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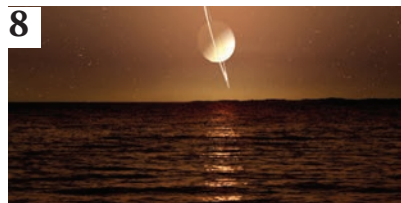
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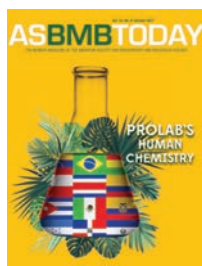
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Help after the storm

By Angela Hopp

At Erin Williams' new home in southwest Houston, Hurricane Harvey's damage started with sewage. It began backing up in the drains. Then came the floodwaters.

"We evacuated about six hours after the house started flooding," Williams, a graduate student at the University of Texas M.D. Anderson Cancer Center and a newlywed, recalled. "When we got back ... we found that water had risen to about 18 inches in the house, and the house is not livable."

Not livable. That's what we're hearing from a lot of people in the scientific community in southeast Texas. Last month, the American Society for Biochemistry and Molecular Biology set up a fund to provide small grants for those affected by Harvey. The applicants' stories underscore just how widespread the need is.

For Bill Dowhan, a professor at the University of Texas McGovern Medical School, this was the second time his home had flooded. This time around he managed to save one car by parking it in an elevated garage.

At the University of Houston College of Pharmacy building in the Texas Medical Center, the lab where graduate student Xiang Gao works "was impacted by high-pressure steam, leaking water and a power outage," Gao reported. How much of the lab equipment and supplies is salvageable remains to be seen. Gao and others have suspended their research until they have finished relocating.

Corina Rosales, whose home backs up to one of the Bayou City's many concrete gullies, had to be evacuated by raft with her husband and dog.

"On the first night, we started getting water in our home at 2:30 a.m., and by daybreak the water was three

How to apply

Those affected by Hurricane Harvey should apply for assistance at www.asbmb.org/harvey. ASBMB membership is not required. The grants, worth up to \$2,000 each, may be used for professional or personal use. Direct questions to membership@asbmb.org.

feet," Rosales, a research scientist at the Houston Methodist Research Institute, recalled. Rosales and her husband lost all the contents of their home and are temporarily in an apartment. "Thankfully, we are fine, and there was no loss of life in our neighborhood."

Other areas were not so fortunate. As September came to a close and more properties became accessible, the number of dead was nearing 100.

I was born and raised in Houston. I lived there for almost 30 years. Even though I've been gone awhile, it's still my town, and it hurt to watch Harvey inundate it. I'm glad that the ASBMB is doing what it can to help some of the people affected with grants for clothes, rent or other necessities (see box). Please spread the word.

And we know Harvey wasn't the only recent devastating hurricane. This program will be expanded to help those affected by Irma and Maria.

Hang in there, Southeast Texas. The ASBMB is thinking of you.

I'm thinking of you.



Angela Hopp (ahopp@asbmb.org) is executive editor of ASBMB Today and communications director at the ASBMB.

It's official — the president has a science problem

By Benjamin Corb

President Donald Trump's first week in office gave us hints that his administration would view science differently than we were used to. It started with reports of gag orders restricting government scientists from speaking to the press and included a travel ban that trapped foreign-born scientists in pseudo-detention at airports across the country while their immigration statuses were scrutinized.

How the White House views science has changed drastically with this administration, and we've been vocal against policies that have the potential to negatively affect the scientific enterprise. The American Society for Biochemistry and Molecular Biology has released statements on the importance of diversity in the scientific workforce, talked with lawmakers and administration officials about the important role foreign-born scientists play in American innovation, and proudly supported the March for Science held earlier this year. We also voiced strong opposition to the president's proposed budget cuts, which would have decimated nondefense discretionary spending broadly — and funding for scientific research specifically.

Thanks in part to consistent advocacy efforts, Congress soundly rejected the president's calls for a nearly 20 percent cut to the National Institutes of Health, instead increas-

ing NIH funding by \$2 billion for the second straight fiscal year. Those advocacy efforts continue to bear fruit as both the House of Representatives and the Senate have proposed large increases for the NIH for fiscal 2018. Unfortunately, more work must be done to ensure that the National Science Foundation begins seeing steady budget growth as well.

While the president has kept Francis Collins on as his director of the NIH and France Córdova continues her tenure as NSF director, many science positions in and around the White House remain unfilled. Beyond a skeleton staff with no real leadership or policy direction, no one currently staffs the White House's Office of Science and Technology Policy. The OSTP has served previous administrations as chief science advisers to the president. Under President Barack Obama, for example, the OSTP director was considered part of the president's Cabinet and was present in a variety of policy debates.

The President's Council of Advisors on Science and Technology, or PCAST, remains inactive, and it is unclear if Trump will extend the PCAST's charter, set to expire this fall. In addition, science officials across the federal government continue to leave the administration. In August, after Trump's controversial statements

about white supremacists demonstrating in Charlottesville, Va., Daniel Kammen, the science envoy for the Department of State, resigned, citing Trump's rhetoric and policies.

When Trump has named appointees to science-related positions, those appointees rarely have had scientific experience. In March, Trump named Michael Kratsios as the U.S. chief technology officer, even though Kratsios' expertise lies not in technology development but in investments in technology. And Trump's nominee for NASA administrator is not a scientist but rather a former pilot and current member of Congress.

The administration clearly has priorities other than science. And that reality — while frustrating — is somewhat understandable. From nuclear proliferation to terrorism to immigration and health care reform, the U.S. faces a variety of policy problems. The president would, however, be better served by bringing scientists and scientific expertise into the debate to understand how his policy decisions affect the American scientific enterprise.



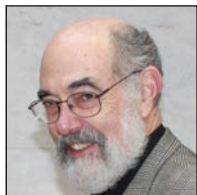
Benjamin Corb (bcorb@asmb.org) is director of public affairs at the ASBMB. Follow him on Twitter @bwcorb.



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Baldwin elected FASEB president



BALDWIN

Tom Baldwin, professor emeritus of biochemistry at the University of California, Riverside, has been elected president of the Federation of American Societies for Experimental Biology.

Baldwin has held a number of leadership roles at FASEB, serving on the science research conference committee, the finance committee, the public affairs committee and the science policy committee. He also represented the American Society for Biochemistry and Molecular Biology on the FASEB board.

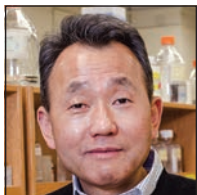
Baldwin's research has focused on the flavoprotein monooxygenase bacterial luciferase. Before joining UCR in 2008, Baldwin held academic positions at Texas A&M University, the University of Illinois at Urbana-Champaign and the University of Arizona.

He began his yearlong term as president in July.

Biophysical Society honors Partch, Cho



PARTCH



CHO

Carrie Partch, associate professor of chemistry and biochemistry at the University of California, Santa Cruz, and Wonhwa Cho, distinguished professor of chemical biology at the University of Illinois, Chicago, have been honored as 2018 Biophysical Society

award recipients.

Partch received the Margaret Oakley Dayhoff Award, which recognizes a woman who has demonstrated outstanding early-career achievement in biophysical research.

She was recognized "for her groundbreaking combination of biophysics and cell biology that is defining how protein conformational changes control circadian clock timing," according to a society news release.

Cho is the recipient of the Avanti Award in Lipids, which recognizes significant research by an investigator in the field of lipid biophysics.

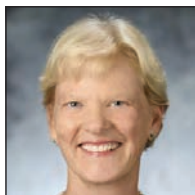
Cho uses innovative chemical biology and imaging tools to explore how membrane lipids and proteins control and mediate the complex molecular interactions necessary for cellular function and regulation.

Partch and Cho will be honored at the Biophysical Society's annual meeting in February.

ACS 2018 award winners



BODNER



BUTLER



GIERASCH

George M. Bodner, Alison Butler and Lila Gierasch are among those honored as American Chemical Society 2018 national award winners.

Bodner, the Arthur Kelly distinguished professor at Purdue University, received the ACS Award for Achievement in Research for the Teaching and Learning of Chemistry.

Butler, a distinguished professor

in the department of chemistry and biochemistry at the University of California, Santa Barbara, received the Alfred Bader Award in bioinorganic chemistry.

Gierasch, a distinguished professor at the University of Massachusetts, Amherst, and editor-in-chief of the *Journal of Biological Chemistry*, has won the Ralph F. Hirschmann Award in peptide chemistry.

The 2018 ACS award winners will be honored in March at the ACS National Meeting.

Sumter named interim dean at Winthrop



SUMTER

Takita Felder Sumter, a professor of biochemistry at Winthrop University, has been named the interim dean of the College of

Arts and Sciences.

Sumter will lead Winthrop's largest academic college, with 14 departments, five centers and more than 300 full- and part-time faculty. She serves as the interim chair of the Department of Human Nutrition and this year was named the first provost's faculty fellow.

Sumter also chairs the ASBMB's minority affairs committee and co-leads the society's Interactive Mentoring Activities for Grantsmanship Enhancement program to benefit early-career scientists.

She began her one-year term as interim dean in August.

In memoriam: Bill Moyle

William R. Moyle, professor of obstetrics, gynecology and reproductive sciences at Rutgers University, passed away July 13 at the Robert Wood Johnson University Medical Center. He was 73.

Moyle was born in Dayton, Ohio, and grew up in Rochester,

N.Y. After graduating from Cornell University, he earned his doctorate in anatomy from Harvard University. He remained at Harvard after receiving his Ph.D., as a research scientist.

Moyle joined the faculty at Rutgers' Robert Wood Johnson Medical School as an assistant professor in 1978. He directed the department of obstetrics, gynecology and reproductive sciences' laboratory in Piscataway, New Jersey, where his research focused on hormone action and evolution.

Moyle is survived by his wife, Tamara Delice-Moyle, and his sisters, Diane, Karin and Lauren.

In memoriam: Maria Tomasz



TOMASZ

Maria Tomasz, professor emerita at Hunter College, passed away at her home in Whitingham, Vt., Nov. 16. She was 84.

Born in Hungary, Tomasz came to the United States in 1957 and earned her Ph.D. in organic chemistry at Columbia University five years later. She worked briefly at New York University's medical school before joining the faculty at Hunter in 1966, where she stayed for the next four decades.

Tomasz helped develop curriculum at Hunter; she designed the biochemistry major in 2002 and created a new biochemistry lab course.

Tomasz's research helped develop chemotherapeutic agents for fighting cancer, an area in which she published more than 100 papers.

She is survived by her husband, J. Richard Marshall; her sister, Erzsebet; and her children, Martin and Julie.



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

Upcoming ASBMB events and deadlines

- OCT** 2: The Art of Science Communication online course begins
15: Fall accreditation deadline
19–21: ASBMB exhibits at the 2017 SACNAS National Diversity in STEM conference, Salt Lake City, Utah
21–22: Workshop: Catalyze Your Career, Tucson, Ariz.
26–29: Emerging Roles for the Nucleolus, Kansas City, Mo.
- NOV** 1–4: ASBMB exhibits at Annual Biomedical Research Conference for Minority Students, booth #801, Phoenix, Ariz.
8–9: Workshop: Catalyze Your Career, Portland, Ore.
11–15: ASBMB exhibits at Neuroscience 2017, booth # 613, Washington, D.C.
- DEC** 5: 2019 Special Symposium proposals due
7: Abstract submission deadline for the 2018 ASBMB Annual Meeting, San Diego
14: Travel award deadline for the 2018 ASBMB Annual Meeting, San Diego



Ching C. Wang (1936 – 2017)

By Margaret (Meg) A. Phillips and Lizbeth (Liz) Hedstrom

Ching C. “C.C.” Wang was a passionate scientist who turned a childhood of suffering into a lifetime crusade against parasitic diseases. He worked tirelessly to build and promote the field of molecular parasitology and was a driving force in creating a community characterized by rigor, creativity and genuine camaraderie. On Aug. 22, at the age of 81, he lost his battle with cancer, and molecular parasitology lost an inspirational leader, mentor and friend. As Ken Stuart of the Center for Infectious Disease Research eloquently wrote, “C.C.’s big smile, enthusiasm for so much, his booming voice and caring for others will be sorely missed. He gave so much of himself to his colleagues, trainees, his research field, friends and family.”

C.C. was born in Beijing in 1936 during the tumult of the Japanese invasion. He contracted many tropical diseases while his family roamed the countryside, and this childhood experience fueled his desire to combat parasitic diseases. His family eventually escaped to Taiwan, where young C.C. thrived and developed his interest in science. An excellent chemistry student, he came to the U.S. and earned his doctorate in microbial biochemistry at the University of California, Berkeley, in 1966. There, C.C. also met his future wife and partner in both life and science, Alice Wang. After his postdoctoral training at Columbia University, he joined the parasitology division at Merck in Rahway, N.J., where he hoped to work on cures for the parasitic diseases that

afflicted the world’s poor, including those he had as a child.

Merck’s transformative antiparasitic drug ivermectin, now a World Health Organization essential medicine, was discovered in 1975, and CC was assigned to investigate its mechanism of action, which was a priority of Merck’s new president, Roy Vagelos. Target identification is a gnarly task even now, and C.C. had few tools beyond his keen observational skills and biochemical instincts. C.C. noticed that ivermectin paralyzes worms, and eventually he showed that it targets glutamate-gated chloride channels. This tour de force led to a faculty appointment as a tenured professor in the Department of Pharmaceutical Chemistry at the University of California, San Francisco, in 1981, at a time when the transition from industry to academics was virtually unheard of.

Despite the success of ivermectin, C.C. arrived at UCSF disillusioned with the screening methods used to discover antiparasitic drugs and determined to develop rational approaches. Where most parasitology laboratories focused on a single pathogen, C.C. investigated several overlooked protozoa, *Giardia lamblia*, *Trypanosoma brucei*, *Trichomonas vaginalis* and *Tritrichomonas foetus*. He began to unravel their mysteries with uncanny molecular intuition and a fearless disregard for disciplinary boundaries. His many seminal contributions include mapping nucleotide salvage pathways,



PHOTO COURTESY OF THE WANG FAMILY

C.C. Wang works in his lab at the University of California, San Francisco, where he studied parasitic diseases.

characterizing a novel organelle called the glycosome and the discovery, with Alice, of a double-stranded RNA virus in *Giardia*. He later turned his efforts to protein degradation, translation initiation and cell-cycle regulation. He was always at the forefront, applying new techniques and forging ahead to the next question. A much-lauded lecturer and mentor, he trained many students and postdocs, including both authors, who had the fortune of working with him in the early days of his laboratory (Meg as a Ph.D. student and Liz as a postdoctoral fellow).

C.C. was devoted to the field of molecular parasitology. He recognized that fellowship was just as important to scientific discovery as rigor and creativity, and he was the nucleus for many forums that enabled the field to thrive. C.C. and his dear friend John Boothroyd at Stanford co-organized the Bay Area Parasitology Club in the 1980s. Alice and C.C. would hold club meetings at their home. Sitting around their living room with the speaker using a home slide projector and screen, we listened to a lecture, discussed the science and snacked on delicious dim sum. These lectures became the hottest tickets in town for budding young parasitologists. Speaking was a special honor for Meg and others who attended during their training.

C.C. felt it was critically important that molecular parasitology be recognized not just for the diseases these organisms cause but also for their fascinating biology. This passion led him to start the journal *Eukaryotic Cell* as a home for such work. Later, C.C. and Alice worked with the American Society for Biochemistry and Molecular Biology to establish the Alice and



PHOTO COURTESY OF MEG PHILLIPS AND LIZ HEDSTROM
C.C. Wang met his wife, Alice, at the University of California, Berkeley. The couple loved to travel and had many adventures.

C.C. Wang Award in Molecular Parasitology, now in its seventh year. C.C. and Alice created this annual award to highlight groundbreaking discoveries in the field of parasitology. As C.C. hoped, the award provides a platform to introduce parasitology to the wider scientific community, both to increase appreciation for the dedicated and versatile scientists that study these organisms and to recruit new scientists to the field.

C.C. was a true scientist's scientist, insightful and rigorous and a champion of truth and integrity. He sat in the front row of every seminar and asked the most penetrating questions. He was always ready for a feisty debate and relished stirring the pot. Many a student and postdoc, including the authors, learned not just how to be a good scientist from C.C. but also what it meant to embrace life itself. His moves on the dance floor were notorious, and he was always the last one to leave a party. He treasured good food, often cooked by Alice, and fine wine and liked nothing better than sharing a meal. He especially loved treating

his friends to mysterious Chinese delicacies, smiling at their pleasure and then laughing when he revealed exactly what they had eaten.

He was generous and warm-hearted, providing beds for new postdocs and gifting projects to fledgling professors. Mike Ferguson of the University of Dundee, the 2016 Wang awardee, wrote, "C.C. was, at once, a giant in his scientific field and an immensely kind and warm human being. I met him first as a Ph.D. student and last as a grateful recipient of the Alice and C.C. Wang Award — he was as nice and as much fun the first time as the last time, and at all times in between."

C.C.'s first round with cancer caused him to close his laboratory, yet he remained engaged after his retirement. He continued to attend the Molecular Parasitology Meeting at Woods Hole, Mass., where he loved the free exchange of ideas. He and Alice enjoyed travel and had many adventures as they traipsed across the world, like the time he broke his leg in Ireland or, on their last trip, sampling the best food Japan had to offer. He also greatly enjoyed spending time with his daughter, Charlotte, and the grandkids.

All of us who knew, learned from and loved C.C. will miss him dearly. But C.C. would have agreed with the sentiment of Jay Bangs of the University of Buffalo, who wrote, "I would prefer to celebrate a life well lived ... he was and remains forever an inspiration!"

Margaret A. Phillips (margaret.phillips@utsouthwestern.edu) is a professor and chair of biochemistry at the University of Texas Southwestern Medical Center.

Lizbeth Hedstrom (hedstrom@brandeis.edu) is a professor of biology and chemistry at Brandeis University.

The cyanides of Titan

By John Arnst

Vinyl cyanide isn't a '70s punk band, even though it sure sounds like it could have been. It's a nitrogenous compound recently confirmed by NASA researchers in the journal *Science Advances* to exist in the atmosphere of Saturn's moon Titan. Some scientists in the past have proposed that vinyl cyanide might have the potential to form membrane-like spheres called azotosomes.

The planetary scientists and astronomers at NASA's Goddard Space Flight Center used calibration data obtained in 2014 from the Atacama Large Millimeter Array of telescopes in northern Chile to confirm the presence of vinyl cyanide in Titan's atmosphere. They also estimated that quantities of the compound copious enough to reach saturation and form a solid precipitate likely exist in Ligeia Mare, Titan's second-largest sea. Located in the north polar region of Saturn's largest moon and named after one of the mythological Greek Sirens, the sea is about one-and-a-half times the size of Lake Superior and made up almost entirely of methane.

Titan is roughly 50 percent larger than our moon, and its frigidly is otherworldly. The average surface temperature is more than 160 degrees lower than the coldest temperature ever recorded on Earth, which is minus 128 Fahrenheit.

At such icy temperatures, cell membranes made of phospholipid bilayers like those surrounding cells found on Earth would be too rigid to function properly. A more significant barrier to life on Titan is that all known cellular processes, such as the storing of genetic information as DNA, must occur in water, meaning any biochemistry on Titan would operate in a man-



COURTESY OF NASA/GREGOR KERVINA

This artist's rendering shows the Huygens probe come to rest on one of Titan's methane lakes.

ner entirely foreign to our own.

While the presence of vinyl cyanide in Titan's atmosphere was predicted in 2007 in a paper in the journal *Icarus* based on spectral data collected by the mass spectrometer on the Cassini spacecraft, the instrument wasn't sensitive enough to distinguish definitively between vinyl cyanide and similar compounds.

"With Cassini, they found evidence for a protonated form of the molecule in the mass spectrometer," said Maureen Palmer at NASA Goddard, the first author on the new paper. However, she said, "you could have multiple different molecules with the same mass, so it can be hard to distinguish that way."

Titan is the only moon in our solar system known to have a dense atmosphere and is the only celestial

body other than Earth to have a dense atmosphere rich in nitrogen, which coats the planet in an orange-brown haze and falls to the surface with methane rain. In 2015, a group of researchers at Cornell University used supercomputer-generated simulations to propose that vinyl cyanide was capable of coalescing to form spherical membranes held together by the polarity of the nitrogen-containing groups, which are known as azoto groups. Thus, the structures were dubbed azotosomes.

"The key to vinyl cyanide is that it was able to form a stable, spherical structure in the liquid methane," said Jonathan Lunine, a planetary scientist who co-authored the 2015 paper, also in *Science Advances*. "But, at the same time, it was flexible. Molecules that didn't work were either

ones that produced unstable spheres that would fall apart or where the spheres were completely rigid, which is not the way cellular membranes work.” If a cell membrane is too rigid, molecules are unable to diffuse in and out, making cellular processes essentially impossible.

“I was very pleasantly surprised that (the Goddard group) detected (vinyl cyanide),” said Lunine. “When we made our list of molecules that we examined in our calculations, our criterion was that they either had been

detected in Titan’s atmosphere or that there was a tentative suggestion or tentative detection that they were there. That was true of vinyl cyanide. The Cassini ion-mass spectrometer had some indication in its spectra that it might be there, but it wasn’t definitive, so this was great. It’s very nice to see it’s really there.”

The presence of vinyl cyanide, though, doesn’t mean that the hypothetical azotosomes are coalescing and propagating life through strange exobiology in the seas of Titan.

“I kind of doubt that Earthlike genes and catalysts would be available,” said David Deamer at the University of California Santa Cruz’s Department of Biomolecular Engineering. “This is very conjectural, in my opinion. I like conjectures, by the way ... every conjecture can be turned into a hypothesis if you can find a way to test it.” Deamer’s research involves the origin and evolution of membrane structures.

“We’re just really depending on acts of imagination, saying, ‘Well, maybe something’s there. Let’s go look for it,’” he said. “And that’s the way science works: It’s the exploration. And these are papers exploring ideas and offering conjectural hypotheses.”

This story is republished from Wild Types, an ASBMB Today blog.

About cyanide

A cyanide group consists of a carbon atom covalently triple-bonded to a nitrogen atom.

When cyanide groups are attached to an organic carbon structure, they can become extremely useful for industrial applications such as the manufacturing of glues, rubbers and plastics. This is true of the double-bonded carbon atoms that make up the vinyl group in vinyl cyanide.

The infamous poisons sodium cyanide and potassium cyanide work by reacting with stomach acids to form hydrogen cyanide, which shuts down cellular respiration and ultimately cuts off oxygen to the brain.



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

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Ph.D. student wins Tabor award for elucidating pathway

By Nathalie Gerassimov

Emily Jie-Ning Yang, a Ph.D. student in Meng Chen's laboratory at Duke University, is the recipient of a 2017 Journal of Biological Chemistry/Herbert Tabor Young Investigator Award for her work in elucidating a novel pathway connecting light sensing and chloroplast biogenesis in plants. Her research looks at how different cellular compartments, such as the nucleus and chloroplast, communicate.

JBC Associate Editor Joseph Jez of Washington University selected Yang for the award at an Arabidopsis research conference in St. Louis in June. Jez was looking for "work that captured 'biological chemistry' in a broad sense and went from the molecular level up to the cell/organism," he said. Yang's research piqued Jez's scientific curiosity. "Imagine yourself as a seedling just coming out of a seed in sunlight — how do you sense light from the environment, and how does that light trigger changes in your budding leaves to make you green?" he said. "If you grew in the dark, your stem and leaves would be a pale white." This is a fascinating question because photosynthesis — the conversion of light into matter — is at the basis of most forms of life on Earth.

Yang and her colleagues used a

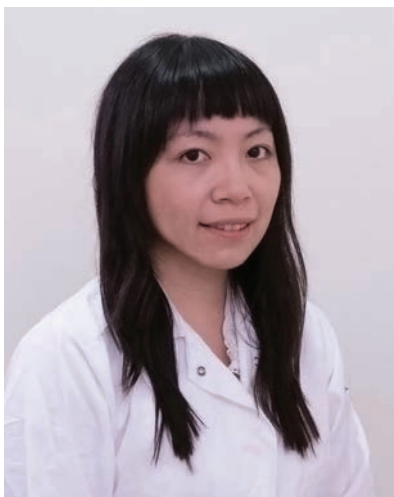


PHOTO COURTESY OF EMILY YANG

Emily Yang won the JBC/Tabor award in June at the North American Arabidopsis Steering Committee's 28th International Conference on Arabidopsis Research in St. Louis.

genetic screen in the plant *Arabidopsis* to find players with dual function of light sensing and chloroplast biogenesis. She identified and characterized one such player, which she named RCBL, short for regulator for chloroplast biogenesis in light signaling. "We are the first group reporting that this protein is dual-targeted to the nucleus and chloroplasts and involved in two distinct mechanisms in different compartments," she said.

Jez liked how Yang's developmental biology question set up future

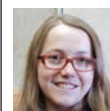
mechanistic work, some of which she already has done. She found that the C-terminal of RCBL forms a thioredoxinlike fold but without reductase activity; instead, it participates in protein-protein interaction. Details of this pathway will follow in a future publication.

In naming RCBL, Yang and her adviser considered "helios" and "hyperion," both gods of light and consistent with the founding member of this pathway, *hemera*. "But in the end, we decided that the name of the gene has to reflect its function," she said.

Yang was born and raised in Taipei City, Taiwan. She received a bachelor's degree from National Taiwan University. She was inspired to pursue a Ph.D. in biology by her undergraduate research experience, during which she said she learned to appreciate how "flexible plants are in response to the environment, especially how light influences the gene expression from transcription to post-translational modification." She earned her Ph.D. in biology from Duke in July. Her next step is postdoctoral research in Liza Pon's lab at Columbia University.

Yang's long-term goal is "to be an independent researcher studying communication between organelles and the nucleus, specifically how cells distinguish the quality of organelles and allocate them appropriately during the cell cycle."

"Imagine yourself as a seedling just coming out of a seed in sunlight — how do you sense light from the environment, and how does that light trigger changes in your budding leaves to make you green?" — JOSEPH JEZ



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The many layers of cholesterol regulation

By Arun Radhakrishnan

Cholesterol levels in the membranes of animal cells are regulated carefully to remain within narrow limits. Regulation is carried out by a network of proteins that resides in the endoplasmic reticulum, or ER, and controls the two pathways by which cells obtain cholesterol: synthesis and uptake from circulating lipoproteins. The key proteins of this network include a cholesterol sensor and a transcription factor (1). The sensor is Scap, a polytopic ER membrane protein that binds membrane cholesterol. The transcription factor is a domain of another ER membrane protein called sterol regulatory element-binding protein, or SREBP.

When ER cholesterol is low, Scap initiates a series of molecular events that eventually release SREBP's transcription factor domain into the cytosol so it can travel to the nucleus to upregulate genes for cholesterol synthesis and uptake. When ER cholesterol rises above a threshold, Scap binds cholesterol and undergoes a conformation change that blocks the processing of SREBPs. Thus, Scap spearheads a feedback mechanism that ensures rapid adjustments to changes in cellular cholesterol levels to ensure cholesterol homeostasis.

However, the cellular distribution of cholesterol poses a significant challenge to this feedback mechanism. Seventy to 90 percent of the cell's cholesterol is located in the plasma membrane, or PM, whereas Scap is

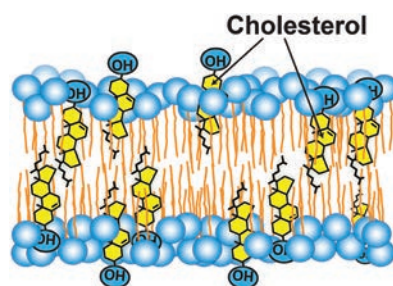


IMAGE COURTESY OF ANNA SOKOLOV AND ARUN RADHAKRISHNAN
Cholesterol accessibility at the surfaces of membranes rises sharply when its concentration exceeds a threshold and plays a role in regulating the total cellular level and intracellular distribution of cholesterol.

in the ER, which contains only about 1 percent of the cell's cholesterol. If Scap is to execute its sensing function, the cholesterol-poor ER must be in constant communication with the cholesterol-rich PM so it can be notified promptly of changes in cholesterol levels. Without such a link, Scap would be blind to changes in cellular cholesterol. Indeed, disrupting this link through the use of a toxin that sequesters cholesterol in the PM results in a lowering of ER cholesterol even though PM cholesterol is unchanged (2). In response to this artificial induction, Scap activates SREBPs even though cellular cholesterol has not been depleted.

How are cholesterol levels in ER linked to those in PM? This process requires mechanisms to transport hydrophobic cholesterol across the aqueous cytosol and mechanisms to

regulate these transport pathways. Cholesterol transport likely involves a combination of vesicular, nonvesicular and membrane contact site-mediated pathways, and remains poorly understood. We know a little more about how this transport may be regulated. Recent work has used soluble cholesterol-binding toxins to assay the exposure of cholesterol at the surface of purified PMs. These studies revealed that PM cholesterol was sequestered in the membrane bilayer and inaccessible to toxins until it exceeded a threshold concentration of about 35 mole percent of total PM lipids (3). Above this sharp threshold, PM cholesterol was accessible to bind to toxins. Sharp changes that have been observed for the exposure of PM cholesterol to the enzyme cholesterol oxidase may occur at similar thresholds (4).

It is tempting to speculate that intracellular cholesterol transport pathways are also sensitive to a sharp change in accessibility of cholesterol on the cytoplasmic leaflet of the PM, allowing for transport to ER to occur only after the PM's cholesterol needs have been satisfied. How subthreshold levels of cholesterol are sequestered in the PM to prevent interactions with the intracellular transport machinery remains a mystery. We have learned a lot, but there are many more layers of cholesterol regulation yet to be revealed.

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A metabolic pathway that feeds liver cancer

By *Sasha Mushegian*

A little-studied gene may explain how some liver cancer cells obtain the nutrition they need to proliferate, according to new research from the University of Maryland. The results of this research were published as an Editors' Pick in a recent issue of the **Journal of Biological Chemistry**.

Because they multiply quickly and spread throughout the body, cancer cells require more energy than normal cells. One approach to treating cancer, therefore, is targeting the pathways that cancer cells have adapted to meet these energy needs, thus starving the cancer. Hong-bing Wang's laboratory was interested in how this principle applied to cancers of the liver.

"The liver is one of the most busy, active organs in the body," Wang said, so the healthy liver already needs a lot of energy. In addition, Wang said, liver cancer appears to be one of the few cancers of which incidences seem to be on the rise, possibly in association with the rise of metabolism-related conditions such as nonalcoholic fatty liver disease.

When looking for genes that might play important roles in the metabolism of healthy and cancerous liver cells, Wang and his colleagues became interested in a gene called SLC13A5, which produces a protein that transports citrate into cells. SLC13A5 is expressed mainly in the liver, but its role is relatively under-studied.

"If you search for SLC13A5 in PubMed — I searched this morning

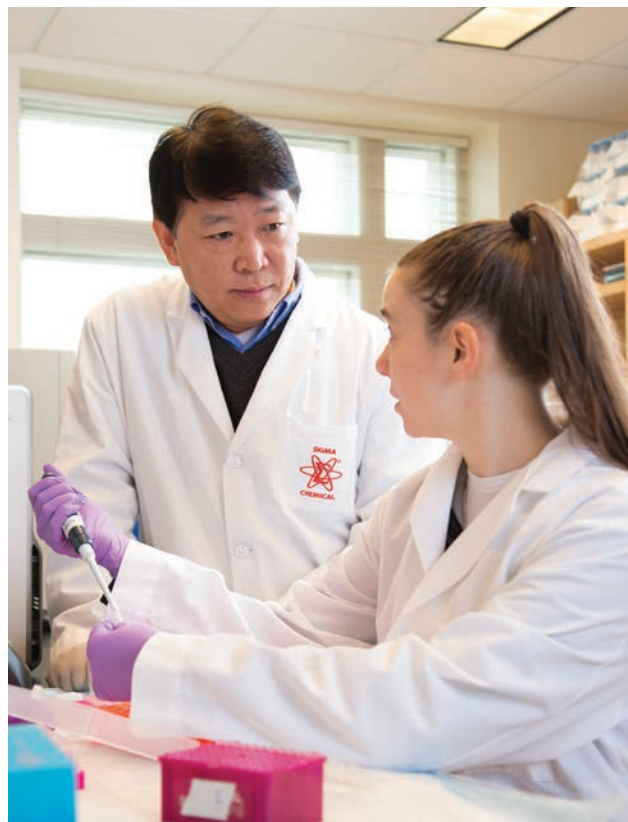


PHOTO COURTESY OF THE UNIVERSITY OF MARYLAND

Hongbing Wang and colleagues research how to starve cancer cells in the liver.

— there are 54 publications, which is not a whole lot," Wang said. Nearly half of these studies were published in the past two years. Research on SLC13A5 has focused on its role in obesity and diabetes; knocking out the SLC13A5 gene in mice prevents high-fat diet-induced obesity. If this gene plays a role in energy homeostasis and energy balance in the context of obesity, Wang reasoned, perhaps it could play a role in the energy requirements of liver cancer cells.

Zhihui Li, a postdoctoral fellow in Wang's lab, performed experiments in which he used a technique called RNA interference to suppress (but not eliminate completely) the production of the SLC13A5 protein. He carried

out these experiments in cultures of two human hepatocellular carcinoma cell lines. Suppressing SLC13A5 resulted in liver cancer cells that did not die but had significantly slower growth and division. Similarly, when these cells were injected into mice, the cells in which SLC13A5 was suppressed formed barely discernable tumors compared with the unmanipulated cancer cells.

Wang hypothesizes that the extracellular citrate taken up by the SLC13A5 protein is required by the liver cancer cells for fatty acid synthesis. Because prostate cancer does not express SLC13A5, the growth of prostate cancer cells was unaffected by suppressing SLC13A5 expression. The fact that prostate cancer grew independently of the presence of SLC13A5 supports the

idea that different cancers use different methods to meet their high energy requirements.

Wang points out that the current findings are preliminary and that comparing SLC13A5 activity in healthy and cancerous human liver tissue will be necessary before studies of this pathway as a cancer drug target should be contemplated. But understanding the involvement of the citrate transport pathway in the growth of liver cancer marks a step forward in understanding energy use in cancer.



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Increasing life span linked to microRNA machinery

By Hailey Gahlon

The Greek writer Plutarch advised, “Instead of using medicine, rather, fast a day.” Since his time, various scientific studies have provided evidence that fasting can promote well-being and increase lifespan in various organisms, such as yeast and mice. Still, the mechanisms underpinning this biological process remain elusive. Akiko Kogure and researchers at Kyoto University recently reported in the **Journal of Biological Chemistry** on the involvement of the microRNA machinery complex in extending lifespan through intermittent fasting. The study shows that fasting enhances microRNA machinery components as well as the expression levels of microRNAs in the roundworm *Caenorhabditis elegans*.

Health benefits derived from fasting include reduced rates of diabetes and cardiovascular disease, which are thought to play a role in slowing the rate of aging. Masaharu Uno, the corresponding author of the study, said, “Diet is closely related to aging. Eating too much shortens life expectancy, and restricting diet extends life expectancy.” Intermittent fasting is one example of diet restriction; others include caloric and protein restriction. “We Japanese have a slogan, ‘pin pin korori,’” Uno said, “‘Pin pin’ means a spry and energetic life, and ‘korori’ means sudden and painless death ... Just restricting diet makes us live longer. This simplicity surprises us and

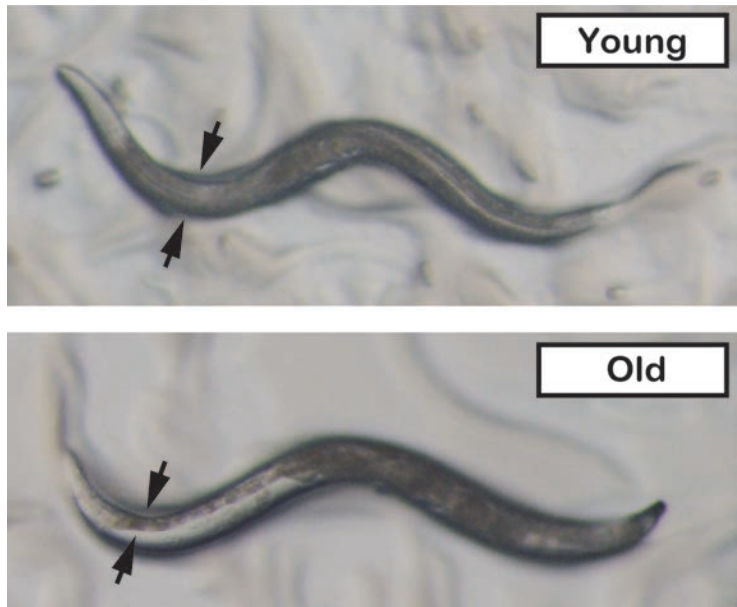


PHOTO COURTESY OF KYOTO UNIVERSITY
Arrows indicate the edge of the intestine in *C. elegans*. The intestines shrink with age and are less wide in the older worm than the younger worm.

brought us to study the mechanisms underlying dietary restriction-induced longevity.”

This study of intermittent fasting in *C. elegans* evaluated microRNAs, small noncoding RNAs that regulate gene expression post-transcriptionally as their main function. *C. elegans* provides a nice model to study aging because the lifespan, typically two to three weeks, allows for a short time frame to conduct many experiments and test a multitude of variables. In this study, the researchers tested a variety of knockdown and knockout conditions to probe the role of various miRNA machinery components. The miRNA pathway starts with a primary miRNA transcript that is cleaved and exported from the nucleus. In the cytoplasm, the pre-miRNA is processed by the enzyme Dicer to generate mature miRNAs that can form a complex with proteins, such as argonaute, to generate a miRNA-induced silencing complex, or miRISC, that

functions to repress target genes.

In this work, the researchers observed considerable changes in components of miRISC under fasting conditions. For example, *C. elegans* mutants lacking miRISC components (e.g., *alg-1*, *ain-1* and *ain-2*) showed a significant reduction in lifespan under intermittent fasting conditions. This suggests a role for miRISC in intermittent fasting-induced longevity. Also, a key player found to be upregulated upon intermittent fasting was *Drossha/DRSH-1*,

a nuclease of the RNase III family and an important miRNA-processing enzyme. The researchers’ studies involving null *DRSH-1* mutants showed that intermittent fasting-induced longevity is completely inhibited.

“The mechanism of aging is one of the biggest outstanding questions in biology,” Uno said. Collectively, this study demonstrates for the first time that the miRNA machinery is activated upon intermittent fasting. This work provides a link between fasting and longevity at the miRNA level. Future work in mammals will help researchers to better understand this process and could lead to ways whereby we can extend lifespan and prevent age-related diseases.



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Comparing the microbiota of preterm infants

By Rachel Goldberg

It has become increasingly apparent that the bacterial community of the gastrointestinal tract, termed the microbiota, plays an important role in health and disease. The development of the intestinal microbiota during early life coincides with the development of the GI tract and immune system. Multiple studies have aimed at understanding the development of the microbiota in newborns and its effect on early and later health outcomes.

Compared with full-term neonates, preterm infants are more frequently exposed to interventions during hospitalization, such as caesarean section delivery, antibiotics and respiratory support, which likely affect the development of their intestinal microbiota. Despite increasing knowledge about which bacteria are present in the GI tract of preterm infants, knowledge about the function of their gut bacteria is limited. A recent paper in **Molecular & Cellular Proteomics** reported the differences in microbiota composition and function in preterm infants.

Clara Belzer's group at Wageningen University in the Netherlands focuses on the human microbiome and includes a special task force on early-life microbiota development. Together with Nutricia Research and clinicians from Isala Clinics, the group initiated a study on the microbiome of preterm infants. To determine if gestational age would influence the colonization by microbes, they studied how the bacterial community developed during the first six postnatal weeks in infants that were born extremely preterm (at

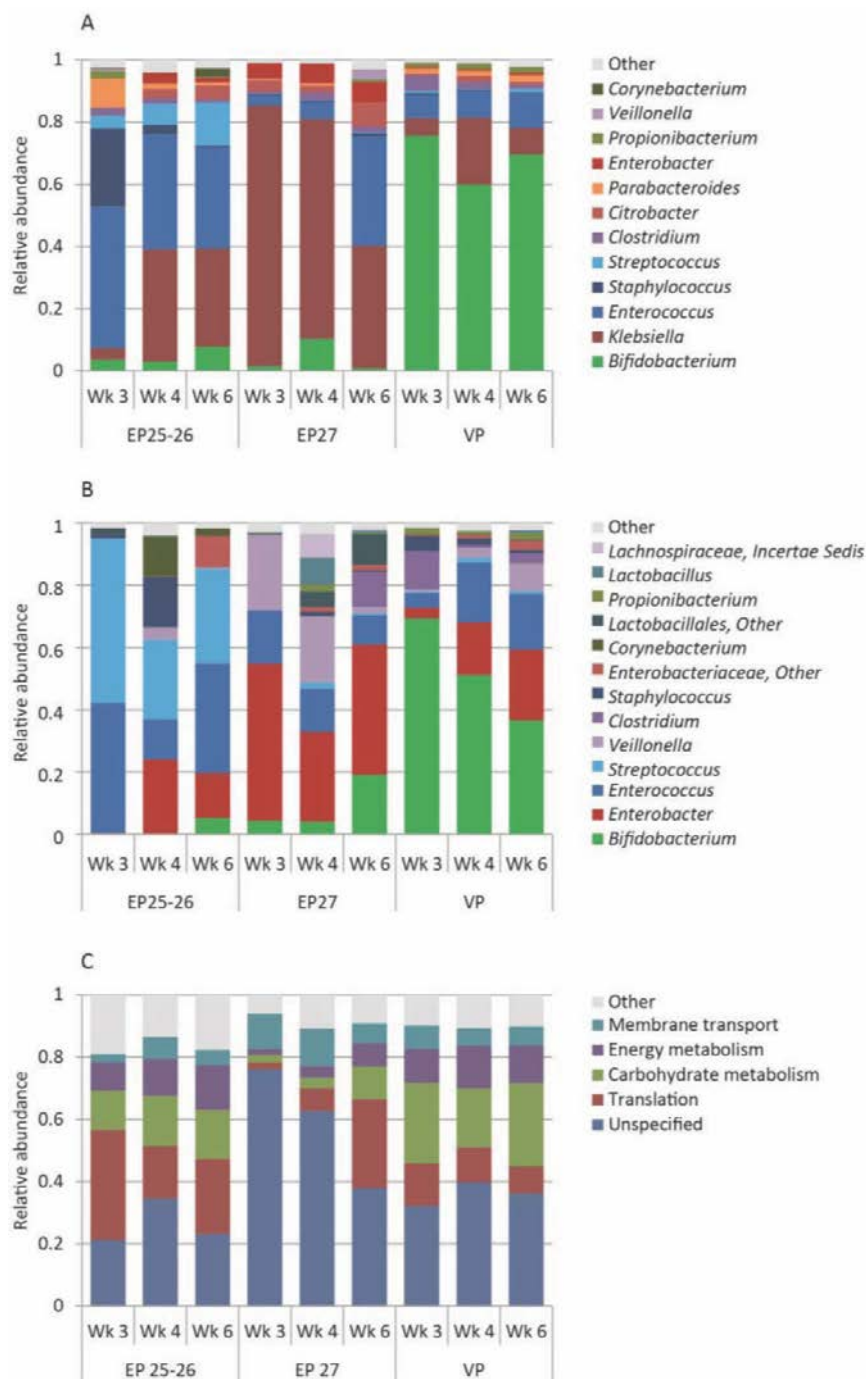


IMAGE COURTESY OF WAGENINGEN UNIVERSITY

Protein-based (A) and 16S-based (B) taxonomic profiles and protein-based functional profiles (C) in extremely preterm (25-26 weeks), extremely preterm (27 weeks) and very preterm infants during postnatal weeks 3-6. Per time point, average relative abundances for each gestational age group are shown. Relative abundances were calculated using iBAQ intensities and read counts for protein and 16S-based profiles respectively. Mec: meconium.

less than 28 weeks of pregnancy, or EP) and very preterm (at less than 32 weeks, or VP).

To identify which bacteria were present, the researchers combined two techniques: 16S rRNA gene sequencing, to determine bacterial composition, and metaproteomics, a technique used less commonly in microbiome studies. The proteomics provided better insight into the activity of the microbes in the preterm intestine. They analyzed fecal samples collected from 10 preterm infants during the first six postnatal weeks. “Using a metaproteomics approach, we could identify the most abundant proteins present in the faeces of each infant over time,” Belzer and first author Romy Zwittink wrote in response to questions about this paper. Once the abundant proteins were identified, the authors used existing data to discover their function. “For many bacterial proteins, their function is known and stored in databases,” they wrote, “and we used this information to get insights in what the gut bacteria are doing.”

Zwittink and colleagues found significant differences between microbiota composition and function in EP versus VP infants. The authors suggest that the increase in respiratory support and antibiotic intervention seen in EP infants was associated with delayed colonization of the beneficial early-life colonizer *Bifidobacterium*. They observed a lower abundance of proteins involved in carbohydrate and energy metabolism, which are important for the degradation of milk, in EP infants. Proteins involved in membrane transport and translation were more abundant in EP infants than in VP infants, and this was likely a result of antibiotic pressure. These results indicate the importance of gestational age on microbiota development. VP infants had a better-established and more metabolically active microbiota compared with EP infants.

While the priority in preterm

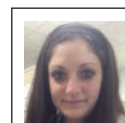


infant care is survival of the infant, clinicians are still interested in further improving care, and Zwittink's research was developed through close collaboration with neonatologists. “In our opinion, the microbiota field should move from being mostly composition oriented to a more function-oriented field,” Zwittink and Belzer wrote. “Unravelling the activity and enzymatic capabilities of the intestinal microbiota might bring us closer to understanding its association with food digestion immune responses and thus health. These microbiota findings can be used to design food and microbiota-based therapies.”

The researchers were most surprised that duration of respiratory support was a major factor influencing the composition and function of preterm microbiota. “After discussion with neonatologists involved, we could put this into perspective, understanding that some methods of respiratory support allow for air to reach the gastrointestinal tract and can therefore greatly affect bacterial colonisation pattern,” Zwittink and Belzer

wrote. “The microbial signature as we observed in extremely preterm infants with many potential pathogens has been previously associated with several negative health outcomes, including necrotising enterocolitis and late-onset sepsis. However, so far these are associations and no causal relationship has been shown. We can also speculate that a microbiota less active in milk degradation will be less favourable for the food digestion and energy harvest in a preterm infant.”

In the future, Zwittink and colleagues hope to confirm these findings in a larger cohort of preterm infants. They now are analysing microbiome data from a set of 120 infants. The researchers said that preterm birth is an increasing global problem, so they hope that these findings eventually will guide clinical practice and thereby improve the well-being and chance of survival of preterm infants.



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We all know about fatty acids, but what about oxylipins?

By Lily Williams

Whether you know fatty acids as the essential nutrients your doctor tells you to eat or as the hydrocarbon chains that terminate in a carboxyl group, you undoubtedly know they are important. But recent research in rats indicates that particular derivatives of fatty acids, known as oxylipins, may also play important roles in the body as the main mediators of the effects of polyunsaturated fatty acids.

A recent paper in the **Journal of Lipid Research** describes one of the first studies to profile oxylipins, which are oxygenated products of fatty acids. Only within the past decade have mass spectrometry and liquid chromatography become effective enough to study

oxylipins.

“There is a lot of literature out there on fatty acid composition, and we tend to make conclusions based on this, but we can’t necessarily do that,” said Harold Aukema, an author of the paper and professor at the University of Manitoba in Winnipeg, Canada. “For instance, the proportion of oxylipins is much different than the proportion of their precursor fatty acids in the tissues.”

Aukema’s research has focused on examining dietary components of kidney health and signaling molecules in the kidneys. His interests include the “physiologic and metabolic basis of dietary recommendations for dietary protein and for omega-3 fatty acids.”

This isn’t his first paper on oxylipins. Among others, in 2015 he authored a paper that reviewed the roles of oxylipins such as prostaglandins, neuroprotectins and maresins.

In the recent paper, Aukema’s team reports on how diets with moderately increased levels of two fatty acids, linoleic acid, or LA, and alpha-linolenic acid, or ALA, affected the percentages of oxylipins in rat kidneys, livers and blood serum.

LA, an omega-6 polyunsaturated fatty acid, or PUFA, is one of the main fatty acids we consume. ALA is an omega-3 PUFA and is plant-derived. Once consumed, LA and ALA produce a large portion of the oxylipins in our bodies. Omega-6 fatty

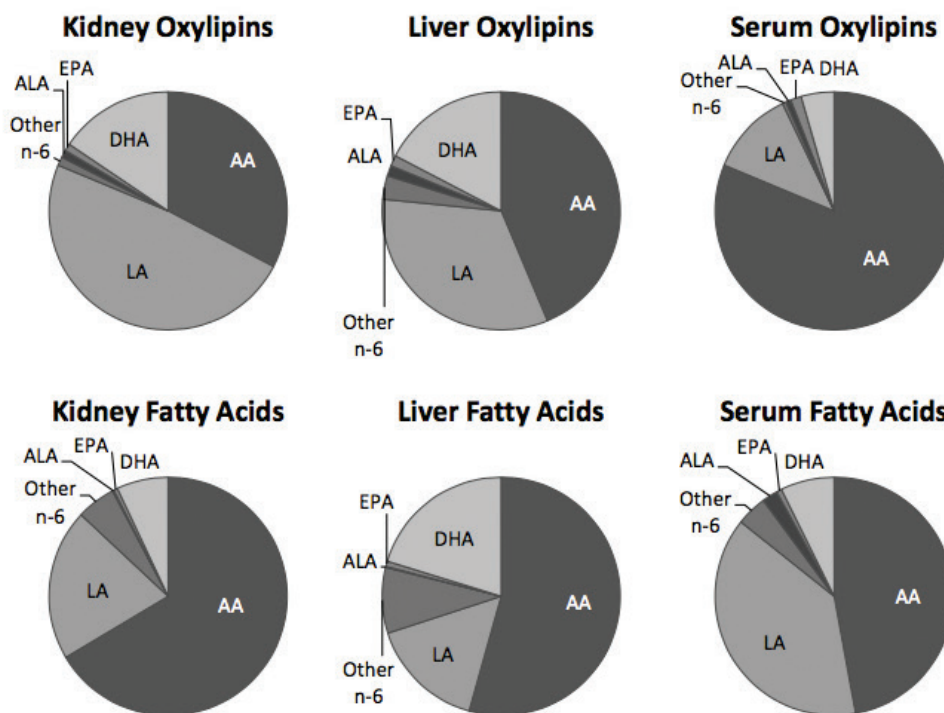


IMAGE COURTESY OF THE UNIVERSITY OF MANITOBA

Distribution of oxylipin and fatty acid mass in kidney, liver and serum of rats provided the control diet. Data are from female and male rats combined. Abbreviations: AA=arachidonic acid, ALA=alpha-linolenic acid, EPA= eicosapentaenoic acid, DHA=docosahexaenoic acid, LA=linoleic acid, n-6=omega-6.

acids tend to increase inflammation in the body despite benefits such as decreasing blood lipids. Omega-3 fatty acids tend to decrease inflammation.

Although our bodies use fatty acids to produce oxylipins, the fatty acid composition of our bodies doesn't necessarily reflect the oxylipin composition. To understand this relationship, the study looked at three groups of rats: a control group, a group fed higher LA, and a group fed both higher LA and ALA but in a ratio similar to that of the control group. The role of the diet with both LA and ALA was to determine whether the omega-3 PUFA ALA would mitigate the effects of the increased omega-6 PUFA LA.

The ratio of omega-6 to omega-3 PUFA is too high in modern diets, Aukema said. "The lower (the ratio) the better, at least 5-to-1, and possibly lower." In one model, this ratio increased from 5.4 in the year 1909 to 9.6 in 1999. The recommended amount of omega-6 PUFA isn't set. The 2015 Dietary Reference Intake Report for fatty acids recommends five to 10 percent of our energy come from omega-6 PUFA for optimal health, while the American Heart Association recommends more.

Many fatty acids confer benefits without being sequestered in tissues. However, fatty acids could affect the body through oxylipins. "You can't

just say, 'If fatty acids don't change (in the body), then the oxylipins won't change,'" Aukema said.

In the study, Aukema increased the rats' dietary LA from two to five grams per 100 grams of food. In the LA group, LA-derived oxylipins increased in the kidneys by 84 percent, in the liver by 175 percent and in serum by 75 percent. Oxylipins from arachidonic acid, or AA, (another omega-6 derived from LA) also increased in kidney and liver. Importantly, in several cases, the increases in oxylipins occurred even when the levels of their fatty acid precursors did not change.

In the rats fed both LA and ALA, fewer types of omega-6 oxylipins were elevated, indicating potential mitigating effects of omega-3 PUFA on omega-6 PUFA. The ratio of the omega-6 to omega-3 PUFA and their oxylipins also was comparable to that in the control group. In contrast, the rats fed a diet of LA alone showed the ratio of omega-6 to omega-3 oxylipins increase by as much as 96 percent.

Philip C. Calder, a professor of nutritional immunology at the University of Southampton in Southampton, England, has done research of his own on the inflammatory processes of omega-3, or n-3, fatty acids. Calder said research already has shown that "n-6 PUFA intake has increased over the last 40 years or so, especially in the U.S., as n-6 PUFA have permeated

the food chain. Some argue this is a bad thing because n-6 PUFA are generally pro-inflammatory, as this paper demonstrates. So one conclusion of this paper might be that we need to be cautious about increasing intake of n-6 PUFA further."

The next step includes understanding more of these oxylipins and how they interact both with each other and with their fatty acid precursors. Future experiments might delineate the relative functions and biopotencies of the oxylipins as well helping us understand how they interact.

"I don't think we should focus exclusively on either," Aukema said. "Fatty acids do more than get converted to oxylipins. While one of the main ways they affect things is through the production of oxylipins, they add important information." He said this work is a fundamental study. "Now that we have a better idea of the spectrum that is present, we can start to examine more their functions and how they interact."



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How green tea affects cells: dissecting the paradox

By Courtney Chandler

Green tea has been reported to have many effects on the body, from steadying blood sugar levels to preventing cancer. Yet reports delving into the scientific validity of these claims often have been paradoxical, with some proposing pronounced health benefits and others finding no correlation. A recent article in the **Journal of Biological Chemistry** from the lab of Chung-ho Kim of Korea University and Mark Ginsberg of the University of California, San Diego, partially explains why results may be inconsistent: The active ingredient of green tea can have multiple effects on transmembrane signaling, resulting in varied outcomes.

Epigallocatechin gallate, or EGCG, is the bioactive ingredient of green tea. “EGCG has been reported to have complex and sometimes paradoxically opposing effects on many cellular signaling pathways,” Kim said. “However, the mechanisms underlying these effects have remained elusive.” Kim began studying the effects of EGCG during his postdoctoral research in the Ginsberg lab partially out of personal interest. “I grew up in a culture that says green tea can thin the blood,” he said. However, many of his initial experimental results were inconsistent and variable, making it difficult to understand the underlying mechanism through which EGCG acts.

Now an independent investigator, Kim has continued his research in collaboration with Feng Ye, a postdoctoral fellow in Ginsberg’s lab, by studying two representative transmembrane signaling receptors to investigate how EGCG induces



cellular effects. The first, an adhesion receptor, is called platelet integrin alpha(IIb)beta(III). The second, the epidermal growth factor receptor, or EGFR, belongs to the tyrosine kinase class of receptors.

The researchers used agonists to analyze the activation of these receptors in the presence of EGCG. They observed different activation effects based on whether the receptor agonist was present or absent. “Our findings with prototypical integral membrane proteins show that EGCG-mediated modulation is unique: it can activate inactive receptors but inhibit activated receptors in a receptor-specific manner. It is working as a toggle switch of transmembrane signaling,” Kim explained.

EGCG has been shown to interact with membrane phospholipids. These interactions can alter characteristics of the lipid bilayer — by decreasing its thickness, for example. To test if EGCG–lipid interactions could explain the receptor activation results, Kim and Ginsberg used transmembrane embedding assays. “We were able to explain the paradoxical effects,” Ginsberg said, “by observing that

EGCG induces changes in embedding of transmembrane domains and relating this to effects on cell signaling.”

The team used the data from the model receptors to come up with a theory as to why EGCG has different cellular effects. Their embedding assay data show that EGCG can change the topologies of receptor transmembrane domains, meaning that the angle at which the domain is embedded in the lipid bilayer can be increased or decreased.

This can activate the receptors. But for receptors with activation that requires a shift in transmembrane domains, EGCG can oppose the shift, which inhibits the receptors. This dual effect would explain why there are so many conflicting reports in the field about the effects of EGCG.

Kim predicts their findings may have an impact on human health. Green tea is consumed as both a beverage and in a medicinal capacity, especially in East Asian countries. Studies have suggested that EGCG or green tea may reduce the risk of developing some cancers and cardiovascular diseases. The research by Kim’s group helps provide better understanding of how green tea may be mediating these healthy effects. “We believe our understanding of the mode of action in EGCG on cellular signaling may enable further development and utilization of EGCG as a pharmaceutical compound,” Kim said.



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From the journals

By *Sasha Mushegian, Angela Hopp & Saddiq Zahari*

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**.

G-protein signaling in light of light

Signals from light to the visual system activate rhodopsin, a G-protein-coupled receptor that catalyzes the dissociation of the G protein transducin. Using several new biochemical strategies, Yang Gao and colleagues isolated and characterized a fully functional and stable complex of light-activated rhodopsin and transducin. Their model, published in the **Journal**

of Biological Chemistry, resolved the stoichiometry of the interaction and showed that the flexible helical domain of the G protein can adopt a range of open positions. Characterizing this complex enables further mechanistic studies of visual signal transduction.

doi: 10.1074/jbc.M117.797100

Short peptides make rats eat more

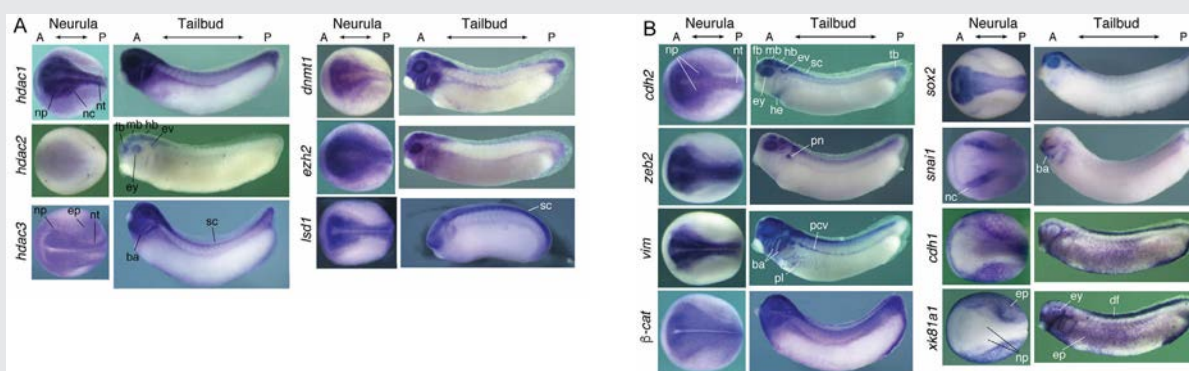
Neuropeptides are short chains of amino acids that regulate a wide range of neurological processes, including food intake and body weight. Identifying which neuropeptides and how they change in response to feeding

would offer a potential avenue for the treatment of eating disorders. In a paper in **Molecular & Cellular Proteomics**, Lingjun Li and colleagues describe how they employed a quantitative proteomics strategy to identify these neuropeptides in the brains of rats that were fed or deprived of food. They further demonstrated that when a few of the identified neuropeptides were injected directly into the brain, the rats would increase significantly their food and water intake.

doi: 10.1074/mcp.RA117.000057

Lipids go spelunking

Caveolae, or “little caves,” are specialized nanodomains enriched in cholesterol and sphingolipids that form



NANJING UNIVERSITY

The genes involved in tumorigenesis show tissue-specific expression in *Xenopus* embryos. (A) Whole-mount in situ hybridization, or WMISH, detection of expression of genes coding for chromatin modification enzymes. (B) WMISH detection of expression of EMT marker genes. Expression of *xk81a1* and *sox2* is shown as control. Mid to late neurula and tailbud embryos were used. Abbreviations: A, anterior; ba, branchial arch; df, dorsal fin; ep, epidermis; ev, ear vesicle; ey, eye; fb, forebrain; hb, hindbrain; he, heart; mb, midbrain; nc, neural crest; np, neural plate; nt, neural tube; P, posterior; pcv, posterior cardinal vein; pl, plexus; pn, pronephros; sc, spinal cord; tb, tail bud.

What cancer can teach us about embryonic neural development

Cancer cells can be viewed as improperly differentiated immature cells. In a paper published in the **Journal of Biological Chemistry**, Ying Cao and colleagues present a series of observations that suggest cancer cells are similar to embryonic neural cells. *Xenopus* embryos expressed pan-cancer-promoting genes and pathways primarily during neurulation, whereas tumor suppressor genes largely were expressed in non-neural cells. Inhibition of cancer-related enzymes involved in epigenetic modifications resulted in neurallike differentiation of cancer cells. Together these results suggest some common regulatory networks underlying tumorigenesis and neural development.

doi: 10.1074/jbc.M117.785865

Short genes, high cholesterol?

Adults who are short are known to be at greater risk of heart disease than their average and tall peers. A team of researchers led by Lee A. Pyles reports in the **Journal of Lipid Research** that, as it is with adults, short stature in children is associated with higher levels of low-density lipoprotein (commonly known as bad cholesterol). The finding, which resulted from a study of more than 63,000 West Virginia schoolchildren, supports “the observations that factors in addition to diet, physical activity and (body mass index) determine serum cholesterol,” the authors wrote. They suggest that it may be wise to factor in children’s heights, in addition to family history, when considering childhood screening for hyperlipidemia.

doi: 10.1194/jlr.P078816



in plasma membranes and participate in signaling, trafficking and metabolic processes. Takashi Hiram and colleagues investigated the fine-scale interactions between specific types of lipids and caveola-specific proteins. Using live-cell single-particle tracking, they showed that the phospholipid phosphatidylserine was required for caveola assembly and stability. The results were published in the **Journal of Biological Chemistry**.

doi: 10.1074/jbc.M117.791400

Gut check: give cholesterol credit

Owing to its role in cardiovascular disease, cholesterol has a bad reputation. But cholesterol is necessary for cellular-membrane integrity and other functions that life requires. We can add to cholesterol’s list of positives, according to new research in the **Journal of Lipid Research**, its role in shoring up the intestine. SREBP-2 is a transcription factor that regulates cholesterol biosynthesis. Researchers led by Luke J. Engelking engineered mice

that lack SREBP-2 in the intestine, making them deficient in cholesterol there. Engelking’s team reported that the mice required exogenous cholesterol to maintain intestinal integrity and, ultimately, survive. Furthermore, as David Y. Hui of the University of Cincinnati College of Medicine emphasized in a commentary accompanying the paper, the work documents that “cholesterol itself, but not intermediates in the SREBP-2-regulated cholesterol biosynthetic pathway, is required” for survival of the intestinal mucosa.

doi: 10.1194/jlr.M077610

Undeterred by damaged DNA

If the DNA replication machinery of a cell encounters a damaged portion of DNA, or DNA lesion, it either skips it or waits for the recruitment of a specialized DNA polymerase capable of synthesis across the lesion. In a paper published in the **Journal of Biological Chemistry**, Philip Nevin and colleagues found that the *E. coli* DNA

polymerase III — within its replisome complex but not by itself — could bypass certain types of lesions without the need for specialized trans-lesion polymerases. This mechanism reveals additional diversity in DNA damage responses.

doi: 10.1074/jbc.M117.800441

Discovery of a novel methyltransferase

Protein methylation is emerging as a widespread and important post-translational modification that regulates diverse cellular processes, but little is known about the enzymes that catalyze this reaction. In a paper in **Molecular & Cellular Proteomics**, Marc Wilkins and colleagues used the CRISPR/Cas9 system to knock out a putative methyltransferase, METTL21B and, using targeted mass spectrometry, showed that it methylates the elongation factor eEF1A. Proteomic analysis of METTL21B knockout cells revealed changes in biological processes and complexes related to eEF1A function, prompting

the authors to suggest that MET-TL21B be renamed eEF1A-KMT3.
doi: 10.1074/mcp.M116.066308

Prion disease — the lipid connection

There are no effective therapies to eliminate or even slow the progression of transmissible spongiform encephalopathies, such as Creutzfeldt–Jakob disease, mad cow disease and scrapie, all of which are fatal. Given that previous studies have found that lipids affect the replication and propagation of the pathogenic proteins that cause the devastating neurodegeneration seen in TSEs, a team of researchers decided to investigate how very low levels of circulating plasma lipids would affect mice infected with scrapie. The project, led by Catherine Desrumaux and Véronique Perrier, used an established mouse model deficient in the phospholipid transfer protein. Mice deficient in PLTP have significantly lower plasma cholesterol than normal. The researchers infected the knockout mice with a scrapie strain and found that the mice lived longer than wild-type mice that also had been infected. In addition, when the knockout mice were fed a high-fat diet, which raised their lipid levels, they developed more prion deposits in the brain and died sooner. In their paper in the **Journal of Lipid Research**, the researchers say the results suggest that lowering plasma cholesterol levels may benefit patients with prion disease.

doi: 10.1194/jlr.M073718

Reprogramming cells from type 1 diabetes patients

Type 1 diabetes, in which patients do not produce enough insulin from their pancreatic beta cells, potentially could be treated by transplanting healthy pancreatic tissues into patients. In a paper published in the **Journal of Biological Chemistry**, Gohar S. Man-

zar and colleagues generated glucose-responsive insulin-producing beta cells from induced pluripotent stem cells derived from type 1 diabetes patients. Key to the differentiation of insulin-producing cells was a treatment that caused transient demethylation in the stem cells. When injected, these cells reduced hyperglycemia in mice.

10.1074/jbc.M117.784280

Restoring cholesterol homeostasis

Niemann-Pick type C is a rare neurodegenerative disorder characterized by the abnormal accumulation of cholesterol and other lipids in the late endosomes and lysosomes. A histone deacetylase inhibitor, Vorinostat, has been shown to restore cholesterol homeostasis in cells derived from NPC patients; however, the mechanisms by which it does this are not known. In a paper in **Molecular & Cellular Proteomics**, William Balch and colleagues performed a comparative proteomic profiling on these cells, where they found that Vorinostat modulates the expression of lysosomal proteins, especially lysosomal acid lipase, which contributes to cholesterol efflux from the cell.

doi: 10.1074/mcp.M116.064949

A biophysical celebration of a DNA-binding protein

Single-stranded DNA-binding protein, or SSB, is essential during DNA replication and repair. Unlike *E. coli* SSB, human mitochondrial SSB lacks a disordered C-terminal domain. In a **Journal of Biological Chemistry** paper, Yufeng Qian and Kenneth A. Johnson characterized the kinetics and energetics of the binding between single-stranded DNA and mitochondrial SSB using an array of quantitative approaches, including DNA footprinting, fluorescence anisotropy, isothermal titration calorimetry and stopped-flow experiments integrated

with real-time statistical evaluation.
doi: 10.1074/jbc.M117.791392

The function of a tuberculosis prodrug activator

Drug-resistant tuberculosis is a public health threat. Thienopyrimidine compounds such as TP053 are promising anti-tuberculosis drugs because they kill both replicating and nonreplicating bacteria. TP053 is a prodrug that must be activated by a *Mycobacterium tuberculosis* enzyme whose function was previously unknown. In research published in the **Journal of Biological Chemistry**, Joris Messens and colleagues characterized this enzyme and found that it is a mycoredoxin involved in the pathogen's oxidative stress response.

10.1074/jbc.M117.797837

The connection between hepatitis C and diabetes

People infected with hepatitis C virus, or HCV, commonly develop type II diabetes. Hervé Lerat and colleagues used transgenic mice expressing HCV proteins in the liver to examine the pathways leading to this state, finding that expression of HCV proteins resulted in impaired insulin signaling via uncoupling of the Akt/FOXO1 pathway, leading to insulin resistance. The results were published in the **Journal of Biological Chemistry**.

10.1074/jbc.M117.785030



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Sadiq Zahari (szahari@asbmb.org) is a postdoctoral scholar at the University of California, San Francisco, and the editor for manuscript integrity at *Molecular & Cellular Proteomics*.

ASBMB STUDENT CHAPTERS

T-SHIRT DESIGN CONTEST



Share what being a part of the ASBMB Student Chapters means to you. All chapters can submit T-shirt designs related to biochemistry and molecular biology. The winning design will be sold at the 2018 ASBMB Annual Meeting in San Diego. All designs must be submitted by Nov. 15, 2017.



- T-shirts cannot include any school's name
- All designs should relate to the Student Chapters' mission
- Designs should be submitted as high-resolution AI or EPS vector files (minimum 300 dpi)
- Designs should not be specific to one event or institution
- Entries must be designed for only the front of the shirt
- T-shirts will be sold at the ASBMB booth and must be appropriate for all age groups
- All design submissions should be emailed to education@asbmb.org

WWW.ASBMB.ORG/STUDENTCHAPTERS

WELCOME NEW ASBMB MEMBERS

Bashir Ado, Bayero University
Eitan Akirav, New York University Winthrop Hospital
Benjamin Allen, University of Michigan
Joe Alvin, University of Arizona
Raymond Anderson, West Virginia University
Fikri Avci, University of Georgia
Ryan Bailey, University of Michigan
Rekha Bassi, King's College London
Sushant Bhatnagar, University of Alabama
Calvin Blaschke, Coker College
Itay Budin, University of California, Berkeley
Juan Luis Callejas Valera, Sanford Research
Guillemette Carrot, Agnes Scott College
Chun Kin Chow, Medtimes Medical Group Ltd.
Derek Clark, Metropolitan State University of Denver
Amy Conte, Providence College
Doug Daniels, University of Dayton
Vincenzo De Filippis, University of Padua
Kanishka de Silva, University of Michigan
Catherine Eichhorn, University of California, Los Angeles
Stefannia Esparza, Brigham Young University-Idaho
Cristina Espinosa-Diez, Oregon Health and Sciences University
Andrej Frolov, Leibniz Institute of Plant Biochemistry
Ria Fyffe-Freil, Virginia Commonwealth University
Ketan Gajiwala, Pfizer Inc.
Amea George, Australian National University
Abigail Giles, National Institutes of Health
Jeffrey Golden, Brigham and Women's Hospital/
Harvard Medical School
Suman Govindaraju, University of Texas MD Anderson
Cancer Center
Stefanie Grunwald, Charité Universitätsmedizin Berlin
Wayne Hancock, University of Pennsylvania
Laura Herring, University of North Carolina, Chapel
Hill
Katharine Hobbing, University of Cincinnati College of
Medicine
Peter Hollenhorst, Indiana University
Mei Hong, Massachusetts Institute of Technology
Jie-rong Huang, National Yang-Ming University
Ayodeji Ipinmoroti, East Tennessee State University
Ece Karatan, Appalachian State University

Sangwoo Kim, Imperial College London
Angela Kita, University of Wisconsin, Madison
Arnulf Kletzin, Technische Universität Darmstadt
Yan Kung, Bryn Mawr College
Chenyang Lan, BIOSS Centre for Biological Signalling
Studies, University of Freiburg
Robert Lazarus, Genentech Inc.
Shuo Li, Lerner Research Institute
Juanita Limas, University of North Carolina, Chapel
Hill
Qingyun Liu, University of Texas Health Science Center
at Houston
Wen Lu, Hainan Medical University
Juan Pedro Luna-Arias, Cinvestav-Instituto Politécnico
Nacional
Tamara Martin, Tennessee State University
Elizabeth Meiering, University of Waterloo
Yasu Morita, University of Massachusetts, Amherst
Fathima Nazeer, State University of New York, Potsdam
Richard Nelson, Boehringer Ingelheim
Luis Netto, Instituto Biociencias-Universidade de São
Paulo
Anna Nguyen, Metropolitan State University of Denver
Alice Oates, University of Kentucky
Kaylie O'Connell, Providence College
Udoka Okaro, University of South Florida
Amit Pandey, Cancer Science Institute of Singapore
John Peters, Washington State University
Michael Pickart, Concordia University, Wisconsin
Nicholas Pilau, Usmanu Danfodiyo University Sokoto,
Nigeria
Madushi Raththagala, Skidmore College
R. M. Imtiaz Karim Rony, Wright State University
Veronica Sanchez Gonzalez, McGill University
Angel Santiago, University of Puerto Rico in Humacao
Colin Scano, Providence College
Mehrnaz Siavoshi, California State University,
Northridge
Ari Simenauer, University of Colorado, Anschutz
Medical Campus
Emily Sutton, University of Oregon
Bryan Thurtle-Schmidt, Davidson College
Paola Torre, University of Pennsylvania
Jinling Zhang, Rutgers University

Acquiring new skills and growing networks

PROLAB travel awards help emerging scientists
gain experience in labs in the U.S. and Canada

By John Arnst



On the seventh floor of the Biosciences Building at The Ohio State University, Pablo Galaz–Davison practices assembling and breaking down a centrifugal force microscope. Galaz–Davison, a second-year Ph.D. student at the Universidad de Chile, is learning the intricacies of this piece of equipment and its many applications in mapping the mechanical properties of single molecules while he visits the laboratory of Marcos Sotomayor, a structural biologist specializing in protein structures and molecular dynamics.

Galaz–Davison’s three-month stay in Sotomayor’s lab has been made possible by the Promoting Research Opportunities for Latin American Biochemists, or PROLAB, program. Over the past seven years, the American Society for Biochemistry and Molecular Biology, the Pan-American Society for Biochemistry and Molecular Biology and the International Union for Biochemistry and Molecular Biology have given 60 young biochemists travel awards to advance their research by working directly with collaborators at labs in the United States and Canada. In 2017, PROLAB gave travel grants to seven Ph.D. students, two postdoctoral fellows and one assistant professor; these recipients are from Uruguay, Argentina, Chile, Brazil, Portugal and Spain (see box).

According to former ASBMB President Judith Bond, who has served on the awards committee for the program since its inception in 2010, the idea for PROLAB emerged after she traveled to the 2005 PABMB annual meeting in Buenos Aires.

“When I was there, I was really impressed with the training and quality of the graduate students and the postdocs who were presenting,” Bond said. “There were some (lab facilities) that were very well-equipped but many places that weren’t, and there was a desire to make connections with labs in the United States where

they could do some special types of procedures or use some type of instrumentation during their training. I came back from that meeting with the idea of trying to forge some relationship between Latin America and the United States.”

Bond’s idea was supported by former ASBMB Presidents Susan Taylor, Heidi Hamm and Bettie Sue Masters, who collectively submitted a proposal to the ASBMB Council to provide \$75,000 for the program over three years.

“Someplace along here, the International Union of Biochemistry and Molecular Biology decided this was a really good idea and that they would also kick in some funds to support the program,” Bond said. This doubled the total funding for PROLAB to \$50,000 each year for the first three years.

According to Jose Sotelo–Silveira, the general secretary of the PABMB and a member of the awards committee, PROLAB “generates a lot of networking and connections, which are essential for building a healthy scientific community in the south linked to the one in the north.”

That belief is shared by the PABMB’s leadership, including Hugo Maccioni, the society’s chairman, who said, “We believe that it is extremely useful for young investigators from countries affiliated with PABMB to update themselves in state-of-the-art technologies in the laboratories of people affiliated with ASBMB, and establish productive relations with them.”

Getting the program off the ground ultimately took about five years, Bond said. The first awards were given out in 2011 to nine biochemists from Brazil, Argentina and Chile.

Physics and folding

Galaz–Davison’s primary investigator, Cesar Antonio Ramirez–Sarmiento, was among the second cohort of scientists to receive PROLAB awards, back in 2012. At



PHOTO COURTESY OF PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
Cesar Antonio Ramirez–Sarmiento is a two-time PROLAB recipient. He runs a lab at the Pontificia Universidad Católica de Chile.

2017 PROLAB recipients



Julia Roulet, Ph.D. student, Argentina

Institution: Instituto de Biología Molecular y Celular de Rosario

Host lab: University of California San Diego, Department of Chemistry and Biochemistry; Michael Burkart

Research: Developing algae as a platform for high-valued molecules production.



Gabriel Oka, postdoctoral fellow, Brazil

Institution: Universidade de São Paulo

Host lab: Howard Hughes Medical Institute, California Institute of Technology; Grant Jensen

Research: Pseudomonas aeruginosa's use of toxins via the bacterial type-IV secretion system as a defense mechanism



Germán Michelis, Ph.D. student, Argentina

Institution: Instituto de Investigaciones Bioquímicas de Bahía Blanca

Host lab: National Institutes of Health National Eye Institute; Patricia Becerra and T. Michael Redmond

Research: Exploring the effects of pigmented epithelium-derived factor on cultured retinal neurons



Martina Lazarro, Ph.D. student, Argentina

Institution: Instituto de Biología Molecular y Celular de Rosario

Host lab: Washington University in St Louis; Mario Feldman

Research: The role of the type-VI secretion system of Serratia marcescens in bacterial interactions; intracellular traffic of Serratia in eukaryotic cell system

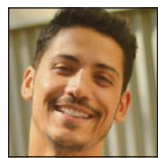


Mauricio Mastrogiovanni, Ph.D. student, Uruguay

Institution: Universidad de la República

Host lab: University of Pittsburgh School of Medicine, Department of Pharmacology and Chemical Biology; Francisco Schopfer

Research: Tyrosine and fatty acid oxidation and nitration in biomembranes

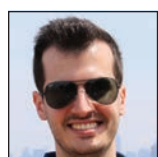


Maximiliano Vazquez, Ph.D. student, Argentina

Institution: Universidad Nacional de Córdoba

Host lab: University of Pittsburgh School of Medicine, Department of Pharmacology and Chemical Biology; Bruce Freeman

Research: Examining nitrolipids' regulation of scavenger receptor expression, foam cell formation and cholesterol metabolism in macrophages



Tiago Figueira, Ph.D. student, Portugal

Institution: Instituto de Medicina Molecular, Universidade de Lisboa

Host lab: Columbia University, College of Physicians and Surgeons; Anne Moscona and Matteo Porotto

Research: The biophysics of viral entry processes



Rafaella Araújo Gonçalves da Silva, Ph.D. student, Brazil

Institution: Instituto de Bioquímica Médica, Universidade Federal do Rio de Janeiro

Host lab: Tanz Centre for Research in Neurodegenerative Diseases, University of Toronto; Paul Fraser

Research: The role of hyperphosphorylation of tau protein in hypothalamic and metabolic alterations related to Alzheimer's disease



Pablo Galaz-Davison, Ph.D. student, Chile

Institution: Facultad de Ciencias Químicas y Farmacéuticas, Universidad de Chile

Host lab: The Ohio State University, Department of Chemistry and Biochemistry; Marcos Sotomayor

Research: Characterizing the structural and thermal properties of RfaH and PET-degrading enzyme



Meritxell Jodar Bifet, assistant professor, Spain

Institution: Universidad de Barcelona

Host lab: Stanford University School of Medicine, Julia Salzman

Research: The potential of circular RNA in male sperm as clinical biomarker of male infertility and its role in early embryogenesis and epigenetic inheritance.

that time, Ramirez–Sarmiento was a graduate student at the Universidad de Chile using biophysics principles to explore whether bacterial enzymes made up of multiple polypeptide chains need to finish folding before becoming fully functional. “I was trying to understand whether they fold first and then they bind, or whether they bind and fold at the same time,” he said.

A few months after applying for an award at the suggestion of his primary investigator, Jorge Babul, then the chairman of the PABMB, Ramirez–Sarmiento was getting to work at the University of California, San Diego, in the lab of Elizabeth Komives, whose expertise includes the biophysics governing protein–protein interactions mediated by nonglobular proteins.

“I got access to all of the instruments I needed for doing that kind of research. I didn’t have them in my country,” Ramirez–Sarmiento said. “I was able to go for three months, and I did, I will say, half of my (Ph.D.) research over there. It was great.”

At the time, Komives’ lab was adjacent to the Center for Theoretical Biological Physics, now located at Rice University, which allowed Ramirez–Sarmiento to learn computational techniques he hadn’t previously encountered. “I ended up doing both computational work and experimental work, and it threw me into this idea of doing interdisciplinary research in my (own) lab,” he said.

After completing his stint at UCSD, Ramirez–Sarmiento finished his Ph.D. and a postdoctoral fellowship at the Universidad de Chile. He then took a faculty position at the Pontificia Universidad Católica de Chile. In 2016, Ramirez–Sarmiento received a second PROLAB award and spent three months at the Ohio State lab of Irina Artsimovitch, who studies the mechanism and regulation of RNA-chain synthesis in bacteria. While at Ohio State, Ramirez–Sarmiento also met Sotomayor, a fel-

low Chilean and biochemist in whose lab Galaz–Davison now works.

Affordable revolutions

Ramirez–Sarmiento’s current research involves thermodynamically characterizing RfaH, a metamorphic protein that has similar molecular mechanisms to prions, as well as an enzyme that degrades polyethylene terephthalate, or PET, the clear plastic found in water bottles. Galaz–Davison, who applied to the PROLAB program at Ramirez–Sarmiento’s suggestion, is involved in both of these research projects, which employ X-ray crystallography, computer simulations and the highly focused laser beams of optical tweezers to characterize biological features of both molecules.

One of Galaz–Davison’s goals for his PROLAB experience was to learn how to set up and break down a centrifugal force microscope, a type of atomic-force microscope that measures the mechanical properties of single molecules by applying a uniform centrifugal force to an orbiting sample. While many recipients spend their time in labs outfitted with extremely high-end equipment, the CFM is actually more affordable than its counterpart in Chile.

“The thing is, it’s cheap,” Galaz–Davison said. “The optical tweezers that we have access to in Chile cost \$70,000.” The CFM, which does essentially the same thing, costs about \$5,000, he said.

After learning the intricacies of the instrument, Galaz–Davison set about applying it to RfaH while simultaneously using X-ray



PHOTO COURTESY OF TIAGO FIGUEIRA

Tiago Figueira, a Ph.D. student at the Universidade de Lisboa, is spending six months at Columbia University in New York City.

crystallography to determine the atomic structure of the PET-degrading enzyme. “We’re now finishing with computational work using molecular dynamics on this enzyme and trying to round up everything we’ve got on this project to try to publish a paper as soon as possible, which is thanks to this, because we didn’t have a structure (defined for the molecule),” he said.

In his remaining time at Ohio State, he plans to finish characterizing the kinetic properties of how the PET-degrading enzyme acts on PET.

Branching into biochem

Beyond access to unfamiliar equipment and the scientists who use it, PROLAB awardees often use their time abroad to explore a new discipline that intersects with their own. At Columbia University, Tiago Figueira is complementing his knowledge of biophysics with a gamut of biochemical lab techniques.

Figueira, now in the final year of his doctoral research at the Universidade de Lisboa Instituto de Medicina Molecular, arrived at Columbia on April 28 for a six-month stint in the lab of Anne Moscona and Matteo Porotto.

“Through biophysics, I’ve entered the world of virology,” said Figueira, whose work began with HIV antivirals and soon expanded to include similar compounds effective against measles and influenza viruses.

“If you do biophysics for a living, you are very good at doing spectroscopy analyses and characterizing molecules, but you may lose on the big part of cell biology and molecular biology and miss the opportunity of correlating both fields,” he said.

By taking this approach, Figueira was able to analyze the effects of proteins and mutations on viral entry, which expanded his appreciation for the field as a whole. “I always thought techniques (that) are routine for most molecular biologists...were really my Achilles heel, and here I do them every

day.”

Figueira was surprised that he was able to get to know his professors outside of the laboratory. “When you come to a foreign lab, you think, ‘My life is going to be mostly professional.’ Right?” he said.

“I had the opportunity of having my girlfriend visit for two weeks,” he said. “At the end of the first week, we were walking down the street and came across one of my supervisors, Professor Anne Moscona. She was so happy to see us both together and she was so happy to meet her that in the following days we ended up having lunch or dinner together almost every day.

“It was so good to have their personal support and even make my girlfriend feel that I’m in good hands. For me, that was really memorable, and it connects both my personal and working life.”

Shorter stays

Meritxell Jodar Bifet, an assistant professor at the Universitat de Barcelona, recently finished her PROLAB stay in Julia Salzman’s lab at Stanford University. Jodar is investigating whether RNA in sperm may be a biomarker of male fertility as well as its potential role in early embryogenesis and epigenetic inheritance.

Her teaching responsibilities in Barcelona gave Jodar only six weeks, from July 16 to Aug. 31, to learn the computational and biochemical techniques she needed to begin studying the role of circular RNA in sperm cells. She learned how to enrich sperm samples for circular RNA, which involved treating them with RNaseR, a ribonuclease that digests nearly all linear RNA.

She also had the opportunity to use a new algorithm known as KNIFE that Salzman’s lab designed to increase the sensitivity and specificity of circular RNA detection, which is useful for assessing the total number of circular-RNA strands in a sample.

“The circular RNA molecules are much more stable than regular RNAs,” she said. “This suggests to me that it could be a good strategy to provide information from the sperm to the oocyte because traveling from the sperm to the oocyte... is a long trip, and maybe the circular RNAs will be the best vehicle to transmit paternal information to the new individual.”

Jodar now plans to examine the roles that these circular RNA play in male fertility, early embryogenesis and transmitting paternal acquired traits to progeny.

“I hope that that we can continue this collaboration within the University of Barcelona and Stanford University in order to discover the real function of the circular RNAs in the sperm,” she said.

Hippocampal tangle

While some of this year’s recipients are in the midst of their visits and others have returned home, Rafaella Araújo Gonçalves da Silva plans to begin her fellowship in the lab of Paul Fraser at the University of Toronto’s Tanz Centre for Research in Neurodegenerative Diseases by the end of October. A Ph.D. student at the Instituto de Bioquímica Médica at Universidade Federal do Rio de Janeiro, Gonçalves is investigating the molecular mechanisms in the brain’s hypothalamus underlying the connections between Alzheimer’s disease and diabetes.

“Historically, people think about Alzheimer’s as a disease of memory, so they look at the hippocampus and cortex,” she said. “Hypothalamic dysfunction could be happening in Alzheimer’s disease, which would explain this correlation with metabolic dysregulation in diabetes.”

Gonçalves’ previous research has examined the ability of intracerebroventricular infusion of amyloid beta-oligomers in wild-type mice to trigger hypothalamic alterations and metabolic dysregulation. She plans to

expand her research to include a variety of mouse models for Alzheimer’s disease available in Fraser’s lab.

One of those mouse models is designed to express the human tau protein, which becomes abnormally hyperphosphorylated and aggregates into neurofibrillary tangles in Alzheimer’s disease.

“What we want to do now is see if the same hypothalamic and metabolic alterations we saw in our animals are related to tau hyperphosphorylation in this model in Paul Fraser’s lab,” said Gonçalves, who is planning to work in the lab for four months.

“They also have a lot of equipment and reagents, and it’s so much easier to buy something there,” she said. “Here in Brazil, if you buy an antibody, it’s going to take three months or more to get to your bench, and there, I can buy it one day and it’s going to be there on my bench the next day.”

Whether the young scientists visit for six weeks or six months, the networks the PROLAB recipients build have a lasting impact on their careers that can prove more valuable than technical experience or exposure to high-end equipment.

Barbara Gordon, executive director of the ASBMB, said the program is funded year-to-year and the society intends to fund it for the foreseeable future. “The PROLAB program has had a monumental effect on the careers of its recipients,” she said. “We hope that it can continue to do so for as long as possible.”

In his lab in Chile, Ramirez-Sarmiento is drawing up research proposals that include Komives and the other collaborators he has gained over the years. “You keep these people that you know through this program forever,” he said. “You think about them for every research endeavor that you can have.”



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

Countries of origin

While the majority of the travel awards go to students from universities in Central and South America, applications also are considered for students from Portugal and Spain. According to former ASBMB President Judith Bond, this inclusion came when the International Union of Biochemistry and Molecular Biology, which contributes half of the \$50,000 meted out to 10 applicants each year, joined with the ASBMB to support the program.

Listed here are the countries of origin of the 60 PROLAB recipients since the program started in 2011.

Argentina – 17

Brazil – 9

Chile – 16

Columbia – 1

Cuba – 1

Mexico – 2

Peru – 1

Portugal – 4

Spain – 6

Uruguay – 3

Scientific sessions at a glance

Below are brief descriptions of the scientific sessions slated for the 2018 American Society for Biochemistry and Molecular Biology Annual Meeting scheduled for April 21–25 in San Diego. We asked the session organizers for their pithiest pitches — and advice for new presenters. (If you've submitted your abstract for a Spotlight Session, you should check out their advice on page 33.)

Biochemistry of autophagy and mitochondrial biology

Kun-Liang Guan,
University of California, San Diego

The session will discuss biochemical and structural studies of autophagy, mitochondrial homeostasis and mitophagy in response to nutrient stress, and the crosstalk of mTOR and the Hippo pathway.

Keywords: autophagy, mitophagy, mitochondrial, mTOR, Hippo

Who should attend: researchers interested in cell biology, cancer biology, autophagy, mitochondrial homeostasis and metabolism

Theme song: “Autophagy Day” by Wumpscut

Advances in single-cell omics

Jim Eberwine,
University of Pennsylvania

Single-cell omics is a rapidly developing field that is revolutionizing the study of cell biology. The speakers will highlight how the newest advances in transcriptomics, proteomics and live-cell-omics analyses are yielding novel insights into the functioning of subcellular compartments, including the nucleus, cytoplasm, mitochondria and cellular processes.

Keywords: single cell, transcriptomics, proteomics

Who should attend: cell biologists, systems biologists, engineers, graduate students, professors, funding agency representatives, journal editors, polemicists

Theme song: “What a Wonderful World” by Louis Armstrong

Intrinsically disordered proteins and their regulation and functions

H. Jane Dyson,
The Scripps Research Institute

Many important proteins and protein domains are intrinsically disordered. As more of these regions are identified, their repertoire of functions and the mechanisms used to achieve them continues to expand. This session includes recent advances in the understanding of intrinsic disorder in the functional life of cells.

Keywords: intrinsic disorder, protein–protein interactions, biophysical characterization

Who should attend: protein biochemists, biophysicists, spectroscopists, and those interested in cell signaling, viral proteins and protein structure

Theme song: “Bamboléo” by the Gipsy Kings

Adapting proteostasis to ameliorate neurodegenerative diseases

Jeffery Kelly,
The Scripps Research Institute

Proteinopathies are a leading cause of death, and the families' social burden of caring for neurodegenerative disease

patients is immense. This symposium focuses on learning enough about these degenerative maladies to conceive of therapeutic strategies that adapt the chemistry or biology of protein homeostasis to slow disease progression.

Keywords: proteostasis, drug, misfolding

Who should attend: protein chemists, cell biologists, neuroscientists, physician-scientists, students, postdoctoral fellows

Theme song: “I am not going to miss you” by Glen Campbell

Glycobiology and functional glycomics

Linda Hsieh–Wilson,
California Institute of Technology

This session will focus on mechanisms of protein glycosylation and new approaches to deciphering the functional roles of glycans and their associated proteins in the regulation of cell-signaling pathways and networks.

Keywords: glycosylation, glycan, signaling, networks, posttranslational modifications

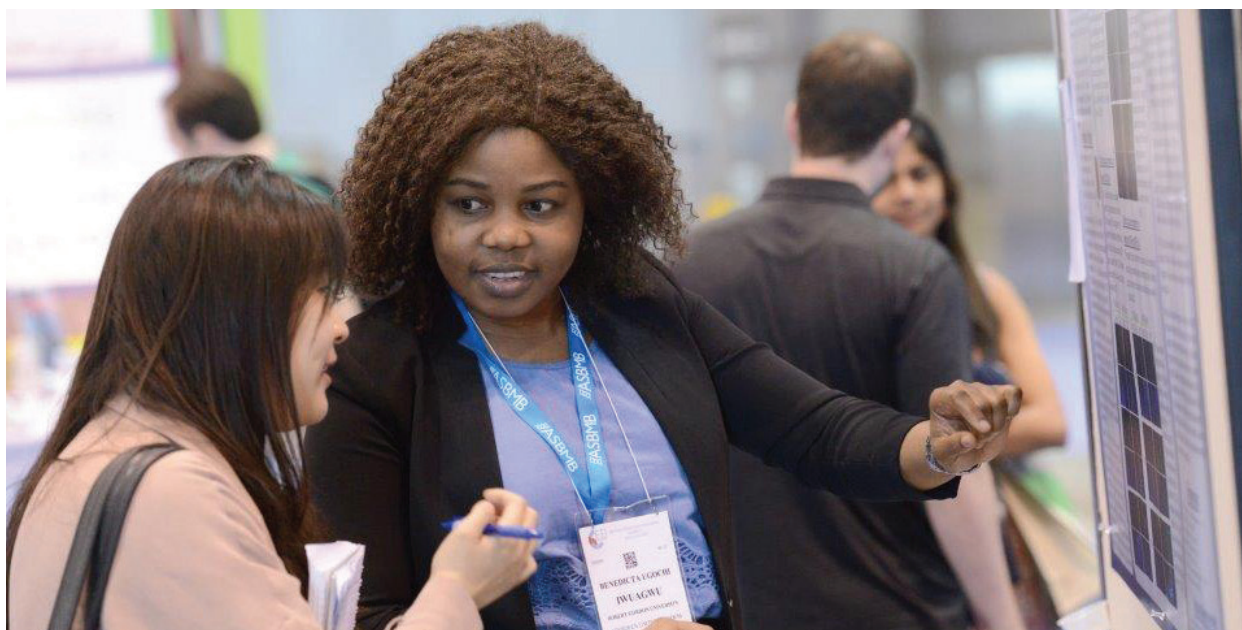
Who should attend: glycobiologists, biochemists, cell biologists, systems biologists, chemical biologists

Theme song: “A Spoonful of Sugar,” because sugars are a delight both to eat and to study!

Signal transduction corrupted by pathogens

Kim Orth,
University of Texas Southwestern Medical Center at Dallas and Howard Hughes Medical Institute

This session analyzes signaling pathways in host cells that are rewired to benefit an invading pathogen. The



ASBMB PHOTO

Benedicta Ugochi Iwuagwu, center, of Robert Gordon University in Aberdeen, Scotland, received a travel award to attend her first ASBMB annual meeting in 2017. She is pictured at the poster and meet-the-speakers session on the final afternoon of the meeting in Chicago.

manipulating virulence factors usually mimic or capture a eukaryotic activity to manipulate host signaling pathways. The mechanisms uncovered, more often than not, reveal new biology and novel biochemical mechanisms.

Keywords: posttranslational modifications, signal transduction, rewiring host signals, pathogenesis

Who should attend: anyone interested in how nature has evolved pathogens to biochemically rewire signaling pathways

Theme song: “Thriller” by Michael Jackson

Metabolism in health and disease

Lewis Cantley, Weill Cornell Medicine

The four speakers in this session will address metabolic changes that occur in human diseases. Much of the focus will be on altered cellular metabolism of cancers, though there also will be discussions on links between obesity, metabolic disease and cancers.

Keywords: cancer, metabolism,

disease

Who should attend: basic scientists interested in cellular metabolism, cancer researchers, drug developers from pharma

Theme song: “All of me, my cancer affects all of me, but now I know how to live without it,” because the session will provide insights into how cancers use fuels to grow, how this affects the whole body and how we can intervene to prevent tumor growth.

Lipid signaling and metabolism

Michael Wakelam, Babraham Institute, Cambridge, England

This symposium will focus on the importance of signaling and metabolic processes in regulating changes in lipid structures and how this affects cell function. The speakers will highlight the importance of lipidomics, imaging and knockout methods in facilitating our increasing understanding of the breadth of lipid-regulated physiological processes.

Keywords: membranes, lipid structures, fatty acids, lipidomics, lipid signals

Who should attend: lipid biochemists, cell biologists and molecular biologists who haven’t thought about the importance of lipids in cell function

Theme song: “I still haven’t found what I’m looking for” by U2, because none of us has yet.

Biochemical communication between the microbiome and the host

Lora Hooper, University of Texas Southwestern Medical Center at Dallas

Humans and other animals are home to enormous numbers of beneficial bacteria, yet we’ve only recently begun to acquire a detailed understanding of beneficial host–microbe interactions. This session will explore the molecular details of how resident microorganisms interact with their hosts and how

these interactions contribute to health and disease.

Keywords: microbiome, host–microbe interactions, metabolism, intestine

Who should attend: clinicians, scientists, students, anyone hoping for better communication with their microbiome

Theme song: “That’s What Friends Are For” by Dionne Warwick, for the longstanding collaboration between humans and their microbes. (Or is it microbes and their humans?)

Epigenetics

Benjamin Garcia,
University of Pennsylvania
School of Medicine

This symposium will focus on biochemical, quantitative and structural investigations of chromatin and epigenetic-related molecular complexes.

Keywords: epigenetics, chromatin, structural, proteomics, chemistry, NMR, histone

Who should attend: scientists at all levels who are experts or new to the chromatin field; there will be something for everyone.

Theme song: “Centuries” by Fall Out Boy, because once you hear these talks, “you will remember me; remember me, for centuries.” Well, remember us!

Enzyme dynamics

Amnon Kohen,
University of Iowa

This session will focus on the protein motions, vibrations, and dynamics that are coupled to catalytic activity. It will bring in experimentalists (vibrational spectroscopy, nuclear magnetic resonance spectroscopy, enzyme kinetics) and theoreticians (molecular dynamic and quantum mechanics/molecular mechanics computations combining motions and chemical reactivity).

Keywords: enzymes, kinetics, dynamics, protein motion, computation

Who should attend: enzymologists,

spectroscopists, theoreticians, protein biochemists and anybody who is interested as to how enzymes can achieve such amazing rate accelerations

Theme song: “Born to move” by Creedence Clearwater Revival

Novel enzymology

Ronald T. Raines,
Massachusetts Institute
of Technology

The four talks in the session will portray how enzymes have evolved to mediate key processes in biology and how enzymes can serve as targets for drugs and even as drugs themselves.

Keywords: chemical biology, molecular evolution, drug discovery

Who should attend: anyone who is interested in cutting-edge science that extends from organic chemistry, through biochemistry and molecular biology, and on to cell biology

Theme song: “Lone Catalysts” by J. Rawls — a song that is dope, like this session.

Metals in biology

Amy Palmer,
University of Colorado, Boulder

An estimated 30 percent of proteins require a metal cofactor, and metals touch nearly every aspect of biology. This session will highlight cellular pathways and biochemical processes that rely on metal ions, from microbes and mammalian cells to the host–pathogen interface.

Keywords: metals, metalloenzymes, homeostasis

Who should attend: anyone interested in learning about the unique biochemistry conferred by metals and discovering how cells use metal ions for essential functions

Theme song: “Titanium” by David Guetta, because metals make proteins and cells bulletproof (or at least stronger than they would be without metals!)

Metabolomics and lipidomics

Daniel Nomura,
University of California, Berkeley

This session will discuss new methods and their applications in the area of chemoproteomics, metabolomics and lipidomics. Method development and use to investigate drivers to disease will be presented.

Keywords: chemoproteomics, proteomics, metabolomics, lipidomics

Who should attend: biochemists, cell biologists, chemical biologists, scientists interested in hearing proteomic methods based on chemical reactivity and their use in investigating cellular processes

Theme song: “Let’s go crazy” by Prince, because not too long ago the idea that you could react the entire content of a cell with a reactive probe or look at all lipids in a cell would have been crazy. But with current methods, this is possible and highly informative. Hence, we can go crazy.

Plants do it all

Sean Cutler,
University of California, Riverside

We will examine the molecular mechanisms underpinning plant responses to environment signals, the power of plants as factories for metabolic engineering and how genomes are being edited to deliver improved crops.

Keywords: signaling, metabolic engineering, genome editing

Who should attend: people with the modest goal of saving the world

Theme song: “Strawberry Fields forever” by the Beatles

Systems biology and proteomics

Ileana Cristea,
Princeton University

This session will discuss state-of-the-art systems biology and proteomic techniques applied in a number of different areas, including virus infection,

biomarker discovery and validation, and drug response.

Keywords: systems biology, virology, proteomics, bioinformatics, mass spectrometry, transcriptional networks, protein–protein interactions, signal transduction, pathogen–host interactions

Who should attend: systems biologists, therapeutic developers, virologists, cell biologists, scientists that want to apply systems biology and proteomic techniques to disease-related problems

Theme song: “Welcome to Paradise” by Green Day, because we are in a

time when complex questions can be investigated by a multipronged approach at a scale never before possible. We have genomic information, transcriptomic information and bio-analytical tools to look at biology from a systems perspective, which not long ago would be considered paradise.

Advice for new presenters

“Be concise and confident.”

– **Kun-Liang Guan, University of California, San Diego**

“Practice saying ‘I don’t know.’”

– **Jim Eberwine, University of Pennsylvania**

“Plan the talk carefully — what it’s about, what you did, what it means. Plan for approximately one slide per minute, but it’s important to have only one idea or point per slide. If you must put multiple points per slide, cut down the number of slides. Rehearse the talk in front of lab mates or other colleagues before the meeting.”

– **H. Jane Dyson, The Scripps Research Institute**

“Excellent slides make giving a clear and concise talk easier.”

– **Jeffery Kelly, The Scripps Research Institute**

“Practice your talk at home with colleagues so that you do not go over time. Keep slides simple, and only include things on the slides that you will talk about. Use simple animations so that the audience only sees what is being discussed. Listen to questions — repeat the question and then answer the question. Get a good night’s sleep, and enjoy sharing your science with others.”

– **Kim Orth, University of Texas Southwestern Medical Center at Dallas and Howard Hughes Medical Institute**

“Try not to present too many ideas in one talk, especially if it is a short talk. Tell the audience what you intend to convey at the beginning, then show some data (not too much), and then give a concise conclusion that restates what you said at the beginning.”

– **Lewis Cantley, Weill Cornell Medicine**

“Emphasize the significance of your work to a broad audience.”

– **Linda Hsieh-Wilson, California Institute of Technology**

“Focus on presenting a clear message that can be appreciated by the nonspecialist as well as those working in your field. Remember that while you are the world expert on your work, not everyone will have your degree of understanding.”

– **Michael Wakelam, Babraham Institute, Cambridge, England**

“KISS — Keep it simple and snappy.”

– **Lora Hooper, University of Texas Southwestern Medical Center at Dallas**

“Get the talk slides finished very early, and practice in front of anyone you can corner.”

– **Benjamin Garcia, University of Pennsylvania School of Medicine**

“Show your enthusiasm for your work.”

– **Amnon Kohen, University of Iowa**

“Be prepared, polished and personable, and enjoy the moment.”

– **Ronald T. Raines, Massachusetts Institute of Technology**

“Less is more. Try to convey one clear idea on each slide. Use simple declarative titles that summarize your message. If you can’t summarize the slide in one sentence, then it contains more than one idea.”

– **Amy Palmer, University of Colorado, Boulder**

“Make clear in the first few slides what you are trying to do and, more importantly, why.”

– **Daniel Nomura, University of California, Berkeley**

“Your talk should have a clear narrative structure — a story you want to tell. Figure out what that story is and, once you have done that, make sure that every slide serves that story. If a figure or slide does not move the narrative forward, then leave it out, no matter how attached you are to it. Less is more.”

– **Sean Cutler, University of California, Riverside**

“Relax. You really belong and everyone is glad you are here and to hear your story.”

– **Ileana Cristea, Princeton University**

Behind the scenes

1,001 tasks precede the ASBMB annual meeting

By Comfort Dorn

No matter how much planning you do, sometimes Wolverine crashes the party.

In her 14 years of organizing the society's annual meeting, American Society for Biochemistry and Molecular Biology meetings manager Joan Geiling has handled a lot of surprises, but even she was unprepared when the Marvel Comics character showed up screaming among more than 200 distinguished guests at the Journal of Biological Chemistry editorial board dinner in Chicago, complete with blood, claws and torn shirt.

The disruptive figure didn't come out of nowhere. It turned out that the Chicago Comic and Entertainment Expo, or C2E2, a pop culture event similar to Comic Con, was booked in McCormick Place on the same April weekend as the 2017 Experimental Biology annual meeting of six scientific societies, including the ASBMB.

The ASBMB staff faced the odd interruption with aplomb. Senior Director of Publications Nancy Rodnan escorted the noisy interloper from the room, and the serious business of science continued.

Even with months of meticulous planning, almost every meeting includes at least one surprise. "Every year, you think you've handled every possible curveball," Geiling said with a laugh.

Brainstorming

All that planning begins about 18 months before the event, she said, when "the little seed is formed — who will organize, what the topics will be."

The choice of each year's two co-chairs is crucial, according to both



PHOTO COURTESY OF CINDY WHALEN

Cindy Whalen (left), membership coordinator, and Joanna Mooney, marketing coordinator, were among the 20 ASBMB staffers who worked at the 2017 annual meeting in Chicago.

Geiling and Dan Raben, a biochemist at Johns Hopkins Medicine and chair of the ASBMB meetings committee, who acts as overseer to the process. The co-chairs are tasked with developing their dream team of presenters, Geiling said, and they need to take into account the meeting's scope.

"The major challenge for the co-chairs is to get scientific balance in the meeting," Raben said, "to get great scientific presentations at the meeting, highlight and discuss emerging scientific issues and try to think of something new we can do ... We try to give them as much freedom as possible." He stressed the importance of striking a balance in geography, gender and race, as well, adding, "The science has to rule it all, but you can meld it with everything else."

With the 2017 meeting, much was new. For more than a decade, the program had revolved around themes that corresponded to the ASBMB disciplines. But there was a downside

in trying to extend that to every day of the conference, Raben said, and sometimes sessions were not well-attended.

Organizers decided they wanted to go with what's hot, he said, embracing the latest scientific trends and casting a wide net to involve scientists in a variety of disciplines and with a range of experience.

Members of the meetings committee, including Raben, also pushed back against a motion to have only hotshots as speakers. They wanted to capture the enthusiasm of younger investigators, so the Spotlight Sessions — hundreds of 15-minute talks by scientists at all careers stages — were born.

"It was a compromise, a combined effort — to have the big shots in the morning and for the afternoon sessions, bring in younger people," Raben said. "This captures their enthusiasm for science and for joining ASBMB — but mostly for science." He stressed the value of having friends and peers hear young scientists present their work. "Nothing will inspire you more."

The co-chairs for 2018 hope to continue this trend. Jin Zhang, a professor of pharmacology at the University of California, San Diego, and Wilfred van der Donk, a professor of chemistry at the University of Illinois at Urbana-Champaign and investigator at the Howard Hughes Medical Institute, both said the move to give early-career scientists more opportunities really struck a chord, and both want the meeting to include diversity in every way, as well as providing as much career advice and preparation as possible.

The co-chairs have been working on

the program for months now. “Jin and I brainstormed many potential session topics in a few phone calls and then discussed our ideas as well as suggestions from the meetings committee,” van der Donk wrote in response to emailed questions. “We then invited scientists that would serve as session organizers. They suggested names of speakers, and these were again discussed with the meetings committee to ensure diversity of speakers across all sessions. We then generated a list of names of early-career scientists that could help us organize the abovementioned Spotlight Sessions that were introduced in 2017 in Chicago. And that is where we are right now!”

(For evidence of Zhang and van der Donk’s work, see the list of planned sessions on pages 30-33.)

Preparations

As the committee and co-chairs plan the meat of the program, Geiling and the staff of the ASBMB swing into action on the logistics. For the last three years, her team has included associate meetings manager Danielle King, who recently took a job elsewhere but was interviewed with Geiling for this story. Society employees from all over the office help with aspects of planning, including outreach, education, Student Chapters, marketing and social media.

The Federation of American Societies for Experimental Biology serves as the contractor for the convention hall, blocks of hotel rooms, registration and vendors, while Geiling and her team work to figure out who will be coming from the ASBMB and what everyone’s role will be. “Joan’s the one who makes the meeting happen,” Raben said.

A series of deadlines keeps the process moving, beginning with the website launch and open registration. This is followed by the abstract-submission deadline. “That gives us a heads-up as to interest and how many people to expect,” Geiling said.



PHOTO COURTESY OF ALLISON FRICK

Jenna Dean (left), director of marketing, poses with Jamie Atkins of Arata Expositions Inc. at the ASBMB booth. Atkins sets up the booth and helps the staff with myriad tasks at the annual meeting.

Attendance varies by city. This year’s choice of Chicago was popular, attracting about 3,600 ASBMB members, Geiling said. Experimental Biology organizers select sites years in advance, and the choice is largely a function of which cities have meeting facilities large enough to accommodate all the activities of the multiple societies. The total attendance for EB is usually 12,000 to 14,000, and some attractive options, such as San Antonio and Baltimore, just don’t have facilities that are big enough. Past meetings have been held in Boston, San Francisco and Washington, D.C. San Diego is the site every other year, and 2019’s meeting will be in Orlando.

Once all the abstracts are in, the next step is assigning posters and talks. Planning the meeting program is like reviewing grants, Raben said. “You learn about things you wouldn’t look at otherwise. You get exposed to new ideas and approaches. That’s the fun part.” He compared the process to the old days of finding interesting research while leafing through the contents of printed journals. “With online journals, you just search for a topic; you don’t happen on things.” As meetings chair, “you’re almost forced to see what’s being presented ... The annual meeting is an opportunity to

The ASBMB 2017 annual meeting by the numbers

\$275,000 awarded in travel funding to ASBMB attendees

7,232 cups of coffee, tea and lemonade served

3,495 session room chairs

1,800 bagels and muffins served

1,600 uses of ASBMB Snapchat geofilters

477 tweets about the meeting

264 pizza slices eaten at the undergraduate poster competition

197 boxes of material and supplies shipped to the site (sealed with 30 rolls of packing tape)

129 signs to help ASBMB attendees find biochemistry sessions and posters

79 countries represented by registrants at all of EB

look across disciplines and learn things you’ve never been aware of. It gives you new ideas to think about.”

Then comes the deadline for travel awards. With more than \$275,000 in travel grants, the ASBMB helps students and undergraduate faculty fund their trips to the meeting.

All the various applications and submissions are reviewed by committees. “We make sure the people responsible for program content have the information they need and that we keep them on task,” Geiling said.

Funneling all this information requires patience, organization and good tools. “Excel has been a really good friend of mine,” King said, adding that she uses the program to create grids, tables and spreadsheets to keep track of what’s happening where and when. “We need to make sure nothing is conflicting and we have the right

size room.” With four other societies sharing facilities in 2018, “we don’t really have a choice all the time.”

For example, committee organizers plan the content for Postdoctoral Development Day. They might need four rooms for presentations and a room for lunch as well as signs to direct participants. Geiling’s job is to have everything organized “so the people running the session can show up, pop in their thumb drive or plug in their laptop, and off they go.”

Flexibility is key, Geiling said, and so is organization. Much of their advance work is responding to emails about deadlines, details and notification: When will I hear about my abstract? When will I be reimbursed for travel? What size is the poster board? What size is the PowerPoint screen? How do I get to the convention center? Students who are going to their first meeting want help. Invited speakers sometimes need assistance with last-minute arrangements.

Showtime

When the meeting starts, the work and the energy ramp up. About half the ASBMB staff attends each year, and everyone is pressed into service. Staffers are at the meeting to interact and raise awareness of their department and committee’s programming, but that’s not all. “We have them multitask,” Geiling said. “They work at our booth or in the meeting office. We have them get lunch because we can’t go out.” Tasks include folding T-shirts, crowd control, registration, pinning up poster board numbers and handing out programs. “Everybody pitches in,” she said. “You just pitch in and make it happen.”

Geiling is on call 24/7 and doesn’t get much sleep, but it’s not all drudgery. “I love being onsite at the events,” she said. “There’s a supercharged energy. People are excited to be there.”

“I love working with people,” King said. “It’s rewarding when you get onsite. It’s not just a job. The members

are appreciative.”

The two said they get emails and hand-written cards thanking them for their work. Members seek them out at the meeting year after year. “That’s really nice,” Geiling said.

And the ASBMB has a secret weapon in the person of Jamie Atkins, an employee of Arata Expositions Inc. who has worked with the society since 2006. His official job is setting up the booth, but Atkins always goes above and beyond the call of duty.

“Jamie’s a lifesaver,” King said.

He shows up early and “always seems to arrive when you need help,” Geiling said. He makes sure signs are in the right place, finds misplaced boxes, fetches lunch, folds shirts. When the ASBMB booth offered temporary tattoos one year, the booth was swamped. Atkins jumped in and started applying the tattoos.

“We request him,” Geiling said. “This is his job. He knows the right people, the in-house operations in each city. He’s a make-it-happen kind of person. He gets along well with everyone and he makes friends everywhere ... We feed him cookies to keep him going.”

Even with more than a year of planning and all this people power, not all aspects of the meeting can be controlled. When a fire alarm went off at the San Diego convention center in 2012, the building security staff forced everyone to evacuate, King recalled. In 2010, when eruptions of Eyjafjallajökull in Iceland spewed a huge volcanic ash cloud that canceled thousands of airline flights across Europe, multiple speakers were delayed. Although the committee and staff encourage organizers to arrange for backup speakers so any absences can be filled seamlessly, in this case, they were left scrambling.

In the wake of the 2013 Boston Marathon bombing, ASBMB meeting organizers found themselves in a city on virtual lockdown as authorities hunted for the suspected terrorists

just days before the annual meeting was scheduled to start. Flights were held and warning signs flashed over highways. “We didn’t know if people could get in,” Geiling said. “It was an unprecedented situation. Representatives from the six EB societies met regularly with convention hall staff to evaluate information and options. The meeting opened on schedule Friday evening about the same time Dzhokhar Tsarnaev was found and arrested in nearby Watertown, Mass.

At the meeting, “people were emotionally impacted by the events,” Geiling said. Some wore Boston Strong hats and T-shirts. “They felt very connected with the city and the people.”

Two years later, again in Boston, meeting planners faced a completely different problem when a longshoremen’s strike in Long Beach, California, interrupted international shipping — including the delivery from China of some 12,000 EB meeting bags. Fortunately, the societies had advance notice. The ASBMB put in an emergency order with a local vendor for bags that were shipped directly to the convention center in time to be distributed at the society’s booth.

Perennial challenges include speakers who cancel at the last minute and complaints about balance in the program. “We always make some people happy and some people unhappy,” Raben said, and that’s where being part of a bigger meeting comes in handy. “We work with EB to make sure every (topic) is covered. I don’t have to worry about getting every discipline in the schedule every time.”

And sometimes a glitch is also a selling point. A number of members enjoyed sharing space with Wolverine and his ilk this year, Geiling said.

“Some people asked, ‘Can we always meet with Comic Con?’”



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



Introducing the ASBMB meme contest

Submit your #ASBMB2018 abstract early.

Automatically enter a drawing to win one of three \$250 VISA gift cards.

Create a meme.

Double your chances of winning a gift card!

Submit your abstract early, by Nov. 23, and you will be entered into a drawing to win one of three \$250 gift cards. Then, share a science-inspired meme with us via Twitter or Instagram by Nov. 30 and you'll be entered in a second contest. We'll open up the meme collection to voting on Dec. 1, and the top three vote-getters each will receive a \$250 VISA gift card. All lucky winners may claim their gift cards when they check in at the annual meeting in San Diego.

Here's how to increase your chances of winning a prize by sending us a meme:

1. Submit your abstract for the 2018 ASBMB Annual Meeting by Nov. 23. (You must submit an abstract to enter the meme contest.)
2. Use your experience in the lab and conducting your research to create a biochemistry and molecular biology-themed meme. (A quick Google search for "meme generator" will lead you to some handy tools.)
3. Tweet us your meme @ASBMB or tag us on Instagram @TheASBMB using #ASBMBMemes by Nov. 30 to submit your meme to the contest. (Set your profiles to public so we can view your work.)
4. Voting for favorite memes will begin Dec. 1 and close at midnight EST on Dec. 7. We will notify the winners via Twitter message or Instagram on or around Dec. 8. Voting will be hosted on ASBMB Today's website (www.asbmb.org/asbmbtoday/). Good luck! We can't wait to see your masterpieces, both abstract and meme!

Shattered dreams

By *Sonia C. Flores*

A year ago, I wrote “DREAM girl” about Lucero, a college student who is not an American citizen but who has spent much of her life in the U.S.

Lucero is one of the many young people who would have benefited from the bipartisan Development, Relief and Education of Alien Minors, or DREAM, Act that was introduced in 2001 but never passed by Congress. President Barack Obama established the Deferred Action for Childhood Arrivals, or DACA, immigration policy in June 2012 as a partial substitute for the DREAM Act and an effort to protect these young people in the face of Congress’ inaction.

Lucero is one of the 800,000 young adults approved for DACA. When the Trump administration announced its plans to rescind DACA, I immediately thought of my DREAM girl.

Lucero was brought into this country from Chihuahua, Mexico, when she was nine years old. She has a sister with a severe neurological condition; their mother, who is the caretaker, and their father, who suffered a work-related injury, contribute very little to the household finances. Lucero knows that her family’s future and well-being depend on her. This is a heavy burden to place on such young shoulders.

Lucero worked for a summer in my lab. She was a gifted undergraduate with a passion for science. She wanted



to go to graduate school and focus on a research career so she could spend her life asking those questions that her natural curiosity always had sparked in her. However, because she was not a citizen, I couldn’t pay Lucero from federally funded grants. The DREAM Act would have allowed her to apply for student loans and work-study and, once she gained permanent residency, federal funds.

Successful DACA applicants can get work authorization and Social Security numbers, but they don’t qualify for federal student loans, and they can’t be appointed to National Institutes of Health-funded training grants or pipeline programs, regardless of merit. This issue makes it hard for program directors like me to fund tal-

ented students like Lucero.

Attorney General Jefferson Beauregard Sessions announced the decision on DACA on Sept. 5, stating, “the program known as DACA that was effectuated under the Obama administration is being rescinded.” Sessions cited legal and constitutional issues with the benefits conferred on the “800,000 mostly-adult illegal aliens who would be impacted.”

Hearing this, I felt my stomach tie up in knots; I had hoped the better angels of our nature would prevail. I couldn’t help thinking that, through all this noise, the signal was getting lost. I had hoped that whoever would be in power would appreciate the contribution of the children of undocumented immigrants and care about their plight.

Sessions said of DACA, “The effect of this unilateral executive amnesty ... also denied jobs to hundreds of thousands of Americans by allowing those same jobs to go to illegal aliens.” Not only is this a factually inaccurate statement, I also feel a visceral negative reaction when immigrants to this country, especially the Dreamers, are referred to as “illegal aliens.” I reject this effort to dehumanize them.

During my childhood, my identity as both an American and a Puerto Rican was never a problem for me. In 1982, I moved from Puerto Rico to Alabama to pursue my graduate degree. The students in my graduate program attended medical school

classes with medical students. My classmates immediately categorized me as “the other” and not worthy of being in this land, with the expectation that I wasn’t smart enough and that I would fail. This was a wake-up call that opened my eyes to biases and prejudices. I don’t always relate to the typical narrative of first-generation Latina students, because in Puerto Rico I was not a minority; I had a positive and privileged academic upbringing where I was expected to excel. The ferocity and meanness of the comments when I moved to the mainland surprised me; for the first time, I felt I didn’t belong.

I am ashamed because I have been complacent. Although I have tried to be an agent for change, I feel I should be doing more. Our nation is a nation of immigrants: Mexican, Irish, Italian, Chinese, Japanese, German, Somali and, yes, Puerto Rican. How can we forget this history?

For my DREAM girl Lucero, who finally was seeing a light at the end of the tunnel, this is devastating news. “DACA allowed me to get a driver’s license, Social Security number and work authorization permit,” she said. “I was able to drive myself without fearing for my safety. I was able to receive in-state tuition, institutional aid and public/private scholarships. Most importantly, I was able to pursue the American dream that my parents brought me here to achieve. I am now afraid that the country I consider my home will not allow me to better myself and contribute to my community.”

Lucero, who switched from studying science to become a business major because of her uncertain future, has a job offer after her graduation in December, but she now has no assurance that she will be allowed to accept the job.

The statement that DACA recipients are taking jobs from “thousands of Americans” is a falsehood. According to Mark Zandi, chief economist

at Moody’s Analytics, there is no evidence that they are taking jobs away from American citizens. “Repealing DACA is particularly wrongheaded as economic policy,” Zandi said.

In a January report, the libertarian Cato Institute predicted that the DACA population eventually would look a lot like people who receive the H-1B visas issued to workers in specialty occupations. Most DACA recipients are still students, and 17 percent are pursuing an advanced degree, the report stated, while most H-1B recipients are between 25 and 34 and hold either a bachelor’s or a master’s degree. “In short, they appear to be a close reflection of what DACA recipients will look like a few years from now as they complete their educations.”

I am not going to belabor the statistics or the fact that the U.S. economy will take a hit if DACA recipients lose their rights. Even if they lose their status, do we have the resources to deport them? If this is the case, what will they do? Go into hiding? Go into the shadows to avoid deportation? After all the effort they have expended and the resources we have used, is this a logical endpoint?

For students in graduate programs or starting a postdoctoral search for faculty positions, the uncertainty is paralyzing. As scientists, we predict outcomes based on scientific premises. Before DACA’s elimination, shouldn’t we use the same metrics to determine whether this program has achieved its objectives?

My heart is broken again by policies that depict immigrants as “illegals” and rapists. How do we call ourselves Christians when we forget that, as the Jesuits of Mexico wrote in an open letter about the rescission of DACA, “our ancestors in faith were once strangers in a foreign land”? How can we tell these productive and beautiful immigrants who are in the process of becoming doctors, nurses, scientists, soldiers and first responders

that we don’t want them anymore? How do we look them in their faces and say, “Thank you for your service, but go away now”?

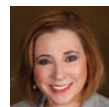
In Obama’s words: “What makes us American is not a question of what we look like, or where our names come from, or the way we pray. What makes us American is our fidelity to a set of ideals — that all of us are created equal; that all of us deserve the chance to make of our lives what we will; that all of us share an obligation to stand up, speak out, and secure our most cherished values for the next generation. That’s how America has traveled this far. That’s how, if we keep at it, we will ultimately reach that more perfect union.”

Although my follow-up column is not as uplifting as I thought it would be, I take solace in the fact that Lucero, in spite of all the uncertainty, still has faith in our country when she says, “What is next for our youth? We cannot give up, and we cannot let our community give up. We have to stay strong and continue doing the right thing.”

Editor’s note: As we prepare this issue of ASBMB Today for publication, President Donald Trump and congressional leaders continue to negotiate the future of DACA.

‘Ending DACA further contributes to a hostile atmosphere’

The ASBMB Public Affairs Advisory Committee released a statement in September condemning President Donald Trump’s decision to end the Deferred Action for Childhood Arrivals program. Read the statement at www.policy.asbmb.org.



Sonia C. Flores (sonia.flores@ucdenver.edu) is a professor of medicine at the University of Colorado School of Medicine.

Science worth a thousand words

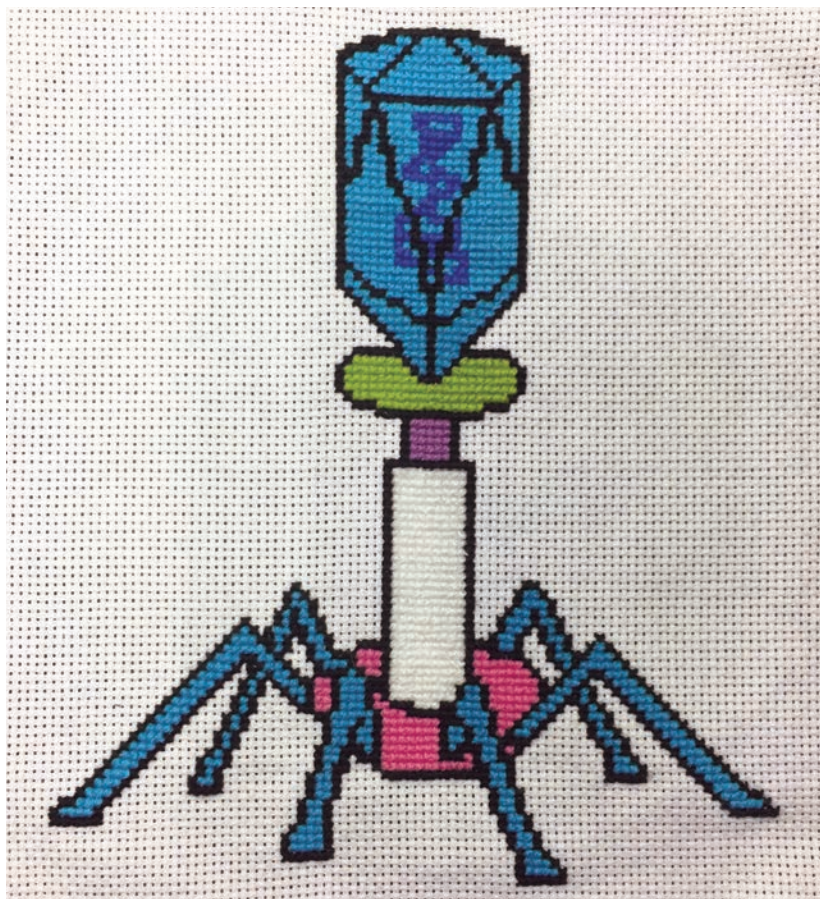
By Danielle Snowflack

In my experience, most communication training for scientists focuses on our words. As scientists, we need to read, write and evaluate scientific literature. We need to communicate our results to all audiences, from our grandparents to our peers to our collaborators. We must learn to stand in front of an audience and engage people with our spoken words. We always will focus on our research in the laboratory, but communication skills are crucial for success in science.

(And as the new manager of public outreach at the American Society for Biochemistry and Molecular Biology, I have to add that our course “The Art of Science Communication” is an amazing way to hone your verbal presentation skills.)

However, I’ve always been a picture person. As an undergraduate studying natural sciences at Muhlenberg College, my notebooks were full of annotated drawings of whatever I was learning in class. I was also an art major — some of my paintings were inspired by microscopic studies from my biology labs. I didn’t know there was a way to combine the two, nor was I pursuing it. Like many optimistic undergrads, I was going to be a biology professor at an institution like my alma mater. Art would continue to be my hobby.

I earned my Ph.D. from Princeton University, where I studied the mechanisms of translational control during development with Elizabeth Gavis. Throughout my graduate work, art served as a pressure valve when the stress of research got to be too much. Toward the end of my graduate



IMAGES COURTESY OF DANIELLE SNOWFLACK

Danielle Snowflack designed and stitched this bacteriophage in 2012 when she was a graduate student at Princeton University.

career, I realized that the professorate just wasn’t for me. But then what do you do after you defend? I knew science could be blended with art, and I even considered pursuing medical or scientific illustration after I finished my Ph.D. I couldn’t shake my desire to be an educator though, so I pursued an amazing opportunity as director of education at Edvotek Inc., a biotechnology company dedicated to creating

hands-on science experiences for educators. (For more on my experience in K–12 education, read about my career insights in the August 2015 issue of *ASBMB Today*.)

In my role at Edvotek, I explored STEAM education — a movement in K–12 education that integrates art into the traditional science, technology, engineering and math curriculum. When done well, STEAM



As an undergraduate at Muhlenberg College in 2001, Danielle Snowflack captured her observations of flower buds under a microscope using acrylic paint.

encourages learners to think creatively about challenges in STEM fields. I stumbled upon the “SciArt” community online while pursuing some experiment ideas, and the breadth of work blew my mind. The arts were being used in so many ways to communicate science, from data visualizations and microscopy pictures to fine art and cartoons and even the occasional science dance. These were visual ways to capture the public’s interest in science and, hopefully, to create discourse on the different STEM fields. I was hooked.

I’m thrilled now to be taking over for Geoff Hunt as the manager of public outreach at the ASBMB. It’s always scary to make a career change, but I couldn’t have landed in a better place. I’m excited to bring my experi-

ence as a scientist, an educator and a communicator to this organization. I hope to encourage scientists to seek all avenues possible to communicate their work, including the arts. While my interest is in the visual arts, literature, music and even dance can be inspired by science. Here are a few ways for us to engage our creative side.

Are you a Ph.D. candidate in a science-related field? Do you love to dance? Each year, the American Association for the Advancement of Science runs the “Dance your Ph.D.” contest. The 2016 winners can be found online at sciencemag.org.

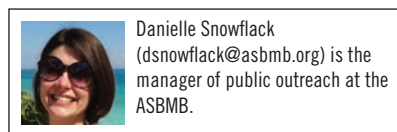
Do you ever sit at the microscope and admire the beauty of biology? Send your images to the FASEB BioArt contest at faseb.org.

Looking for inspiration through

social media? Check out the #SciArt tag on Twitter or Instagram and prepare to have your mind blown.

Not an artist? Hire one. Science illustrators can help scientists tell their story in a different way. Learn more at asbmb.org/asbmbtoday/201401/MedicalIllustrator.

Are you creating SciArt? Share it with us at outreach@asbmb.org or with me on Twitter @[@drsnowflack](https://twitter.com/drsnowflack). You might be featured on the outreach blog at cellularculture.asbmb.org or in the pages of ASBMB Today.



Danielle Snowflack (dsnowflack@asbmb.org) is the manager of public outreach at the ASBMB.

For members, by members

The public affairs committee engages with NIH and NSF

By Rick Page

Two messages came out of the American Society for Biochemistry and Molecular Biology Public Affairs Advisory Committee's 2017 meetings with leaders at the National Institutes of Health and the National Science Foundation. First, at the highest levels, the NIH and NSF value and support basic research. Second, NIH and NSF leaders have some advice for investigators who are crafting proposals.

Advocating for you

Each year, the ASBMB PAAC joins with trainees from around the country to take your message directly to Congress. This year, in 100 meetings across Capitol Hill, we advocated for robust, sustained and increased federal funding of biomedical research. But we didn't stop there; PAAC members engaged directly with the federal agencies that fund ASBMB members. In meetings at the NSF and at seven NIH institutes and centers, or ICs, PAAC members posed questions to NSF leadership and NIH IC directors and their staffs. These questions, of interest to the members of the ASBMB and developed by PAAC

members, examined the details of policies and initiatives the NIH and NSF are taking to ensure robust support for basic research. We also voiced our commitment to the principle that advocacy is a two-way street; thus, we paired our questions to the funding agencies with our broad and strong support for their missions and continued success.

Basic research — value and support

Heading to meet with the agencies, we were concerned that recent pushes to prioritize translational research, such as the Precision Medicine Initiative and the Cancer Moonshot, would come at the expense of basic research. Yet in talking with NIH and NSF leaders, we found that support for basic research is strong and pervasive. George Mensah, senior adviser at the National Heart, Lung and Blood Institute Center for Translation Research and Implementation Science, said, "Without fundamental discoveries, there would be nothing to translate."

The multifaceted support for discovery research is emphasized by a range of funding strategies. The

National Institute of General Medical Sciences recently announced technology development R01 and R21 proposals (PAR-17-045 and PAR-17-046) that are examples of this support. These awards provide protected space for development of new technologies for which a proof of principle exists yet significant technical hurdles remain. NIH leaders also emphasized that basic research and translational research move forward together, a prime example being the bench-to-bassinnet effort linking basic research into cardiovascular development and pediatric cardiovascular genomics to the Pediatric Heart Network. Results from basic cardiovascular research address questions pursued by the Pediatric Heart Network, which in turn provides results that guide basic biomedical researchers in further studies.

Grants: a view from the other side

What should investigators do in times of tough budgetary challenges filled with continuing resolutions and stagnant funding? We're all familiar with the first stage of the grant process, the endless hours of writing, shaping and honing the proposal. NIH and NSF leaders provided advice to investigators for what you can do prior to submission to set your grant on the best footing.

NIH leaders highlighted program announcements with funds set aside as a strategy for investigators to target in a tough funding environment. To find these opportunities, look for program announcements with a "PAS" prefix,

In talking with NIH and NSF leaders, we found that support for basic research was strong and pervasive across all our meetings. George Mensah, senior adviser at the National Heart, Lung and Blood Institute Center for Translation Research and Implementation Science, said, "Without fundamental discoveries, there would be nothing to translate."



NATIONAL INSTITUTES OF HEALTH PHOTO

Members of the Public Affairs Advisory Committee met with leaders at the federal agencies that fund ASBMB members, including the National Institutes of Health.

as these have money allocated to the program. One such example is PAS-15-029, a program with \$5 million set aside for basic research.

National Institute of Neurological Disorders and Stroke leaders encouraged investigators to write their grants for the research that the investigator wants to do, not the grant the investigator thinks that the NIH and NINDS want to see. If there is no direct disease link and the research is strictly basic neuroscience, so-called “basic/basic,” the NINDS suggests that investigators should not try to shoehorn in a disease link, as this results in lower success rates compared with basic/basic grants.

Similarly, NHLBI leaders urged investigators not to get too cutesy with naming of grant applications. Rather, applicants should remember that some award details, such as titles, are public and that legislators may not under-

stand or may misinterpret names that aim to be clever. Grant titles should be written to encompass the whole story at a low level of scientific literacy.

In response to a question regarding perceptions in the research community of low success rates for resubmissions at the NSF, program officers advised that principal investigators use a short section of the project description to address reviews of previous submissions in a direct yet positive manner. This approach, combined with discussions with your program director, can help you avoid the pingpong effect in which sequential reviews appear to direct principal investigators in different directions.

Marching onward

As ASBMB members keep pushing the limits of science, the PAAC will continue pushing to keeping science

funding in the conversation and to advocate on behalf of ASBMB members for increased and sustained basic research funding. As the PAAC fights for research funding policies that maximize opportunities for ASBMB members, you can stay tuned to the ASBMB Policy Blotter for advocacy news and resources. PAAC visits to the NIH and NSF are a key part of these advocacy efforts, and we encourage you to join us by participating in the ASBMB Grassroots Advocacy Network.

Get involved today, make your voice heard, and help shape the conversation.



Rick Page (pagerc@miamioh.edu) is the Robert H. and Nancy J. Blayney assistant professor in the chemistry and biochemistry department at Miami University.

Follow him on Twitter @ThePageLab.

M.D.–Ph.D. student seeks to uncover telomere-based cancer therapeutic strategies

Margaret (Maggie) Pruitt talks about the experiences that led her to pursue a career in medicine and research and about the resources and habits she uses to succeed in her M.D.–Ph.D. training. Her answers, originally published on the minority affairs page of asbmb.org, have been edited.

Tell us about your current career position.

I am an M.D.–Ph.D. student at the University of Kansas Medical Center in Kansas City, Kansas. As a seventh-year student in the program, I have completed the first two years of medical school and four years of graduate school. Recently, I defended my doctoral dissertation and returned to medical school for the last two years of training. My research is conducted under the mentorship of Peter Baumann at the Stowers Institute for Medical Research and uses fission yeast as a model to investigate the



PHOTO COURTESY OF MAGGIE PRUITT

Personal experiences in her family alerted Maggie Pruitt to the relationship between science and medicine.

role of telomere sequence in telomere function, telomerase activity and cell survival. My overarching goals are to identify mutant telomere sequences that can be used to destabilize telomeres in cancer as well as functional, non-wild-type telomere sequences that can inform our understanding of telomerase catalytic activity.

I'm inspired by how medicine can target molecular processes that ultimately determine whole-organ function or dysfunction. And I find that I am most motivated when I can contribute to and share these ideas with fellow researchers, worried patients and concerned family members.

What are the key experiences and decisions you made that have helped you reach your current position?

Personal experiences with illness and loss in my family alerted me to the relationship between science and medicine. I explored different types of research ranging across the basic to clinical continuum. I then took time to focus on cancer research in a translational environment and confirmed that I wanted to be involved in both patient care and scientific discovery. These experiences also gave me the chance to find fantastic mentors from different careers and career stages. Among so many other things, they have provided professional support, networking opportunities and advice.

What skills have you learned during your scientific training that prepared you for your current role?

For M.D.–Ph.D. training, important skills include critical thinking and communicating your science. Additionally, give yourself a good founda-

tion for academic success by honing your studying and test-taking abilities.

M.D.–Ph.D.s obtain two types of training. Medical school teaches you how to diagnose and treat clinical conditions and exposes you to an array of medical specialties. Graduate school provides you with skills to generate new information through the process of forming a hypothesis, experimentally testing that hypothesis and analyzing data to form conclusions about the hypothesis. Doing the two together gives you a unique perspective on relevant clinical problems and scientific approaches to address them.

What is the biggest challenge that you have faced in pursuing your career? What have you done to overcome it?

As a graduate student, I spent most of my time running experiments. Despite all of my preparation, one experiment proved to be particularly difficult. This was frustrating because I was dedicating too much time to troubleshooting. I realized that I was doing my research with tunnel vision and decided to expand my view by presenting my research in any forum available and broadening the scope of my literature review. I'm glad I did, because each interaction and article stimulated my thinking, and soon I found alternative approaches to achieve my experimental goal. Beyond that, it generated several other questions that were equally important and could be addressed with different experimental strategies.

What advice would you give to young persons from underrepresented backgrounds who want to

pursue a career in science similar to yours?

Explore. Discover research questions and clinical problems that are important to you. As you work with a research mentor or volunteer in a clinical setting, think about where there are gaps in knowledge and how addressing them might improve patient care.

Become a life-long learner. Stay hungry for information and feed your curiosity. As a physician-scientist, you will constantly gain new information and skills. Embrace the opportunity to find, learn and apply them.

Seek good colleagues. From college to medical and graduate school, the steps toward becoming an M.D.–Ph.D. can be long and rigorous. Therefore, it is essential to surround yourself with equally motivated and passionate individuals. Find friends who provide diverse perspectives and fresh ideas to help stimulate your thinking along the way.

What can young scientists do to learn more about careers in your field?

Seek out research and clinical mentors. Talk to current M.D.–PhD students. Look up their email from a program that you're interested in and contact them.

What are your hobbies?

I enjoy traveling, dancing and playing cards.

What was the last book you read?

My most recent read was “The Immortal Life of Henrietta Lacks” by Rebecca Skloot.

What is it that keeps you motivated?

I enjoy interacting with and caring for people. I'm inspired by how medicine can target molecular processes that ultimately determine whole-organ function or dysfunction. And I find that I am most motivated when I can contribute to and share these ideas with fellow researchers, worried patients and concerned family members.

Helpful websites

- **To learn more about cancer research:** American Association for Cancer Research, aacr.org
- **To learn more about M.D.–Ph.D. training:** Association for American Medical Colleges, aamc.org
- **To learn more about M.D.–Ph.D. training:** American Physician Scientists Association FAQs, physicianscientists.org
- **To find a research, physician and/or M.D.–Ph.D. mentor:** National Research Mentoring Network, nrmnet.net

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, post-doctoral fellows, and new or established faculty and researchers. To nominate a colleague for this feature, contact education@asbmb.org.



Re-searching for a lab

By Happy (at last) Lab Rat

I chose the wrong thesis lab. My fear had been realized — a fear that is common to nearly all first-year graduate students who are searching for their lab. They quiet this fear by telling themselves that they have spent a year testing out different labs during rotations and are (reasonably) confident they have found The One. But a small voice in the back of their heads keeps asking, “Is this the right mentor? Is this the right project? Is this the right place for me?”

At the end of my first year, I was convinced I had found those right things. My mentor was energetic, passionate and well-funded, and he saw something promising in me that I didn't see in myself. He was encouraging and supportive of my initial experiments and thoughts. The lab was small, with every person functioning as an essential member of the team. The older graduate students and postdocs were knowledgeable and helpful, and I was excited about my project.

Almost a year and a half later, however, I was unenthusiastic and lethargic about my work. My PI told me to prioritize a single aim of my research plan over the others. Although I was making slow and steady progress there, I hadn't begun the exciting experiments that initially had piqued my interest in the project. When I asked when I could start those experiments, my PI gave me several reasons why it wasn't the right time: We were waiting for the new year for funding to kick in, and he wanted me to focus on my first aim. These were reasonable arguments. I trusted that he had my best interests in mind, so I plugged away at my work.

Months passed and January came,



and he still did not allow me to begin the experiments. I asked him again, and this time, instead of pushing it off, my PI told me that another member of the lab would be performing the pilot experiments of my coveted aim. When he said this, I felt my stomach drop. I was hurt and disappointed by his decision, so I decided to make my case. As a Ph.D. student, I wanted to feel ownership of this project from start to finish. I explained how I felt, and as a compromise we agreed that I would be a part of the planning and execution of these pilot experiments.

It was a shock then, a few weeks later, when my lab mate began presenting the preliminary data for this project at a lab meeting. I had no idea she had started the work, and I felt completely blindsided. I sat silent throughout the entire meeting, trying to figure out if I could have seen this coming. I replayed my previous conversation with my boss over and over in my head. My only conclusion was that he had lied to me, or at the very least he had changed his mind without telling me.

After the meeting, I couldn't step foot back in lab. I was frozen in the

conference room, trying to control my anger and hold back tears. I didn't want my boss to see me so upset. Two of my other lab mates stayed in the room with me and helped me calm down and rationally think through my situation. They gave me the confidence to confront my boss that afternoon. I asked him why he had excluded me from the project, and he finally admitted that he was not confident enough in my ability to execute the experiments. I admit that I had not been as productive as I had hoped, so he may have had legitimate reasons to feel this way. But I was most heartbroken by the fact that he had not been honest with me about his reasoning and had kept me in the dark about my own project.

I no longer felt like a vital member of the team — instead, I felt like I was dispensable. I became even less motivated and productive, paralyzed by self-doubt. I had fewer and fewer meetings with my boss, and even when we did speak I didn't trust him to tell me the truth anymore. I finally realized that I would not be able to complete my Ph.D. in his lab. In fact, I was not sure if I would be able to complete my Ph.D. at all.

I worried what people would think if I left my lab. Would they think I was incapable of dealing with the challenges that come with research? Would they believe I was just not tough enough? During this time, I reached out to my friends, family and professors. To my surprise, many people praised my decision to switch labs as brave. I spoke with a former mentor of mine, who challenged me to tease apart two things — my passion for research and my passion for research in my current lab — to help me determine my future in my Ph.D. program. It was a daunting question. Untangling the two seemed impossible; I feared I had lost interest entirely.

I decided that I would put off the real decision by doing a new lab rotation. If I hated it, the worst that could happen was that I'd quit later. But I wanted to give research one last try. I explored new avenues of research around me, and I found my first spark of renewed excitement

when I considered working for a PI I had met during her time as a postdoc. She had just opened up her lab at my university, and I was excited by the idea of working with her. I knew the work would be fast-paced and that I would need to play an important role in helping the lab get off the ground. I joined that lab as a (very experienced) rotation student. During this time, I was able to have frank conversations with my potential mentor. I was happier and more productive in my new lab because we could have open and honest communication. She was aware of the difficulties I had in my previous lab, and she understood my weaknesses as a researcher. When the rotation reached its end, I joined without hesitation or fear. I had finally found my home.

Still today, she holds me accountable for my work but in a manner that leaves me less ashamed of my failures in the lab. I am more willing to be open with her than I ever was with

my former PI — especially when my work isn't going well. The trust built from our communication has given me confidence within the lab and as a member of the research community. Importantly, she fosters a community of collaboration rather than competition within the lab.

I have been asked many times if I regret joining my first lab. Although I would have preferred a smoother start to my graduate career, I do not regret the decision I made as a first-year student. During my time in my first lab, I learned how to be a rigorous scientist, and I matured as a student. I was able to overcome a situation where my relationship with my mentor had broken down and I did not believe in myself. I learned that it is OK to admit defeat, and more importantly, I learned how to pick myself up and try again. For all of that, I am thankful that I got a do-over.

The author is an anonymous graduate student at an East Coast research university.

CALL FOR ESSAYS

WHEN SCIENCE MEETS SICKNESS

For an upcoming essay series, ASBMB Today is asking readers to send in essays about their experiences as scientists who become patients.

Does your understanding of biology make the diagnosis and treatment easier or more difficult? Does it increase your fear? Are you more critical of your doctors' decisions?

If you want to share your story, be honest and true. Be open to editing and coaching. Your essay must be unpublished and between 500 and 1,000 words. Submissions should be sent to asbmbtoday.submittable.com. Submit under "Science meets sickness." Please include a title and complete contact information.

Questions?

Send them to Comfort Dorn, ASBMB Today managing editor, at cdorn@asbmb.org.



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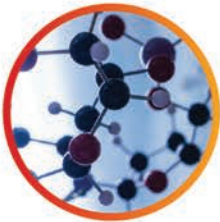
Proteomics – deciphering the protein symphonies that underlie homeostasis and system discord



This collection of recent minireviews has been selected to highlight the broad scientific impact of proteomics in virtually all aspects of protein biology.

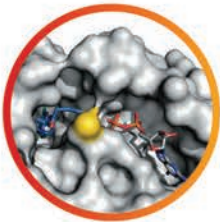
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