed as a teacher and mentor; in 2016, his former trainees contributed funds toward an endowed professorship in his name.

ENGLUND

Tamara Doering, endowed professor of molecular microbiology at Washington University School of Medicine in St. Louis and a former Englund trainee, was quoted in a Johns Hopkins press release, saying, "Paul was a brilliant and creative scientist whose excitement and enthusiasm for research never flagged … He was also an inspiring and supportive mentor, who taught generations of trainees to do rigorous and collegial science."

Englund was elected as a fellow of the American Association for the Advancement of Science in 2000 and elected to the National Academy of Sciences in 2012.

He is survived by his wife, Christine Schneyer Englund; his two brothers, Robert J. Englund and Donald R. Englund; and his four children, Suzanne Elizabeth Pykosh, Maria Jean Englund, Jennifer Insley–Pruitt and Peter Insley.

Send us your news

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

CONTINUED FROM PAGE 2

and a joint umbrella graduate program. Thus, each department maintains its culture, but cross-departmental interactions are encouraged.

Similarly, the American Society for Biochemistry and Molecular Biology sometimes grapples with the challenge of representing broad areas of molecular science.

I've heard members complain that the annual meetings are too large and do not include enough sessions on whatever topic they are interested in. In past meetings, we highlighted specific themes, sort of meetings within the meeting. These themes kept the meeting interesting to subgroups within the society, but people ended up interacting mostly within their small areas of interest. This downside was offset by larger lectures and award presentations that cut across disciplines and were attended by most of the membership.

The ASBMB is the victim of its own success. It used to be that nearly everyone in a biochemistry or molecular biology department belonged to the American Society of Biological Chemists (the society's name prior to ASBMB) and went to the annual meeting. With time, the ASBMB begat focused societies such as the American Society for Cell Biology, the Society for Neuroscience, the Protein Society and the RNA Society, some of which are now larger than the ASBMB. Many biochemists and molecular biologists now identify themselves by the biological problems they study. A hardcore biochemist who works with lymphocytes might call himself or herself an immunologist, or researchers working on biochemical processes in neurons might call themselves neuroscientists, but, in reality, they are still biochemists.

As science evolves, does the ASBMB need to rethink its organizational structure to remain relevant?

Several years ago, to prevent the lipid community from leaving the ASBMB and forming its own society, Greg Petsko, then the president of the ASBMB, together with Dan Raben, a lipids researcher at Johns Hopkins University, helped create the Lipid Research Division, or LRD, of the ASBMB. This subgroup has been successful and active and has helped keep this field among the strongest groups within our society. However, to date, the LRD is the only such division within the ASBMB.

Most major scientific societies have created formal divisions as part of their governance structures. Perhaps it's time for the ASBMB to consider creating, for example, the Omics and Systems Biology Division, the Metabolism Division, the Glycobiology and Extracellular Matrix Division, the Enzymology Division, and so on. Of course, the members of these groups and society leadership would need to determine what each division should be called and what its focus and mission would be.

Each division, along with ASBMB journals, could play a direct role in programming the national meeting and/or small meetings so its interests are not forgotten. The national meeting could retain major lectures and educational activities of interest to all members, but we could give each division a block of time in which to organize activities of interest to members in their fields.

Should the ASBMB create formal divisions to make itself more attractive to members? Thoughtful feedback is welcome.

Gerald Hart (gerald.hart@uga.edu) is a professor and Georgia Research Alliance eminent scholar at the University of Georgia and president of the ASBMB.

Upcoming ASBMB events and deadlines

APRIL

National Minority Health Month
4 Evolution and Core Processes in Gene Expression registration deadline
6–9 ASBMB annual meeting
19 IMAGE application deadline
29 Communication Course applications open
30 Elections close

MAY

National Stroke Awareness Month
1 PROLAB deadline
9–12 Evolution and Core Processes in Gene Expression
16 Award nominations close

JUNE

Communications Summer Course begins (First week)
1 Marion B. Sewer Distinguished Scholarship for Undergraduates deadline
4 Transforming Education in the Molecular Life Sciences poster deadline
13–15 IMAGE grant writing workshop
25–28 Transforming Education in the Molecular Life Sciences

ASBMB

Julian B. Marsh (1926 – 2018)

By Edward A. Fisher, Michael C. Phillips, Daniel J. Rader & Ernst J. Schaefer

Julian B. Marsh, a pioneer in lipid and lipoprotein metabolism research and a past editor-in-chief of the Journal of Lipid Research, died Nov. 16 at the age of 92. He was a beloved mentor and colleague to many investigators in the lipid field, including the authors of this tribute.

Born in New York City in 1926, Julian attended the High School of Music and Art in Harlem. He moved to Philadelphia to study chemistry as an undergraduate and then medicine at the University of Pennsylvania; he earned his M.D. at the age of 21. After postdoctoral work in biochemistry in David Drabkin's laboratory at Penn, he spent a year at the Walter Reed Army Research Institute.

Julian joined the faculty of the school of medicine at the University of Pennsylvania in 1954 as an assistant professor of biochemistry. He was awarded a Guggenheim Fellowship in 1960 to study at the Medical Research Council Laboratory in London, where he investigated fatty acid metabolism with Anthony James. Back at Penn, he became a professor in 1963 and was chairman of the biochemistry department at the dental school from 1965 to 1975.

With Drabkin and other colleagues, Julian published a series of papers on the effects of nephrosis on lipoprotein metabolism, an interest he maintained for much of his career. Another longstanding interest was the biosynthesis of lipoproteins, and, in collaboration with Arthur Whereat, he used rat liver slices and perfusates to investigate this topic. A 1959 paper in the Journal of Biological Chemistry reported the first measurement of the rate of synthesis of cholesterol in secreted lipoproteins. Julian also helped develop a simple charring method for rapid quantitation of lipids (for example, in column chromatography fractions); this work with David Weinstein was published in 1966 in the Journal of Lipid Research.

PHOTOS COURTESY OF MICHAEL C. PHILLIPS

Julian B. Marsh, pictured here in 1983, served as editor-in-chief of the Journal of Lipid Research from 1983 to 1986.

> **"Julian was the true embodiment of a gentleman and a scholar. He leaves a legacy of groundbreaking scientific discovery in lipid and lipoprotein metabolism and a community of scholars around the world whom he trained, mentored and provided with collaborative advice."**

Julian moved to the Medical College of Pennsylvania in 1975 to chair the department of physiology and biochemistry, a position he held until 1984. He and George Rothblat recruited faculty to form what became well known as the Philadelphia Lipid Group, which was supported for 35

Julian B. Marsh stands front and center in this group photo taken at the 1982 Lipoprotein Metabolism Gordon Research Conference in New Hampshire, which he chaired.

years by grants from the National Heart, Lung and Blood Institute and other institutes of the National Institutes of Health.

At the Medical College of Pennsylvania, Julian mentored three of the authors and promoted our interests in biomedical research in the lipoprotein field.

Michael C. Phillips: *Julian recruited me from England and facilitated my entry into the U.S. lipoprotein research community. We were members of the same research group, and I benefited from many enriching discussions with Julian about lipoprotein metabolism and also from his insightful comments on draft manuscripts.*

Edward A. Fisher: *Julian recruited me as a junior faculty member, actively mentored me and continued to collaborate with me even after I moved to New York, leaving a record of multiple joint publications. Shortly after Julian returned from a sabbatical with Paul Nestel in Australia, a leader in the effects of fish oils on very low-density lipoprotein production, he infected me with his enthusiasm and helped get my studies in this area off the ground. This included both direct mentorship and sharing his wide network of scientific colleagues; for example, I visited Rochester to learn how to make primary rat hepatocytes and perform pulse-chase analyses of protein synthesis and degradation from Charles and Janet Sparks. With characteristic generosity, Julian ceded leadership of his project on a Philadelphia Lipid Group grant to me, resulting in a series of papers showing how fatty acids in fish oils regulated the post-translational degradation of apolipoprotein B, or apoB.*

Daniel J. Rader: *As a first-year medical student with no experience in biomedical research, I fortuitously decided to spend a summer working in the laboratory of Julian and his collaborator Charles Sparks. A focus of their research was the differential metabolism of apoB100 and apoB48 (which theyreferred to in conversation as big B and little B) well before the discovery of apoB mRNA editing. Julian was a remarkably attentive mentor, ensuring that not only the scientific concepts but also the methodologic details (in this case, of rat liver perfusion, endogenous labeling, and separation of big B and little B) were taught effectively and learned firmly. Julian permitted me to continue working in his laboratory*

throughout medical school and without a doubt prompted my entry into the lipoprotein field.

Julian also supervised M.D./Ph.D. candidate Joseph Bass on a nephrotic syndrome project that led to several publications on apoE and apoA-I in nephrosis. Bass is now a renowned molecular endocrinologist at Northwestern University.

In collaboration with Dennis Cryer, Paul Coates and Jean Cortner at the Children's Hospital of Philadelphia and Penn, Julian helped establish the methodology for studying human apolipoprotein metabolism using endogenous stable isotopic labeling, initially publishing this work in the JLR in 1986. Endogenous labeling with stable isotopes allows for the simultaneous kinetic analyses of multiple apolipoproteins and permits studies in children and women of child-bearing age. The methodology pioneered by Julian and his colleagues was adopted rapidly by many other investigators and has been used extensively to understand lipoprotein metabolism in humans.

Soon after Julian retired from the Medical College of Pennsylvania in 1998, the Julian Marsh Faculty Scholar Award was created. Now an annual award at Drexel University College of Medicine (which includes the legacy of the Medical College of Pennsylvania), it has gone to 15 distinguished winners to date.

After he retired, Julian moved to Boston to be near his daughter and began a collaboration with the fourth author of this tribute.

Ernst J. Schaefer: *Julian became a visiting scientist in the lipid metabolism laboratory at the Human Nutrition Research Center on Aging at Tufts University. At weekly laboratory meetings and journal clubs, he never hesitated to provide his insights, to make presentations and to provide suggestions with regard to our lipoprotein metabolic studies. He greatly helped Alice Lichtenstein, Stefania Lamon-Fava and me in carrying out human apolipoprotein metabolic studies. His former research assistant Margaret Diffenderfer took over the responsibilty for the technical aspects of these studies.*

Colleagues marked Julian's 80th birthday in 2006 when a symposium on high-density lipoprotein metabolism was held at Tufts University. During a special luncheon for his 90th birthday in 2016, many former colleagues called to congratulate him.

the viola for many years in the Philadelphia Doctors Orchestra and, later, in the Wellesley Symphony Orchestra. He played tennis at a very high level, such that at many Lipoprotein Gordon Research Conferences, much younger opponents were seen to be losing while doing all the running.

Julian was the true embodiment of a gentleman and a scholar. He leaves a legacy of groundbreaking scientific discovery in lipid and lipoprotein metabolism and a community of scholars around the world whom he trained, mentored and provided with collaborative advice. He is remembered with great admiration and grateful affection.

He was predeceased by his wife, Priscilla, and is survived by a daughter, Gail, and two grandchildren.

"Julian was a man of character, warm and compassionate. His advice was invariably wise and often leavened by humorous puns. Always willing to help solve any problem, scientific or other, Julian was an oasis of calm and sage advice, focused on pragmatic problem-solving."

Julian was a man of character, warm and compassionate. His advice was invariably wise and often leavened by humorous puns. Always willing to help solve any problem, scientific or other, Julian was an oasis of calm and sage advice, focused on pragmatic problem-solving. After years of seeing a procession of people from graduate students to department chairs come to his office, Peg Diffenderfer commented he was truly a "Mr. Fix-it."

His over 100 publications, many of which have become points of reference, reflect Julian's scientific abilities. He was editor-in-chief of the JLR from 1983 to 1986 and served as chair of the Lipoprotein Metabolism Gordon Research Conference in 1982 and chair of the American Heart Association Arteriosclerosis Council from 1986 to 1988. His teaching was of the highest quality, and in 1977 he won the Lindback Award for excellence in teaching.

In addition to his scientific prowess, Julian possessed exceptional musical and athletic abilities. He played

The authors thank Margaret Diffenderfer and Barbara Engle for valuable research for this article.

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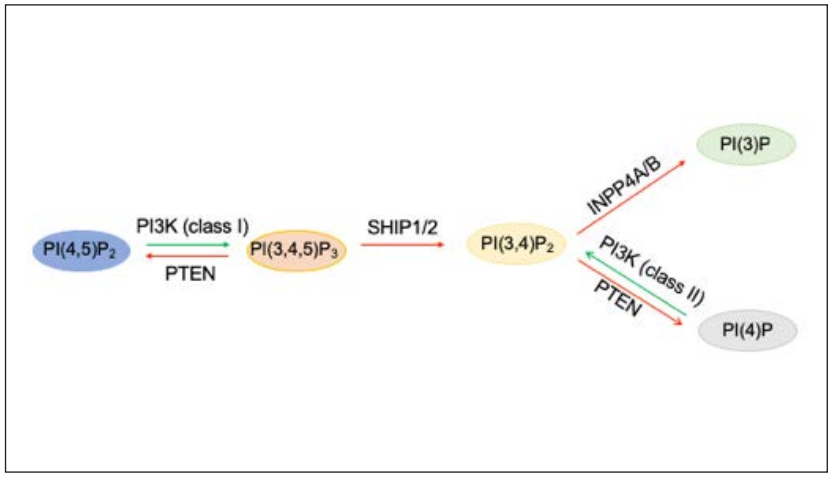
$PI(3,4)P_2$: a versatile lipid second messenger

By Hui Liu & Alex Toker

The phosphoinositide 3-kinase, or PI3K, signaling pathway has been studied intensively since its discovery in the mid-1980s and has been found to play a critical role in the regulation of normal cellular physiology. The pathway is dysregulated in pathophysiologies such as cancer and diabetes.

Much of this work focused on the lipid product of PI3K activity, PIP_3, or $PI(3,4,5)P_3$, derived from the phosphorylation of the membrane phosphoinositide $PI(4,5)P_2$. PIP_3 is a true lipid-derived second messenger: It is absent in unstimulated cells, it is synthesized rapidly at sites of PI3K activation at the plasma membrane, it is removed by the action of the lipid phosphatase and tumor suppressor PTEN, and it initiates PI3K signal relay by recruiting effector proteins such as the serine/threonine protein kinase Akt and downstream nodes such as the mTOR pathway.

By contrast, a separate lipid product of PI3K, $PI(3,4)P_2$, remained largely out of the limelight. Recent studies point to an important role for this neglected lipid second messenger, with some surprises. Unlike PIP3, $PI(3,4)P_2$ can be generated by more than one route of synthesis. 5′ phosphoinositide phosphatases can dephosphorylate PIP_3 to generate $PI(3,4)P_2$. Alternatively, class II PI3-kinases can use PI4P as a substrate to generate $PI(3,4)P_2$. And $PI(3,4)P_2$ can be degraded by lipid phosphatases such as PTEN and INPP4B — tumor suppressors frequently inactivated in human cancers.



HUI LIU

In phosphoinositide metabolism, PIP_3, labeled $PI(3,4,5)P_3$, is generated by phosphorylation of the precursor $PI(4,5)P_2$ by the action of class I PI3-kinases, and the reverse reaction is generated by the phosphatase PTEN. SHIP1/2 lipid phosphatases dephosphorylate PIP_3 to generate $PI(3,4)P_2$, which is degraded further by INPP4A/B to PI3P. Class II PI3-kinases also can generate $PI(3,4)P_2$ by phosphorylating PI4P.

$PI(3,4)P_2$–binding proteins, such as TAPP1/2 and lamellipodin, link PI3K/$PI(3,4)P_2$ to cytoskeletal remodeling. However, many proteins with modular domains that directly bind to PIP_3, including Akt, also bind to $PI(3,4)P_2$. This has hampered identification of any potential unique signaling roles for $PI(3,4)P_2$. Advanced high-resolution live cell imaging and microscopy show that $PI(3,4)P_2$ is localized predominantly at early endosomes, although some plasma membrane localization is also evident. In growth factor signaling, this pool of $PI(3,4)P_2$ seems to be generated predominantly by the action of phosphatases acting on PIP_3. In contrast, PIP_3 is localized exclusively at the plasma membrane, where class I PI3-kinases are activated.

These discrete intracellular pools of $PI(3,4)P_2$ and PIP_3 have remarkable consequences. In mammals, three Akt isoforms exist: Akt1, Akt2, and Akt3. Genetic ablation studies have shown that Akt isoforms play a non-redundant role both in normal development and in diseases such as cancer. Although a few isoform-specific substrates have been identified, of the 200-plus Akt substrate proteins identified, most are not unique to any one Akt. So how is specificity achieved? Recent research shows that Akt1 and Akt3 are activated specifically by the plasma membrane PIP_3 pool, whereas Akt2 seems to be exclusively localized and activated by the endomembrane pool of $PI(3,4)P_2$, at early endosomes

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A change in labs reveals a key to cataract formation

Researchers studying lens crystallin proteins describe how two types of damage interact

By Laurel Oldach

Researchers working to understand the biochemistry of cataract formation have made a surprising finding: A protein that was long believed to be inert has an important chemical function that protects the lens of the eye from cataracts.

The lens is made up of cells packed with structural proteins called crystallins that form a dense gel. The gel's optical properties — such as its transparency and the way it refracts light — help focus light onto the retina. But when crystallin proteins clump together, they scatter incoming light, forming cloudy deposits known as cataracts.

According to Harvard postdoctoral fellow Eugene Serebryany, lead author on a study in the **Journal of Biological Chemistry**, researchers long believed that crystallin proteins were chemically inert; except for aggregating over time, the proteins were not supposed to interact much with other proteins.

As a graduate student at the Massachusetts Institute of Technology, Serebryany used a mutant form of gamma-crystallin to mimic the damage ultraviolet light causes the protein. While studying how that mutation leads crystallin to clump up, Serebryany found something surprising: The mutant was more likely to aggregate if wild-type, or undamaged, protein was also present.

Eugene Shakhnovich of Harvard, who collaborated with Serebryany and his graduate adviser, Jonathan King, on the earlier studies, described the finding as "fairly striking."

ACELA 2038/WIKIPEDIA

Though the labs where Eugene Serebryany did his graduate and postdoctoral research were just two stops apart on the subway, he had trouble replicating his experiments when he moved. Figuring out what had changed led to a discovery in cataract formation.

"If you had these damaged proteins in a test tube, they would not aggregate for a while," Shakhnovich said. "If you had the wild-type protein, it would not aggregate forever. But then, when you mix the two, you see rapid and precipitous aggregation."

Somehow, the healthy version of a protein everyone had thought was inert was causing a slightly damaged version to get much worse — and fast. Shakhnovich hired Serebryany at Harvard to continue studying how a supposedly inactive protein could cause this effect.

But Serebryany had trouble replicating the results of his own experiments. "It's a different place, it's a

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and also early lysosomes. In the latter case, upon nutrient deprivation, class II PI3-kinases produce $PI(3,4)P_2$ at the lysosome, leading to suppressed mTORC1 activity. Class II PI3-kinases also been have implicated in the formation of clathrin-mediated endocytic cups leading to vesicle fission, a process shown to be mediated by $PI34P_2$.

A picture begins to emerge: Discrete pools of PIP_3 and $PI(3,4)P_2$ selectively activate Akt isoforms leading to presumably unique substrate phosphorylation patterns and downstream effects, although this has yet to be demonstrated rigorously. These observations begin to ascribe a critical role for $PI(3,4)P_2$ in cell biology and also explain the roles of Akt isoforms in phenotypes associated with disease.

Questions remain about the intracellular localization of PI3K lipid second messengers and their effectors. The answers will come from continued advances in imaging technologies using live cells and tissues, giving a more complete picture of how specificity is achieved in this versatile lipid signaling pathway.

Hui Liu (hliu5@bidmc.harvard.edu) is an instructor in pathology and a researcher in the Toker lab at Beth Israel Deaconess Medical Center.

Alex Toker (atoker@bidmc.harvard.edu) is a professor in the department of pathology and chief of the division of signal transduction in the departments of medicine and pathology and the cancer center at Beth Israel Deaconess Medical Center, Harvard Medical School, and a Journal of Biological Chemistry associate editor. Follow him on Twitter @alex_toker.

CONTINUED FROM PAGE 11

different set of instruments, a slightly different set of procedures. You see where this is going," he said. "All of a sudden, experiments that were highly reproducible before were giving a lot of variability."

In the Harvard lab, the wild-type crystallin sometimes caused mutant crystallin to aggregate, and sometimes it didn't.

"Obviously, if there is suddenly variability, there is a hidden variable that we didn't see before," Serebryany said. He set up a series of experiments to try to pinpoint that variable.

Close comparison of the molecular weights of batches of the wild-type protein that caused or failed to cause the mutant to clump revealed a difference equivalent to the weight of two hydrogen atoms. This gave the researchers a hint that the protein's redox state — whether two sulfur atoms were bound to one another or to hydrogen atoms — made a difference.

"By carrying out isotopically resolved mass spectrometry experiments, we got more than we bargained for," Serebryany said. "Not only did the aggregation-prone mutant acquire one internal disulfide bond per molecule during the aggregation reaction, but the aggregation-promoting wild-type protein lost its disulfide at the same time."

By mutating crystallin's sulfur-containing cysteine amino acid residues one by one, Serebryany found that two residues close together on the surface of the protein acted as a kind of switch. When they bound, forming a disulfide bond, crystallin was able to push damaged molecules toward aggregation. When each was bound to a hydrogen atom, wild-type crystallin was inert.

How could one bond between amino acids on the surface of this protein make it drive other proteins to aggregate?

The team found that although the disulfide bond forms easily, it strains the protein's structure. This made each molecule likely to pass along the disulfide bond to another nearby, receiving two protons in return. In this way, the disulfide bond could be passed constantly around among crystallin protein molecules like a hot potato.

Given a whole population of undamaged crystallin proteins, that could go on indefinitely. But if one protein was already a little damaged, the authors showed, it caught the hot potato with a different set of cysteines, which were less able to pass it on. This drove the damaged protein to aggregate.

According to Shakhnovich, the team is working on peptide treatments that might keep the hot potato from reaching damaged proteins. Serebryany hopes such peptides "could actually soak up some of those disulfides and delay the time that it takes to form the more aggregation-prone species."

That could lead to slower cataract formation for patients.

DOI: 10.1074/jbc.RA118.004551

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Proteogenomics researchers zero in on causes of immune disease

By Laurel Oldach

Routine clinical sequencing has given doctors unprecedented insight into genetic disorders. However, genomics fails to diagnose up to half of patients who are tested. That's the problem that scientists at universities in Munich and Berlin tackled in a recent study in the journal **Molecular & Cellular Proteomics**. With samples from patients in four countries and a novel database on the neutrophil proteome, Christoph Klein and colleagues diagnosed two children with severe congenital neutropenia using mass spectrometry-based proteomics when typical sequencing had failed.

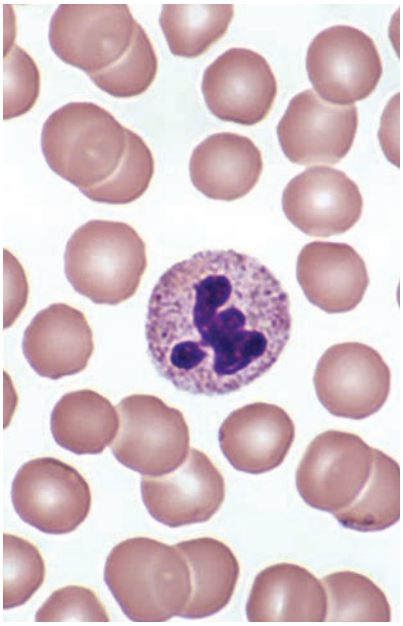
"There are very few examples of people who use multiple omics to investigate rare diseases … (but) I think this is the future of personalized medicine," said Klein, a physician and director of the Children's Hospital of the University of Munich.

The patients' disease affects their neutrophils, white blood cells packed with toxic proteins to deploy against bacteria. When neutrophil development is disrupted, which Klein estimates happens to 1 in 200,000 newborns, every bacterial or fungal infection can become a life-threatening medical emergency.

Klein's lab has studied rare genetic causes of neutropenia for years, but proteomics was a new field for the group. Postdoctoral researcher Sebastian Hesse met proteogenomics expert Juri Rappsilber at a conference, sparking a collaboration to study the proteome and transcriptome of neutrophil granulocytes.

Neutrophils are post-mitotic and very fragile, which makes studying them a challenge.

"You can think of them as suicide bombers," Klein said, explaining that the cells are full of granules loaded with proteases that make retrieving other proteins a challenge. Hesse painstakingly developed a protocol to collect intact proteins and mRNA from healthy neutrophils.



GUY WATERVAL /WIKIMEDIA COMMONS

Neutrophils, like the one in the center of this photo, are loaded with granules full of proteases that make them difficult to study.

Using mass spectrometry, scientists led by co-first author Piotr Grabowski in the Rappsilber lab at the Technical University of Berlin analyzed the cells' proteome. When they added transcriptomic data, they found strikingly little correlation with the proteome, so they chose to focus on protein in patient samples.

Next, Hesse collected neutrophils from 16 patients with congenital neutropenia. Some were in Germany; to find others, he had to travel.

"These patients are from various parts of the world — that's another unique challenge of working with rare diseases," Klein said. "Sebastian flew to Iran and Turkey, in a collaborative effort with the pediatric hospitals there."

Back at home, after processing and freezing the samples, Hesse handed them off to Grabowski; the proteomics scientists repeated the analyses to see what proteins had changed in the patients' blood.

The team used abnormal protein profiles to guide the diagnosis of two patients with inconclusive exome sequencing results.

In one child's case, a pseudogene made it difficult to identify mutations in the protein-coding gene; in the second, incomplete coverage by exome sequencing had missed a key point mutation. Data on protein abundance in each patient led the researchers to run more specific genetic tests that proved conclusive.

"This highlights (that) even if you have highly controlled pipelines for genetic studies, there's always a risk that you are not 100 percent correct," Klein said.

The researchers did not set out to make diagnoses from patient proteomes, but the study highlights the value proteomics data can add.

"Cellular proteome studies are not in routine clinical use at this point," Klein said. "But … I think there will be huge potential for proteome analysis at a very low cost down the road."

The team plans to expand its studies to other patients with immune deficiencies, looking for new genetic mechanisms of disease.

DOI: 10.1074/mcp.RA118.001141

‘Almost like a Velcro ball’

Proteome study illuminates eclectic nature of high-density lipoprotein

By Laurel Oldach

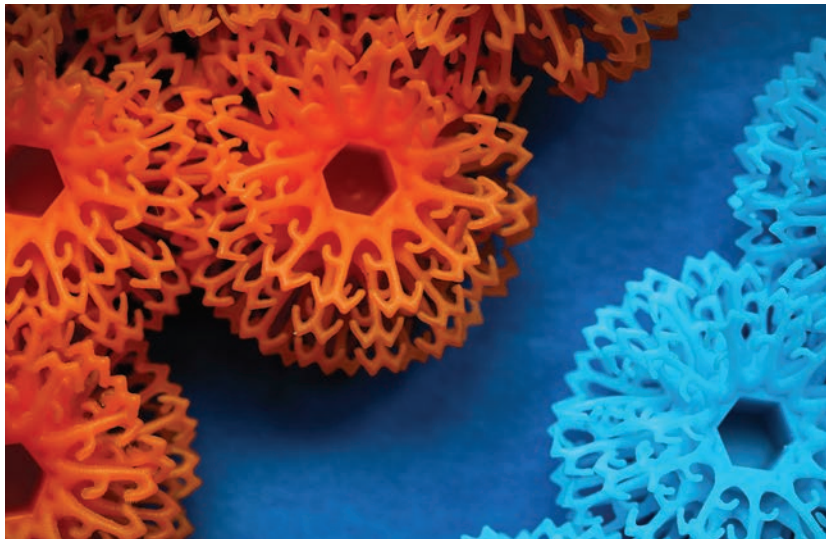
Cholesterol carried in high-density lipoprotein, or HDL, particles is called the good cholesterol because people whose levels are high have a lower risk of developing heart disease. That link, established in 1977, has been confirmed over and over.

But in the last 15 years, a string of drug candidates that failed to raise HDL, along with genetic studies that dispute a causal link, have led researchers, including Nathalie Pamir of the Oregon Health and Sciences University, to reexamine why HDL is a good predictor of cardiac mortality.

“Around 2010, the belief was that HDL doesn’t matter with regard to cardiovascular disease risk,” Pamir said. “But now, we understand that there’s more to HDL than HDL cholesterol level. Now, the more we dig, the more exciting biology we discover.”

In the **Journal of Lipid Research**, Pamir and colleagues report on their work with an underappreciated HDL component: its proteins. In a genetic study of the HDL proteome, the team showed that a mixture of heritable and environmental factors drives variation in protein makeup of HDL particles. The approach may help unpack the lipoproteins’ puzzling relationship to cardiovascular mortality.

Pamir isolated and analyzed the proteome of HDL particles from the Hybrid Mouse Diversity Panel. The panel, developed in the University of California, Los Angeles lab of senior author Jake Lusis, includes both common lab strains and hybrid strains, each inbred to homozygosity. The hybrid strains remix the same core gene pool and offer an unlimited supply of genetically identical mice.



The team measured some clinical features of each healthy chow-fed mouse, such as HDL’s ability to suction cholesterol out of macrophages in the plaques in the blood vessel.

“We interrogated as many traits as we could and treated each protein that gets associated with HDL as a trait,” Pamir said.

In a process known as quantitative trait locus mapping, they correlated each trait they measured to the known genetic landscape of the hundreds of mice to reveal genetic loci that affect each protein or function.

The team found single-nucleotide polymorphisms linked to cholesterol efflux capacity and several linked to the presence or abundance of certain proteins. Correlation between proteins hinted at complex interactions within the HDL proteome.

According to Lusis, this study is “the first time where you can see how genetics … could paint a really useful picture of how the different HDL components interact.”

While some proteins were present in almost every strain, other components varied among strains or even among genetically identical individuals. The team interpreted the latter group as responding to environmental and metabolic changes in each mouse. For Pamir, they confirm a new way of thinking about HDL’s activity.

“It’s almost like a tiny Velcro ball that is rolling on surfaces, infiltrating intercellular space … and sampling from the environments that it’s been in,” she said.

Exposure to microinflammations caused by changes as small as social hierarchy within a cage of mice may change what HDL picks up.

The next step is to see whether the team’s finding generalizes to human HDL, Pamir said. “At the end of the day, a mouse is a mouse is a mouse.”

DOI: 10.1194/jlr.M090555

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JLR launches junior associate editors program

By Laurel Oldach

The **Journal of Lipid Research** welcomes its first cohort of junior associate editors.

The four assistant professors, chosen from nominations made by the journal's associate editors, are partnering with senior editors to learn how to manage the peer-review process.

"Engagement with the best and brightest young investigators in the lipid field is an investment in the future of JLR," Co-Editor-in-Chief Kerry-Anne Rye said.

The new editors — two Ph.D.s and two M.D.s — already have accrued accolades and earned the community's trust. Two are recipients of the JLR Junior Investigator Award. One won the Journal of Biological Chemistry/Herb Tabor Young Investigator Award. Another is on the Deuel Conference board.

Co-Editor-in-Chief Nicholas Davidson said the program's mission is two-fold: "It's demystifying the peer-review process and also teaching what we hope are going to be the next generation of full associate editors."

The new editors are serving a two-year term from March 1, 2019, to Feb. 28, 2021.

They also will contribute a new type of article to the journal — commentaries on exciting lipid research published elsewhere.

Junior associate editors of the JLR

Raymond Blind
Vanderbilt University School of Medicine
Research area: Nuclear lipid signaling and structure
Mentor: George Carman

Gissette Reyes-Sofer
Columbia University Irving Medical Center
Research area: Regulation and metabolism of Lipoprotein(a)
Mentor: Henry Ginsberg

Brandon Davies
University of Iowa Carver College of Medicine
Research area: Lipid metabolism in endothelial cells
Mentor: Jean Schaffer

Rotonya Carr
University of Pennsylvania Perelman School of Medicine
Research area: Metabolism and lipid droplets in liver disease
Mentor: Nick Davidson

From the journals

By Nathalie Gerassimov, Jonathan Griffin, Dawn Hayward & Sasha Mushegian

We offer a selection of recent papers on a variety of topics from the **Journal of Biological Chemistry,** the **Journal of Lipid Research,** and **Molecular & Cellular Proteomics**.

Blood and aggression in crayfish

Transglutaminase is a cross-linking enzyme involved in diverse cellular functions including blood coagulation and communication between cells and the extracellular matrix. Different isoforms of the enzyme have different substrate specificities and are expressed differentially across tissues and cell types. Kingkamon Junkunlo and colleagues at Uppsala University examined the role of transglutaminase in hematopoiesis in crayfish. They found that inhibiting transglutaminase not only increased the number of circulating blood cells but also unexpectedly made crayfish move less and display less aggressive behavior. This link between hematopoiesis and the nervous system controlling behavior may provide insights into diseases involving defects in motor functions. The study was published in the **Journal of Biological Chemistry**.

Early markers of Alzheimer's disease

Alzheimer's disease is characterized by neurodegeneration, including synapse loss, and preclinical markers of Alzheimer's and other neuronal disorders have been elusive. These markers someday could be used to diagnose patients before symptoms start.

Alberto Lleo, Olivia Belbin and colleagues at the Hospital de la Santa Creu i Sant Pau in Barcelona, Spain, used a mass spectrometry-based proteomic technique to determine which proteins in cerebrospinal fluid, or CSF, samples change prior to the onset of Alzheimer's symptoms. Their results were published in the journal **Molecular & Cellular Proteomics**.

The researchers first compared CSF proteins in Alzheimer's patients to those in people without the disease. Next, they narrowed the set down to CSF proteins from synapses, identified by comparing the data set to synaptic proteins established in the literature. Nine were chosen for monitoring changes in expression levels in Alzheimer's patients.

Using a proteomics technique called selected reaction monitoring, the researchers found that while some marker proteins were high throughout the onset of disease, several proteins were lower in CSF from presymptomatic patients than in healthy individuals but then were elevated where neurodegeneration occurred. Lleo and colleagues described this as a "biphasic profile" and concluded that those decreased proteins could be early biomarkers of synapse loss that could be used to identify individuals with Alzheimer's disease before irreversible neurodegeneration becomes widespread.

DOI: 10.1074/mcp.RA118.001290

The new old cause of gallstones

A person living in the U.S. has a 10 to 20 percent chance of developing stones in their gallbladder. Yet up to 80 percent of affected individuals will have no symptoms. The remaining 20 percent may experience biliary pain or other complications requiring costly interventions.

In a paper in the **Journal of Lipid Research**, Mats Rudling and colleagues at the Karolinska Institute, Sweden, describe new insight into the cause of gallstones.

The stones develop when gallbladder bile is supersaturated with cholesterol, one of three major lipid components in bile, with bile acids and phospholipids being the other two. Traditionally, it is thought that excessive hepatic secretion of cholesterol is the main cause for such supersaturation. Rudling's team used unpublished data from a previous study to show that a shortage of bile acids is probably the major and most common reason why gallbladder bile is supersaturated with cholesterol in gallstone patients. Furthermore, the researchers used 13 previously published studies from 11 countries to corroborate their findings. Future studies are needed to investigate the cause(s) of reduced bile acid levels.

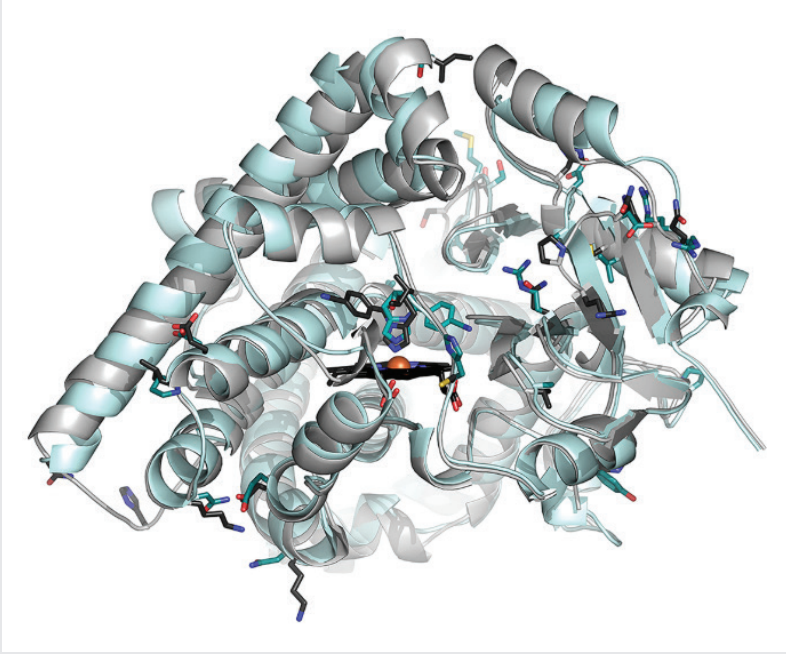
DOI: 10.1194/jlr.S091199

Discovering a new pool of iron

Like many elements, iron is a double-edged sword. It is an essential cofactor but can pose a danger to cells by catalyzing the formation of reactive oxygen species. In a paper in the **Journal of Biological Chemistry**, Joshua Wofford and colleagues at Texas A&M University describe how they revised previous estimates of iron usage in cells by using multiple methods to inventory total iron content and characterize the distribution of different iron species in Escherichia coli. They discovered a previously unknown low-molecular-mass Fe(II) pool in the cytosol and suggested that this pool might be prevented from reacting with oxygen by a shield of membrane-bound iron-rich respiratory complexes.

DOI: 10.1074/jbc.RA118.005233

Distinguishing near-identical enzymes to help treat Cushing's disease



BRIXIUS-ANDERKO ET AL.

A structural comparison of CYP11B1 (cyan) and CYP11B2 (gray). Darker sticks represent nonidentical amino acids.

The stress hormone cortisol is produced in the adrenal glands but has important duties throughout the body, from nutrient metabolism to immune suppression. Excessive production of this hormone can have devastating consequences, however, such as Cushing's disease, with symptoms that include weakened immune responses, rapid weight gain and osteoporosis.

In a study in the **Journal of Biological Chemistry**, Simone Brixius–Anderko and Emily Scott at the University of Michigan shed light on unique structural features of the cortisol-producing enzyme cytochrome P450 11B1, or CYP11B1, that could aid researchers in designing selective drugs for Cushing's disease treatment.

For years, researchers have thought of CYP11B1 as a prime drug target for Cushing's; however, 93 percent of the enzyme's amino acid sequence is shared with CYP11B2, which is essential for the production of aldosterone, a hormone central to the regulation of blood pressure. Structural differences between these close relatives have not been determined, so researchers have difficulty developing drugs that will specifically inhibit CYP11B1 and reduce cortisol levels without also disrupting CYP11B2's aldosterone-producing activities.

Using an X-ray-based technique, the researchers found the crystal structure of each enzyme bound to fadrozole, a breast cancer drug that inhibits the estrogen-producing CYP19A1. They identified considerable differences between the orientation and placement of certain residues within the enzymes. Because of these distinctions, the enzymes favored mirrored shapes, or enantiomers, of the drug. CYP11B1's structure accommodated the shape of the left-handed, or S, enantiomer of fadrozole, while CYP11B2 was a better fit for the right-handed version.

By identifying CYP11B1's strong preference for the S enantiomer, this study could aid in the development of more selective inhibitors that would treat Cushing's disease without causing unwanted effects, such as reduced aldosterone, in patients.

DOI:10.1074/jbc.RA118.006214

—Jonathan Griffin

DNA repair pathway resolved

DNA repair is a critical function, and cells have multiple ways of carrying it out. One efficient method of DNA repair is transcription-coupled repair, which is carried out as DNA is being transcribed. Previous research provided conflicting evidence as to whether transcription-coupled repair worked on DNA sequences encoding ribosomal RNA; this was unclear because rRNA and protein-coding genes are transcribed by different RNA polymerases in eukaryotes. Yanyan Yang and colleagues at the University of North Carolina used excision repair sequencing with single-nucleotide resolution to investigate this question. They found that transcribed and non-transcribed sections of ribosomal DNA are repaired at the same rates, suggesting that ribosomal DNA is repaired by global repair mechanisms, not transcription-coupled repair. The study was published in the **Journal of Biological Chemistry**.

DOI: 10.1074/jbc.RA118.006121

Glycoproteins and food poisoning

The gastrointestinal bacterium Campylobacter jejuni, a major cause of food poisoning, causes abdominal cramps and inflammation and is transmitted through contaminated water or poultry. C. jejuni uses a sophisticated system to attach oligosaccharide chains to the nitrogen in some amino acids. The system involves multiple steps carried out by the pgl cluster, which codes for proteins that act as a glycoprotein assembly line. Researchers at the University of Sydney generated C. jejuni bacteria without a key gene in this cluster and performed proteomic analysis to determine the importance of N-glycosylation in pathogenesis. Their work was published in the journal **Molecular & Cellular Proteomics**.

Researchers found that without the pglB protein, C. jejuni no longer could recover from extreme cold or heat as normal bacteria could. In addition, C. jejuni switched which amino acids it used most, decreased levels of certain transport proteins and could no longer migrate toward some metabolic substrates.

Without glycosylation, certain proteins within the glycoproteome were downregulated, and an enzyme involved in utilization of nitrogen was less active. This was specific; a strain without the pgl cluster had restored activity of this enzyme when researchers added the pgl cluster back. Because protein glycosylation in C. jejuni was found to affect many pathways, it could be a way to stop this gastrointestinal bacterium.

DOI: 10.1074/mcp.RA118.001199

How an upstream enhancer regulates a protein's expression

GPIHBP1 is a protein that shuttles lipoprotein lipase, or LPL, from capillary endothelial cells to capillary lumen, where it can process triglyceride-rich lipoproteins. Lack of GPIHBP1 prevents LPL relocation to the capillary lumen, impairing plasma triglyceride hydrolysis and leading to severe hypertriglyceridemia (high blood levels of triglycerides — a risk factor for atherosclerosis).

In a paper published in the **Journal of Lipid Research**, Christopher Allan and colleagues at the universities of California, Michigan and Arizona describe an upstream enhancer that regulates GPIHBP1 expression in a tissue-specific manner. Deletion of the relevant DNA segment using CRISPR/Cas9 genome editing reduced GPIHBP1 expression by more than 90 percent in the liver and by about 50 percent in the heart and brown adipose tissue, but that was wasn't enough to block LPL relocalization to the capillary lumen and cause hypertriglyceridemia. Future studies may investigate why the enhancer deletion had such strikingly different effects in the liver versus the heart and focus on other unknown players in the regulation of GPIHBP1 expression. It is likely that other GPIHBP1 enhancers were present, which contributed to the tissue-specific changes in expression.

DOI: 10.1194/jlr.M091322

Finding ligands using phage

USP11 is a human deubiquitinase that regulates DNA double-strand break repair and cellular stress responses; it is dysregulated in pancreatic and ovarian cancers. Unlike other ubiquitin-specific proteases, USP11's peptide-binding sites were unknown. Anastasios Spiliotopoulos and colleagues at the University of Nottingham combined phage display library screening with next-generation sequencing to discover USP11-interacting peptide motifs. They found a binding site that modulates USP11's DNA repair function and developed a ligand that could be used to arrest the cell cycle. This strategy, published in the **Journal of Biological Chemistry**, could be used to develop new biochemical tools.

DOI: 10.1074/jbc.RA118.004469

Selectivity hinges on a hinge site

Despite being structurally similar, caspases are highly selective for specific substrates. In a study published in the **Journal of Biological Chemistry**, Derek McPherson and colleagues at the University of Massachusetts searched for secondary binding sites in caspases that could help explain this selectivity. They discovered an exosite in caspase-6 composed of a tri-arginine patch in the hinge between the core

Is an over-the-counter sleep aid the next big diet fad?

MICHAEL C. BERCH/WIKIMEDIA COMMONS

The white fat running through red muscle, also known as intramuscular fat, or IMF, is made of lipids deposited in fat cells, called adipocytes, which affect the flavor of animal meat as well as insulin sensitivity in humans.

Steak connoisseurs are familiar with the marble pattern of white fat running through raw red flesh. The white fat inside the muscle, also known as intramuscular fat, or IMF, is inside adipose cells, called adipocytes, that are located between the skeletal muscle fibers. In research published in the **Journal of Lipid Research**, Kaiqaing Liu and colleagues at Nanjing Agricultural University, China, investigated how melatonin, a circadian rhythm-regulating hormone involved in sleep, affects how IMF is deposited and showed that long-term melatonin treatment reduces IMF deposition. These results are relevant for farm animal breeding where fat content affects flavor and for human "globesity" — the global epidemic of overweight and obesity.

In humans, IMF content affects insulin resistance and type 2 diabetes, with the reduction of IMF content improving insulin sensitivity of muscle tissue. Several previous studies using cells and laboratory animals also have shown that melatonin affects fat deposition, but the observed effects differed by study. Liu and colleagues found consistent results in pig fat cells and mice, and they proposed a mechanism for melatonin's effect on IMF deposition. Specifically, the researchers showed that melatonin treatment inhibited pig intramuscular preadipocytes' proliferation by arresting the cell cycle in a way that varied according to dose and time.

Furthermore, the size of deposited lipid droplets in melatonin-treated preadipocytes was smaller while the expression of lipolytic enzymes was increased. Additional experiments showed that melatonin likely acts via an increase in uptake through upregulation of its receptor, MT2, and involves ERK1/2 and protein kinase A signaling pathway. Consistent with these observations in cultured cells, mice injected with melatonin had lower body weight and lower fat deposition than control mice.

This research suggests that doctors and personal trainers may soon recommend melatonin supplements in addition to exercise and caloric restrictions to prevent and treat obesity and related diseases.
DOI: 10.1194/jlr.Mt087619

—Nathalie Gerassimov

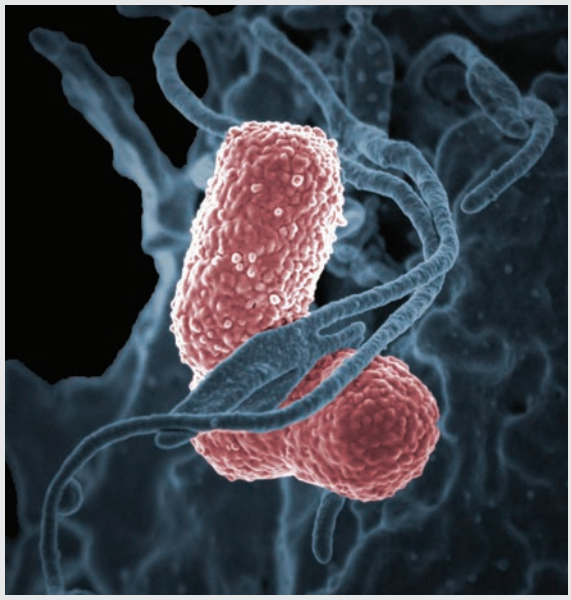
How a gut pathogen sidesteps antibiotic treatment

Hospital-acquired antibiotic-resistant infections occur in hospitals and clinics worldwide. Klebsiella pneumoniae is a Gram-negative bacterium that invades the gastrointestinal and respiratory tracts, causing a range of diseases. The ability to cling to medical devices makes it especially harmful in those hospital settings where antibiotic resistance is common.

Sarah L. Keasey and colleagues at the U.S. Army Medical Research Institute of Infectious Diseases examined the gastrointestinal pathogen K. pneumoniae from a lethal outbreak in laboratory monkeys to determine which pathways were altered when standard antibiotics were used. They published their work in the journal **Molecular & Cellular Proteomics**.

When the researchers used a panel of antibiotics on bacterial cultures isolated from the infected monkeys, they found differing growth patterns depending on the treatment used. They then did a proteomics study using streptomycin and doxycycline alone and in combination. These two antibiotics both target the ribosome but have very different chemical structures, and researchers found differences in bacterial enzymes involved in biosynthesis. Next, since antibiotics must first cross the bacterial cell wall, the researchers examined changes in transport protein levels, some of which decreased with treatment, indicating that bacteria could change their proteome to prevent antibiotic entry.

As transport protein changes also meant certain sugars couldn't enter cells, researchers found that the bacteria altered their fuel sources to compensate. In addition, the capsule that surrounds K. pneumoniae increased its composition in cells treated with doxycycline but not those treated with streptomycin, indicating they have different mechanisms of resistance. When these antibiotics were combined, researchers found that treated cells had lowered transport of certain molecules and increased levels of membrane proteins. After repeated doses, as in a clinic, K. pneumoniae recovered and its growth rate increased over time, signaling resistance to the combination.



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Klebsiella pneumoniae, shown with an immune cell, evades antibiotic treatment by altering its proteome.

Knowing which pathways bacteria use to evade antibiotics is therefore key to developing effective treatments for these pathogens.

DOI: 10.1074/mcp.RA118.000739

—Dawn Hayward

caspase domain and a disordered N-terminal domain. Since caspase-6 plays a unique role among apoptotic caspases in neurodegeneration, modulating this substrate-binding site could be therapeutically valuable for conditions such as Alzheimer's and Huntington's disease.

DOI: 10.1074/jbc.RA118.005914

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For April, it's copper — atomic No. 29

By Quira Zeidan

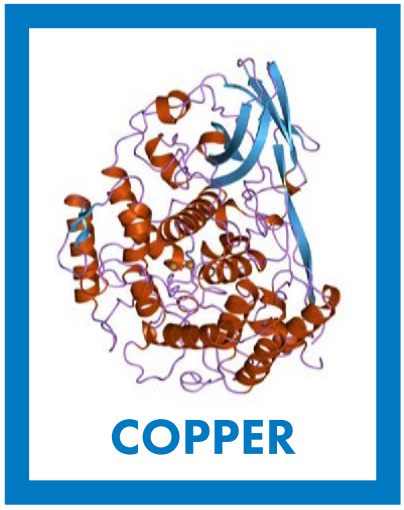
2019 marks the 150th anniversary of the first publication of Dimitri Mendeleev's periodic table of chemical elements. To honor the occasion, each month we are focusing on elements important in biochemistry. In January and February, we featured hydrogen and iron, respectively, and in March, we tripled down with sodium, potassium and chlorine.

For April, we have selected copper, a transition metal with chemical symbol Cu and atomic number 29. Copper participates in chemical reactions via a wide range of oxidation numbers from -2 to +4 but most commonly is found in organic cuprous and cupric complexes with oxidation states of +1 and +2, respectively.

Ancient civilizations used copper extensively in the manufacture of ornaments, weapons and tools, and the late fifth millennium BC is the archeological period known as the Copper Age.

Copper most likely forms during the expansion of supergiant stars and makes up about 0.0068 percent of the Earth's crust. In nature, it occurs in its pure metallic form as native copper or in combination with other elements in minerals containing copper oxides, copper sulfides or copper carbonates. These minerals form when volcanic activity separates copper from magma and the copper reacts explosively with ascending sulfurous gases, precipitating beneath the surface as copper-rich ores.

After iron and zinc, copper is the third most abundant metallic element in biological systems. Copper is indispensable for most living organisms



JAWAHAR SWAMINATHAN & MSD STAFF / EUROPEAN BIOINFORMATICS INSTITUTE

Oxygen-bound copper, represented by the two orange spheres in the center of the structure of the protein hemocyanin, gives arthropod hemolymph a blue color.

in trace amounts, but it can produce highly reactive toxic species when found in excess inside cells. Microorganisms can mobilize solid copper by incorporating it into cyanide compounds, and copper-binding proteins in the periplasmic space allow bacteria to trap copper to avoid intracellular toxicity. In yeast, cell surface metalloreductases render copper available to high-affinity transporter proteins by reducing Cu^{+2} to Cu^{+1}. Fungi that colonize the roots of host plants protect them from toxicity by trapping soiled or soluble copper in compounds with other metals.

Once in cells, copper binds to proteins that participate in electron transfer reactions or oxygen transportation. In the mitochondrial respiratory chain, a binuclear copper center in cytochrome c oxidase transfers electrons from cytochrome c to molecular oxygen in the final redox step of the oxidative phosphorylation pathway. Similarly, a copper-containing protein called plastocyanin in the thylakoid lumen of chloroplasts carries electrons between two membrane-bound proteins — cytochrome f and P700+ — during photosynthesis.

Like hemoglobin in vertebrates, a copper-containing protein called hemocyanin transports oxygen in the hemolymph of invertebrates, such as mollusks and some arthropods. When a molecule of oxygen binds two copper atoms in hemocyanin, copper is oxidized from Cu^{+1} to Cu^{+2}, and the energy associated with this electron transfer changes the light-absorbing properties of copper. This causes oxygen-rich hemolymph in these animals to appear blue in contrast to the bright red color of oxygen-bound iron in hemoglobin.

In eukaryotes, the antioxidant enzyme superoxide dismutase uses copper to catalyze the decomposition of the superoxide radical into molecular oxygen and hydrogen peroxide, which are less toxic to the cell.

Thus, from the heart of volcanoes to the relay of electrons inside cells, copper is critical to the survival of all aerobic organisms.

Quira Zeidan (qzeidan@asbmb.org) is the ASBMB's education and public outreach coordinator. Follow her on Twitter @quirazeidan.

Meet Jean Schaffer

Tracing the lipid path from diabetes to heart disease

By Laurel Oldach

Cardiologist Jean Schaffer realized early that she wanted to pursue research. She was an undergraduate biochemistry major at Harvard University, working with molecular biologist Richard Morimoto.

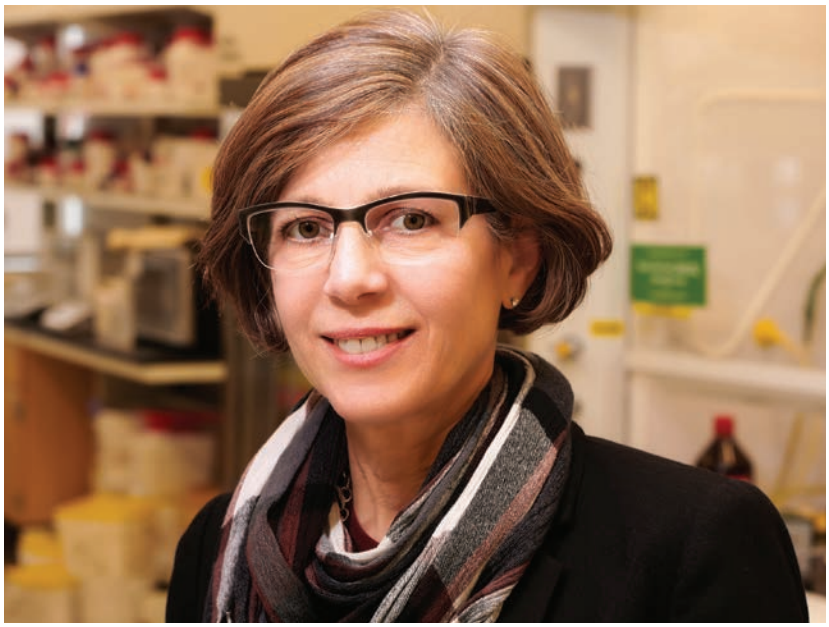
"That experience told me I wanted research to be a central focus of my career," Schaffer said. "But I also knew I wanted to study human disease."

She opted for medical school and completed a residency in medicine and a fellowship in cardiology before returning to the lab as a postdoctoral fellow with cell biologist Harvey Lodish at the Massachusetts Institute of Technology.

The two aspects of her training progressed in parallel, Schaffer said. "I began to see relationships between what I was studying in the laboratory, which was very interesting at a basic biological level, and fundamental questions about the kinds of pathophysiology that we commonly see in the clinic."

Schaffer began her own program of investigation when she took a job as an assistant professor at the Washington University School of Medicine in St. Louis. She since has become a full professor and director of the university's Diabetes Research Center. Her lab seeks to understand the molecular basis of diabetes complications including heart failure. The research focuses on lipotoxicity, which occurs when fatty acid accumulation damages cells and tissues.

Schaffer became an associate editor at the Journal of Lipid Research in 2017. ASBMB Today writer Laurel Oldach caught up with her over the phone about her research and her professional roles. This interview has been condensed and edited.



TIM PARKER/TIM PARKER PHOTOGRAPHY

Jean Schaffer, director of the Diabetes Research Center at Washington University at St. Louis, is also an associate editor of the Journal of Lipid Research.

How did you start working on the molecular mechanisms linking metabolic stress and cardiovascular disease?

I began studying fatty acid transport as a postdoc in the Lodish lab. I was very interested in testing the hypothesis that specific proteins regulate fatty acid import into tissues, given both the importance of this metabolic substrate and the potential toxicity of lipid overload. I used an expression cloning strategy to identify the first fatty acid transport protein and long-chain acyl CoA synthetase 1 as key regulators of fatty acid transport.

TIM PARKER/TIM PARKER PHOTOGRAPHY

Jean Schaffer (right) with staff scientist Robert Crowder, who works in her lab at Washington University at St. Louis.

As I studied these molecules, I observed that overexpression of these proteins in the heart in a mouse model led to excessive lipid uptake that resulted in cell death, tissue damage and heart failure. And I was struck by the parallels with the heart disease that I treated in my patients with diabetes. This led me to pursue my current interests in metabolic stress responses and diabetes complications.

Broadly, how can diabetes lead to heart disease?

Dysregulation of both glucose and fatty acid metabolism in diabetes leads to excess delivery of metabolic substrates to tissues throughout the body. One way that cells in different organs compensate initially is by upregulating metabolic pathways to dispose of these substrates.

Excess glucose increases flux through pathways that can contribute to hyperglycemia-induced oxidative stress, and enhanced oxidative metabolism of both glucose and fatty acids at the level of the mitochondria produces reactive oxygen species. So both of these metabolites clearly can cause problems for tissues.

Another way tissues respond to the excess fatty acid supply is to sequester that lipid in cellular triglyceride stores. We found that this initially helps protect against lipotoxicity, but the storage function is limited in non-adipose tissues, and triglycerides can eventually be hydrolyzed to release free fatty acids.

Metabolite-induced oxidative stress damages the endothelium, and it can also cause dysfunction of monocytes, macrophages and foam cells. So in these ways, the abnormal substrate environment of diabetes can lead to initiation and progression of atherosclerosis. But I think it's important to also remember that there are direct

untoward effects of hyperglycemia and hyperlipidemia on the cardiac myocytes themselves that contribute to heart failure.

Some of your recent articles focus on how noncoding RNAs affect mitochondrial function. Tell me about that research.

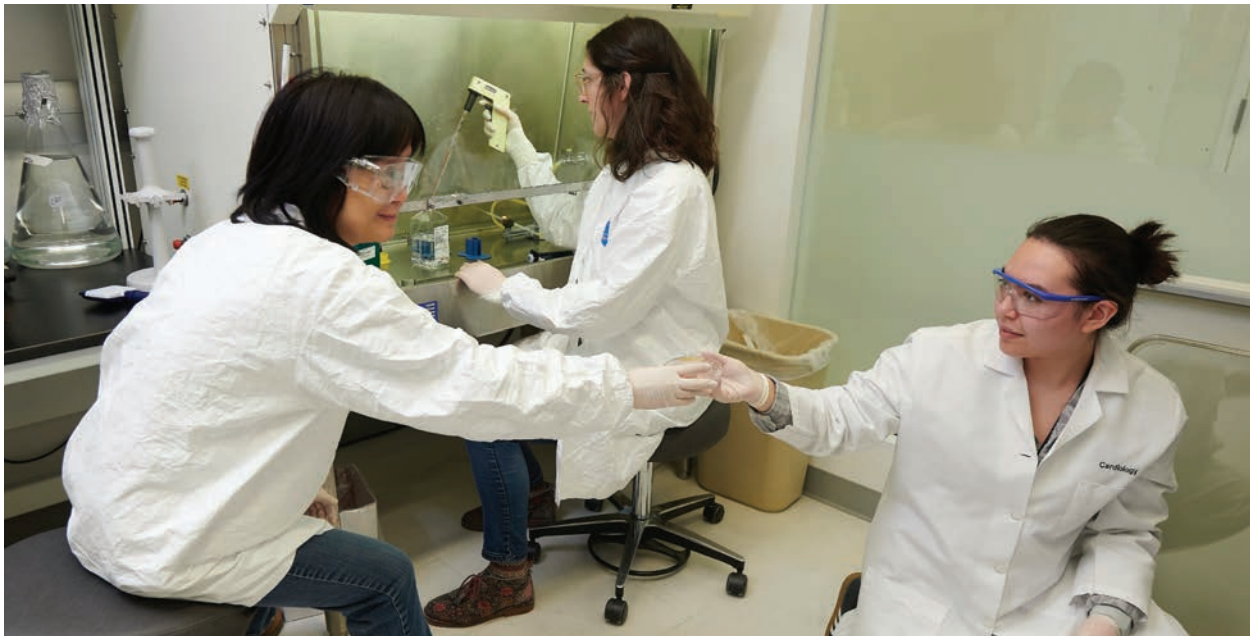
We wanted to identify novel regulators of lipid-induced cell death, or lipotoxicity, so we used a cell culture model of lipotoxicity and carried out a genetic screen. Through this effort, my lab discovered that small nucleolar RNAs, or snoRNAs, encoded within the introns of the ribosomal protein L13A gene are critical for lipotoxic cell death.

For a long time, we've known that snoRNAs form ribonucleoprotein particles that reside in the nucleus and direct epigenetic modifications on newly synthesized ribosomal RNAs. But a new role for snoRNAs in metabolic stress really intrigued us. We discovered that disruption of the gene that hosted these snoRNAs conferred resistance to lipotoxicity, and our screen showed that disruption of proteins involved in snoRNA biogenesis and trafficking also led to resistance. That suggested to us that we had identified several components of an important metabolic stress pathway.

As we further studied these snoRNAs, an important step was to confirm we had the right gene identifications. It's important to show that that the knockout phenotype can be complemented by restoring the disrupted genetic elements. In this case, the Rpl13a locus encodes four snoRNAs and the RpL13a protein. We found that genetic complementation only occurred when the snoRNAs were restored.

What research questions or directions are most exciting for you right now?

Obviously, we're interested in the physiological function of these snoRNAs. Our studies suggest that they may have important roles in regulating metabolism. Mice with loss of the Rpl13a snoRNAs have evidence of metabolism that is uncoupled at the level of mitochondria, and this



TIM PARKER/TIM PARKER PHOTOGRAPHY

Jessie Zhang, McKenna Feltes and Sammy Moores (left to right) work together in the Schaffer lab's tissue culture room.

COURTESY OF JEAN SCHAFFER

Members of the Schaffer lab enjoy a lunch outing.

alteration is likely to have important effects on whole-body metabolic efficiency. That's an area we are excited to pursue.

Another really important direction for us is to determine whether loss of the Rpl13a snoRNAs actually protects against lipotoxicity in vivo in diabetes complications — which was the motivation for originally pursuing these studies.

There are about 400 well-characterized snoRNAs throughout the human genome. There's an intriguing possibility that other snoRNAs could have noncanonical functions that impact cellular metabolism. That's an area for future studies.

You spent a long time in Boston. Was it a big move to go out to St. Louis?

Yes. I spent a good number of years getting educated and trained in Boston. But as I embarked upon my independent career, I looked for an environment with a critical mass of outstanding investigators studying metabolism and diabetes. Washington University has a long and rich tradition of contributions to metabolism science. It is also an incredibly supportive institution for career development for physician-scientists. It seemed like the right place.

In addition to running your lab, you also direct the Diabetes Research Center at Washington University. Do running a center and heading a lab inform each other in any way?

These two roles actually involve many of the same skills. One needs to be always looking for new opportunities: new science to pursue, new faculty to recruit, new areas for development of a center to provide resources for the research community. Learning how to listen to others and how to build consensus, how to make decisions, and how to engage others to pursue common goals — these are

important skills both in the laboratory and for leading a research center. You really need to strike a proper balance.

How did you first get involved with the Journal of Lipid Research?

I published my first paper in the JLR, in 1999. This journal reaches a broad audience with interest in many different aspects of lipid metabolism and physiology, so it's a great place to showcase our work. Along the way, I've been asked to review many papers. I suppose because I was diligent as a reviewer and turned my reviews in on time, I was rewarded with being asked to serve as an associate editor.

What do you like to do when you're not thinking about snoRNAs, metabolism and diabetes?

My passions outside the lab are family and music. My husband is also a scientist, and together we raised our two children during the early stages of our careers. We benefited immensely from mentors who trusted us to work hard and gave us the flexibility to design our own schedules. I also have a great love for music — I play the piano and attend concerts as much as my schedule allows.

In the end, to be able to spend time with family and music — or whatever else interests the scientist outside of their work — the most important skill for success is good time management.

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

TIM PARKER/TIM PARKER PHOTOGRAPHY

Sasha Medvedeva (left) and Sarah Gale hard at work in the Schaffer lab.

ASBMB '19

ANNUAL MEETING

ORLANDO | APRIL 6-9

MILDRED COHN AWARD IN BIOLOGICAL CHEMISTRY

Gronenborn honored for advances in NMR spectroscopy

By Kerri Beth Slaughter

Angela Gronenborn, a professor at the University of Pittsburgh, has won the 2019 Mildred Cohn Award in Biological Chemistry from the American Society for Biochemistry and Molecular Biology for her work in nuclear magnetic resonance spectroscopy. This award recognizes scientists who have developed innovative physical approaches to advance the field of biological chemistry.

Tatyana Polenova, a professor at the University of Delaware, nominated Gronenborn for the award, writing, "Professor Gronenborn's pioneering contributions to the field of biological chemistry are remarkable in their vision, creativity and intellectual depth."

Gronenborn chairs the department of structural biology at the University of Pittsburgh School of Medicine. Her research group combines NMR spectroscopy with biophysics, biochemistry and chemistry to investigate cellular processes at the molecular and atomic levels to understand human disease. Major focuses of her lab include protein-carbohydrate recognition, HIV pathogenesis and protein deposition diseases.

Gronenborn became interested in NMR spectroscopy during her graduate training at the University of Cologne. Throughout her career, she has transformed and expanded the applications of NMR spectroscopy to determine the structure of biological macromolecules. Her work includes nearly 500 peer-reviewed articles, including several landmark publications that opened the door for modern triple-resonance NMR experiments.

In 1988, Gronenborn joined the National Institutes of Health to work in HIV-targeted antiviral program. She pushed the boundaries of NMR spectroscopy by developing new technologies to determine the structures of proteins and protein complexes larger than 20 kilodaltons, a feat the scientific community considered impossible at the time.

"I am deeply grateful and very pleased to have been nominated and selected for the 2019 Mildred Cohn Award from the ASBMB. Mildred Cohn was one of the first women in NMR and pioneered its use to study enzymatic reactions. She was daring and undeterred, overcoming countless obstacles during her long life. It's an honor to receive this award named after such a tremendous scientist."

— ANGELA GRONENBORN

Bax wrote in his letter of support for Gronenborn's nomination, "Her work, both in quantity and depth, continues to define and extend the limit of macromolecular NMR."

Gronenborn's current work aims to understand how HIV hijacks host cell machinery for replication by determining complexes of viral and cellular proteins. She combines computational tools from chemistry and physics with her expertise in NMR spectroscopy and X-ray crystallography to analyze HIV biology.

Robert Griffin, a professor at the Massachusetts Institute of Technology, wrote in his letter supporting Gronenborn's nomination, "Her research continues to push the technological boundaries for determination of structure and dynamics of large complexes of HIV assemblies with human proteins."

In addition to her research achievements, Gronenborn has been honored for her devotion to the scientific community. She has trained more than 60 Ph.D. students, postdoctoral researchers and undergraduate students during her academic career. She also has chaired multiple international scientific conferences, and she serves in editorial roles for a number of journals. In 2007, Gronenborn was elected to the National Academy of Sciences for her outstanding contributions to research.

Gronenborn will receive her award at the ASBMB annual meeting during the Experimental Biology 2019 conference in Orlando, where she will deliver an award lecture on "The awesome power of Fluorine NMR" at 9 a.m. April 17 in Valencia Ballroom A at the Orange County Convention Center.

Kerri Beth Slaughter (kerri.slaughter@uky.edu) is a graduate student in the biochemistry department at the University of Kentucky. Follow her on Twitter @KB_Slaughter.

DELANO AWARD FOR COMPUTATIONAL BIOSCIENCES

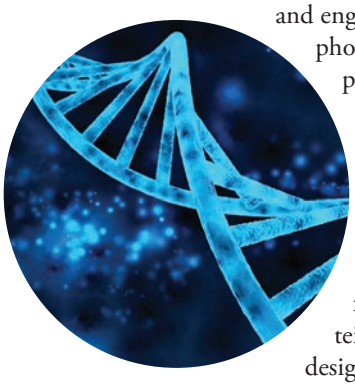
Kuhlman solves protein puzzles with a modeling program

By Elizabeth Stivison

The American Society for Biochemistry and Molecular Biology has given the 2019 DeLano Award for Computational Biosciences to Brian Kuhlman, a professor of biochemistry and biophysics at the University of North Carolina School of Medicine. The award recognizes scientists whose work excels in two key elements: "more productive use of computers to accelerate and facilitate research, and ready access of these programs for the scientific community."

Kuhlman's studies have done exactly that; Ruth Nussinov of the National Cancer Institute wrote in her nomination letter, "I cannot think of a more deserving recipient than Prof. Kuhlman."

Kuhlman's work can be described broadly as using computers and computational biology to design new protein structures and functions. As a postdoc in David Baker's laboratory, Kuhlman created a protein design module in the molecular modeling software Rosetta. As a professor, he has continued to advance the uses of Rosetta in several forms: protein interface design, antibody assembly and engineering photoactivatable proteins. He makes the modules available to all researchers.



In the field of protein interface design, Kuhlman's lab has redesigned proteins to increase their affinity to binding partners and has designed interfaces that allow previously nonbinding proteins to bind each other or other substrates they would not typically bind. This has achieved binding with micro to nanomolar affinities, and the experimentally determined structures of his designed interfaces typically were quite similar to his models, showing how effective his modeling techniques are. This work and his freely available Rosetta modules open the doors for many researchers to use these ideas in countless other fields.

"What a fantastic honor! Warren DeLano's software, PyMOL, is a terrific example of what can be achieved by making research tools easily accessible. It has been very rewarding to contribute to the Rosetta software and community in the same way, and it is exciting to see all of the wonderful proteins that are being designed with Rosetta."

— BRIAN KUHLMAN

Gideon Schreiber of the Weizmann Institute of Science wrote in support of the nomination that Kuhlman "is known for driving technology as well as using it in biologically important applications."

Kuhlman's group has worked to solve the longstanding problem of creating bispecific antibodies, antibodies that bind two different antigens, by creating a novel protocol for multi-state protein design. They generated two different light and heavy chains with orthogonal interfaces that can be assembled with high fidelity. This has significant potential in any field where two cellular structures need to be brought in close proximity, including cancer immunotherapy.

The lab is also working on creating protein switches that can be turned on or off using light with high spatial and temporal resolution. They are designing these switches to control intracellular localization, gene expression and differentiation.

Kuhlman is known among his colleagues as an innovative and reliable scientist, an effective and wise collaborator, and a superb speaker. This is shown in his high (and increasing) number of citations, his many papers written in collaboration with other labs and the many talks he gives around the world.

Kuhlman will receive his award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "Designing novel protein structures and interactions with Rosetta" at 1:45 p.m. April 9 in Valencia Ballroom A at the Orange County Convention Center.

Elizabeth Stivison (elizabeth.stivison@gmail.com) is a Ph.D. student at Columbia University studying mechanisms of DNA repair.

ASBMB AWARD FOR EXEMPLARY CONTRIBUTIONS TO EDUCATION

Garg made organic chemistry one of UCLA's most popular classes

By Adriana Bankston

Neil Garg is a chemistry professor with a mission to change the way organic chemistry is taught. For his classroom innovations, he has won the 2019 American Society for Biochemistry and Molecular Biology Award for Exemplary Contributions to Education.

Organic chemistry is not a class that people typically think of as being fun. But Garg's Chemistry 14D: Organic Reactions and Pharmaceuticals is a popular course at the University of California, Los Angeles. Garg describes real-life applications in his classes, and students say that he makes a personal connection with every one of his nearly 400 individuals in the classroom, according to an article on the UCLA Newsroom website.

Catherine Clarke, a professor and chair of chemistry and biochemistry at UCLA, nominated Garg for the award, explaining that he has succeeded with Chem 14D because he can explain concepts clearly and teach problem-solving skills. He also is able to integrate established and innovative teaching methods — for example, with an assignment in which students can produce chemistry music videos.

"Simply put, Neil has been an amazing teacher and his impact on chemical and biochemical education has been transformative," Clarke wrote in her nomination letter.

Garg earned his undergraduate degree in chemistry from New York University and a Ph.D. from the California Institute of Technology, where, in Brian Stoltz's lab, he synthesized several dragmacidin alkaloids possessing anti-viral and anti-cancer activities. He did postdoctoral work in Larry Overman's lab at the University of California, Irvine, where he completed the total synthesis of the bioactive alkaloid sarain A.

"It is a tremendous honor to receive the ASBMB Award for Exemplary Contributions to Education. Organic chemistry has been viewed as a weed-out class for decades, but at UCLA, we are challenging our students to overcome such preconceived notions. We want our students to appreciate how organic chemistry relates to biology and modern medicine. We also use the class as a vehicle for students to learn impeccable problem solving skills that will benefit them in all of their future endeavors."

— NEIL GARG

Since joining the UCLA faculty in 2007, Garg has helped develop many educational tools to help students, including an app called Backside Attack, an online tool called QR Chem and an online tutorial, BACON, short for Biology and Chemistry Online Notes. He also wrote and self-published an organic chemistry coloring book for children.

Justin Bañaga, who took Garg's classes as an undergraduate, supported the award nomination with a letter. "Dr. Garg has a unique teaching style that sets him apart from other professors," Bañaga wrote. "He inspires and captivates his students with his highly entertaining and enjoyable lectures and devises ingenious methods of combining fun facts with notable information to help his students learn the depth and immense amount of material that he covers."

In another letter of nomination, Robert Grubbs, a chemistry professor at the California Institute of Technology, wrote, "Garg has also done amazing things in undergraduate education and is clearly one of the best university educators in the country."

Garg has won numerous honors, including UCLA's Harvey L. Eby Award for the Art of Teaching. He also competed for and won the Robert Foster Cherry Award, which is the largest university teaching prize and spans all fields of academia.

Garg will receive his award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "How organic chemistry became one of UCLA's most popular classes" at 3 p.m. April 7 in Valencia Ballroom A at the Orange County Convention Center.

Adriana Bankston (abankston81@gmail.com) is a former bench scientist with a passion for improving training and policies for junior scientists. She is a policy and advocacy fellow at the Society for Neuroscience and a policy activist at the nonprofit organization Future of Research. Follow her on Twitter @AdrianaBankston.

FASEB EXCELLENCE IN SCIENCE AWARD

Kahn honored for research, mentoring

By George Van Den Driessche

Barbara Kahn is the recipient of the Federation of American Societies for Experimental Biology's 2019 Excellence in Science Award.

FASEB is honoring Kahn, the George R. Minot endowed chair and professor of medicine at Harvard Medical School and vice chair for research strategy in the Beth Israel Deaconess Medical Center department of medicine, for her contributions to diabetes research and the scientific community. Kahn is a member of the National Academy of Sciences and the National Academy of Medicine and a fellow of the American Association for the Advancement of Science.

Gerald I. Shulman, a professor at Yale University, wrote in his nomination letter that Kahn "has made pioneering discoveries throughout the past 30 years that elucidate the molecular mechanisms underlying obesity, insulin resistance and type 2 diabetes, with a particular emphasis on the role of the adipocyte in regulating glucose homeostasis."

In the 1990s, Kahn discovered that obese and diabetic people had downregulation of the major insulin-regulated glucose transporter protein, GLUT4, in fat cells, causing insulin resistance. This discovery fueled a research career studying insulin action and the pathogenesis of type 2 diabetes. Kahn's work regarding the cellular and molecular effects of altered GLUT4 levels resulted in identification of novel mechanisms that cause insulin resistance and increase the risk of developing diabetes. In the early 2000s, her lab determined that the fat-secreted retinol binding protein 4, RBP4, is increased in adipose tissue and blood in obesity and type 2 diabetes in humans, and this causes insulin resistance by creating a pro-inflammatory state. In 2012, Kahn's lab found that increasing GLUT4 protein expression induces carbohydrate-response element-binding protein (ChREBP) which regulates fatty acid synthesis. Kahn's lab discovered ChREBP is necessary in adipocytes to maintain whole-body insulin sensitivity.

"It is an honor to receive this award on behalf of the talented postdoctoral fellows, students and junior faculty who have catalyzed the discoveries in my lab, and our collaborators who have expanded our scientific horizons. The inspiration and skills of this team deserve this award. As a physician-scientist, my vision is to leverage emerging technologies to better understand metabolism and discover new approaches to prevent and treat metabolic diseases."

— BARBARA KAHN

The insights gained from these studies led to the discovery of a new class of lipids called branched fatty acid hydroxy fatty acids, or FAHFAs. Insulin-resistant people have low biological concentrations of FAHFAs. If these lipids are restored to normal healthy levels in diabetic mice, insulin sensitivity improves. These lipids may provide a new therapeutic treatment for Type 2 diabetes.

Kahn's contributions go beyond groundbreaking research. She has mentored 100 postdocs and students, and she has played a leadership role in mentoring programs that help junior faculty, especially underrepresented minorities and women, gain high-visibility positions in the research community.

As a physician–researcher, Kahn has served as a consultant for the National Diabetes Advisory Board at the National Institutes of Health and is on the Advisory Council for the National Institute of Diabetes, Digestive and Kidney Diseases. She has served on numerous American Diabetes Association committees and as an editor for several academic journals. Kahn is also a leader within the Beth Israel Deaconess Medical Center where she was chief of the Diabetes Unit and the Division of Endocrinology, Diabetes, and Metabolism. She also co-chairs the Unconscious Bias Awareness committee for the department's Committee on the Advancement of Women.

Kahn will receive her award at the ASBMB annual meeting during the Experimental Biology 2019 conference in Orlando, where she will deliver an award lecture titled "Glucose transport, adipose biology and novel mechanisms for regulating systemic insulin sensitivity" at 8 a.m. April 8 in Valencia Ballroom A at the Orange County Convention Center.

George Van Den Driessche (gavanden@ncsu.edu) is a Ph.D. student in chemistry at North Carolina State University. Follow him on Twitter @George_V14.

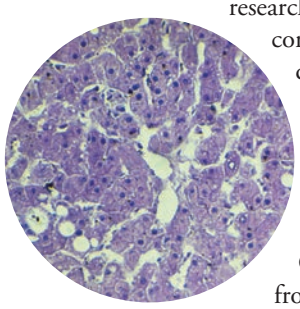
RUTH KIRSCHSTEIN DIVERSITY IN SCIENCE AWARD

Torres honored for decades dedicated to diversity in science

By Alyson Smith

Jorge Torres, an associate professor in the department of chemistry and biochemistry at University of California, Los Angeles, has won the Ruth Kirschstein Diversity in Science Award. With this award, the Minority Affairs Committee of the American Society for Biochemistry and Molecular Biology honors an outstanding scientist who has contributed significantly to increased participation and effective mentorship of underrepresented minorities in the sciences.

Torres studies proteins that direct the assembly and function of the mitotic spindle and uses multidisciplinary approaches to develop new anti-cancer drugs. He has authored over 30 publications in his nine years as a principal investigator, and his discoveries have led to two provisional patents. He also has developed a compound target identification database and other resources, which he has posted online to benefit other researchers in his field. His contributions to understanding mitotic spindle function and pathology have earned him multiple honors, including the Basil O'Connor Award from the March of Dimes Foundation and the American Cancer Society Research Scholar Award.



When he was an undergraduate at the University of California, Santa Barbara, Torres helped found an organization to recruit minority students to the university and provide peer mentoring and tutoring. He participated in similar programs and activities as a graduate student at Princeton University and postdoctoral fellow at Stanford University and Genentech.

"I am deeply honored to be the recipient of the 2019 Ruth Kirschstein Diversity in Science Award. It is imperative that the scientific workforce represent the diversity of our society. A diverse and inclusive scientific workforce can harness the creativity, thought and experience that can spur innovation and the advancement of science. I commend all that strive for true diversity in STEM!"

— JORGE TORRES

As a principal investigator, he has mentored more than 20 minority undergraduates, graduate students and postdoctoral fellows. Most of his undergraduate students become co-authors on a publication before leaving his lab, and three have won the UCLA Dean's Research Prize. Torres also mentors students in the classroom, developing new curricula and guest lecturing in multiple courses.

In her nomination letter for the award, Tama Hasson, assistant vice provost for undergraduate research at UCLA, wrote, "From the day he arrived he has served as an extraordinary role model for our diverse student body. He has proven to be a great colleague and has shared our campus' vision for improving the diversity of the academy."

Torres shares his discoveries and mentorship experience with a variety of audiences. He has spoken at minority-targeted conferences and participated in multiple campus and statewide diversity initiatives, including the National Science Foundation-Louis Stokes California Alliance for Minority Participation. He has given Spanish-language interviews about his research on Univision and CNN en Español.

Torres' colleagues commend his contributions in research, mentorship, teaching and advocacy. In her nomination letter, Sabeeha Merchant, formerly of UCLA and now a distinguished professor of biochemistry, biophysics and structural biology at the University of California, Berkeley, describes Torres as "an all-around outstanding individual — a creative scientist, an inspired teacher and a dedicated citizen of the diverse community around him."

Torres will receive his award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "Dissecting the mechanisms of cell division" at 8:30 a.m. April 8 in Valencia Ballroom A at the Orange County Convention Center.

Alyson Smith is a recent Ph.D. graduate from Scripps Research in La Jolla, California. Follow her on Twitter @cellbionerd.

ASBMB–MERCK AWARD

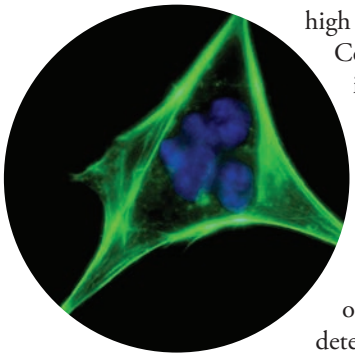
Banerjee honored for discoveries in vitamin B12 and H2S signaling

By Dawn Hayward

The complicated makeup and chemistry of the cofactor vitamin B12 have intrigued researchers for decades. Ruma Banerjee, Vincent Massey collegiate professor and associate chair of biological chemistry at the University of Michigan, has unraveled much of the mystery behind this vitamin, including transport to other proteins and the kinetics of a related sulfur signaling pathway. For her work, she has won the American Society for Biochemistry and Molecular Biology's 2019 ASBMB–Merck Award.

Also known as cobalamin, vitamin B12 is a cofactor for two mammalian enzymes, but how the cobalt atom is prepped to reach its final destinations had eluded researchers. Banerjee's laboratory discovered dual functionalities for a protein, CblC, that partitions cobalamin to the cytoplasm and the mitochondrion to generate methionine and succinyl-CoA, respectively.

In the mitochondrion, cobalamin is transferred to the active site of a different enzyme to generate succinyl-CoA from methyl-CoA. Inactivating the enzyme, however, can lead to buildup of a radical. Banerjee showed that turnover can be regulated by the substrate to prevent high radical levels. Collaborating with Catherine Drennan at the Massachusetts Institute of Technology, Banerjee determined the crystal structure of the chaperone in this process.



"I saw that Natalie Ahn was calling and wondered what ASBMB committee she was going to ask me to serve on. I was floored when I realized she was calling about the Merck award!"

— RUMA BANERJEE

Banerjee investigated hydrogen sulfide production where substrate homocysteine is used in the methionine arm of vitamin B12 chemistry. Cystathionine beta-synthase, or CBS, produces H2S along with cystathionine. Banerjee determined the specific residues in CBS that differentiate these functions and identified a metabolic switch whereby iron helps determine activity.

Her University of Michigan colleague James Bardwell, who nominated Banerjee for the award, wrote in his nomination letter, "This insight explains why previous clinical trials for lowering homocysteine have failed to increase cardiovascular disease burden and suggests … that a strategy for modulating H2S might be effective instead."

Banerjee received her bachelor's and master's degrees from Delhi University in India and her Ph.D. in biochemistry from the Rensselaer Polytechnic Institute in New York and was a postdoctoral fellow in biophysics at the University of Michigan. She served on the faculty at the University of Nebraska-Lincoln before moving back to the University of Michigan.

Banerjee is an associate editor for Chemical Reviews and the Journal of Biological Chemistry. She also has chaired and started two new sections for the Gordon Research Conference. Squire J. Booker, a professor at Pennsylvania State University, wrote in his letter supporting the nomination, "She cares deeply about our scientific discipline, and gives of her time unselfishly to make it better."

Banerjee has authored more than 230 publications. She received the Pfizer award early in her career, and this is noteworthy, according to Judith P. Klinman, a professor at the University of California, Berkeley, because the Pfizer "has been a very significant predictor of future advances by the awardee. Her progress and contributions have confirmed this expectation."

Banerjee will receive her award at the ASBMB annual meeting during the Experimental Biology 2019 conference in Orlando, where she will deliver an award lecture titled "Signaling through sulfide" at 8 a.m. April 9 in Valencia Ballroom A at the Orange County Convention Center.

Dawn Hayward (dhaywar5@jhmi.edu) is a graduate student at the Johns Hopkins University School of Medicine.

WILLIAM C. ROSE AWARD

Shippen mentors students, breaks new ground in telomere and plant science

By Kelsey Hughes

Dorothy Shippen, a professor and interim head of the department of biochemistry and biophysics at Texas A&M University, has won the American Society for Biochemistry and Molecular Biology's 2019 William C. Rose Award for her contributions to both molecular biology and the training of younger scientists.

Shippen has made numerous significant contributions to telomere biology and plant science. Andrew Nelson and Mark Beilstein, researchers at the University of Arizona, submitted a joint letter in support of her nomination, writing, "While plant biologists proudly proclaim her one of our own, she is equally a member of the biochemistry, telomere biology, and molecular genetics communities."

Also supporting the nomination was Virginia Zakian of Princeton University. "Research from the Shippen lab has had a major impact on the telomere community, especially in the area of telomerase regulation," Zakian wrote. "She has made important contributions to the telomere field in two different organisms, ciliated protozoa and plants."

Shippen's early contributions to telomere biology include discovery of a Euplotes crassus telomerase RNA template and determination of the mechanism and regulation of E. crassus de novo telomere formation. Most importantly, she established Arabidopsis thaliana as a model system for the study of telomere function. This work paved the way for significant findings, including identification of A. thaliana CST complex homologues and, in collaboration with Carolyn Price, the identification of human CTC1, which has now been linked to devastating stem cell disorders.

"The ASBMB Rose Award is especially meaningful for its recognition of collaborative research. The vast majority of scientific discoveries, even the most exciting, end up as a thin sedimentary layer in the rising mountain of new knowledge. What lasts is our impact on young scientists. Sharing with my students the scientific enterprise — its empowerment, disappointments, and ultimately, illumination — has been one of the greatest joys of my life."

— DOROTHY SHIPPEN

Shippen has mentored 126 students at all levels and is invested in their success as independent scientists. "Dorothy allows researchers in her group to engage in side projects, permitting exploration of the field of telomere biology," Nelson and Beilstein wrote in their letter. "She was always available to talk, and she encouraged brainstorming sessions to flesh out models and plan future experiments. These sessions … provided us with an invaluable model of an effective researcher engaged in the scientific experience."

Shippen's dedication to the development of young scientists extends far beyond her own group. In collaboration with Texas A&M business professor Daria Panina, she developed a course, Building Scientific Relationships, that focuses on equipping students and postdocs with often overlooked skills in leadership and management. As chair of the university's interdisciplinary graduate program in genetics, she has worked to expand career development opportunities for trainees by creating an administrative postdoctoral fellow position, a summer biotech internship program and a summer fellowship program. Shippen is also active in programs supporting the recruitment and retention of women and underrepresented minorities in science.

Sarah Bondos, a colleague at Texas A&M, nominated Shippen for the Rose Award, writing, "Her research is outstanding, and her deep commitment to training younger scientists has helped a variety of students across the university."

Shippen will receive her award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where she will deliver an award lecture titled "Breaking new ground: the emergence of non-canonical functions for telomerase subunits in plants" at 8:30 a.m. April 9 in Valencia Ballroom A at the Orange County Convention Center.

Kelsey Hughes (kelsey.hughes9@gmail.com) is a writer and RNA scientist living in Austin, Texas.

WALTER A. SHAW YOUNG INVESTIGATOR AWARD

Chng a 'rising star' in bacterial membrane lipid research

By Courtney Chandler

Shu-Sin Chng, a professor in the department of chemistry at the National University of Singapore, has been awarded the American Society for Biochemistry and Molecular Biology's 2019 Walter A. Shaw Young Investigator Award. The award recognizes Chng's work on outer membrane biogenesis in Gram-negative bacteria and mycobacteria.

In her letter supporting Chng's nomination for the award, Tracy Palmer of Newcastle University wrote that his research has made "an outstanding contribution to our understanding of bacterial lipid trafficking" and that Chng "has already cemented himself as a world leader in his field."

The outer membrane of Gram-negative bacteria has a unique composition compared to the inner membrane. While mechanisms for outer membrane protein and glycolipid transport and assembly have been well defined, how glycerophospholipids are transported to and from the outer membrane was largely unknown. Chng has investigated how phospholipids are transported by the OmpC-Mla system, which is important for the maintenance of outer membrane lipid asymmetry in Escherichia coli. The Mla system had been described previously, but Chng identified a new component OmpC, defined the biochemical mechanisms of this system and demonstrated that it did in fact transport lipids. The Chng lab also reported that the Tol-Pal complex, first defined over 50 years ago, is involved in phospholipid transport. In what Palmer described as a "profound discovery," Chng's group demonstrated that this complex is important for the retrograde transport of phospholipids from the outer to inner membrane and is thus required for outer membrane lipid homeostasis in Gram-negative bacteria.

"I am extremely excited and honored to receive the Walter Shaw Young Investigator Award in Lipid Research. I am deeply indebted to my mentors Daniel Kahne and Jonathan Beckwith for providing exceptional training, friendship and support throughout my career. I am also very grateful to my postdocs and students past and present for their commitment, patience and hard work — this success also belongs to them!"

— SHU-SIN CHNG

Chng also investigates mycobacteria, which have evolved an outer membrane rich in mycolic acids. Mycobacteria are notoriously hard to work with, yet Chng was able to describe how mycolic acids are flipped by a protein called MmpL3, as well as how MmpL3 is the direct target for small molecule inhibitors. Mycolic acid synthesis is an important pathway for targeted antibiotic therapies. Thus, Chng's research on lipid transport in mycobacteria could lay the groundwork for improved therapies against mycobacterial infection.

Jean-Francois Collet of the Université catholique de Louvain nominated Chng for the award. "The importance of his work is greatly amplified given that the bacterial (outer membrane) is a prime target for the development of novel antibiotics, especially in the context of combat against multidrug resistant 'superbugs,'" Collet wrote in his nomination letter.

Hiroshi Nikaido, of the University of California, Berkeley, wrote in support of the nomination that he "was struck by both the range of Dr. Chng's work as well as the creativity and originality in his studies," while Stephen Trent of the University of Georgia called Chng "a rising star."

Chng received his Ph.D. in chemistry at Harvard University in 2010, and he remained at Harvard as a postdoctoral fellow. In 2011, he joined the department of chemistry at the National University of Singapore. He is also a visiting professor at the Singapore Center on Environmental Life Sciences and Engineering.

Chng will receive his award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "Bacterial lipid trafficking and outer membrane homeostasis" at 1:45 p.m. April 8 in Valencia Ballroom A at the Orange County Convention Center.

Courtney Chandler is a Ph.D. student in biochemistry at the University of Maryland, Baltimore. Follow her on Twitter @CourtneyEChan.

EARL AND THRESSA STADTMAN DISTINGUISHED SCIENTIST AWARD

Tonks honored for seminal work on protein tyrosine phosphatases

By Nathalie Gerassimov

Nicholas Tonks, the Caryl Boies professor of cancer research at Cold Spring Harbor Laboratory, has won the American Society for Biochemistry and Molecular Biology's 2019 Earl and Thressa Stadtman Distinguished Scientist Award for his three decades of outstanding research in the field of protein tyrosine phosphatases, or PTPs, enzymes that regulate the signal transduction cascades of many cellular processes.

Bruce Stillman, president and CEO of Cold Spring Harbor Laboratory, nominated Tonks, calling him "a pioneer and a consistent leader in the field." David Barford of the Medical Research Council Laboratory of Molecular Biology wrote in support of the nomination, "Tonks is a member of a select group of scientists responsible for establishing and developing a new research field of immense importance and significance."

Tonks received a bachelor's degree in biochemistry from Oxford University in 1981 and a Ph.D. from the University of Dundee in 1985, working with Sir Philip Cohen.

Little was known about tyrosine dephosphorylation when Tonks started his postdoctoral work with Edmond Fischer at the University of Washington, where Tonks discovered and characterized the first PTP, known as PTP1B. Tonks and collaborators also showed that the membrane-spanning lymphocyte common antigen CD45 was a PTP, advancing the field of immunology.

After Tonks joined the faculty at Cold Spring Harbor in 1990, his lab showed that PTEN, the major tumor suppressor protein mutated in many cancers, had PTP activity, and he characterized further the importance of its lipid and protein phosphatase function. Throughout his independent career, Tonks has advanced the PTP field in diverse cellular pathways.

"I am honored to receive this award, which I hope will help to draw attention to all of the outstanding research being performed on the PTP family of enzymes. These are exciting times as new biological functions and links to disease are being defined for the PTPs. Hopefully, we will soon witness the first drugs that target these enzymes for the treatment of major human diseases."

— NICHOLAS TONKS

His lab helped lay the groundwork for PTP1B as a therapeutic target for a range of human diseases. In collaboration with others, they determined the crystal structure of PTP1B, deciphering the mechanisms of PTP catalysis and substrate recognition, and then designed substrate-trapping mutants that other researchers used to identify physiological PTP substrates.

In their second decade, Tonks' team discovered how PTP1B is regulated: Hydrogen sulfide, a gaseous signaling molecule with membrane permeability, regulates PTP function as part of the unfolded protein response to endoplasmic reticulum stress, an essential process implicated in many diseases. They also discovered that PTPs can be inactivated reversibly by oxidation and developed methods to assay PTP redox state. This mechanism plays a role in insulin signaling, providing a therapeutic target for diabetes.

Tonks has pursued the therapeutic potential of his discoveries. His lab showed that small molecule inhibitors of PTP1B could have therapeutic use for Rett syndrome, and he led an early-stage human trial to show that PTP1B allosteric inhibitor MSI-1436 (trodusquemine) is a therapeutic target for HER2-positive breast cancer.

"Nick Tonks has been a major figure in biochemistry and signal transduction for nearly 30 years," Benjamin Neel of New York University wrote in a letter supporting the award nomination. "He shows no sign of slowing down, and indeed, his most important work may yet be to come."

Tonks will receive his award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "30 years of protein tyrosine phosphatases — basic research to novel therapeutics" at 1:15 p.m. April 9 in Valencia Ballroom A at the Orange County Convention Center.

Nathalie Gerassimov (nathalie.gerassimov@gmail.com) is a Ph.D. student at the Johns Hopkins University School of Medicine.

HERBERT TABOR RESEARCH AWARD

Thorner stands as a giant in the golden age of yeast research

By Gelareh Abulwerdi

Saccharomyces cerevisiae is a species of yeast, a unicellular organism long used by bakers and brewers. As a eukaryotic single-cell microbe, yeast is also a great organism for research. Among the pioneers in studying yeast is Jeremy Thorner, who has increased understanding of signal transduction in several diseases, using yeast as a research model.

For his breakthrough research and other contributions to science, Thorner, a professor of biochemistry, biophysics and structural biology at the University of California, Berkeley, has won the American Society for Biochemistry and Molecular Biology's 2019 Herbert Tabor Research Award, which honors excellence in biological chemistry and molecular biology and contributions to the community of scientists.

Thorner grew up in Quincy, Massachusetts. He received his Ph.D. in biochemistry from Harvard University in 1972 under the guidance of Henry Paulus, studying a model allosteric enzyme, E. coli glycerol kinase. As a postdoctoral fellow under I. Robert Lehman at Stanford University, he studied T4 phage and E. coli DNA replication.

At a Lake Arrowhead Genetics Conference in Los Angeles, Thorner ran into Ira Herskowitz, an acquaintance from graduate school, who was studying mating-type switching in yeast. At Herskowitz's suggestion, Thorner enrolled in the Cold Spring Harbor yeast genetics course, which led him to establish projects working with yeast in his own lab when he joined the faculty at UC Berkeley in 1974.

"I feel very honored to be the most recent (2019) recipient of the ASBMB Herbert Tabor Research Award. The year (1971) Herb ascended to editor-in-chief of the JBC coincided with my first scientific publication (in the JBC, of course!) and his superb stewardship of the journal over the next four decades is legendary among biochemists. Having the opportunity to be a scientist and do research has been an enormous privilege."

— JEREMY THORNER

Along with an early student, David Julius, Thorner published seminal papers describing the mechanisms by which the peptide mating pheromones of yeast are produced. One of these factors is pheromone precursor prepro-alpha-factor, which is processed to its active form through the secretory pathway. Julius and Thorner discovered Kex2, a prohormone-processing endoprotease whose mammalian orthologs are important in maturation of proinsulin and other bioactive peptides. These discoveries contributed to making recombinant insulin for treating diabetes.

Using yeast, Thorner studied G-protein coupled receptors, or GPCRs, and their downstream signaling cascades. He cloned the first MAP kinase, Kss1, and showed that these kinases are downstream of GPCRs. This work helped illuminate certain pathways that are important in cancer treatment.

Michael Hall of the University of Basel nominated Thorner for the award, calling him "one of the giants of the golden age of yeast research." Hall wrote in his nomination letter that Thorner "has continually made groundbreaking contributions of great importance to our understanding of hormone action, signal transduction and cellular morphogenesis at the biochemical level."

Thorner is an outstanding mentor, according to Hall, "with at least seven former Ph.D. students and fifteen postdocs in faculty positions at distinguished universities." He is also a longtime journal editor who "tirelessly writes lengthy emails to authors to ensure a fair, constructive review process," Hall wrote.

Thorner will receive his award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "Regulation of plasma membrane homeostasis: Dissecting TORC2 signaling" at 8:15 a.m. April 7 in Valencia Ballroom A at the Orange County Convention Center.

Gelareh Abulwerdi (gelareab@umaryland.edu) is a Ph.D. candidate at the University of Maryland, Baltimore. Follow her on Twitter @ Gelareh_science.

BERT AND NATALIE VALLEE AWARD IN BIOMEDICAL SCIENCE

Thompson honored as 'exemplary scientist' in cancer biology

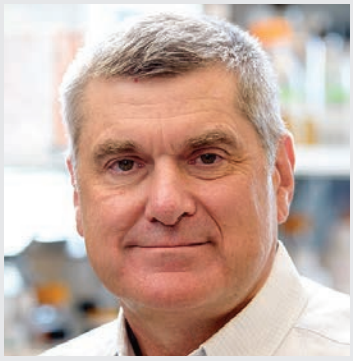
By Isha Dey

Craig B. Thompson, president and CEO of Memorial Sloan Kettering Cancer Center, is the recipient of the American Society for Biochemistry and Molecular Biology's 2019 Bert and Natalie Vallee Award in Biomedical Science. The award honors an established scientist for outstanding accomplishments in basic biomedical research. Thompson's lab focuses on studying cancer cell metabolism.

Thompson is a pioneer in the field of cancer biology. His findings have challenged existing notions about mammalian cell metabolism and its regulation. Contrary to earlier findings that mammalian cells take up nutrients autonomously, Thompson demonstrated that growth factor signaling is essential for glucose and amino acid uptake by cells for ATP synthesis. Without growth factors and hormones, cells ultimately undergo apoptosis. However, oncogenic transformation of mammalian cells alters the regulation of cellular metabolism. Due to activation of the oncogene Myc, cancer cells switch to using glutamine instead of glucose as an energy source. This allows glucose metabolites to be directed to nucleotide synthesis, which aids in uncontrolled cell proliferation.

Thompson's group showed how mutations in genes coding for metabolic enzymes lead to several forms of cancer. Over the years, his work has established beautifully how cellular metabolism regulates signal transduction and gene expression and how oncogenic transformation alters these mechanisms. He also has contributed to the development of treatment for autoimmune diseases.

Joan Massagué, director of the Sloan Kettering Institute, nominated Thompson for the award. "Dr. Thompson's research elucidating cancer cell metabolism is pioneering, visionary and of outstanding quality," Massagué wrote in his nomination letter. "He has established a reputation as one of the most thoughtful and accomplished investigators in the field of cancer research."



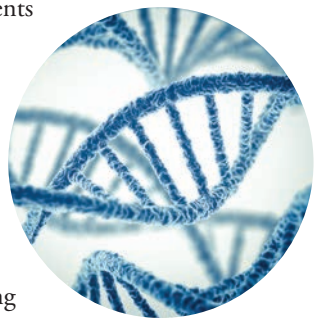
"I am honored to receive this recognition from the American Society for Biochemistry and Molecular Biology and to be recognized among those who have previously won this award. I wish to thank the Vallee Foundation for their commitment to championing basic biomedical science, and the Society for recognizing my lab's work on cancer metabolism."

— CRAIG B. THOMPSON

Thompson received his undergraduate degree in biochemistry from Dartmouth College in 1974, followed by a medical degree at the University of Pennsylvania in 1977. He served as medical officer at the Naval Blood Research Institute and National Naval Medical Center before being appointed an assistant professor of medicine and microbiology and immunology at the University of Michigan. He went on to become a professor in the departments of medicine and molecular genetics and cell biology at the University of Chicago, an investigator at the Howard Hughes Medical Institute, and then a professor and chair of the department of cancer biology at the University of Pennsylvania. In 2010, he was appointed president and CEO of Memorial Sloan Kettering Cancer Center.

Thompson has co-authored more than 400 peer-reviewed articles, has been cited more than 93,000 times and holds 30 patents. He also serves in leadership positions at various scientific organizations.

As the Vallee award recognizes outstanding achievements in sciences basic to medicine, Thompson fits the bill as a "champion of cancer research," Massagué wrote in his nomination letter.



Thompson will receive his award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "The role of metabolites in regulating cellular differentiation and gene expression" at 1:15 p.m. April 8 in Valencia Ballroom A at the Orange County Convention Center.

Isha Dey (ishaadey@gmail.com) is a scientist at Thermo Fisher Scientific in India.

ALICE AND C.C. WANG AWARD IN MOLECULAR PARASITOLOGY

Soldati–Favre honored for research on Toxoplasma gondii

By Kerri Beth Slaughter

Dominique Soldati–Favre, a professor at the University of Geneva, has won the American Society for Biochemistry and Molecular Biology's 2019 Alice and C.C. Wang Award in Molecular Parasitology. Soldati-Favre is honored for her outstanding work in Toxoplasma gondii invasion and egress.

Soldati–Favre's research group studies intracellular parasites, specifically members of Apicomplexa, to understand how they cross biological barriers during invasion. Apicomplexan parasites cause a number of diseases in humans and animals, such as malaria, toxoplasmosis, cryptosporidiosis and coccidiosis. To address this disease burden, Soldati–Favre's group investigates Toxoplasma to discover the mechanisms involved in host cell attachment, invasion and intracellular survival.

After obtaining her Ph.D. in 1990 from the University of Zurich, Soldati–Favre worked as a postdoctoral fellow in John Boothroyd's laboratory at Stanford University School of Medicine. While studying Toxoplasma there, she was the first researcher to develop methodologies to apply reverse genetics in this parasite.

"Dr. Soldati–Favre is an outstanding scientist whose work has consistently broken new ground," Boothroyd wrote in a letter of support for the award nomination. "The field of parasitology would not look the way it does were it not for her and her lab's key contributions."

Soldati–Favre returned to Switzerland in 2004 to build her laboratory at the University of Geneva. Seminal contributions from her research career include the establishment of a tight inducible system to study the function of essential genes in apicomplexan parasites and the characterization of the molecular machine termed "the glideosome" that powers motility and invasion.

"Alice and C.C. Wang paved the way of my education in parasitology through the insightful Bay Area Parasitology Clubs at the time of my postdoctoral training at Stanford. I am deeply honored and grateful to receive this award that I wish to share with all the talented collaborators who have built fantastic teams around me over the years. In sweet memory of C.C.'s big smile."

—DOMINIQUE SOLDATI-FAVRE

Recently her group has unraveled the central roles played by aspartyl proteases that act as key maturases for secreted proteins involved in subversion of host cellular functions or in invasion and egress. Her laboratory also contributed to some studies on the metabolic pathways hosted by two endosymbiotic organelles, the mitochondrion and the relic of a plastid called the apicoplast, and conducted exciting cell biology projects on the mechanism of organelles biogenesis and inheritance as well as on cell–cell communication.

In addition to her research contributions, Soldati–Favre has served in editorial roles for several major journals in her field, including PLoS Pathogens and Cell Host & Microbe, and as editor of parasitology in Molecular Microbiology. Among her many awards and honors, Soldati-Favre was a Howard Hughes Medical Institute junior and senior International Research Scholar, nominated as a European Molecular Biology Organization member in 2011 and elected in 2014 as a member of the Swiss Academy of Medical Sciences. She currently serves as the vice dean for basic research of the faculty of medicine at the University of Geneva.

Henri Bounameaux, dean of the faculty of medicine at the University of Geneva, nominated Soldati–Favre for the award, writing, "Dominique is unanimously recognized among her peers as one of the most gifted Swiss scientists of her generation."

Soldati–Favre will receive her award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where she will deliver an award lecture titled "The ins and outs of Toxoplasma invasion and egress" at 2:30 p.m. April 8 in room W307AB at the Orange County Convention Center.

Kerri Beth Slaughter (kerri.slaughter@uky.edu) is a graduate student in the biochemistry department at the University of Kentucky. Follow her on Twitter @KB_Slaughter.

ASBMB YOUNG INVESTIGATOR AWARD

Dunham recognized for ribosome regulation insights

By Kelsey Hughes

In recognition of her contributions to the fields of biochemistry and molecular biology, Christine Dunham, an associate professor of biochemistry at Emory University, has been selected to receive the American Society for Biochemistry and Molecular Biology's 2019 ASBMB Young Investigator Award.

In the 17 years since her first publication examining hammerhead ribozyme biology, Dunham has published more than 30 original research papers. Dunham consistently has been recognized as a superb scientist, beginning with her graduate work with William Scott at the University of California, Santa Cruz, and continuing through her postdoctoral work with Nobel laureate Venki Ramakrishnan at the Medical Research Council Laboratory of Molecular Biology in Cambridge, England. Dunham's recognition has only grown since she started her own group in 2008 at Emory.

Writing in support of the award nomination, Johns Hopkins University professor Rachel Green described Dunham as "an outstanding early investigator who has established a program focused on interesting and important (medically relevant) problems. Her early work at Emory has made substantial contributions to the field and is taking her in new and compelling directions."

Dunham's work has provided significant insight into the structural basis of ribosomal decoding and frame shifting, the bacterial toxin-antitoxin system and mechanisms of antibiotic resistance. Her work has touched on numerous aspects of translation, in particular the impact of tRNA and rRNA modifications on bacterial translation and antibiotic resistance.

"It is an incredible honor to have our work on the regulation of protein synthesis recognized by our ASBMB colleagues. I have been honored to mentor and work alongside a diverse group of bright and creative researchers in my lab and this award is a recognition of their accomplishments. Science is challenging but working with such inspiring colleagues towards unexpected discoveries has been the greatest privilege of this wonderful career."

— CHRISTINE DUNHAM

Anita Corbett, an Emory colleague, nominated Dunham for the award, noting her far-reaching impact as a researcher. "Her work exploits her expertise in structural biology of the ribosome and touches on fundamental aspects of biochemistry and molecular biology," Corbett wrote in her nomination letter. "Notably, her work highlights how focused mechanistic studies that employ biochemistry and molecular biology approaches can provide critically important insights to broad areas of biology. Her work gives perspective and highlights the impact of basic, fundamental studies of the utmost creativity and quality."

Christopher Lima of the Sloan Kettering Institute, wrote a letter in support of the nomination, highlighting the importance of Dunham's work. "Her investigations are fundamental to our biological understanding of the ribosome and its roles decoding the genome, and perhaps more intriguing, its unanticipated importance in adaptive processes such as bacterial persistence," he wrote.

Dunham's work is recognized widely and has garnered awards from numerous scientific organizations and funding agencies. She has received a National Science Foundation Faculty Early Career Development, or CAREER, award, as well as recognition as a Pew Scholar in the Biomedical Sciences, a Burroughs Wellcome Investigator in the Pathogenesis of Infectious Disease and the 2017 American Crystallographic Association's Etter Early Career Award. One of her lab's recent papers was a Journal of Biological Chemistry Editor's Pick and a 2018 paper in PNAS won the Cozzarelli Prize.

Dunham will receive her award during the ASBMB annual meeting at the Experimental Biology 2019 conference in Orlando, where she will deliver an award lecture titled "Mechanisms of RNA-mediated translational control" at 2:15 p.m., April 7 in Valencia Ballroom A at the Orange County Convention Center.

Kelsey Hughes (kelsey.hughes9@gmail.com) is a writer and RNA scientist living in Austin, Texas.

AVANTI AWARD IN LIPIDS

Bankaitis a 'tour de force' in the field of lipid biology

By Courtney Chandler

Vytas Bankaitis, a distinguished professor at the Texas A&M University College of Medicine, has been awarded the Avanti Award in Lipids by the American Society for Biochemistry and Molecular Biology. He is being recognized for his work on elucidating the role of lipid transfer and phosphatidylinositol exchange proteins in cell biology.

Arthur Johnson, also of Texas A&M, wrote in his letter supporting the award nomination that Bankaitis' contributions to the field of lipid science "have profoundly influenced our understanding of the importance of lipids to so many areas."

For 25 years, Bankaitis and his laboratory have focused on the regulation and organization of lipid signaling in eukaryotic cells. His laboratory described the first biological function for what had previously been a functionally enigmatic group of proteins, the phosphatidylinositol transfer proteins, called PITPs. These proteins bind and exchange specific phospholipids, the phosphatidylinositols, between membranes in vitro. His early research described an important and novel link between lipid metabolism and cellular trafficking when he discovered that a yeast protein called Sec14 had PITP activity. This launched a new research area at the interface of vesicle trafficking and lipid metabolism. He discovered that vesicle trafficking is, in fact, dependent on lipids, and he went on to elucidate the structure and mechanism of Sec14.

Bankaitis' recent research indicates that PITPs are crucial for coordinating the interfaces of lipid-driven metabolic reactions and intracellular signaling. In this way, PITPs act as highly regulated coordinators of phosphatidylinositol kinase signaling in eukaryotic cells, which channels lipid kinase activities toward specific biological outcomes. When the interfaces are regulated inappropriately, it can affect membrane trafficking, growth factor receptors, cell growth and developmental pathways.

"I am deeply honored to be recognized as recipient of the Avanti Award in Lipids. This award belongs to the talented and dedicated students, postdoctoral fellows and technicians who drove our research over the years. I stand on their shoulders. It also serves as testimony to my mentors and insightful colleagues, and to the lipid community who embraced our science, that their interest and investment was worthwhile. I thank them all."

— VYTAS BANKAITIS

William Dowhan of the McGovern Medical School at the University of Texas Health Science Center at Houston wrote in his nomination letter that Bankaitis' recent research is entirely novel and "is reshaping how we think about the regulation, physical organization, and diversification of lipid signaling, and it promises to rewrite the textbooks" on these subjects.

Of Bankaitis' collective research contributions to the field of lipid science, Johnson wrote that his "creative, thorough, and comprehensive elucidation of the structure and function of PITPs and of their integration into the metabolic signaling pathways of the cell constitutes a tour de force."

Bankaitis earned his Ph.D. in microbiology at the University of North Carolina and then worked in cell biology as a Helen Hay Whitney Foundation postdoctoral fellow at the California Institute of Technology. He subsequently joined the faculty at the University of Illinois, Urbana–Champaign, followed by positions at the University of Alabama at Birmingham and the University of North Carolina. In 2012, he joined the department of molecular and cellular medicine at the Texas A&M Health Sciences Center, where he is the E.L. Wehner-Welch foundation chair in chemistry.

Bankaitis will receive his award at the ASBMB annual meeting during the Experimental Biology 2019 conference in Orlando, where he will deliver an award lecture titled "Instructive regulation of phosphoinositide signaling by lipid transfer proteins" at 1:45 p.m. April 7 in Valencia Ballroom A at the Orange County Convention Center.

Courtney Chandler is a Ph.D. student in biochemistry at the University of Maryland, Baltimore. Follow her on Twitter @CourtneyEChan.

Beyond federal funding

PAAC workshop to explore nontraditional sources for research grants

By Benjamin Corb

For many American Society for Biochemistry and Molecular Biology members who run independent labs, the search for research funding is an ongoing challenge.

The ASBMB's Public Affairs Advisory Committee started an alternative funding working group in 2017 tasked with creating tools to help members find funding from sources other than federal science agencies such as the National Institutes of Health or the National Science Foundation.

The working group will host its first major event during the annual meeting at 5:30 p.m. Sunday, April 7, in room W205A. This panel discussion will explore alternative funding options available to biochemists and molecular biologists. The panelists will include:


GREER

- Susanna Greer, ASBMB member and director of the clinical cancer research, nutrition and immunology program in the extramural grants department of the American Cancer Society;


TONKS

- Nick Tonks, recipient of the ASBMB's 2019 Earl and Thressa Stadtman Distinguished Scientist Award (read his profile on page 37) and a professor at the Cold Spring Harbor Laboratory; and


HIESHETTER

- Janet Hieshetter, executive director of the Dystonia Medical Research Foundation.

The panel will be chaired by ASBMB PAAC member Terri Kinzy, vice president for research at Western Michigan University.


KINZY

All ASBMB members are invited to attend. Greer and Hieshetter will describe the funding mechanisms offered by their organizations and share tips for submitting successful applications. They also will talk about similarities and differences between grants from large and small foundations. Tonks will share his experience as a recipient of several grants from foundations.

This panel is one of several events planned by the PAAC's alternative funding working group to help ASBMB members learn about innovative ways to find funding for their research. If you want to see more of these events highlighting alternative funding opportunities, please contact us at publicaffairs@asbmb.org.

Benjamin Corb (bcorb@asbmb.org) is director of public affairs at the ASBMB. Follow him on Twitter @bwcorb.

Town hall at EB

For the third consecutive year, the ASBMB PAAC will hold an advocacy town hall event at Experimental Biology.

The event, at 12:15 p.m. Sunday, April 7, in room W307CD, is an open-format briefing from PAAC chair Matt Gentry of the University of Kentucky and Benjamin Corb, the ASBMB's public affairs director. Matt and Ben will update attendees on the committee's activities over the past year and discuss the policy agenda that the public affairs team is advocating for in Washington on behalf of ASBMB members and the research community. They also will answer your questions about science policy and your research experience.


GENTRY

Topics for discussion include the NIH's Next Generation Research Initiative, how science funding agencies are working to combat sexual harassment and fiscal policies in Capitol Hill that might impact investments in research.

Ben Corb and policy specialist Daniel Pham will be at the meeting representing the ASBMB public affairs team, and they will be happy to arrange one-on-one meetings with you to discuss policy questions, concerns or strategy. Just visit the ASBMB booth and they'll help you connect.

Professional development — it's not just for grad students

By Danielle Snowflack

Each year, the American Society for Biochemistry and Molecular Biology invites top researchers from around the world to inspire the next generation of scientific discoveries with their talks at the ASBMB annual meeting.

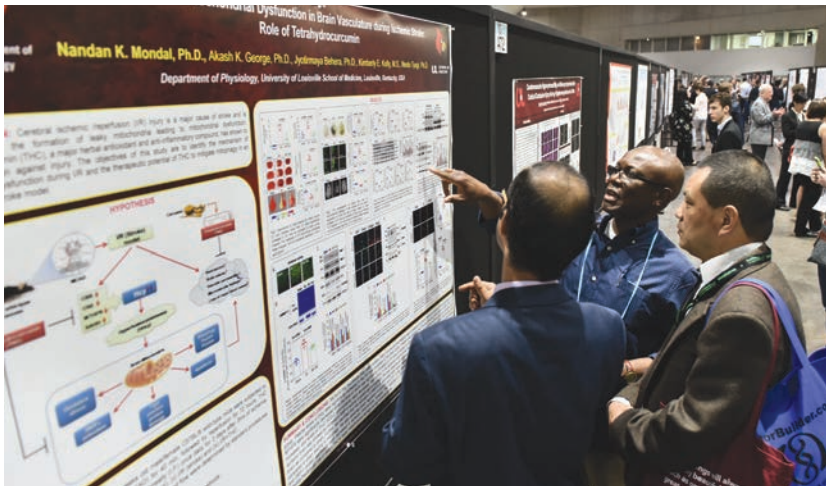
This year, I offer a challenge to all annual meeting attendees: Step away from the science and take time to invigorate your professional life outside the lab.

Career development

The ASBMB 2019 annual meeting has career development for researchers at all career stages. In addition to the grad student/postdoc career development sessions and the undergraduate speed-networking opportunities, we will focus on "Transitions at the Mid-Career Point." These talks, highlighting career transitions in teaching, industry and university leadership, will help midcareer faculty think about their next professional steps.

Science communication

Writing a grant to fund your research? Emailing a member of Congress to advocate for funding? Talking to your neighbor about your work? These are all moments when you need science communication skills. One secret to good communication is creating a compelling narrative about your science through storytelling. In our interactive workshop "Storytelling and the art of giving a great presentation," experienced science storytellers share strategies to help you think about your research in a new way to engage and excite your audience. At the end, we open the floor to let you share your science story.



ASBMB

Want to see science communicators in action? This year, we are hosting the inaugural Science in a Flash communication contest. This event features 10 speakers, each of whom will share their science in just four minutes with only one slide. In addition to distilling their research down to its essence, presenters must work to eliminate scientific jargon so that their presentation is understood by specialists and non specialists alike. The audience will play a major role in selecting winners, so join us and vote for your favorite.

Outreach

After being inspired by the work presented in the science outreach poster session, join us to learn strategies to take your science beyond the bench and into the public sphere. In the "Transforming science research into science outreach" workshop, speakers will talk about how they successfully translated their research into outreach and engagement programs. At the end of the workshop, you'll have time to pitch your ideas to our panelists and the audience to get feedback on how to take your science to the public.

Education

Looking for inspiration to shake up your teaching practices? Start with the ASBMB Award for Exemplary Contributions to Education lecture; 2019 award winner Neil Garg (see his profile on page 31) will talk about how he made Chem 14D, an organic chemistry class, into one of UCLA's most popular undergraduate courses.

After the award lecture, the education spotlight sessions will help you explore biochemistry and molecular biology teaching in the lab and in the lecture hall.

Danielle Snowflack (dsnowflack@asbmb.org) is the ASBMB's director of education, professional development and outreach. Follow her on Twitter @drsnowflack.

CAREER DEVELOPMENT

Workshop / Alternate Funding: Driving Philanthropic Support for Basic Science
5:30–7 p.m. Sunday, April 7
Convention Center W205A

Transitions at the Mid-Career Point
9:30–11:30 a.m. Monday, April 8
Convention Center W306AB

Micro-learning hub / How to Develop a Comprehensive Job-Search Strategy
Part 1: 3:30–4:30 p.m. Monday April 8
Part 2: 9–9:30 a.m. Tuesday April 9
EB Career Central

Workshop / Navigating Difficult Conversations
5:30–7 p.m. Monday, April 8
Convention Center W306AB

SCIENCE COMMUNICATION

Constructing your Elevator Pitch
1:15–2:45 p.m. Saturday, April 6
Convention Center W306AB

Workshop / Storytelling and the Art of Giving a Great Presentation
5:30–7 p.m. Sunday, April 7
Convention Center W207B

Micro-learning hub / How to Get Started with Science Writing and Build a Portfolio
3–3:30 p.m. Monday, April 8
EB Career Central

ASBMB Student Flash Talk Science Communication Competition and Reception
7–8:30 p.m. Monday, April 8
Rosen Centre Grand Ballroom C

ASBMB

OUTREACH / ADVOCACY

EB Welcome Reception with Science Outreach Poster Session
7–8:30 p.m. Saturday, April 6
Convention Center Valencia Ballroom ABCD

Advocacy Town Hall Meeting
12:15–1:45 p.m. Sunday, April 7
Convention Center W307CD

Workshop / Transforming Science Research into Science Outreach
5:30–7 p.m. Monday, April 8
Convention Center W307CD

ASBMB

EDUCATION

Using Large Sets of Data with Students
10 a.m.–noon Sunday, April 7
Convention Center W306B

ASBMB Award for Exemplary Contributions to Education Lecture
"How organic chemistry became one of UCLA's most popular classes" — Neil Garg, UCLA
3–4 p.m. Sunday, April 7
Valencia Ballroom A

Exploring Biochemistry Teaching and Learning
4:15–5:15 p.m. Sunday, April 7
Convention Center W305A

Workshop / Integrating Research into the Classroom: Developing an Engaging CURE with Big Data
5:30–7 p.m. Sunday, April 7
Convention Center W306AB

Exploring Experimentation in Biochemistry Lab and Non-Lab Settings
2:30–3:45 p.m. Monday, April 8
Convention Center W306AB

SCAN & CONNECT

ASBMB '19
ANNUAL MEETING
ORLANDO | APRIL 6-9

INSTAGRAM

THEASBMB

SNAPCHAT

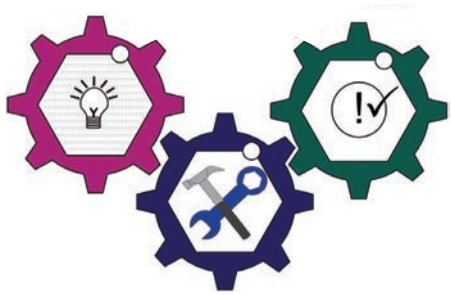
SPOTIFY

From workshops and award lectures to spotlight talks and poster presentations — a lot of amazing ideas will be exchanged at **#ASBMB2019.** Help us continue these important conversations off the convention center floor by connecting with the American Society for Biochemistry and Molecular Biology on social media.

- Follow us on Twitter **@asbmb**, and share your thoughts and pictures using **#ASBMB2019.**
- Scan the codes above to find us on Instagram, Snapchat and Spotify. Is our playlist missing your favorite song? Tweet it our way!

Remember to visit the Apple Store or Google Play to download the EB Annual Meeting app. This will allow you to build an itinerary for the meeting. We'll see you in Orlando and online!

Carbs got you down?



Come get friendly with glycans

By Catherine Grimes & Natasha Zachara

Glycans are everywhere.

Development, the immune system, the definition of self, protection of surfaces, adhesion of cells, signal transduction and metabolism. What do they have in common?

All are regulated by glycans and their conjugates (glycoproteins, glycosaminoglycans and glycolipids). Perhaps you've encountered glycans in your research: milk oligosaccharides that play a critical role in innate immunity, the ABO blood group antigens, hyaluronic acid (in our knees and in cosmetics), and the carbohydrates that often form the ligands critical to vaccines.

Discovering a glycan associated with your favorite research question can be daunting. What do you do? Call a friend who knows about glycans? Stop working on the problem? Dealing with anything glyco traditionally has been reserved for specialists. Yet, given their prevalence in biology, everyone should get to know these molecules.

In response to the National Academy of Sciences' 2012 report "Transforming glycoscience: A roadmap for the future," the National Institutes of Health is investing about $120 million in the Common Fund Glycoscience Program. An NIH working group designed a seven-year program to create, test and disseminate new tools, reagents and methods to help all scientists do research under the glycoscience umbrella. Four years in, the program's investigators have progressed toward the NAS goal of a glycoscience tool kit and now seek collaborating partners from the broader scientific community — researchers with an interest in glycans and their binding partners — to use these tools.

Funded projects must cross-validate their efforts, highlighting the utility of tools and reagents while promoting fruitful collaborations. For example, Catherine Grimes' laboratory at the University of Delaware has developed a method to label the bacterial cell wall metabolically with modifiable sugar building blocks. These reagents have been shared with numerous laboratories. Nina Salama's laboratory at the Fred Hutchinson Cancer Research Center in Seattle used Grimes' tools to study the role of the glycan coat in the pathogenesis of Helicobacter pylori, the bacteria that causes stomach cancer. This non-glycobiologist has streamlined the methodology into her microbiology-based research program. This is just one example of how the common fund is working across disciplines to assure that new approaches to studying glyco are inclusive.

Do you have glycans questions in your field? If so, we're here to help.

A workshop to highlight recent advances from the glycoscience community and assist you in tackling your glyco needs will be held Sunday, April 7, at the American Society for Biochemistry and Molecular Biology annual meeting in Orlando. This low-key networking event is designed to facilitate discussions tailored to all levels of your research needs. The designers of new tools, standards, methods and syntheses will be waiting to talk with you at tables labeled "Ask a Glycoscientist." Academic investigators Catherine Grimes, Will York, Lance Wells, and Natasha Zachara and industry representatives from Lectenz Bio and Glycan Therapeutics LLC will be available to answer such questions as:

- How do I determine if my protein is glycosylated?
- How do you approach a glycomics project?
- What bioinformatics tools are there?
- What reagents are available to help me label my glycans?

We hope this interactive night of programing will lower any barriers between you and working on sugars in your research.

Indulge your sweet tooth in Orlando.

Emerging Technologies in the Glycosciences

SUNDAY, APRIL 7 ■ 5:30 – 7 p.m.

Room W307CD, Orange County Convention Center

Presented by **Catherine Grimes,** University of Delaware, and **Natasha Zachara**, Johns Hopkins University

Catherine Grimes (cgrimes@udel.edu) is an assistant professor of chemistry and biochemistry at the University of Delaware.

Natasha Zachara (nzachara@jhmi.edu) is an associate professor in the biological chemistry and oncology departments at the Johns Hopkins University School of Medicine.

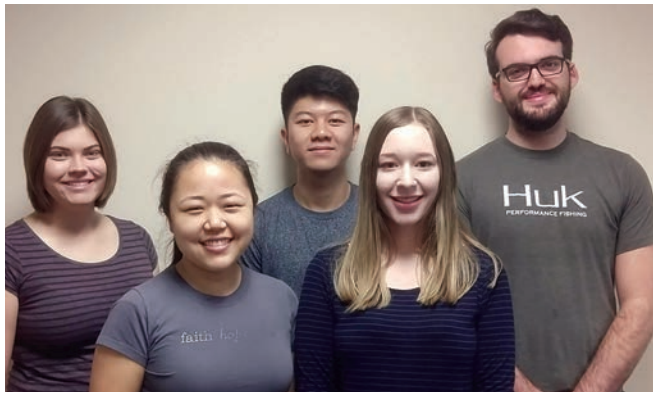
WELCOME TO ORLANDO

By Haley Davenport, Haley Lehew, Jessica Krogh, Matthew Caldwell & Andy Nguyen

There will be plenty to do and see inside the Orange County Convention Center during Experimental Biology 2019. Even so, you'll want to get outside to see some of the sites of Orlando. The following guide was created by officers of the University of Central Florida's American Society for Biochemistry and Molecular Biology Student Chapter.

This guide includes some of Orlando's most notable tourist destinations as well as some local favorites. Options range from short evening events to activities that may take all day. Distances listed are from the convention center. For advice on how to get around, check out our transportation guide on p. 51)

All activities listed — from arcades to Disneyworld — are suitable for all ages and have been experienced by one or more of our members, so we guarantee that every activity is enjoyable.



COURTESY OF KEN TETER/UCF

These officers of the newly chartered University of Central Florida ASBMB Student Chapter assembled this guide. In back are Haley Davenport (president), Andy Nguyen (treasurer) and Matthew Caldwell (historian). In front are Haley Lehew (vice president) and Jessica Krogh (secretary).

THINGS TO DO IN ORLANDO

INTERNATIONAL DRIVE

ICON Orlando 360

(iconorlando.com). The Orlando Eye, Madame Tussauds wax museum, the SEA LIFE Orlando Aquarium, Arcade City and the Orlando StarFlyer are among the attractions of this entertainment complex.

Fun Spot Orlando

(fun-spot.com/orlando). This theme park has go-karting, roller coasters and many other fairlike activities. Admission is free, but the attractions are not. More affordable than the big parks such as Disney or Universal. *(4 miles)*

Dave and Buster's

(daveandbusters.com/locations/orlando). A full-service sports bar and restaurant as well as a large arcade with many games. Great for families. *(1.7 miles)*

Andretti Indoor Karting & Games

(andrettikarting.com). A large indoor arcade and indoor go-karting venue. Also offers food and drink, bowling, VR games and simulators, and more. *(0.8 miles)*

Topgolf

(topgolf.com/us/orlando). Large multi-story golfing venue with over 100 individual hitting bays. Includes a full-service restaurant and bar. Great for families and parties. $15 per bay and up. *(1 mile)*

Yard House, Shake Shack, Sugar Factory and many other restaurants are located here. *(1.5 miles)*

AARON CLAUSEN

Fun Spot America Orlando Freedom Flyer Coaster

The Escape Game Orlando (theescapegame.com/orlando). You have 60 minutes to solve puzzles and find a way to escape from one of four rooms with themes including Mission: Mars and Gold Rush. Great for parties of up to 8 people. $35/person. *(2 miles)*

Wonderworks (wonderworksonline.com/orlando). If you don't get enough science inside the convention hall, this amusement park features more than 100 hands-on science exhibits in six zones, including natural disasters and physical challenges. $34/adult, $25/child. *(1.7 miles)*

Titanic: The Artifact Exhibition (premierexhibitions.com). Self-guided tours of objects and displays from the Titanic or a guided tour with an actor portraying an individual linked to the Titanic. Interesting for all ages. $22/adult, $15.75/child. *(2.5 miles)*

Pointe Orlando (pointeorlando.com). This outdoor shopping center includes a movie theater, restaurants, live entertainment and other activities for adults and children. *(1 mile)*

SEAWORLD

SeaWorld (seaworld.com/orlando). This theme park is on International Drive, close to the convention center. It has multiple exhibits, aquatic shows and thrill rides. This is a full-day activity. $80. *(3 miles)*

Aquatica (aquatica.com/seaworld). This water park is across the street from SeaWorld on International Drive. It has multiple slides and wave pools. This is a full-day activity. $40. *(2 miles)*

BRIAN MARSHALL

Drops of Taumata Racer in Aquatica, Florida

SPORTS

Orlando Magic (nba.com/magic) host the Atlanta Hawks for Classic Night and Fan Appreciation Night, 7 p.m., April 5, at Amway Center. $18 and up. *(11 miles)*

Orlando City Soccer Club (orlandocitysc.com) host the Colorado Rapids, 7:30 pm, April 6, at Camping World Stadium. $23 and up. *(10 miles)*

BOB LINSDELL

Universal Studios

SHOPPING MALLS

The Florida Mall (simon.com/mall/the-florida-mall). This large enclosed mall features many department stores, smaller stores and a food court. *(6 miles)*

The Mall at Millenia (mallatmillenia.com). This indoor mall includes department stores, high-end designer stores, smaller stores and a food court. *(6.2 miles)*

Orlando Vineland Premium Outlets (premiumoutlets.com/outlet/orlando-vineland). This large outdoor outlet mall contains multiple stores as well as a food court. *(5.5 miles)*

Orlando International Premium Outlets (premiumoutlets.com/outlet/orlando-international). Another large outdoor outlet mall with many stores and a food court. *(4.5 miles)*

CONTINUED ON NEXT PAGE

CHAD SPARKES

Disney's Typhoon Lagoon

UNIVERSAL

universalorlando.com (4 miles)

CityWalk. This location features mini-golf, clubs, a movie theater, and many gift shops and dining opportunities. It directly connects to the theme parks. There is a $25/day parking fee for park visitors.

IVAN CURRA

Epcot Center

Universal Studios. This movie- and TV-based theme park has multiple rides, restaurants and shows. This is a full-day activity. $114/adult, $109/child.

Islands of Adventure. This theme park has multiple rides, restaurants and shows. This is a full-day activity. $114/adult, $109/child.

Volcano Bay. This water park has a surf pool, an artificial volcano and multiple slides. This is a full-day activity. $80/adult, $75/child.

WALT DISNEY WORLD

disneyworld.disney.go.com (7 miles)

Disney Springs. This location features multiple restaurants, shops, shows and other activities such as a movie theater and bowling alley.

Magic Kingdom. This theme park contains multiple areas, each with a unique theme, as well as dining, shows and rides. This is a full-day activity. ($109 age 10 and up)

Animal Kingdom. This theme park is continent based and features animals, rides, dining and shows. This is a full-day activity. ($109 age 10 and up)

Epcot. This theme park is a world showcase featuring food, drinks and performances representative of regions of the world. This is a full-day activity. ($109 age 10 and up)

Hollywood Studios. This theme park is mostly movie-based, featuring rides, shows and dining. This is a full-day activity. ($109 age 10 and up)

Blizzard Beach/Typhoon Lagoon. These water parks feature lazy rivers, slides and wave pools. ($65 age 10 and up)

Winter Summerland/Fantasia Gardens. These 18-hole themed mini-golf courses are located at the Disney World and Epcot resorts. ($14 age 10 and up)

Getting around Orlando

Welcome to the sunshine sprawl

By John Arnst

Congratulations. If you're heading for the American Society for Biochemistry and Molecular Biology's annual meeting, then you'll be in Orlando in April. As a former Floridian, I can state authoritatively that's a pretty good month to visit — the weather is likely to be hot but not yet sweltering — so you might want to see some sights outside the big Experimental Biology meeting in the Orange County Convention Center.

What's the best way to do that?

Most of Orlando isn't especially hospitable to foot traffic; the heat, humidity and asphalt can render more than a few minutes outside sweaty and unpleasant. However, the shopping centers and restaurants around the convention center are surprisingly walkable, given the sprawling nature of the city and state, so you're in luck if you want to get through the meeting without renting a car. If you decide to rent a vehicle, buckle in and drive carefully — the combination of congested roadways and tourists unfamiliar with them can be harrowing.

If you're reading this before you've arrived at either the Rosen Centre Hotel or the Hyatt Regency Orlando, your nonrental options for getting from the airport to your hotel are to take a taxi, one of the local Lynx buses or a paid shuttle. If you've already made it to your hotel, consider these as options for your return trip.

A taxi's a taxi, and the hotels are nearly 13 miles from the airport; with minimal traffic, the drive takes about 20 minutes, but with springtime tourism, it may take the better part of an hour, and the cost averages $30 to $60. A rideshare service such as Lyft or Uber will save you from a running meter if you wind up stuck in traffic, but both will carry a $5 airport surcharge.

VISITOR 7/ WIKIMEDIA

Orange County Convention Center

If you aren't pressed for time, the westbound route 42 of the local Lynx bus system, which runs between the airport and Destination Parkway near the convention center with minimal stops, is the most affordable option at $2. However, the ride takes an average of 80 minutes and requires exact change.

Between these extremes of cost and convenience are the paid shuttle bus services Mears Transportation and SuperShuttle, which respectively cost $22 and $19 for a one-way trip from the airport and can be scheduled in advance.

Once you've gotten to your hotel, it's a breeze to get to the convention center; both the Hyatt Regency Orlando and the Rosen Centre Hotel connect to the center through indoor bridges. If you aren't inclined to eat at the hotel restaurants, a short walk on International Drive takes you to a Denny's, Red Lobster and Dunkin' Donuts, and just northward lie the bars and upscale chain restaurants of the Pointe Orlando.

If you want to explore a bit farther afield, consider the I-RIDE Trolley. This affordable transportation service operates from 8 a.m. to 10:30 p.m. in the International Drive area. Cost is $2 per adult and $1 per child. Unlimited day passes also can be purchased online. More information, including the route map and real-time trolley tracking, can be found on the website.

John Arnst (jarnst@asbmb.org) is an ASBMB Today science writer. Follow him on Twitter @arnstjohn.

MAYBE YOUR NEW FAVORITE T-SHIRT?

This year's American Society for Biochemistry and Molecular Biology annual meeting T-shirt design comes from the ASBMB Student Chapter at Otterbein University in Westerville, Ohio.

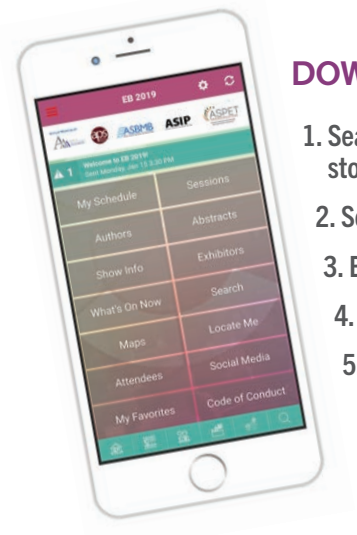
"We came up with this idea one day while in the research lab," Erin Hughes, the chapter's president, said. "A few chapter members were trying to brainstorm what ASBMB and BMB meant to us."

Chapter member Katie Dodds came up with the idea to use some common research techniques to spell out ASBMB and created the design. Hughes drew up the final design and thought of the phrase "these are a few of my favorite things."

The Otterbein University ASBMB Student Chapter is a decentralized student chapter that prides itself on allowing everyone to be involved, Hughes said. "We focus on making connections between the members and talking about science in new and fun ways."

This year's T-shirt will be sold at the ASBMB booth at Experimental Biology 2019 in Orlando, April 6–9.

— *Stephanie Paxson*



DOWNLOAD THE EB APP

1. Search "EB Annual Meetings" in your app store.
2. Select "Experimental Biology 2019."
3. Browse sessions and abstracts.
4. Build your schedule.
5. Get ready to enjoy #ASBMB2019 at EB!

SPEAK YOUR MIND

Will you be at #ASBMB2019 in Orlando?

If so, drop by ASBMB headquarters for an on-camera interview.

We invite you to share

- career advice
- your thoughts on wellness for scientists
- inspiring personal experiences
- opinions on other topics

The edited videos will be paired with online editions of upcoming ASBMB Today articles.

Please contact our media specialist, Allison Frick, at africk@asbmb.org or on Twitter, @AllisonFrick, to schedule your interview or ask questions.

Follow #ASBMB's official meeting tweeter

Guillaume Thibault is an assistant professor in the School of Biological Sciences at the Nanyang Technological University in Singapore. In his lab, he uses his multidisciplinary training to tackle biological key questions on endoplasmic reticulum stress, lipid regulation and homeostasis using the model organisms yeast, cell culture and C. elegans. He won the highly competitive Elite Nanyang Assistant Professorship Award in 2013.

THIBAULT

Thibault was previously a research fellow in Davis Ng's laboratory at Temasek Life Sciences Laboratory, Singapore. He received his Ph.D. under the supervision of Walid Houry in the department of biochemistry, University of Toronto, Canada.

This is Thibault's first Experimental Biology conference.

Follow him on Twitter @Guillou76 or @ThibaultLab.

asbmb.org/careers

ASBMB

ASBMB professional-development resources

Job board
asbmb.org/jobboard

The ASBMB job board has listings from academia, government and industry. Looking for your next hire? Members can post jobs for free.

Grant-writing training
asbmb.org/grantwriting

This Washington, D.C.-based summer workshop yields impressive results; 75% of participants end up with successful grants within two years.

Communications training
asbmb.org/commcourse

Can't travel for training? Take the ASBMB's "The Art of Science Communication" online course to gain the skills, knowledge and mindset necessary to become a great presenter.

Small meetings
asbmb.org/specialsymposia

Small meetings are offered throughout the year on a wide range of scientific topics. Interested in organizing a meeting? Members can work with the ASBMB to plan and organize a special symposium.

Careers blog
asbmb.org/careersblog

Every week, our careers blog presents insights into the current job market.

Webinars
asbmb.org/webinars

We offer live webinars and recordings of past webinars on topics including getting funding, salary negotiation, research careers in industry and more.

Video tutorials
asbmb.org/careers/tutorials

Our video series has tips on networking, dressing professionally, building a personal brand and more.

Advocacy Training Program
asbmb.org/advocacy/atp

The ASBMB ATP is a six-month externship that provides hands-on science policy and advocacy training and experience.

The recommendation letter conundrum

Should the trainee write their own first draft?

By Kamalika Saha

Imagine this: You are well on your way to graduating or nearing the end of your postdoctoral stint, and it's time for the pivotal transition toward that coveted postdoc or industry position. You've done the groundwork by successfully clearing the first two interview rounds. The key factor is now the letter of recommendation. You approach your mentor, who tells you to start by drafting the letter yourself.

What's your reaction? Are you surprised at the request, or do you readily comply? What are the ethical guidelines surrounding this? Are mentors shirking their responsibilities by having students write their own letters?

A letter of recommendation is an important piece of the application puzzle, and the opinions reflected in this letter can sway the outcome. A well-written letter succinctly highlights and analyzes the candidate's strengths in an unbiased manner. And a letter with a personal touch provides an added advantage.

Having a student or postdoc write the first draft may provide a platform the mentor can build upon. It gives them the pertinent facts to create the final version. At times, drafting this letter helps candidates rethink their strengths and weaknesses from the employer's perspective and impels them to evaluate their career path. A mentor's feedback on a draft letter can help a candidate gain valuable insights into how they should represent themselves to the employer.

Richard Eckert, a professor of biochemistry and molecular biology at the University of Maryland, Baltimore, believes that writing a draft letter can be educational. "I prefer to have students and postdocs draft their recommendation letters to help them understand how to encapsulate their achievements," Eckert said. "I then rewrite them to a final form and share the copy with candidates as an additional part of the learning experience."

When a mentor has limited contact with a student who was a summer intern or short-term research trainee, a draft letter listing achievements or experiences can provide a more targeted approach than basing the recommendation on a CV.

That's the view of Rajini Rao, a professor of physiology at Johns Hopkins School of Medicine. "When I ask for a draft from trainees I do not directly mentor, it is solely informational," she said. "I'm looking for data that I can polish, elevate with language and context, and provide my perspective. The labor is not lessened, but the content is enhanced."

In other instances, the quantity of requests is an issue. Application season for graduate and professional schools brings a surge of recommendation letter requests, and it might not be feasible for the mentor to remember and highlight exact nuances for each trainee's letter without assistance. A draft from the student makes the process more efficient and helps a professor draft a personalized letter.

Mayuri Rege, faculty at Ramnarain Ruia Autonomous College in India, sees the benefits in this approach but also limitations. "One of the

reasons that professors, especially in universities, will ask students to write their own LORs is because they are simply overwhelmed with writing them for almost 20-30 students in one application season," she said. "However, these impersonal letters written by inexperienced writers make for little impact and show how little the professor cares for the student. A good alternative is to ask the student to provide a list of career highlights and circumstances that were special moments shared with that professor."

A candidate might be applying for a position outside academia that requires strengths and skills unlike those needed at a university. In such cases, it is useful for the student to provide a template highlighting the job-specific qualities.

Priyanka Subrahmanyam, a postdoctoral fellow at Stanford, recognizes this. "The tendency to let students write their own letters stems from the PI wanting to make sure the right qualities are highlighted, especially for jobs outside academia," she said. "For grant applications or academic jobs, they will almost certainly write the letters themselves, with minimal involvement from the student." In either case, Priyanka believes it is fair to assume that the mentor has thoroughly reviewed the letter and will stand by its contents. So having a student or postdoc draft a letter may stimulate ideas for the mentor, who can then reword, edit and review the final version before signing off on it.

One professor who asked to remain anonymous believes, however, that mentors are passing off a fundamental responsibility by having students or trainees draft their own letters. "I would personally never ask my trainees to do the job for me and write a grant application in my name," the professor said. "Although this could be construed as part of the training, it is, in my opinion, way outside of the job description for any research trainees."

Senthil Arumugam, group leader at the University of New South Wales in Sydney, believes that trainees may not have the bigger picture in mind and are ill-equipped to elaborate honestly on their strengths and weaknesses. "I write every single LOR for my students," he said. "I deliberately keep it factual and honest so that the reader gets a true picture of the student's time in my lab. I believe as group leaders, we owe it to the students and future employers who value our words, to put these facts and opinions in our own words rather than entrust it with the students. In cases where the student's growth has been positive, I believe it matters that the group leaders take the time to do justice to their hard work."

From a trainee's perspective, choosing the right person to write a reference is of utmost importance for their career path. Sreemoyee Acharya, a graduate student in the University of Iowa, believes a professor or mentor who has worked closely with them and is familiar with their work ethic is a natural choice. "The recommendation letters should be written by the professor and not by the student/postdoc," she said. "If the professor asks the applicant to write his or her own LOR, I would believe that either the professor isn't very keen on spending time on the applicant or he/she could care less."

The recommendation letter conundrum has multiple solutions. Arguments exist both for and against having students and trainees author a draft of their own letters. A recommendation letter needs to have just the right blend of thoughts and perceptions to propel a trainee to the next rung of the career ladder. Getting some insight from the mentee may aid the process of writing a letter that is factually accurate and has a personal touch. On the other hand, writing a well-crafted letter is an art, and if a mentor readily writes one unassisted, the mentee can't ask for more.

Kamalika Saha (kamalika.saha@gmail.com) is a medical writer at Sanofi.

Seeking to understand the rules of life — and taking life lessons from dogs

As an assistant professor of biochemistry and biomedical informatics at Vanderbilt University, Carlos F. Lopez works to develop numerical methods to understand signal transduction cascades in cells and their dysregulation in cancer. He is also the Vanderbilt liaison to Oak Ridge National Laboratory.

Lopez earned his Bachelor of Science in chemistry and biochemistry (double major) and Bachelor of Liberal Arts at the University of Miami and his Ph.D. in physical chemistry at the University of Pennsylvania. He did postdoctoral work at University of Texas at Austin in biophysics and then in systems biology at Harvard Medical School.

In this month's Research Spotlight, Lopez talks about the value of strong mentors and his need for alone time. His answers have been edited for length and clarity.

COURTESY OF CARLOS LOPEZ

Carlos F. Lopez has had many supportive mentors in his life and says, "Your adviser's trust is fundamental to building your own confidence as a scientist."

What key experiences and decisions have enabled you to reach your current position?

Excellent mentorship has shaped my career. I was lucky to find mentors who guided me toward excellence and encouraged me to search for the answers to big questions — mentors who were willing to trust that I could deliver what I promised.

During my graduate work with Michael Klein, I once gave him some slides with incorrect results for a presentation. I found out a week later that I had made a mistake. I was nervous about talking to my mentor, but he was very matter-of-fact about it and taught me simply to own it, correct it and move on. I learned that it was OK to make mistakes as long as we can correct them.

Support from mentors at the undergraduate, graduate, postdoctoral and even faculty levels has shaped my multidisciplinary interests at the interface of chemistry, physics and biology in a way that would not have been possible otherwise.

How did you first become interested in science?

I learned to read when I was very young, and I asked many "why" questions. My mother found all kinds of

child-friendly books about science topics, and I devoured them. My father later encouraged my interest in science, and I enjoyed chemistry and physics. However, it was not until I took biochemistry as an undergraduate that I found a connection between the physical and biological sciences. There was a component of luck when I once stayed after organic chemistry class a bit too long and the instructor recommended I explore undergraduate research. I found an undergraduate mentor, Jeff Evanseck, and that experience completely changed my career focus.

Were there times when you failed at something critical to your path? If so, how did you get back on track?

Many times! I think the constant in science is failure.

I worked as a postdoctoral fellow with Peter Rossky studying water-protein interactions at UT-Austin. I thought quantum dynamics sounded cool, and I wanted to pursue this topic. Prof. Rossky explained that this was not a good idea: I did not have a strong foundation in quantum mechanics, and I struggled with some aspects of mathematics. He pointed out that I was talented with statistics and had an understanding of biology that others in my program simply did not have. But I was not good at quantum dynamics. It was a hard conversation. My ego was bruised, but I realized he was correct, and I decided to nourish my talents. After coming to terms with this failure, I embraced my skills, embraced multidisciplinary research in biology, and never looked back.

What advice would you give to young persons from underrepresented backgrounds who want to pursue a career in science?

Find advisers who believe in you — advisers who understand your talents and where you need to improve. You need advisers with whom you can build a relationship based on trust and who are willing to give you opportunities to learn from failure. They may not tell you what you want to hear, but they will help you grow, focus your work on the areas that excite you and achieve your goals.

I tell my students that a mentor-mentee relationship goes beyond guiding their project. Many emotions are involved in this process, and you need to have a mentor with whom you can express your frustrations and celebrate your achievements. I always joke with Peter Sorger, my postdoc advisor, that we have a mostly loving relationship. He helped me to take a deep breath during the hard times and, most importantly, always showed that he believed in me. Your adviser's trust is fundamental to building your own confidence as a scientist.

What are your hobbies?

Despite enjoying other people's company, I find that I need long periods of solitude to think and process my ideas. Alone time becomes harder to find as your career evolves, so I try to be mindful about these times. This alone time spurs creativity. My creative process is nurtured by good movies, good music, conversations, walks (preferably with a dog) and playing with my children.

What was the last book you read?

I read two at once. "This Is How You Lose Her" by Junot Diaz is a collection of short stories about relationships among individuals with mixed ethnic and socioeconomic backgrounds. The book's themes revolve around what it means to be human, what it means to be male and the roles we play in society. "A Field Guide to Getting Lost" by Rebecca Solnit reminded me that being lost is how we find ourselves.

Do you have any heroes, heroines, mentors or role models? If so, how have they influenced you?

I do not have a specific hero, but I find qualities in many people that I would like to emulate. I have taken many lessons from my dogs: live the moment, fear can be overcome with love and good company, forgive and forget, enjoy the journey — and cuddling with your loved ones is perhaps the most important thing you can do every day.

What keeps you working hard every day?

The desire to understand how life works! We know that we have DNA, RNA, proteins and so forth; that these make cells; and that cells talk to each other to make organs — and suddenly we have a human being. But how does it all come together? How do we understand this parts list to explain how life works? These questions keep me coming to work and writing grants on a regular basis.

ABOUT THE RESEARCH SPOTLIGHT

The American Society for Biochemistry and Molecular Biology's Research Spotlight highlights distinguished biomolecular and biomedical scientists from diverse backgrounds as a way to inspire up-and-coming scientists to pursue careers in the molecular life sciences. Eligible candidates include Ph.D. students, postdoctoral fellows and new or established faculty and researchers. To nominate someone for this feature, contact education@asbmb.org.

Struggle of choice

Letter from a chronic night owl

By Len Sprague

As I leave the office for the day, exhausted after hours tethered to the computer screen struggling through articles and code, I begin fantasizing about dinner and an early bedtime. Sweet relief from the endless typing, pondering, calculating, analyzing tasks that consume my daily routines, soon to be granted as I return home.

Dinner is prepared in a haze. My eyes close slowly, kept open only by heat from the stove top's flames as I carefully warm last night's leftovers. I can feel my mind fog and my eyelids sag, begging me to rest.

Soon, I promise myself. Soon.

But then, a familiar sensation passes through me — as the clock strikes 8 p.m., I get my second wind. My magnificent mattress no longer seems appealing as my eyes open wide and my limbs shake off the heaviness of near slumber.

Night has begun.

I sail over to my desk to wake my computer. I press the space key, and a loud clack resonates in the silence as my keyboard flares to life, coursing with a myriad of colors. Bright light bursts from the monitors and washes over the room, reinforcing my re-invigorated state.

Ideas begin to cascade over one another — should I begin that literature review? Review a few more edits on my nearly complete manuscript? Brainstorm a new clip about that Nature article? Emails? (Yuck.) Options abound, and I struggle to sort through them for the best choice.

I convince myself that this will be a simple task.

"All right, not a problem. Just need to compare my options a bit. Easy enough!"

What if I start that literature review? Pro: new paper in the works. Con: likely to consume the entire night … maybe best for tomorrow if I wish to get any shuteye this evening.

Perhaps a few more edits on that manuscript? Pro: close in on finishing this current paper. Con: I spent all day on the paper already and may do more harm than good by looking at it again without a fresh perspective.

Brainstorming a new clip? Pro: builds my portfolio. Con: article was deeply technical, so it might take a while just to sort through the jargon.

Emails? … Just, no.

A bubble of an idea begins to form amid the tangle of thoughts, breaching the chaos, an idea that is dismissed more often than I would like: What about spending time with friends?

As if on cue, my phone buzzes. A group message has come alive, fellow chronic night owls reaching out for companionship and camaraderie. I notice that everyone else is available

this evening.

I struggle again. How do I choose? How can I choose?

I reach for my phone, forming a message of regret in my mind: "Sorry everyone, but maybe next time."

I can rest when I'm done with my work.

A feeling halts me — loneliness. It's been weeks since I've been able to speak with everyone. I've begun to feel out of place, burned out by the constant struggle.

I reach my phone and reply: "I'll be there!"

Night is a special opportunity; the silence makes it easier to see every possibility that could be embarked upon. In the plethora of choices, a rare chance to be with friends is not a choice to be overlooked.

Sincerely,
Chronic Night Owl

Epilogue:

My work as a graduate student brings many challenges, likely shared by others traversing similar paths. I must rapidly digest information and reconstitute it for peers, instructors, mentors, editors, committees … only to restart the process from a different angle. I scramble to pursue my passions (climate advocacy, renewable energy, writing and teaching), to identify and claim who I am and where I want to go, all while trying not to forget the simple things — like dinner (or, more often, lunch) and paying rent. I love the battle for understanding, the tension of projects coming to a crescendo, the joy of collaboration; I equally fear the evaluations, worry about the possible failures and struggle to accept it all.

Yet none of this entirely nourishes my spirit, my drive or my motivation. Sharing time with close friends, forging bonds among kindred individuals and reveling with them in those in-between moments (our beloved night hours) fulfills my desire for support, re-motivating me faster than anything else can.

As I barrel through the turbulent waters of graduate school and career hunting, I know I benefit from keeping my friends at the top of my priority list — even if, sometimes, my academic passions end up fighting them for attention.

Len Sprague (leonard_sprague@ brown.edu) is a chemistry graduate student, summer instructor and writing consultant at Brown University. He is pursuing science writing as a way of sharing knowledge and experiences with a global audience. Len also enjoys cooking and snowboarding, albeit not at the same time. Follow him on Twitter @ lensprague.

Credit for discovery and a patenting gaffe

On page 32 of the December 2018 issue of ASBMB Today, there is a half-page box that includes a picture of Nobel laureate César Milstein who, as the article explains, invented an efficient method to develop monoclonal antibodies. In the same issue, on page 27, you have a picture of Nobel laureates Michael Brown and Joseph Goldstein, who invented critical pathways of cholesterol metabolism. Unfortunately, in the aforementioned box, you did not credit Georges J. F. Köhler, who was the first author of the 1975 paper in the journal Nature on monoclonal antibodies and co-winner of the 1984 Nobel Prize with Milstein (and Niels Jerne). Köhler's name is not mentioned even once. Since both Köhler and Milstein are now dead, I do not believe that this mishap will bring up any immediate complaints. But I believe it would be instructive to your audience, especially trainees, to publish a picture portraying both Köhler and Milstein and give them equal credit in the caption.

CELIA MILSTEIN/MRC LABORATORY OF MOLECULAR BIOLOGY

This photo of César Milstein and Georges Köhler was taken in 1982, two years before they, along with Niels Jerne, won the Nobel Prize in physiology or medicine.

On the question as to who contributed more to the discovery, Köhler or Milstein or others, I would say, Who knows? But if I have to guess, I would pick Köhler, the postdoc who likely conducted all the experiments.

On the issue of not patenting the invention, you report that Milstein blamed the bureaucracy of his institution. I read elsewhere (but do not recall the specific reference) that Milstein believed that humanity would have been better served without patenting of their invention. I believe that the likely truth is different. Neither Milstein nor anybody else could have guessed in 1975 the impact of monoclonal antibodies in diagnostics and therapeutics. Most academics, even today, are not familiar with patents and the regulatory/disclosure issues associated with them. When they have a discovery, they usually try to publish it as soon as possible, for the fear of being scooped, and they lose sleep until their paper is accepted in Nature or a similar journal. If my suspicion is true, this incident was likely a gaffe due to ignorance of patenting practices as well as impatience. Based on its estimated value (around $100 billion), this discovery likely qualifies as the biggest financial gaffe in the history of scientific discovery.

Regarding claims of inventorship, the Nobel prizes and Nobel laureates: I published a 2013 paper in the journal Clinical Chemistry and Laboratory Medicine on Nobelitis, a common disease among Nobelists, and I recently argued, with Clare Fiala, in the same journal that the Nobel Prize should be abandoned. There are many reasons, one being that credit is impossible to assign fairly among those who contributed to the inventions. Controversies as to who should get the prize are almost as many as the awarded prizes themselves.

— *Eleftherios Diamandis (eleftherios.diamandis@sinaihealthsystem.ca), University of Toronto*

CLASSIFIEDS

Scripps Institution of Oceanography, UC San Diego: Marine Aquaculture/ Marine Omics

Assistant/Associate/Full Researcher (Biology Section)

SCRIPPS INSTITUTION OF OCEANOGRAPHY
UC San Diego

The Scripps Institution of Oceanography (http://scripps.ucsd.edu) at the University of California San Diego invites applications for a full-time Researcher position to be funded largely by extramural research grants and contracts in the research areas of marine aquaculture and marine omics. The Researcher series at SIO parallels the Professor series in terms of expectations for research and service but carries no teaching requirements. Researchers receive nine-month appointments with 25% salary support from institutional sources. Externally funded research programs are expected to provide the remaining salary support, including an opportunity for summer salary. Researchers at SIO often obtain lecturer appointments in the SIO department, which provides a mechanism to serve as a graduate student advisor.

http://www.asbmb.org/Careers/Jobs/79457/

Western New England University

Assistant Professor or Professional Educator of Forensic Science

WESTERN NEW ENGLAND UNIVERSITY | WNE

The Department of Physical & Biological Sciences at Western New England University seeks applications for a full-time faculty position in Forensic Science beginning in September 2019. Depending on the education and background, the finalist will be hired either as a tenure-track Assistant Professor or as a Professional Educator with a three-year renewable contract.

Responsibilities include teaching lecture and laboratory sections of forensic science courses on Scientific Evidence, Crime Scene Processing, and advanced Forensic Science courses and laboratories, and guiding student research projects and internships in support of the B.S. in Forensic Biology and B.S. in Forensic Chemistry programs.

To be considered for a tenure-track position, candidates should have a Ph.D. in forensic science, molecular biology, or analytical chemistry. Professional work experience in a forensic science laboratory or in molecular biology/analytical chemistry with applications to forensic science is required.

http://www.asbmb.org/Careers/Jobs/79417/

National Institute of Environmental Health Sciences

Staff Scientist

NIH National Institute of Environmental Health Sciences

We are seeking an experienced scientist with a proven track record in metabolomics utilizing mass spectrometry. The Metabolomics Lead is to recommend, develop and/or implement innovative mass spectrometry-based metabolomic analysis methods to support the research needs of the investigators of the NIEHS. A demonstrated mastery of mass spectrometry is required; an expert understanding of cellular metabolism is highly preferred. The Metabolomics Lead will work in conjunction with the existing MSRSG staff to import and implement novel small molecule mass spectrometry approaches. The Metabolomics Lead must also maintain state-of-the-art knowledge of the field and be skilled in preparing scientific presentations and publications.

http://www.asbmb.org/Careers/Jobs/79705/

Alabama College of Osteopathic Medicine

Assistant or Associate Professor in the Biomedical Sciences

ALABAMA COLLEGE OF OSTEOPATHIC MEDICINE

The Alabama College of Osteopathic Medicine (ACOM) is now recruiting for an Assistant/Associate Professor in the Biomedical Sciences. This is a new full-time position to add to our existing faculty to teach first and second-year medical students. The successful applicant must have a Ph.D. or equivalent degree in Molecular Sciences, Biomedical Sciences or other related field. We are looking for a candidate whose training and experiences will enhance our existing faculty's basic sciences areas of expertise. Prior teaching experience in a medical or biomedical program is a plus. The faculty member is expected to contribute to the development of scholarly programs in areas of their choosing. The review of applications will begin immediately and continue until the position is filled.

http://www.asbmb.org/Careers/Jobs/79458/