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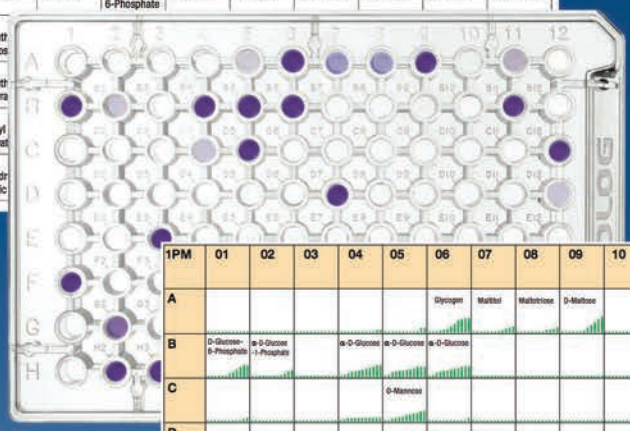

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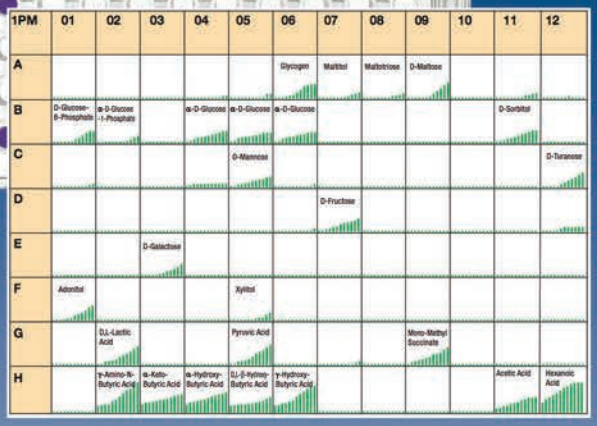

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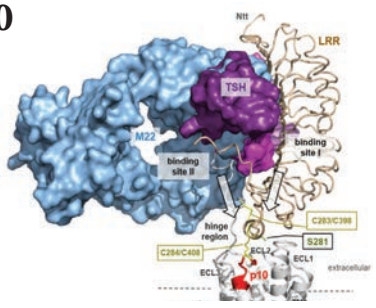

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Conscience of commitment

By Steven McKnight

Every four years, my institution requires that I take a course and exam regarding conflicts of interest. Past courses have focused primarily on financial conflicts of interest, but the course and test I took this past month had a new category on conflicts of commitment. The gist of things was simple and reasonable: If I agree to spend a percentage of my time on any endeavor or project, it is imperative that I do so.

My school, the University of Texas Southwestern Medical Center at Dallas, allows me to spend 20 percent of my time on outside activities. Using this time, I can engage in any of a number of activities relating to my role as a scientist. I can go to speak at high school science fairs, I can work with the American Society for Biochemistry and Molecular Biology, I can help organize and attend meetings, I can give lectures at other institutions, I can help found biotechnology companies, and on and on — so long as the activities have legitimate relationships to my job as a scientist.

On the home front, my job responsibilities as an employee of UTSWMC are varied. For the past two decades, I have been chairman of our biochemistry department, which takes 20 to 30 percent of my time. I also need to perform as a teacher and mentor to my trainees and the young faculty members within our department. Finally, I need to write grant applications to secure external funding for my research and manuscripts account-

Correction

In a feature story on the Human Placenta Project in ASBMB Today's February issue, a researcher photographed working with a placenta was incorrectly identified as David Weinberg.

Upcoming ASBMB events and deadlines

MAR.
Mar. 15: Accreditation deadline

APR.
Apr. 2 – 6: ASBMB annual meeting
Apr. 28: ASBMB Hill Day, Washington, D.C.

ing for the science that we perform in my lab.

Among these varied activities, I am able to spend about half of my time directly running my laboratory. If I count a 40-hour work week and devote eight hours (20 percent) to outside activities, this leaves me 16 hours to run my lab. It is these 16 hours where the rubber meets the road with respect to my duties as a mentor to the postdoctoral fellows and graduate students working under my direction.

On average, over the past two decades, I've directed a lab composed of around five or six trainees. The formula I've run with equates to being able to devote around two to three hours per week per trainee. Many people run successful laboratories with upwards of double or even quadruple this number of trainees. I've found my sweet spot; others can function effectively with larger laboratory groups.

If my three hours a week per trainee were cut to an hour, owing to a larger lab group, I believe I could handle this — but not optimally, at least for me. Other scientists are more skilled and efficient managers, so I can understand lab groups consisting of even 15 to 20 trainees. What would happen, however, were I to have 50 trainees instead of five? Instead of getting three hours of mentoring per week, each trainee would be getting only 20 minutes per week on average. I strongly doubt that I could function as an effective mentor if my time with trainees were cut so drastically.

What amount of time do I owe to my trainees? Does this weigh on my conscience? Does anyone even look at this? I can assure you that this issue is not addressed in the classes on conflict of interest that I am periodically asked to take at my home institution. When I apply for a National Institutes of Health grant, does anyone care how much time I spend mentoring my trainees? These are complicated and thorny questions. I have thought about them a lot but never in the context of a conflict-of-interest perspective.

As pointed out above, there is no question that different scientists are more or less efficient with respect to managerial talent. Large laboratories can operate effectively via a lieutenant system, wherein trainees are not directly mentored by the principal investigator of the lab but instead by intermediaries. Likewise, ineffective mentors may fail even if afforded unlimited time for trainee interactions. It is clear that strict formulas for mentor-to-trainee balance would be a terrible idea. On the other hand, is it proper that little or no attention is paid to the obligation of a scientist to spend an adequate amount of time mentoring his or her trainees?

To what can we attribute the success of the biomedical enterprise in the United States, starting around 50 years ago? Back then we were different from the then-dominant scientific structures of other countries. Instead of having large, hierarchical laboratories directed by distinguished professors, the United States sprinkled grant funding liberally to much younger scientists running small laboratories. Our style let young people drive the car from the very get-go of their independent careers. Young scientists did not have to pay decades of dues to run their own science, waiting as lieutenants until they might assume the top role of professor.

Though I have no data to bolster this thesis, I think funding a diverse distribution of young, independent scientists was incredibly healthy — and a big reason why American science has been so successful. I likewise do not know how things have evolved. I offer the caution, however, that — as we have enjoyed our own dominance of late — we may have reverted to the hierarchal, professorial system that we displaced decades ago. Might it be proper to begin to pay some level of attention to this question of conscience of commitment?

Steven McKnight (steven.mcknight@utsouthwestern.edu) is president of the American Society for Biochemistry and Molecular Biology and chairman of the biochemistry department at the University of Texas-Southwestern Medical Center at Dallas.

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Gene-editing summit

By Sarah K. Martin

Gene-editing technology vaulted into the public consciousness with Science magazine naming the CRISPR–Cas gene-editing tool its 2015 Breakthrough of the Year.

CRISPR–Cas is a programmable nuclease-enzyme system that allows scientists to edit specific sequences of DNA, potentially resulting in profound changes to an organism. Importantly, the CRISPR–Cas technology is specific, accurate and easily incorporated into laboratory methods.

But the potential uses of gene-editing technologies — from fixing genetic abnormalities to genetic customization of offspring — have raised scientific, ethical and societal questions. Now that we can edit the human genome, should we?

This question and others arose during the International Summit on Human Gene Editing in December in Washington, D.C. Hosted by the U.S. National Academy of Sciences to discuss the current state of gene-editing science and to consider scientific and ethical implications associated with human gene editing, the summit attracted, among others, scientists from the Chinese Academy of Sciences, the United Kingdom's Royal Society and the U.S. National Academy of Medicine.

In a public statement released after the three-day summit, the event's organizers addressed human gene editing in three separate categories: basic research, somatic clinical use and germline clinical use.

They called for exhaustive basic research on gene editing in human cells to determine potential benefits and risks of clinical use. They said that such research will enhance our fundamental scientific understanding of the biology of human embryos and germline cells.

Since somatic cell gene editing affects only the cells of the body and not reproductive germ cells, this type of gene editing could be used in patients without the risk of transmitting genetic modifications to future generations. The summit organizers said that somatic cell gene editing has the potential to be used safely and effectively in clinical applications when carefully governed by existing regulatory frameworks.

With regard to germ cell gene editing, the organizers called for caution, writing, "It would be irresponsible to proceed with any clinical use of germline editing unless and until (i) the relevant safety and efficacy issues have been resolved, based on appropriate understanding and balancing of risks, potential benefits and alternatives and (ii) there is broad societal consensus about the appropriateness of the proposed application." The committee stopped short of issuing a ban on germline gene editing but reiterated that human gene-edited cells should not be used to establish a pregnancy until extensive basic research is done.

The committee also called for an ongoing discussion of human gene editing so that more nations and diverse stakeholders can participate in the conversation.

The NAS has undertaken a comprehensive study of human gene editing led by R. Alta Charo of the University of Wisconsin–Madison and Richard Hynes of the Massachusetts Institute of Technology. The final report, due later this year, will cover the science behind gene-editing technology; potential biomedical uses in research and medicine; and associated ethical, legal and social considerations.

The American Society for Biochemistry and Molecular Biology supports the summit organizers' call for exhaustive basic research on the effects of gene-editing human cells to guide how this technique should be used for clinical applications.

Sarah K. Martin (smartin@asbmb.org) is the science policy fellow at the ASBMB.

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Charpentier's CRISPR work lands her the Leibniz Prize

CHARPENTIER

Emmanuelle Charpentier is one of 10 recipients of this year's Gottfried Wilhelm Leibniz Prize, a prestigious honor established in 1985 by the German Research Foundation. Charpentier was among the first to recognize the bacterial defense system CRISPR's potential for genome editing. Charpentier and Jennifer Doudna of the University of California, Berkeley, shared the 2015 Breakthrough Prize for their work on CRISPR. Charpentier serves as the director for the Max Planck Institute for Infection Biology in Berlin and as a visiting professor at Umeå University in Sweden. She is a co-founder of CRISPR Therapeutics, a biopharmaceutical startup that plans to harness CRISPR–CAS9 technology for translational applications. CRISPR Therapeutics recently formed a joint venture with Bayer to research and develop treatments for various diseases. The 2016 Leibniz Prizes awards ceremony took place March 1 in Berlin.

Written by Alexandra Taylor

NAS chemical sciences prize goes to Bertozzi

BERTOZZI

Carolyn Bertozzi of the Howard Hughes Medical Institute and Stanford University won the 2016 National Academy of Sciences Award in Chemical Sciences. Founded in 1978, the award is bestowed annually for pioneering research in the chemical sciences and carries a $15,000 cash prize. In a statement, the NAS said Bertozzi won "for her invention of a new class of chemical reactions, called bio-orthogonal chemistry, that lets scientists label biomolecules within living cells without disrupting any of the biochemical reactions that are naturally occurring there." Bertozzi's lab focuses on establishing novel technologies to aid in investigations at the interface of chemistry and biology. She first used bio-orthogonal chemistry to study glycans. Since then, researchers have used it in a variety of ways.

Leahy leaves Hopkins to lead UT–Austin department

LEAHY

Dan Leahy, formerly of the Johns Hopkins University School of Medicine, took the helm of the department of molecular biosciences at the University of Texas at Austin in January. Leahy is a structural biologist whose research interests include the molecular mechanisms of cell signaling and members of the epidermal growth factor receptor families. In a statement, Dean Appling, UT's associate dean for research and facilities, said: "Bringing a first-rate researcher of this caliber to our college is an accomplishment and further enhances UT Austin's profile in the growing field of structural biology." UT established the department in 2013 during a reorganization, and it is today home to 64 faculty members with a broad spectrum of research expertise. Leahy replaces Jon Huibregtse, also an ASBMB member, who had served as interim chair.

Pederson gets distinguished service award from ASCB

PEDERSON

The American Society for Cell Biology recognized Thoru Pederson of the University of Massachusetts Medical School with the society's Award for Distinguished Service. Pederson has been a member of the ASCB for 50 years. Since joining in 1966, Pederson has held numerous positions for the society, serving as program chair for the 1982 annual meeting, treasurer from 2008 to 2014, and today as chair for the search committee for the next ASCB executive director. During the ceremony, ASCB President Shirley Tilghman revealed that Pederson is "Labby," the pseudonymous author of a popular career advice column, "Dear Labby," published in the ASCB Newsletter. Pederson runs a lab that focuses on the functional significance of protein–RNA interactions in eukary-

CONTINUED ON PAGE 6

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otic gene expression. He previously served as president of the Worcester Foundation for Biomedical Research, and he was appointed editor-in-chief of the Federation of American Societies for Experimental Biology journal in January.

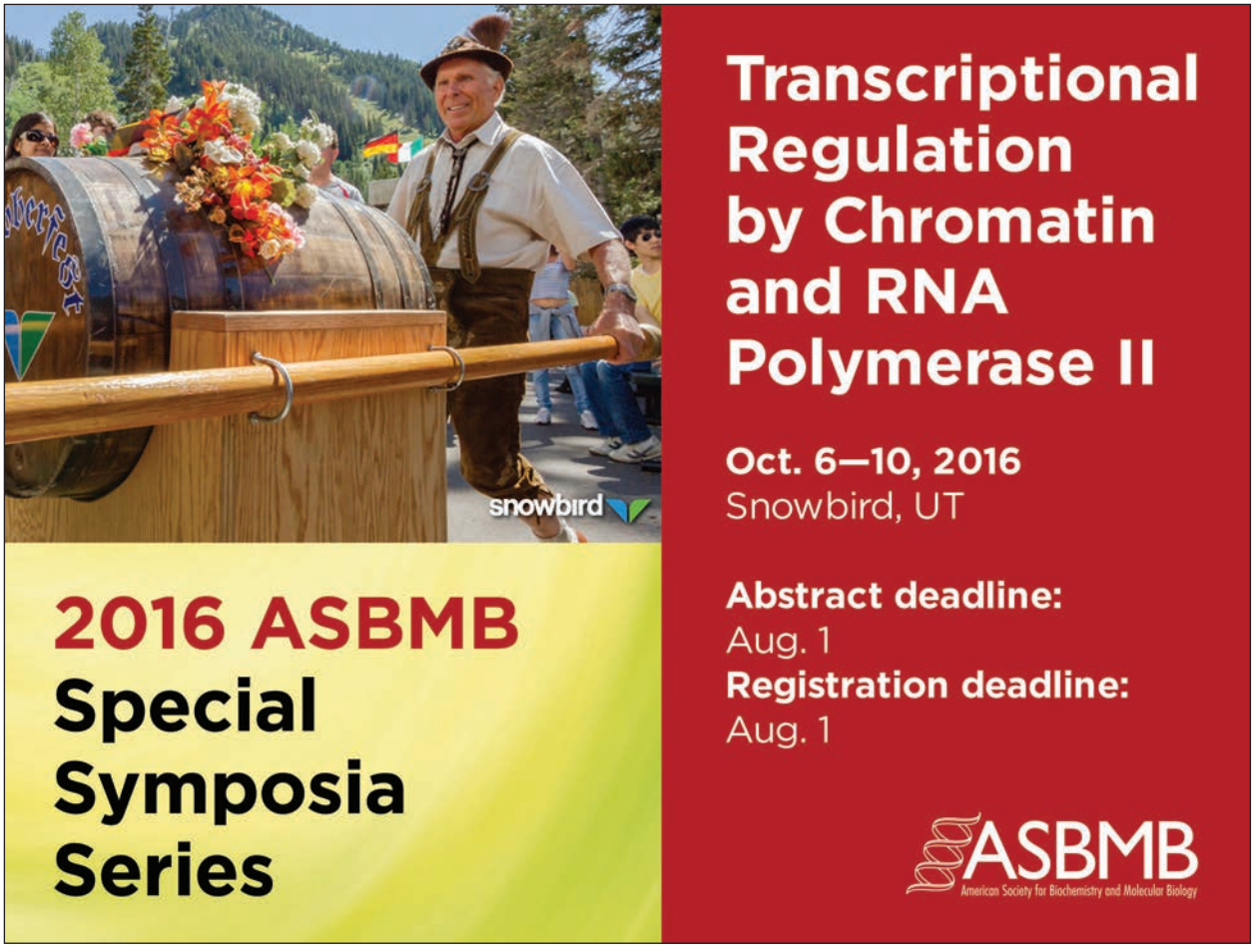
Written by Erik Chaulk

IN MEMORIAM: Alfred G. Gilman, (1941 – 2015)

Alfred G. Gilman, who shared the 1994 Nobel Prize in physiology or medicine for the discovery of G proteins, passed away in December at the age of 74. Gilman was born in New Haven, Conn., on July 1, 1941. His father was pharmacologist and chemotherapy pioneer Alfred Z. Gilman. The younger Gilman received his bachelor's degree from Yale University and a medical degree and doctorate of pharmacology from Case Western Reserve University. He completed postdoctoral training at the Laboratory of Biochemical Genetics at the National Institutes of Health before joining the faculty at the University of Virginia. It was there that in 1977 Gilman discovered G proteins, intermediaries that help relay messages from outside a cell's walls to actors within. (Gilman won the Nobel along with Martin Rodbell at the National Institute of Environmental Health Sciences.) In 1981, Gilman became chairman of the pharmacology department at the University of Texas Southwestern Medical School and later held positions as dean, provost and executive vice president for academic affairs. He won election to the National Academy of Sciences in 1985 and received the Albert Lasker Basic Medical Research Award in 1989. In 2009, Gilman joined the Cancer Prevention and Research Institute of Texas as its chief scientific officer but later resigned over what he perceived to be a focus on commercially marketable research over sound science. Gilman's colleagues remember him for his integrity and his dedication to scrupulous science. Gilman had been battling pancreatic cancer before his death. He is survived by his wife and three children.

GILMAN

Written by Alexandra Taylor



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Marion Sewer (1972 – 2016)

By Squire J. Booker

Young, gifted and black. In 1969, Nina Simone emphasized those three powerful words when penning a song in memory of her dear friend, the great American playwright and writer Lorraine Hansberry. They are also among the first few adjectives that come to mind when reflecting on the life and achievements of Marion B. Sewer. However, many more words are necessary to try to capture the true essence of Sewer's spirit. She was also funny, caring, giving, loving, passionate, energetic, efficient, analytical and prepared. She was a daughter, sister, aunt, colleague, teacher, mentor, leader and friend. She was special. She was a mover and a shaker and a champion of those young scientists who are in desperate need of role models to affirm that their dreams and aspirations are indeed achievable. She was a hero. It is therefore with a heavy heart that we remember our friend and colleague, who contributed so deeply and unselfishly to the American Society for Biochemistry and Molecular Biology and particularly to its Minority Affairs Committee as well as to the entire scientific community. She was inspirational. She was a star.

Marion B. Sewer

Marion B. Sewer's scientific achievements were exceptional. After a successful undergraduate career at Spelman College in Atlanta, where she participated in undergraduate research through the Minority Access to Research Careers program, she earned a Ph.D. in pharmacology from Emory University as a Howard Hughes Medical Institute predoctoral fellow. She then moved to pursue postdoctoral studies at Vanderbilt University School of Medicine where she received a prestigious United Negro College Fund/Merck Postdoctoral Fellowship. She initiated her independent career in the biology department at Georgia Tech in 2002 and received tenure in 2008. She then moved in 2009 to the Skaggs School of Pharmacy and Pharmaceutical Sciences at the University of California, San Diego, where she was promoted to the rank of full professor in 2015. During her career, she became an international authority on the regulation of cytochrome P450 enzymes as well as on the biosynthesis of steroid hormones and their effects on various biological pathways. In a career that spanned 22 years from matriculation into graduate school in 1993 to her untimely death in 2016, she published more than 44 scientific papers and reviews in the top journals in her field and almost 30 as an independent investigator. She always maintained a well-funded research program, securing multiple R01 and other research grants from the National Institute of General Medical Sciences and the National Institutes of Diabetes and Digestive and Kidney Diseases, and earned research awards from the National Science Foundation. She also served as principal investigator on several grants devoted to increasing participation among underrepresented minorities and furthering student training. Moreover, she served on the editorial boards of the journals Molecular Endocrinology and Steroids and was a standing member of several National Institutes of Health and NSF grant review panels. Her record of service to her home institution and the scientific community as a whole is long and distinguished. Despite all of her scientific achievements, Sewer confessed to suffering from impostor syndrome from time to time, a common condition among high achievers, and particularly underrepresented minorities, who often feel unworthy

of their status or the praise that they receive. She wrote very eloquently on the subject in the Dec. 2015 issue of ASBMB Today, explaining how to identify it, cope with it and finally overcome it (1).

Despite her impressive scientific achievements, Marion B. Sewer will be remembered mostly by members of the MAC for her warm smile and hearty laugh and her unwavering commitment to helping others identify and navigate the barriers that frequently impede them from achieving their goals. She reached out to young scientists, making herself readily accessible and available, and was among the first scientists featured on the ASBMB MAC's Research Spotlight collection. She joined the ASBMB MAC in 2010 and quickly became a leader, rising to deputy chair of the committee in 2013. She was active in a number of the MAC's endeavors but took an active leadership role in addressing the issue of disparity in securing federal research grants that plagues minority and early-career scientists. She played a major role in developing the original platform for the annual ASBMB Grant Writing Workshop and was a co-organizer of the workshop for each of its three years in existence. She spearheaded the writing of a funded proposal to the NSF to broaden the workshop into a comprehensive mentoring program for early-career scientists and postdoctoral fellows called IMAGE, for Interactive Mentoring Activities for Grantsmanship Enhancement. Among other initiatives, mentees at the workshop are paired with paid mentors who help them to craft and submit their first federal grant. Deeply devoted to this endeavor, she embraced its challenges with passion and optimism and beamed like a proud parent when any IMAGE participant received news of an award.

In recognition of Sewer's indefatigable commitment to underserved populations within the scientific community, the ASBMB has launched the Marion B. Sewer Scholarship for Distinguished Undergraduates. This scholarship will be awarded to undergraduate students who excel academically in fields related to biochemistry and molecular biology and who show a commitment to diversity in science.

Marion B. Sewer was on a steep upward trajectory with no limit in sight. So where do we go from here amid this tragic and potentially deflating loss? Just before her death, Sewer laid out a roadmap for diversity in her final article in the February 2016 issue of ASBMB Today, entitled "Where do we go from here?" (2) She would, of course, be devastated if the MAC did not capitalize on the momentum that she created and further her work in increasing access to scientific careers.

The MAC held its annual retreat just outside of Charleston, S.C., in October amid tremendous rainstorms that resulted in catastrophic flooding around the state. While the skies rained tears upon us throughout the day and the night, none of us foresaw that that meeting would be our last chance to celebrate the successes of the MAC with Marion. Had we known, we would have laughed a lot louder, smiled a lot wider, high-fived a lot higher, hugged a lot tighter and toasted a lot longer. We would have given her a proper goodbye.

To share your own memories of Marion B. Sewer, please email us at asbmbtoday@asbmb.org.

Squire J. Booker is professor of chemistry, professor of biochemistry and molecular biology, and a Howard Hughes Medical Institute investigator at the Pennsylvania State University.

REFERENCES

1. asbmb.org/asbmbtoday/201512/MinorityAffairs/
2. asbmb.org/asbmbtoday/20162/Diversity/Sewer/

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ASBMB American Society for Biochemistry and Molecular Biology

Turning on the thyroid

Researchers determine mechanism that triggers normal and abnormal hormone production

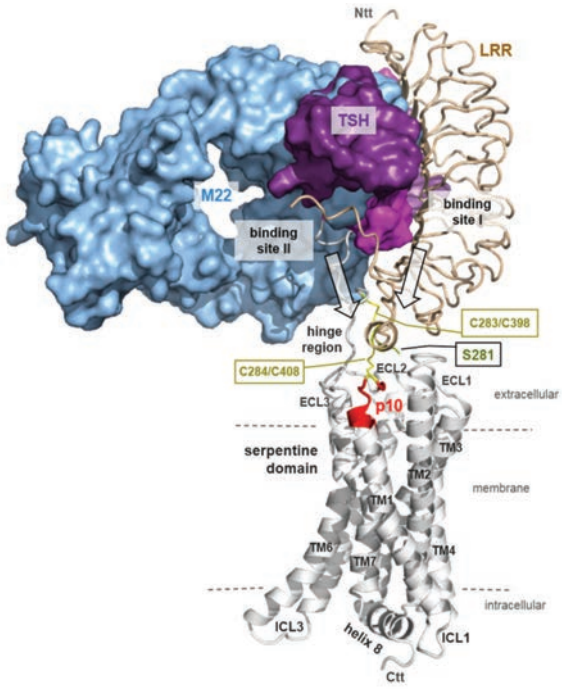
By Angela Hopp

Thyroid disease affects about 12 percent of the U.S. population. While many people with thyroid disease don't even know they have it, an overactive or underactive thyroid can cause a slew of problems, including weight gain or loss, mood changes and infertility. In children, an underactive thyroid can be fatal, which is why they are tested for a deficiency at birth.

Despite the prevalence of thyroid disease and its occasional serious effects, researchers have struggled to answer a pretty basic question about the hormone-producing gland: What turns it on? A study published in the **Journal of Biological Chemistry** provides an answer, and that answer was found within the gland itself. What's more, the researchers who made the discovery say their finding will aid in the design of therapies for thyroid problems, such as Graves' disease, and problems with other glands that operate in a similar fashion.

The thyroid is a hormone factory. Under normal conditions, the factory foreman — the molecule calling the shots — is the aptly named thyroid-stimulating hormone. Called TSH for short, this hormone attaches to a receptor on the thyroid cell surface, triggering a series of signals that provoke the gland to pump out thyroid hormones.

However, sometimes autoantibodies, essentially posing as TSH, attach to the receptor and trick the thyroid into flooding the body with more hormones than are needed. In addition, sometimes the receptor itself has an inherited or acquired mutation that triggers production of too many or too few hormones.



Model of a thyroid receptor (white backbone ribbon) with bound hormone and the activating antibody visualizes a potential arrangement and the principal mechanism of glycoprotein hormone receptor activation.

Torsten Schöneberg of the University of Leipzig in Germany, who led the study reported in the JBC, says it was curious that the legitimate activator hormone, autoantibodies and mutations all were able to provoke thyroid hormone production. So his team set out to identify a common thread among them.

Turns out the answer lay in the receptor itself.

"We discovered a small amino acid sequence — we call it p10 because it is 10 amino acids long — within the TSH receptor protein," Schöneberg explains. This sequence "functions as activator of the receptor upon binding of the hormone or autoantibodies."

In other words, the receptor itself flips the switch — when it should and when it shouldn't.

"In most other hormone-receptor systems, the hormone directly activates the receptor protein," says Antje Brüser, first author of the study and junior scientist of the group, offering the example of how adrenalin activates the beta-adrenergic receptor. "In the case of glycoprotein hormone receptors, the family of proteins that includes the thyroid receptor, upon binding of the extracellular hormone, the intramolecular activator (p10) induces structural changes of the receptor protein, triggering activation of the intracellular signaling cascade."

Now that researchers know from their cell studies that this family of receptors essentially can flip its own switch, they can use that information to design drugs to prevent that from happening when it shouldn't. "For example, in Graves' disease, autoantibodies directed against the TSH receptor stimulate the thyroid in an uncontrolled fashion, causing hyperthyroidism," Schöneberg says. "Our findings will promote the development of specific small-molecule drugs useful to treat Graves' disease and other dysfunctions of GPHRs."

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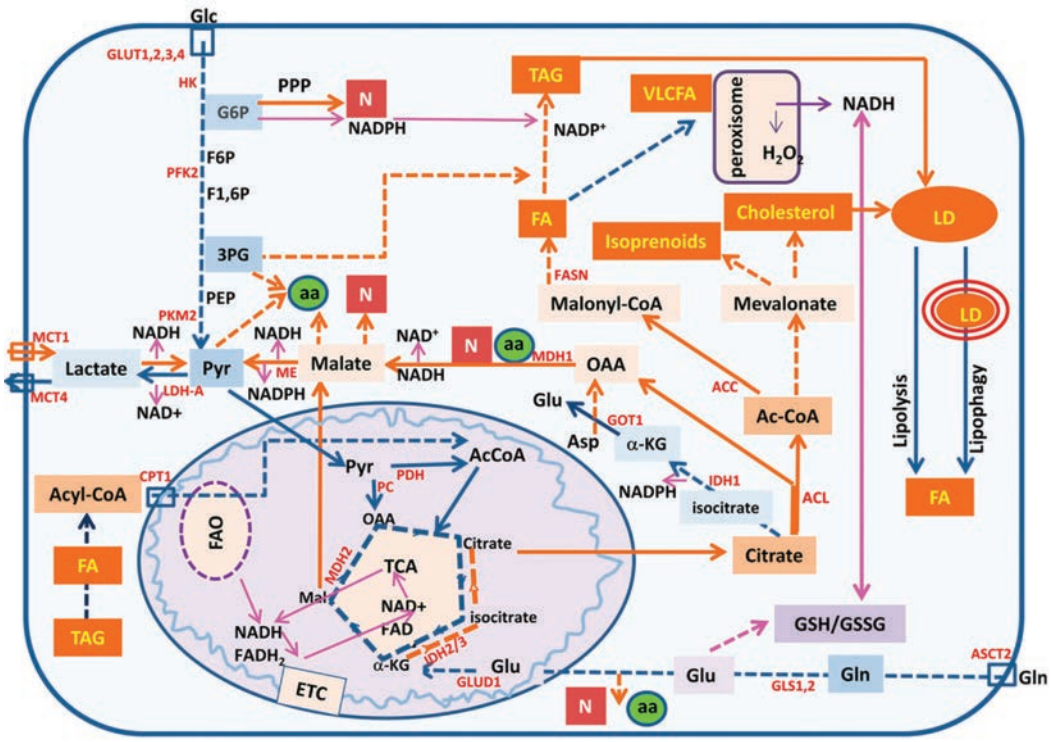
Using microRNAs to target cancer cells

By Dawn Hayward

Lipids form membranes of our cells and serve as rainy day fuel. However, cancer cells have a habit of dysregulating every possible pathway they can, including lipid metabolism, generating an overabundance of lipids. Fortunately, the body already produces molecules that have the potential to stop this dysregulation in its tracks: microRNAs.



Summary of the metabolic pathways altered in cancer that are described in this review

In a recent review in the **Journal of Lipid Research**, Marta Gómez de Cedrón and Ana Ramírez de Molina of the Madrid Institute of Advanced Studies delve into exactly which microRNAs can be used to target cancer cells.

Lipids, molecules known for their insolubility in water, are synthesized to provide membrane integrity and are signaling molecules used by downstream effectors in the cell. As an energy source, lipids are broken down via beta-oxidation, and the intermediates can be used in other metabolic pathways.

MicroRNAs, meanwhile, are small single-stranded RNA molecules that can stop the synthesis of proteins. They bind to mRNA transcripts in the cell and cause their degradation, preventing production of proteins that cancer cells so desperately need.

The authors of the JLR review discuss several lipid-metabolism enzymes that cancer cells rely on whose targeting could prevent the synthesis and dissemination of lipids altogether. For example, an enzyme called fatty acid synthase, which is involved in the making of lipids, is upregulated and overused in cancer cells. Activation of a microRNA targeting this gene may shut down production of this enzyme and turn off this essential pathway. Mono-acyl glycerol lipase, which is involved in storing these lipids, may also be targeted.

Why is all of this important? If researchers can use normal cells' machinery to target cancer cells specifically, the cancer may be slowed or completely halted. In fact, scientists have used antisense oligonucleotides that bind to microRNAs and repress their action as well as primary microRNAs, which mimic RNA of choice and activate their function. These methods have been used as cancer therapy in clinical trials.

MicroRNAs stand out from conventional gene-therapy-based approaches and have a niche in lipid metabolism. They can be designed specifically to target a gene and serve as modulators rather than on/off switches. Increased lipid formation and breakdown in cancer cells creates vulnerability that might be taken advantage of by microRNAs. In addition, cancer as a whole involves a combination of many factors, and microRNAs could lead the attack as professional pathway regulators to reset the normal metabolic landscape.

Dawn Hayward (dhaywar5@jhmi.edu) is a graduate student in the Johns Hopkins University School of Medicine's pharmacology and molecular sciences department.

A mouse model for Hajdu–Cheney syndrome

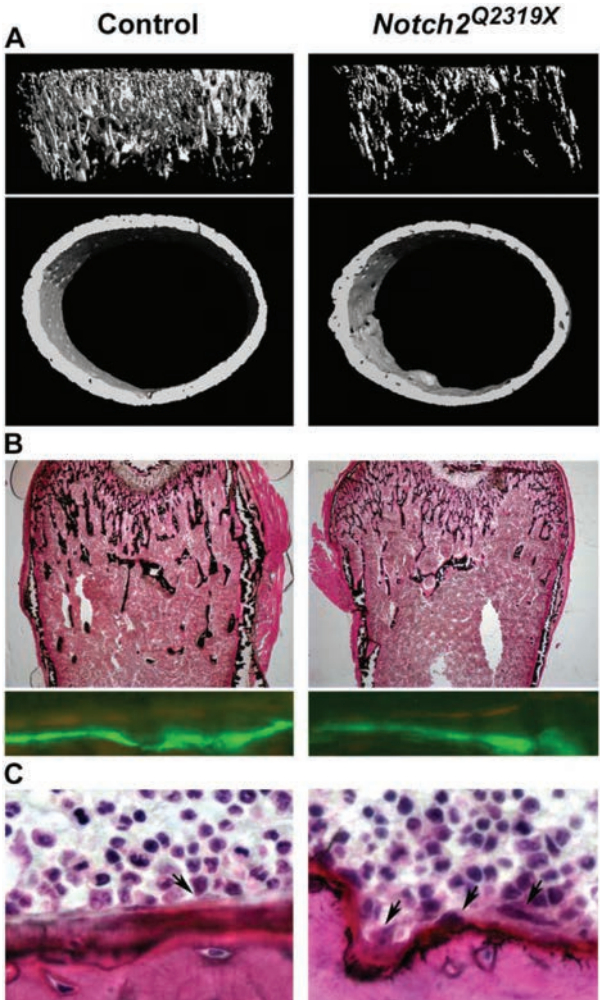
By Kim Krieger

Fragile bones are usually an old person's affliction, but sometimes children are born with them. Now, a team of researchers led by University of Connecticut professor Ernesto Canalis has shown in mice that a specific mutation can cause the disease called Hajdu–Cheney syndrome. Overabundant bone-absorbing cells may be causing the disorder's characteristic bone loss, and the researchers hope to find a potential treatment.

People born with Hajdu–Cheney syndrome develop misshapen skeletons and bones that quickly start to soften and fracture. Researchers knew Hajdu–Cheney was an inherited disease, but they weren't sure which genetic mutation caused it. They suspected it was in a gene called NOTCH2, which has a specific mutation that appears in people with the syndrome. But Hajdu–Cheney is very rare, and it might just have been a coincidence that families with Hajdu–Cheney also happen to carry an unusual variant of NOTCH2.

To figure out whether the NOTCH2 variant really was responsible, Canalis and his colleagues replicated it in mice. The result, which was published in a recent issue of the **Journal of Biological Chemistry**, was essentially a mouse version of Hajdu–Cheney syndrome.

"Until now, nobody understood why people afflicted with the disease had osteoporosis and fractures," says Canalis, a professor of orthopedic surgery at UConn Health. His mice seem to provide the answers. They generate a larger pool of cells that break down and resorb old bone. These cells also mature faster than they do in normal mice. So the bodies of Hajdu–Cheney mice resorb far too much bone, and new bone doesn't grow fast enough to replace it. This leads to mice with fragile bones, very similar to people with the disease.



In A, representative microcomputed tomography images of proximal trabecular bone and midshaft of femurs, showing cancellous bone osteopenia and decreased trabecular number and thinner and porous cortical bone in male Notch2^{Q2319X} mutant mice. In B, representative static cancellous bone histological sections stained with toluidine blue showing decreased number of trabeculae in Hajdu-Cheney Notch2^{Q2319X} mice and calcein and demeclocycline labels showing no differences in mineral apposition rate between control and Notch2^{Q2319X} mice. In C, cross-sectional cortical bone stained with hematoxylin and eosin. Arrows point to osteoclasts on the endocortical surface. All representative images are from femurs from 1-month-old male Hajdu–Cheney Notch2^{Q2319X} mutant and littermate wild-type controls.

There are a few symptoms of the disease in humans — such as shortened fingers and oddly shaped skull bones — that the mice don't display. But overall, the mouse model is a very good model of the human disease, Canalis says.

Knowing how the disease works also suggests how it must be treated. If people with Hajdu–Cheney have too many bone-resorbing cells, then it may help to suppress the formation or activity of those cells. And Canalis says scientists know how to do that. His group currently is working on treatments in mice.

Hajdu–Cheney is an incredibly rare disease, with fewer than 100 cases ever described. But there are good scientific reasons to study it. It can illuminate the workings of bone formation and destruction and give insight into a gene important to both the skeleton and the immune system. It also possibly could tell us about Alagille syndrome, a much more common genetic disease associated with NOTCH2. But for Canalis, even if Hajdu–Cheney only affects a few people from a few families, what causes such suffering and how to abate it is worth searching for.

Kim Krieger (kim.krieger@uconn.edu) writes about research for the University of Connecticut. Follow her on Twitter @Epitopic.

One gene, two proteins, one complex

By Rosemary Wilson

"To see two proteins produced from the same gene that then bind together to form a complex — that is truly unique!" says European Molecular Biology Laboratory Hamburg group leader Rob Meijers excitedly.

In a study recently published in the **Journal of Biological Chemistry**, Meijers and collaborators from the Institute of Food Research in Norwich, U.K., show that the genes of viral enzymes that degrade the cell walls of Clostridia bacteria produce not the usual one but two proteins. The results give insights into how these enzymes degrade the bacterial cell wall and could be used to combat a range of Clostridium infections.

Dotted along the seemingly infinite string of A, T, G and C that make up an organism's DNA, specific triplets of these letters — known as codons — indicate where the cell's machinery should start and stop when it translates the language of genes into proteins. Some genes have not one but several start codons, resulting in proteins of different lengths being produced from one gene. "This study shows how two such proteins from the same gene form a complex and how the shorter protein regulates the full-length protein," says Meijers. "To our knowledge, that has never been seen before."

Coming of phage

The double-packed gene studied by Meijers belongs to a virus that preys on species of Clostridia bacteria. After infecting their target, these viruses — or bacteriophages — break open the bacterial cell wall using enzymes known as endolysins, thereby destroying the bacterial cells. "It's a perfectly timed process," says Meijers, who is interested in understanding how these enzymes work. "At a fixed time point after infection, when all resources in the bacteria cell have been exhausted and the viral progeny are ready to be released, the endolysins start to break open the cell wall." But just what triggers the endolysin to start its work is not yet understood.

With their precise choice of target, bacteriophages have long been considered potential allies in the fight against persistent bacterial infections. "In an era when many bacteria have evolved mechanisms to make them resistant to treatments such as antibiotics, we urgently need alternative ways of combatting bacterial infections," explains Meijers. "Since they naturally destroy specific bacteria, bacteriophages, and particularly their cell-wall degrading enzymes, are very interesting research objects. How do they do it, and what can we learn from them?"

A cheesy problem

Of the about 100 species of Clostridium, a handful play a disruptive role in human society. Meijers and collaborators focused on C. tyrobutyricum, the byproducts of which in raw milk can lead to cheese defects that represent a significant economic drain for the cheese-making industry. This study presents the 3-D atomic structure of the complete C. tyrobutyricum endolysin bound to a smaller protein called cell-wall bound domain, or CBD — the structure of which was solved by the group in 2014. "These two proteins are both coded for by the same gene," says Meijers. Reading and translating the full-length gene produces the endolysin; reading from the second start codon produces the small CBD molecule.

"It seems the bacteriophage uses both proteins to regulate the activity of the endolysin," says Meijers. Removing the second start codon from the gene, the group shows, greatly reduces the activity of the endolysin. Too much CBD, however, and activity is also slowed. These findings build on earlier work: "We originally thought that it was the endolysin complex that initiated and activated the bacteria cell wall breakup," Meijers adds. "But actually it seems the activation of the endolysin begins in the gene itself."

The long and short of it

After inserting the endolysin gene into milk bacteria used in cheese making, the researchers could show that the new host produced both the full endolysin enzyme and the smaller CBD. "We tricked the milk bacteria into producing the endolysin and the CBD for us, but these proteins remain trapped inside the bacterial cell," explains Meijers. "We have made the full-length endolysin pass across the cell wall, but so far not the shorter CBD — without both parts, no complex forms, and activity is reduced."

This highlights again how important both parts are and presents a potential path for future molecule design for treating Clostridia infections.

Meijers concludes: "Cheese makers currently add large amounts of enzymes to the cheese to combat the effects of the Clostridia — maybe in future we can just use small amounts of modified milk bacteria that will effectively destroy any Clostridia present."

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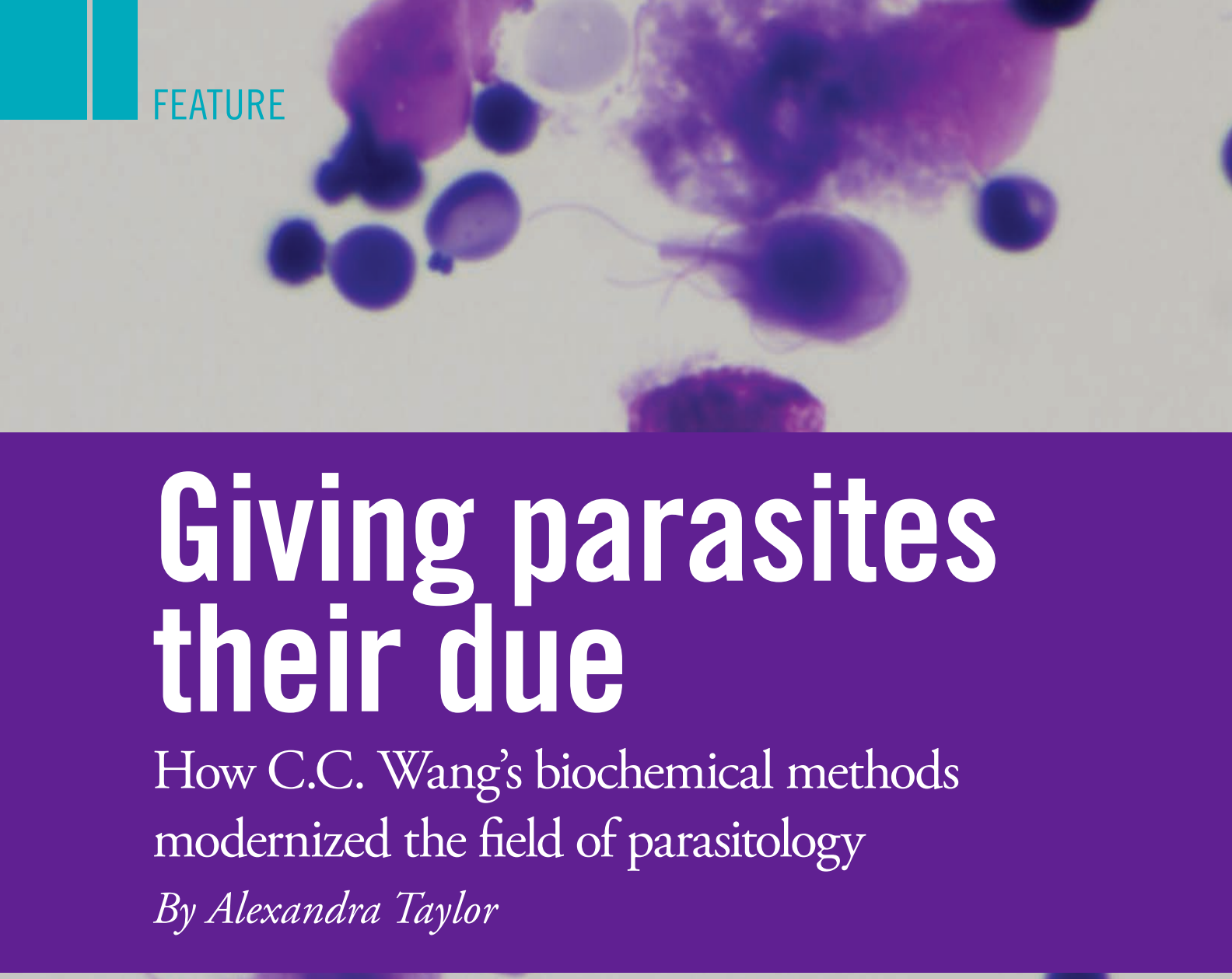

Giving parasites their due

How C.C. Wang's biochemical methods modernized the field of parasitology

By Alexandra Taylor

IMAGE COURTESY OF WIKIMEDIA COMMONS USER JMGARDNER

C. C. Wang might be in his 70s, but he still recalls the fever dream that plagued him during childhood illnesses. "I always had the same nightmare," he says. "I was watching people slaughtering a hog and was badly shaken by its ear-piercing shrieking. The hog, covered with blood, suddenly struggled free and started to chase after me."

Wang, an emeritus professor at the University of California, San Francisco, says his childhood bouts of malaria, typhoid and other infectious diseases shaped his future. "I was lucky to have survived them all," he says. "The memories of these sufferings drove me into parasite research."

These days, Wang is most recognized for applying biochemical analyses to parasitology. His approaches not only advanced our understanding of biology but helped bring about antiparasitic drugs, including ivermectin, a treatment for river blindness and elephantitis that was noted in the 2015 Nobel Prize for medicine.

Margaret Phillips was a doctoral student in Wang's lab at UCSF, and now runs a parasitology research laboratory at the University of Texas Southwestern Medical Center at Dallas. She says that Wang always believed that working on parasites gave scientists important insights into biology and that his lab was always at the forefront of bringing molecular biology and biochemistry to parasitology.

In 2012, Wang and his wife, Alice, established an award for recognizing scientists in the field of molecular parasitology that they hope will give research in parasitology wider exposure among biochemists and molecular biologists. The Alice and C. C. Wang Award is given out every year by the American Society for Biochemistry and Molecular Biology.

Wanting to help

Wang, who was born in Beijing, was a year old when the Japanese invaded China in 1937. Wang and his family escaped the invasion by roaming the countryside of southern China for nearly a decade. During this time, he contracted several infectious diseases, including malaria, which brought him to the brink of death.

"I would suddenly develop a chill, which could not be relieved no matter how many blankets were placed on me," he recalls. "That was then followed by extremely high fever. My legs would twitch, and I would fall into hallucinations followed by nightmares."

Quinine, the preferred antimalarial treatment of the time, was difficult to obtain, and Wang was treated with the drug quinacrine, which turned his eyes yellow and partially deprived him of his hearing. After two years, the malaria disappeared on its own. Wang also suffered from typhoid, dysentery, pneumonia and various skin infections during this period.

In 1949, his family settled in Taiwan, where his father taught Chinese linguistics. Wang eventually completed his bachelor's degree in chemistry at National Taiwan University. Biochemistry had caught his attention after he attended a course on the subject taught by a visiting Chinese-American lecturer, and, in 1960, Wang was inspired to move to the U.S., to earn his Ph.D. in the subject from the University of California, Berkeley. It was during this time at Berkeley that he met his wife, Alice, who was a graduate student in molecular biology. The two were mar-

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ALL PHOTOS COURTESY OF C.C. WANG

C.C. Wang as a toddler with his mother.

At about age 3, Wang lived in a village in southern China.

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ried in 1963.

After completing postdoctoral fellowships at Columbia University and Princeton University, Wang attempted to move back to China to study parasitology. He knew very little about parasitic infections but was aware of their immense human toll, especially in impoverished and rural areas.

"(Parasitic diseases) are neglected to this day. The reason is quite simple: Poor people get them, not wealthy people," he says. This disparity has been a source of motivation throughout his career.

But Wang wasn't able to return home. "My qualifications weren't that great, and the councilor at the embassy said, 'We advise you to stay in the United States, to learn more science and technology from the American imperialist. Then maybe you can consider coming back.'" Wang says, "In 1969, it was the height of the Cultural Revolution. If I had gone back then, I don't think I would have survived."

Working on animal parasites

Wang searched for a job in the American pharmaceutical industry that would allow him to focus on human parasitic diseases. Hired by the pharmaceutical company Merck to use biochemical techniques to develop new antiparasitic drugs, Wang was in for a newcomer's shock.

"After a few days, I realized that Merck was not interested in human parasitic diseases at all," he recalls. "What they were interested in were animal parasites — domestic animals, such as cattle, sheep, dogs — because that's where the money is. Treating poor people, you don't get money."

Wang began to organize seminars and conferences about the ways in which Merck could contribute more to human health, especially parasitic infection. The events were successful, and eventually Wang was called to a meeting with the president of Merck, Lewis Saret. Saret told him that the company developing a cure that could benefit people around the world might be a good thing but Merck had an obligation to its stockholders and Wang had to remember that they were not in the business of losing money.

"After this conversation with the president, I started to quiet down and obediently work on animal parasites," he says.

Wang was a biochemist at a time when most parasitologists still practiced 19th-century science. Research at the time was mostly descriptive and focused on where the parasites were found and in what quantity.

"He was a tireless and creative researcher who introduced me to the world of modern biochemistry and molecular biology," remembers Ronald Stotish, who was Wang's technician at Merck for many years. Stotish is now president and CEO of AquaBounty. "He kept the academic perspective of the value of basic research, even though he was in the employ of a major drug company at that time."

Wang eventually was involved in working on nematode infections in cattle and sheep. He was part of an effort to identify natural compounds produced by soil bacteria that worked as antiparasitic therapies. But the method was crude.

Merck had set up an animal model assay in which microbiologists cultured bacteria from soil samples. They infected rats with parasitic worms and fed the bacterial cultures to the rats.

Wang, at approximately age 4, with his parents and younger brother near the Yangzi River in southern China. Wang contracted malaria soon after the photo was taken.

Wang first arrived in the U.S. as a graduate student at the University of California, Berkeley. Alcatraz island is in the background.

They then killed and examined the rats to determine whether the parasites had been affected by the bacterial cultures. If the bacteria produced a compound that was toxic to animals, the rat died. If the rat appeared unscathed but the parasites died, the compounds might have potential as antiparasitics.

"It was a pretty stupid assay," says Wang, adding that Merck used it for a decade. "We went through something like 150,000 soil samples. Everybody got very frustrated."

That all changed with the discovery of ivermectin.

Ivermectin

In 1974, Merck received a shipment of 50 soil samples from the lab of Satoshi Ōmura at the Kitasato Institute in Japan. Bacteria cultured from one of these samples contained a substance called avermectin, which in its modified state is known as ivermectin. The drug would come to be known as one of the most potent antiparasitic treatments ever.

The Merck scientists screened it in the usual way by feeding it to rats. "In the first round of testing, we found activity. The second round was highly toxic. Just when we were about to abandon this thing, somebody said, 'Well, maybe we should give it another try.' We tried it a third time, and it turned out to be active," says Wang. "Overnight, there were 50 chemists assigned to this project."

At that time, Merck had a new president, P. Roy Vagelos. Vagelos wanted to understand ivermectin's mechanism of action, hoping the details of the biochemistry and molecular biology of the molecule might assist future drug development efforts. He assigned the task of unraveling ivermectin's mechanism of action to Wang, who described it as "a total nightmare." He couldn't derive a single clue about how it worked from the molecular structure.

Wang tested the compound on bacteria and worms for several years to no avail. Eventually he noticed that the middle portions of worms taken from the intestines of pigs seemed to wiggle less after being exposed to ivermectin. He eventually determined that the drug inhibits signal transmission at the neuromuscular junction in insects and at the junction between the interneuron and motor neuron in nematodes. The parasites became paralyzed and were no longer able to move.

After confirming the mechanism of action and other findings, Merck began to sell ivermectin in the U.S. as a veterinary antiparasitic drug. It quickly became a market leader, generating more than $1 billion per year in sales. Ivermectin is probably most recognizable in the U.S. as the active ingredient in the heartworm treatment Heartgard.

But it turned out ivermectin wasn't just good for animals; it could do something extraordinary for people. William Campbell, now at Drew University, proposed to Merck that ivermectin be tested against river blindness in humans. River blindness is a debilitating condition caused by microscopic worms that affects hundreds of millions of people in some of the world's poorest areas. In 1981, clinical trials began in Senegal. The trials were a success, and in 1987 Vagelos announced that his company would give the drug away for free for as long as it took to eradicate river blindness.

"After a couple of decades now, I think the disease is basically under control in West Africa," says Wang. "There has never been a case where a

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Wang with fiancee Alice at UCB.

Wang working on the mechanism of action of ivermectin at Merck.

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pharmaceutical company has donated a drug to cure a disease where the end result is so wonderful."

In 2015, Ōmura and Campbell shared half of the Nobel Prize in physiology or medicine for their work discovering and developing ivermectin. Ōmura was recognized for his discovery of the avermectin-containing soil sample, while Campbell was instrumental in demonstrating avermectin's potential against parasitic worms. Wang says he would have liked to have seen Vagelos recognized as well for his decision to make the drug available free of charge.

"The world is still a very sad place," says Wang. "But I am very happy the Nobel Prize recognized the problem and gave out the prize to ivermectin and artemisinin. At least people are starting to realize the importance of these diseases."

Freedom to pursue any project

In the late 1970s, Wang organized a monthly seminar program with other parasitologists from New York University and The Rockefeller University, two schools that were close to Merck's New Jersey site. The seminars were followed by cocktails. In the spring of 1981, at a party that Wang described as "wild," he was approached by two professors from UCSF. They asked if he was interested in joining the university. At that time, it was uncommon for a person to transition from industry to academia.

"I thought they were kidding, so half-drunkenly, I said, 'Of course, if you give me a full professorship and beat my salary at Merck!'"

But the conversation was no joke. A couple of months later, he received a phone call from the head of pharmaceutical chemistry at UCSF.

Wang transferred from Merck to the university, where he conducted research on parasites for more than 30 years. He describes this as the happiest time in his life because he had complete freedom to choose his own projects.

But the experience of working in industry gave him some perspective. "After I moved to UCSF, I realized that to discover a fantastic drug like ivermectin, you really have to be extremely lucky. In an academic setting, it would be quite difficult, because the mundane screening effort — to go through 150,000 soil samples in 10 years — you would never train any good students doing that, and the National Institutes of Health would never fund you," he says.

Wang focused on basic parasite research, namely regarding giardia and African trypanosomes. Giardia causes a diarrheal condition known as giardiasis, while African trypanosomes are responsible for a potentially fatal condition known as sleeping sickness.

Wang conducted research alongside his wife, Alice, who became a senior member of his laboratory at UCSF.

Alice Wang discovered a double-stranded RNA virus specific to giardia, one of the first viruses ever discovered in a parasitic protozoan. Working together over a couple of decades, the Wangs demonstrated how the microRNA machinery operates in giardia. These molecules may be primarily responsible for the expression of variant surface proteins, which

Wang in the research lab at the Institute of Molecular Biology, Academia Sinica, Taiwan.

Wang working as the director of the Institute of Molecular Biology, Academia Sinica, Taiwan.

could allow the parasite to elude its host's immune response by altering its antigen profile.

Wang's group examined the cell cycle of the African trypanosome to find that cell division operates differently depending on whether the parasite is found in the human bloodstream or within its fly host. They discovered new proteins involved in the metaphase-to-anaphase transition during cell division, which could have implications for novel antitrypanosomiasis treatments. Additionally, Wang expects these findings to contribute to understanding the evolution of eukaryotic cell division, because these protozoans represent an early branch of the eukaryotic tree of life.

Expanding the field

Wang never lost his connections to Asia. As a representative for Merck, in 1979, Wang visited mainland China, where he learned about the Chinese government's research on artemisinin. He later returned several times, teaching at universities and visiting with researchers for several months at a time until the late 1980s. But "after the Tiananmen Square massacre on June 4, 1989, I cut off all my interactions with China," he says. "(On) subsequent visits to China, (I) wore the hat of a tourist only."

Wang still feels a connection to Taiwan, to which he has returned many times. "Taiwan is a more democratic country, so I feel a little bit more comfortable about going back there," he says. In 1988, he established a molecular parasitology research program at the Institute of Biomedical Sciences, Academia Sinica, and worked there for a year. In 1991, he traveled to the island with colleagues to establish the Institute of Molecular Biology at the National Academy of Science. He stayed for three years, eventually returning to UCSF.

Although he retired in 2011 and is now a professor emeritus at UCSF, Wang remains invested in his field. Wang says he feels that molecular parasitology has been rejected by mainstream science despite advances in techniques and research in the field. This concern motivated him and his wife to establish the award through the ASBMB.

Looking back at his career, Wang says he feels lucky to have been involved in the discovery of ivermectin, which he emphasizes was the result of extensive group effort. The fervor of his youth has been rewarded: "I was very idealistic — very foolishly idealistic — when I was young, thinking that I alone could do something to save a lot of people," he says. "I went through tremendous frustration, but somehow, through a collaboration with hundreds of people, I was able to contribute to the treatment of river blindness."

Wang is measured in describing his contributions, but his influence on the field of parasitology has been indispensable. "He's an intellectual force," says Phillips, his former doctoral student. "He's always the one at the meeting to ask the good questions, to push everybody to think about the big picture and be rigorous scientists. He's had a huge impact on the field."

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Alice Wang working in the lab at the University of California, San Francisco.

C.C. and Alice Wang with the 2012 winner of their molecular parasitology award, the late Elisabetta Ullu, along with former ASBMB presidents Jeremy Berg and Suzanne Pfeffer.

When our DNA is fair game

By Nicole C. Woitowich

ALL IMAGES COURTESY OF HEATHER DEWEY-HAGBORG

Dewey–Hagbourg's work is concerned with privacy, genetics and the future of biotechnology.

The average person sheds 50 to 100 strands of hair every day. Some hair gets stuck on our clothes or remains in our brushes or combs, but a good number of strands can be lost during our daily travels and end up attaching to subway seats, drifting onto elevator floors, or settling on tables at our local cafés. How many of us ever pause to consider the genetic information that we are scattering with every left-behind hair? The 33-year-old, Chicago-based artist Heather Dewey–Hagborg thinks about it a lot, and after viewing her work, she hopes you might too.

In 2012, Dewey–Hagborg created the piece "Stranger Visions," which displays 3-D portraits of individuals that are generated through DNA-phenotyping of items she came across in her daily life, such as hair, chewing gum and cigarette butts.

For "Stranger Visions," Dewey–Hagborg amplified regions of DNA that contained single nucleotide polymorphisms, or SNPs, associated with physical traits such as gender, ancestry, eye color, hair color, freckles or predisposition to obesity. When determining which SNPs to analyze, Dewey–Hagborg did her research. She says, "I tried to gather as much information as I could on anything that could be extrapolated to be related to appearance." She says SNPedia — an online database that summarizes peer-reviewed data related to medical, phenotypic or genealogical SNPs — was a valuable resource for the project. She also used 23andMe, the personal genetic profiling service. "For a SNP of interest, they link to the papers that the trait is based on, and you can make up your own mind if it's accurate or relevant."

After DNA sequencing, Dewey–Hagborg analyzed her results and determined which phenotypic alleles were present for the sample. She then compiled the results of the physical traits into custom software that she developed to generate a 3-D model of what the individual's face might look like. The key word being "might."

"Exact reconstruction of a face from DNA alone is still the stuff of science fiction. It represents a general likeness of the person at best," Dewey–Hagborg says. A description of the SNPs analyzed and a detailed materials and methods section can be found on Dewey-Hagborg's blog (deweyhagborg.wordpress.com).

Prior to creating "Stranger Visions," Dewey–Hagborg had no formal training in molecular biology. She took an introductory biotechnology course at the community laboratory Genspace in Brooklyn, N.Y. There she learned

Products created by Dewey–Hagbourg to protect our DNA identities in public spaces.

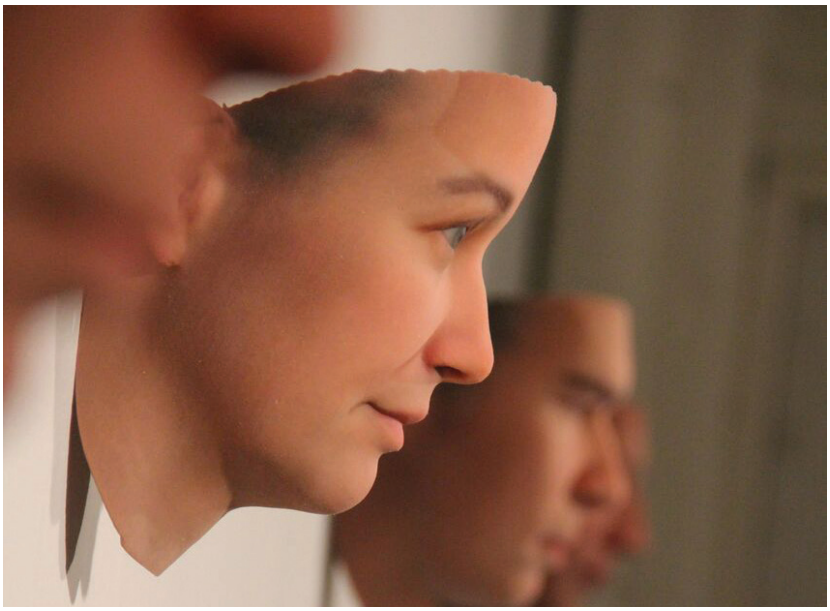
the basics of DNA extraction and polymerase chain reaction.

Dewey–Hagborg did have a background in computer programming and electronics but found molecular biology techniques challenging. With the guidance of scientists at Genspace and the Rensselaer Polytechnic Institute in Troy, N.Y., where the artist is a Ph.D. candidate in electronic arts, Dewey–Hagborg soon began pipetting like a professional. "It was a really steep learning curve," she says.

Before her work on "Stranger Visions" even was finished, the press took notice. Major media outlets, from Science to CNN, came calling. "It took on a life of its own," says Dewey–Hagborg. The publicity for "Stranger Visions" fueled strong reactions, and the artist says she received some hate mail. "People were upset that I was violating individuals' privacy, and of course they were right! That was the point of the work — to make you think about privacy, genetics and the future of biotechnology. "

Dewey–Hagborg had been thinking a lot about privacy and surveillance tools such as facial recognition, speech recognition and wiretapping before creating "Stranger Visions." "It struck me that we pay attention to specific forms of surveillance but ignore an incredibly personal form that could be taking place without our knowledge. That realization was something I felt I needed to follow up on and make public and visible," she says.

This led Dewey–Hagborg to create her follow-up to "Stranger Visions," called "Invisible." "Invisible" consists of two products that protect our DNA identities in public spaces by providing a "forensic cover-up." The first component is a spray called Erase that is composed of a bleach mixture that can remove nearly all traces of DNA left on a surface. The second solution, Replace, is a mixture of arbitrary, synthesized DNA from more than 50 people that is used to cover up any of our remaining DNA. "Invisible" is



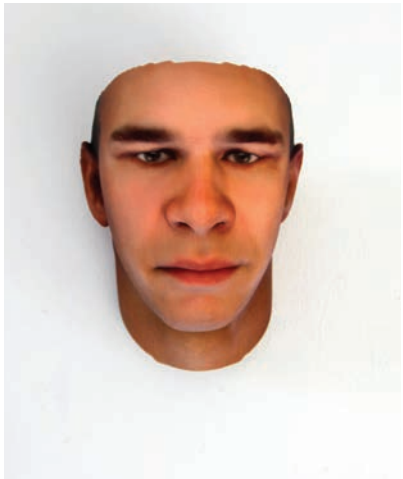
Dewey–Hagbourg's 3-D portraits are generated through DNA phenotyping of discarded items such as hair, chewing gum and cigarette butts.

sold at the New Museum of Contemporary Art in New York City and meant to be both a real product and thought-provoking art.

"It is again something that is meant to bring public attention to these issues around hackability and privacy and to question the authority of DNA as a gold standard in a forensic context," Dewey–Hagborg says. The instructions to make your own Invisible kit are available online (bionony mous.me/diy-guides).

Currently, Dewey–Hagborg is an assistant professor at the School of the Art Institute of Chicago, where she teaches a class in bioart and has developed a lab to facilitate this type of artistic work. She plans on continuing to exhibit "Stranger Visions" by incorporating new research that has become available since its 2012 debut as well as designing other pieces that focus on privacy and surveillance. "I have a feeling they will stir up some more controversy!" she quips.

Nicole C. Woitowich (nicole.woitowich@gmail.com) is a member of the public outreach committee and a Ph.D. candidate at Rosalind Franklin University of Medicine and Science.



Dewey–Hagbourg analyzes phenotypic alleles before using custom software to generate what she calls a "general likeness" of a stranger.


ASBMB
2016
Annual
Meeting
SAN DIEGO
April 2–6

Calendar of special events

Saturday, April 2

9 a.m. – 11:30 a.m. Building your outreach program from A to Z
San Diego Marriott Marquis, San Diego Ballroom C (see page 29)
11:30 a.m. – 12 p.m. ASBMB annual meeting orientation for undergraduate students
San Diego Convention Center, Rooms 6B, C and F (see page 25)
12 p.m. – 4:30 p.m. Undergraduate research poster competition
San Diego Convention Center, Rooms 6B, C and F (see page 25)
12:30 – 4:30 p.m. Communication Workshop: Make your elevator pitch
San Diego Marriott Marquis & Marina, San Diego Ballroom C (see page 29)
2:30 p.m. – 4:30 p.m. Career-development sessions
San Diego Convention Center, Rooms 1A, 1B and 6D (see page 24)
4:45 p.m. – 5:45 p.m. Exploring careers speed-networking event
San Diego Convention Center, Room 6A (see page 25)
7:30 p.m. – 9 p.m. Opening reception and science outreach poster session
San Diego Convention Center, Sails Pavilion (see page 29)

Sunday, April 3

9:45 a.m. – 12 p.m. Advancing teaching and learning in the biochemistry/molecular biology classroom
San Diego Convention Center, Room 14A
12:30 p.m. – 1:30 p.m. Grad student and postdoc career hour at the ASBMB booth
San Diego Convention Center Exhibit Floor, Booth #516 (see page 24)
12:30 p.m. – 2 p.m. Incentivizing great research
San Diego Convention Center, Room 6A (see page 30)
4 p.m. – 6:15 p.m. Integrating complementary skills into graduate and postdoc training
San Diego Convention Center, Room 14A (see page 28)
6:30 p.m. – 8:30 p.m. CRISPR: Power and Challenges
San Diego Convention Center, Room 6A
7:00 p.m. – 9:30 p.m. ASBMB Minority Affairs Committee-sponsored welcome and networking reception
San Diego Marriott Marquis, Marina Ballroom D (see page 28)

Monday, April 4

12:30 p.m. – 2 p.m. Communication workshop: Tell your science as a story
San Diego Convention Center, Room 6A (see page 29)
6:15 p.m. – 7:15 p.m. Organizing a successful ASBMB student chapter
San Diego Convention Center, Room 14A (see pages 25 and 28)
6:30 p.m. – 9 p.m. Wikipedia edit-a-thon
San Diego Convention Center, Room 14B (see pages 28 and 29)
6:30 p.m. – 9 p.m. ASBMB grad student and postdoc game night
San Diego Convention Center, Room 6A (see page 24)
9 p.m. – 11:30 p.m. Y.E.S. mixer (Young Experimental Scientists)
San Diego Marriott Marquis, Marina Ballroom G

Tuesday, April 5

12:30 p.m. – 2 p.m. The do's and dont's of data analysis and reporting
San Diego Convention Center, Room 6A
6:30 p.m. – 8 p.m. Women scientists networking event
San Diego Convention Center, Room 6A (see page 28)
6:30 p.m. – 9 p.m. Straight from the Bench: graduate student and postdoc event
San Diego Marriott Marquis, San Diego Ballrooms A and C
7 p.m. – 9 p.m. Meet the BioArtists
Karl Strauss Brewing Company in downtown San Diego (see page 29)

Grad student and postdoc guide to the annual meeting

By Erica Siebrasse

Grad students and postdocs, how are you preparing for the exciting science and excellent professional-development opportunities at the 2016 American Society for Biochemistry and Molecular Biology annual meeting? Do you know which events you will be attending? How will you make the most of the meeting while still remaining energetic enough to forge lasting connections and get home in one piece?

Here are some pointers that could help.

Choose your events early

The ASBMB has numerous career-development events planned for grad students and postdocs. This year, we made it easy by listing them in one place (asbmb.org/AM2016/gradpostdocschedule). Here are a few new events to consider:

Career-development sessions. The Saturday afternoon career development sessions take place from 2:30 to 4:30 p.m. and are free. Choose from three discussion sections: "Implementing your individual development plan," "Pathway(s) to your own lab" and "Taking the industrial route."

ASBMB game night. Join us Monday night for fun games (including science-themed trivia), prizes, snacks, drinks and antics in a photo booth. Open only to grad students and postdocs, this will be a great opportunity to connect with your peers.

Career hour at the ASBMB booth. Drop by booth #516 during the lunch break on Sunday to talk with scientists who have taken a variety of career paths. Visit the website schedule above to see who is coming.

Know whom to meet

Identify people you want to meet and determine how to make a meeting happen. Are they giving talks or presenting posters? Do you expect to see them at particular sessions? Can you reach out to them before the meeting and schedule sit-downs?

Make a plan

Create a written, day-by-day plan before the meeting and keep it organized and easily accessible so you stick to it. Build in rest, coffee and meal breaks.

Brush up on your networking skills

Bring business cards. If you cannot order them through your institution, cards are available online at Vistaprint (www.vistaprint.com) for around $10.

Prepare a 15- to 30-second elevator pitch. Do you want people to come by your poster? Are you looking for a job? Practice your pitch with a friend or colleague until it is comfortable to say. You also can join our outreach team and perfect your pitch at their Saturday communication workshop. Pitches also are great ways to introduce yourself to new people.

Pre-write several questions for each person you would like to meet. Keep these handy so you can speak up when the time is right.

If you are on the job market, bring copies of your résumé on good quality paper. If you are presenting a poster, consider printing a simplified version of it on letter-size paper.

Look professional

Make sure you dress and act appropriately. Do not wear anything that is too worn out, too casual, too tight, too short or too low cut. This goes for men and women alike. Think about it this way: Will you be comfortable with how you are dressed if you unexpectedly meet someone for whom you would like to work?

Check the ASBMB meeting site in mid-March for video tutorials on appropriate meeting attire.

Gather info

While you are at the meeting, take good notes. This goes for scientific sessions, career-development events and one-on-one discussions. If you meet someone new, ask for a business card. Jot a note on the back about what you discussed. You will be exhausted by the end of the meeting, so do not rely on your memory.

Follow up

If you said you would reach out to someone after the meeting, do so. This is critical and will set you apart as someone who is organized and responsible.

Finally, come see me!

Make time to stop by the ASBMB booth, learn how to make the most of your membership and hear about several new professional-development benefits we will have for grad students and postdocs in 2016.

Erica Siebrasse (esiebrasse@asbmb.org) is the education and professional development manager for the ASBMB. Follow her on Twitter at twitter.com ericasieb.

Annual meeting events and advice for undergraduates

By Andrea Anastasio

The 2016 American Society for Biochemistry and Molecular Biology annual meeting is held in conjunction with Experimental Biology, a conference of six societies that will feature more than 500 sessions and 6,000 posters. More than 10,000 scientists from all over the world will be coming to San Diego to share their research and to network. It can be an overwhelming event, and taking time to prepare before you arrive is essential to getting the most out of the meeting.

Undergraduate Poster Competition winners in 2015.

Undergraduate events

Undergraduates can start with the ASBMB annual meeting orientation at 11:30 a.m. Saturday, April 2, in Rooms 6B, C and F at the San Diego Convention Center. A great way to meet other undergraduate students from across the country, the orientation provides tips on how to navigate the meeting and plan out a schedule.

The ASBMB also hosts the 20th annual Undergraduate Poster Competition on Saturday. More than 200 undergraduates will present their research, and those with the best posters in each category will receive recognition and cash awards. Poster presentations are held from 1 p.m. until 4:30 p.m. Graduate school exhibitors will be set up nearby to speak with interested undergraduates.

The Exploring Careers speed-networking session takes place on Saturday from 4:45 p.m. to 5:45 p.m. in Room 6A. The session brings a variety of science professionals together to sit down with undergraduates and discuss their career paths.

The ASBMB Student Chapters program has several sessions at the meeting. The meeting is an excellent place to connect with this network of students and faculty mambers, who together make up more than 100 undergraduate chapters across the country. The Student Chapters will host an "Organizing a successful ASBMB Student Chapter" session at 6:15 p.m. Monday, April 4, in Room 14A, and then a reception from 7 p.m. to 9 p.m. Sunday, April 3, in the Marina Kitchen at the Mariott Marina Marquee for all faculty advisers. Any faculty members interested in starting chapters should attend the reception.

Budget your time

Browse the preliminary online program and start planning before the meeting. If a speaker or topic is of particular interest, pencil it into your calendar and brainstorm some questions to ask on site. Be sure also to visit the exhibit hall to meet with graduate school exhibitors and industry representatives.

Presenting a poster

If you are presenting a poster for the first time, be sure to know your material and practice. Try your presentation out on friends or family. And make sure you practice in front of both scientists and nonscientists. It's important that your material and explanations be understandable to everyone. Your poster also should not have too much information or look cluttered. If you are nervous about fielding questions, try to remember that questions are a positive — they indicate curiosity from your listeners.

Networking

Come to the meeting prepared to make contacts. Arrive with business cards and have a short spiel worked out for anyone who asks about your scientific interests and career plans. If you present a poster at the meeting, keep paper copies of the poster on you at all times in case you speak to someone who wants to know more about your research.

Some of the events we've mentioned are excellent networking opportunities for undergraduates. Chat with your neighbors at the annual meeting orientation, and show up to the "Organizing a successful chapter" meeting to speak with faculty and student members from across the country.

Have a good time

Really enjoy the meeting. It is a busy event, but it doesn't have to be stressful. Carve out time to slow down and take in all that is happening. Have fun at the receptions. They are an excellent chance to mingle and have a laugh even as you meet new contacts and learn what others are doing. By the time you leave San Diego, you should feel rejuvenated and inspired to take on whatever your next steps may be.

Andrea Anastasio (aanastasio@asbmb.org) is the Student Chapters program coordinator at the American Society for Biochemistry and Molecular Biology.

What's buzzworthy at ASBMB's annual meeting?

This year, we'll be using Twitter to help you navigate the annual meeting. We'll be posting tweets about session times and locations and changes in the program so you can get to the events that matter most to you. We also want to see the meeting from YOUR perspective, and Twitter is a great way to connect with your colleagues and highlight your areas of interest and expertise. So how does Twitter (2016 ASBMB annual meeting-style) work? Check out the chart below.

Which best describes you?

I don't have a Twitter handle.

Not to worry! It's easy to sign up. Just follow these steps:

1. **Go to twitter.com**
2. **Click "Sign up"**
3. **Enter the required information and select your Twitter handle (your username)**
4. **Log in to your new account**
5. **Search for "@asbmb" and click follow**

I have a Twitter account, but I never use it ...

1. **Log in to your account**
2. **Update your profile**
3. **Search for "@asbmb" and click follow**

I'm a Twitter pro!

Great, then this isn't for you! Follow us (@asbmb) and check out some of our favorite BMB-focused accounts. @RajMukhop, @biochembelle, @madamscientist, @youinthelab, @BiophysicalFrog

Do you have Twitter on your phone?

No

Go to your app store of choice and download it.

Yes

Log in

Now you're meeting ready!

Twitter Tips

- Keep your tweets to 140 characters or fewer.
- Click "follow" on someone's profile to keep up with that account.
- To tweet at or mention someone in a tweet, include his or her Twitter handle. For example: "I have arrived at the @ASBMB annual meeting!"
- Don't start a tweet with @ if you want it to be visible to everyone who follows you.
- Put a # in front of a word in a tweet to see what others have to say about the topic.
- Tweet about the meeting by tagging us @ASBMB and using one of the hashtags from the chart.
- Click the ♥ to show you "like" a tweet.
- Click the ⇄ to "retweet" someone. That tweet will appear on your profile.
- Click the ↩ to reply to a tweet publicly.

Other ways to get social with ASBMB

Instagram: Follow "@TheASBMB"
Facebook: Like "American Society for Biochemistry and Molecular Biology"
Snapchat: Friend "theasbmb"
YouTube: Subscribe to "TheASBMB"

ASBMB 2016 Themes	Hashtags
• Bioinorganic Catalysis	#catalysis
• Cell Signaling, Kinase and Chemotherapy	#cellsignal
• Chemical Biology	#chembio
• Chromatin Organization and Gene Regulation	#chromatin
• DNA Replication, Repair and Recombination	#DNA
• Glycoscience in Biology	#glyco
• Lipids and Lipid Signaling	#lipids
• Metabolism, Disease and Drug Design	#metabolism
• Non-alcoholic Fatty Liver Disease	#liver
• Parisitology	#parasite
• Post-translational Modifications	#PTM
• Protein Engineering	#proteins
• Protein Synthesis and Degradation	#proteins
• Systems Biology and Proteomics	#proteomics
• Biochemistry Education and Career Development	#education
• Public Engagement (ASBMB)	#scicomm
• Plenary and Award Lectures (ASBMB)	#bigtalks

Special Events	Hashtags
• Student events	#ASBMBgradstudents
• Game night	#ASBMBgamenight
• Postdocs	#ASBMBpostdocs

Paying it forward

Discover new ways to contribute to the BMB community at the meeting

By Andrew Macintyre

How do I thank Mr. Jonas, he wondered, for what he's done? … Pass it on somehow, he thought, pass it on to someone else. Keep the chain moving. Look around, find someone, and pass it on. That was the only way.

– Ray Bradbury, "Dandelion Wine"

With the wealth of science on offer at the 2016 American Society for Biochemistry and Molecular Biology annual meeting, it is easy to overlook one of the most valuable and inspiring aspects of the event: the opportunity to contribute to the biochemistry and molecular biology community. Many of you joining us in San Diego have benefited from the support and guidance of other scientists. Here is a selection of ways to pay those kindnesses forward while you are at the meeting.

Everyone: support new sessions

This year's meeting includes two new scientific sessions organized by graduate student and postdoc members of the society. The Straight from the Bench sessions focus on two exciting areas of research: recent advances in protein engineering and post-translational modifications and the microorganism response. Each session includes presentations from keynote speakers and up-and-coming trainees and will take place 6:30 – 9 p.m. Tuesday, April 5, in Marina Ballrooms A and C .

Undergraduate students and faculty: start an ASBMB Student Chapter

The ASBMB Student Chapters are a national network of undergraduates and faculty members that provide on- and off-campus networking and career-development opportunities, along with grants and awards to support research and outreach. Why not grow the BMB community by starting a Student Chapter on your campus? Interested faculty members and students can visit the ASBMB booth or attend the session "Organizing a Successful ASBMB Chapter" at 6:15 p.m. Monday, April 4, in Room 14A.

Postdocs and grad students: share your experience

If you've benefited from one of these workshops, why not pay it forward by attending the undergraduate poster competition and talking to the presenters? The presenters will benefit from your knowledge of science and graduate school, and you will get to practice quizzing others about their projects. Posters will be on display from 12 – 4 p.m. Saturday, April 2, in Rooms 6B, C and F.

Everyone: improve Wikipedia

In conjunction with the Wiki Education Foundation's Year of Science, the ASBMB Public Outreach Committee is hosting an edit-a-thon to improve biochemistry and molecular biology content on Wikipedia. Share your expertise with millions of Wikipedia users and learn Wiki editing at the same time. Takes place 6:30 – 9 p.m. Monday, April 4, in Room 14B.

Faculty and equivalent: become a mentor

Mentorship doesn't have to be restricted to your own campus. Both the ASBMB Minority Affairs Committee-sponsored Welcome and Networking Reception (7:30 – 9:30 p.m. Sunday, April 3, Marina Ballroom D) and the Women Scientists Networking Event (6:30 – 8 p.m.Tuesday, April 5, Room 6A) provide informal opportunities to connect with students, postdocs, faculty members and others looking for career advice.

If you are looking for other opportunities to become a mentor, consider signing up for the National Institutes of Health's National Research Mentoring Network (nrmnet.net), which offers four-month online mentorship experiences with regular guided interactions.

Faculty: become a more effective mentor

It can be a challenge to provide guidance to those interested in BMB career paths other than your own. Why not attend the session on "Integrating Complementary Skills into Graduate and Postdoctoral Training" (4 – 6:15 p.m Sunday, April 3, Room 14A) or the panel discussion on "Maximizing Graduate and Postdoctoral Training for Non-Research STEM Careers" (1 p.m. Wednesday, April 6, Room 6A)? Both are focused on helping your mentees succeed, whatever career they decide to pursue.

Looking for more ideas?

Stop by the ASBMB booth to learn about even more opportunities to give back to the BMB community.

Andrew Macintyre (amacintyre@asbmb.org) is an education and professional development manager at the ASBMB.

Outreach fun at the meeting

By Geoffrey Hunt

Every year at the American Society for Biochemistry and Molecular Biology meeting, the ASBMB Public Outreach Committee sponsors a bevy of exciting, interactive events that go beyond typical conference sessions. This year is no different. Here is our lineup for 2016.

Science communication workshops

Over the past few years, the Public Outreach Committee has developed "The Art of Science Communication," an online course that provides fundamental training in presenting science to a nonexpert audience. The course next will be offered in the summer of 2016, but you can get a sneak preview of what to expect at two on-site science communication workshops that will feature exercises taken straight from the course.

A half-day workshop that provides hands-on communication training is slated for Saturday, April 2. Focused on how to give an elevator talk about your research and led by members of the committee, this workshop will help you come up with a pithy, engaging pitch to use in conversation with colleagues at the conference. Several graduates of the "Art of Science Communication" course will be on hand to share their experiences and help walk you through the exercises.

A second workshop on the craft of storytelling happens Monday, April 4. Our speakers for "Tell Your Science as a Story" include ASBMB Chief Science Correspondent Rajendrani Mukhopadhyay, who will walk you through the importance of telling a story when communicating your science to others. You'll get a chance to create your own science story using tips and feedback from our experts. At the end of the workshop, brave souls will present their stories to the whole group.

Outreach sessions

The first of this year's outreach offerings will happen the morning of Saturday, April 2. "Building Your Outreach Program from A to Z" is an interactive networking session with presentations from program organizers and participants about unique outreach efforts aimed at the general public. We'll also have a panel discussion about the National Science Foundation's "broader impacts" requirement, which mandates that all grant applicants specifically delineate how their projects will benefit society. There will be insights from former NSF program officers on how to navigate the preparation, writing and reviewing of your grant and plenty of time for informal networking.

Later that evening, our annual outreach poster session will showcase activities and programs from ASBMB members and local organizers that bring science to the general public. Held during the ASBMB opening reception directly after the Herbert Tabor Research Award lecture by Robert G. Roeder of The Rockefeller University, this informal gathering is a great chance to learn what outreach is all about!

Wikipedia edit-a-thon

Raise your hand if you have used Wikipedia for researching a scientific topic. You aren't alone: The crowdsourced encyclopedia is one of the most visited websites. Unfortunately, the quality and accuracy of Wikipedia articles are highly variable, especially when it comes to science. To help improve the scientific content on Wikipedia, we will host a biochemistry and molecular biology-themed edit-a-thon at 6:30 p.m. Monday, April 4, as part of ASBMB Game Night. Sponsored by the Simons Foundation, the edit-a-thon requires no previous experience — our seasoned moderators will guide you through the process. Just join us, pick your favorite scientific subject, and get to work adding your own knowledge and expertise.

Meet the BioArtists

One of the overarching goals of outreach is to bring science to new audiences by taking it out of its normal, staid settings and bringing it to different outlets and interesting cultural venues. On the evening of Tuesday, April 5, we will do just that with "Meet the BioArtists," a science-themed art gallery event to be held at the Karl Strauss Brewery. Winners from the Federation of American Societies for Experimental Biology's BioArt contest will be on hand to present their works and talk about the blending of their scientific research and artistic ambitions. Come see outreach in action!

The Cellular Culture blog will roll out in-depth descriptions of these sessions throughout March. Visit: cellularculture.asbmb.org.

Geoffrey Hunt (ghunt@asbmb.org) is the ASBMB's outreach manager. Follow him on Twitter at twitter.com/thegeoffhunt.

Incentivizing great research

By Benjamin Corb

The American scientific enterprise is renowned for the quality of research it produces. However, pressures on individual scientists to publish in high-impact journals, secure grants and comply with regulations may be weakening the quality of American science by providing incentives that can interfere with the pursuit of groundbreaking discoveries. Such perverse incentives may be contributing to the rise in irreproducible research, the disproportionate time spent on writing grants and papers, and the reduction in time devoted to experiments and training. Most importantly, these incentives may be getting in the way of scientists' regular beneficial interactions with colleagues and the larger scientific community.

The Public Affairs Advisory Committee symposium at the 2016 American Society for Biochemistry and Molecular Biology annual meeting will focus on analyzing counterproductive pressures on scientists and discuss how they can be managed to preserve and incentivize outstanding research. The panel discussion, to be held at 12:30 p.m. on Sunday, April 3, in Room 6A of the San Diego Convention Center, will cover:

- pressure to publish — evaluating research quality, reproducibility and importance
- pressure to obtain grants — balancing translational vs. basic science, safe vs. daring science, etc.
- pressure to achieve tenure — balancing collaborative and individual contributions
- pressure to comply — finding the right level of regulation

As of now, speakers for this session include Randy Schekman, 2013 Nobel laureate, publisher of eLife, and professor of cell and developmental biology at the University of California, Berkeley; Jon Lorsch, director of the National Institute for General Medical Sciences; and Vivian Lee, dean of the University of Utah School of Medicine. After the presentations, there will be an opportunity for the audience members to join in the discussion and share their views on how best to eliminate perverse incentives in research.

Benjamin Corb (bcorb@asbmb.org) is director of public affairs at ASBMB.

Stop by booth #516

- Free professional headshots
- Career advice sessions
- Chat with the editors:
  - Journal of Biological Chemistry
  - Journal of Lipid Research
  - Molecular & Cellular Proteomics
- Ethics of publishing workshop
- Complimentary ASBMB publications
- T-shirts and souvenirs

www.asbmb.org/join

ASBMB

Make connections at the 2016 ASBMB Annual Meeting

April 2 – 6 in San Diego

The ASBMB Minority Affairs Committee will sponsor special events and scientific sessions, including:

- **Ruth Kirschstein Diversity in Science Award lecture: "Chemical genetic analysis of mast cell activation" by Avery August of Cornell University**
- **Welcome and networking reception**
- **Beyond the Bench: Maximizing Graduate/Postdoctoral Training for NonResearch STEM Careers**
- **Symposium on nonalcoholic fatty liver disease**

Join the ASBMB Partnership for Diversity

This network promotes diversity and inclusion within both the society and the scientific community at large.

Visit www.asbmb.org/minorityaffairs for information about how to join the partnership or visit ASBMB booth #516 at the annual meeting.

ASBMB

2016 Annual Awards

ALICE AND C.C. WANG AWARD IN MOLECULAR PARASITOLOGY

Ferguson's 'achievements place him in this top-most rank of scientists'

By Caitlin Hanlon

Michael A. J. Ferguson, associate dean for research strategy for the School of Life Sciences at the University of Dundee in Scotland, is the 2016 awardee of the American Society for Biochemistry and Molecular Biology's Alice and C.C. Wang Award in Molecular Parasitology. Ferguson's discovery of glycosyl-phosphatidyl inositol, or GPI, anchors revolutionized the membrane protein field and biochemistry itself. Ferguson then transitioned his expertise in GPI biosynthesis to the parasitology field and the development of therapeutics targeting the parasitic GPI pathway.

The Wang Award recognizes scientists who make significant contributions to the field of molecular parasitology. "Michael Ferguson's achievements place him in this top-most rank of scientists," wrote George Cross of The Rockefeller University in his letter of support for Ferguson's nomination. "He is the world leader in a field that has significance throughout the entire domain of eukaryotic membrane biology … and will continue to make unique contributions to understanding pathogenic mechanisms in parasitic protozoa."

Ferguson's first major contribution to the field was identifying how a surface protein without any discernible transmembrane domains remains attached to the outside of a cell. The agents of human African trypanosomiasis use their variant surface glycoproteins, or VSGs, to evade a host's immune system. As a postdoc in Cross' lab at The Rockefeller University, Ferguson identified the fatty acid components that anchor the trypanosome's VSG to the plasma membrane. Now known as GPI anchors, Ferguson's discovery of this glycolipid post-translational modification catalyzed the field, and soon many other labs were building on his finding. Ferguson went on to deduce the structure of an entire GPI anchor. As Cross wrote, this work was seminal: "Descriptions of GPI anchors are now a standard component of most biochemistry, cell biology and immunology textbooks." These findings laid the groundwork for the establishment of Ferguson's own laboratory, which went on to determine the structure of many complex glycoconjugates and the pathways that produce them.

This prize is of particular significance to me. Alice and C.C. Wang are outstanding pioneers of molecular parasitology. It is a terrific honour to be selected by a distinguished panel of peers for an award bearing the names of, and endowed by, Alice and C.C. Wang. I am also extremely grateful to my co-workers, past and present, for making this possible.

– MICHAEL A. J. FERGUSON

Many parasites have very unusual glyoconjugates. Ferguson recognized that this unique feature could be "an Achilles' heel for antimicrobial chemotherapy," wrote Professor Keith Gull at Oxford University in his letter of support for Ferguson's nomination for the award. By developing drugs that inhibit the enzymatic pathways that create these unique lipid anchors, Ferguson and his laboratory are able specifically to target the parasites that cause devastating illnesses such as malaria and trypanosomiasis.

To further his translational research, Ferguson and his colleagues, with support from the Wellcome Trust, established the Drug Discovery Unit at the University of Dundee. He also has led two major expansions of the Dundee College of Life Sciences, which is one of the top three biological research schools in the U.K.

Awarded the Royal Medal by the Royal Society of Edinburgh, Ferguson is a fellow of the Royal Society. He is also a Regius professor of life sciences, an honor bestowed by the monarch just twice in the past century, and was appointed recently to the governing body of the Wellcome Trust.

Ferguson earned his bachelor's degree from the University of Manchester and a Ph.D. in biochemistry at the University of London. After his postdoctoral studies at The Rockefeller University, he continued his work at the University of Oxford before starting his own lab at the University of Dundee.

Ferguson's award lecture, "Translating the trypanosome surface," takes place at 9:45 a.m. Monday, April 4, in Room 1A of the San Diego Convention Center.

Caitlin Hanlon (chanlon3@jhmi.edu) earned a B.S. from Ursinus College and a Ph.D. in the department of cell biology at the Johns Hopkins School of Medicine.

EARL AND THRESSA STADTMAN SCHOLAR AWARD

Skiniotis has 'outstanding talent,' 'technical prowess'

By Ulli Hain

Georgios Skiniotis, associate professor of biological chemistry at the University of Michigan Life Sciences Institute and the University of Michigan Medical School, is the co-winner of the 2016 American Society for Biochemistry and Molecular Biology Earl and Thressa Stadtman Scholar Award for his innovative use of electron microscopy. The award, given every other year, honors outstanding researchers with fewer than 10 years of post-postdoctoral experience.

To initiate intracellular signaling, G-protein–coupled receptors, or GPCRs, on the surface of our cells transmit diverse information, such as hormones, neurotransmitters and light from our environment. Skiniotis pioneered the use of single-particle electron microscopy, or EM, to study GPCRs in complex with their cognate G proteins. These structures were groundbreaking in terms of both the small size of the analyzed proteins and the surprising amount of movement within the receptor-bound G protein.

In her letter nominating Skinoitis for the award, colleague Janet L. Smith at the University of Michigan said Skiniotis' "rare combination of outstanding talent in biochemistry and technical prowess with electron microscopy has allowed him to push the boundaries of EM analysis and obtain structural information from molecules and assemblies formerly considered too small for single particle reconstruction." She added that he has also "fearlessly tackled problems of great biological and chemical importance."

Skiniotis' work has important implications for human disease, because understanding the structural mechanism behind GPCRs allows for the development of novel therapies that target these receptors.

It's an honor for our lab to receive an award named after such pioneers as Earl and Thressa Stadtman. Cryo-EM is a fast evolving technology poised to shed light on the mechanisms underlying complex cellular processes; in its application we strive to embody and transmit the tradition of excellent basic science and passion for discovery that is the Stadtmans' legacy.

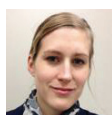
– GEORGIOS SKINIOTIS

During his dissertation work at the European Molecular Biology Laboratory, Skiniotis developed a novel technique for labeling proteins for cryo-EM analysis. He used this technique to study the movement and processivity of the motor protein kinesin. He demonstrated that tubulin is not just a track for kinesin but rather actively modulates kinesin movement.

Most recently, Skiniotis applied his EM expertise to better understand polyketide synthesis by the multidomain polyketide synthases, or PKSs. Polyketides are naturally produced and structurally complex compounds. Many polyketides have antimicrobial, antifungal or immunosuppressant activity, and nearly a third of pharmaceuticals are based on or inspired by polyketides. By understanding the mechanism behind these polyketide factories, it may be possible to bioengineer PKSs to create novel antibiotics.

Skiniotis recently published a stunning series of structures of a PKS module in the journal Nature. In his letter supporting Skiniotis' nomination, Stephen Harrison at Harvard Medical School, who interacted with Skiniotis when the latter was a postdoctoral fellow at the school, described the series as "triumphs of structural biology." The structures not only represent the complete enzymatic cycle of a full PKS module for the first time but also detail an unexpected architecture. Unlike the related mammalian fatty acid synthase, the bacterial PKS module forms an arch-shaped dimer that creates a single chamber for the acyl carrier protein to deliver its substrate to the different active sites within the module.

Skiniotis adds the Earl and Thressa Stadtman Scholar Award to an already impressive résumé. He was named a Pew Scholar in Biomedical Sciences in 2011 and received the Presidential Early Career Award for Scientists and Engineers in 2012. He will deliver an award lecture, "Molecular choreography of an antibiotic assembly line," at 2:50 p.m. Monday, April 4, in Room 6B of the San Diego Convention Center.



Ulli Hain (hain.ulli@gmail.com) is a Ph.D. graduate in biochemistry from Johns Hopkins School of Public Health and a science writer at Palladian Partners, Inc.

EARL AND THRESSA STADTMAN SCHOLAR AWARD

Marraffini exhibits 'uncanny research instincts'

By Ulli Hain

Luciano Marraffini, assistant professor and head of the Laboratory of Bacteriology at The Rockefeller University, is the co-winner of the American Society for Biochemistry and Molecular Biology's Earl and Thressa Stadtman Scholar Award for his work on CRISPR-Cas immunity. The award honors outstanding contributions of early-career researchers who have had 10 or fewer years of post-postdoctoral experience.

Marraffini first sought to understand the mechanisms of CRISPR–Cas immunity during postdoctoral studies at Northwestern University, when much was still unknown about the system.

As part of his letter in support of Marraffini's nomination, Marraffini's postdoc adviser Erik J. Sontheimer at the University of Massachusetts Medical School said, "In proposing to study the roles and mechanisms of CRISPR interference, (Marraffini) demonstrated the ability to recognize a fabulous scientific opportunity that bears directly on fundamental biology as well as biotechnology and infectious disease … Given the way that the CRISPR field has exploded since then, it is easy to forget that those were very, very early days in CRISPR biology, and his independent decision to go down that path exemplifies his uncanny research instincts as well as his intellectual courage."

Bacteria acquire immunity against viruses using the CRISPR–Cas system, which captures small pieces of viral DNA that are used to recognize future invaders and subsequently degrade the foreign DNA. In recent years, the CRISPR–Cas system has generated widespread excitement among scientists and the public alike for its ability accurately to edit the genome of any organism.

I am honored to receive the Stadtman Scholar Award and to share it with Georgios Skiniotis. This is also a recognition to all the members of my lab that have worked so hard during these first five years and an incentive to continue unraveling the mechanisms of CRISPR immunity.

–LUCIANO MARRAFFINI

During his postdoc, Marraffini used an elegant experiment to demonstrate that antisense CRISPR RNA molecules, or crRNAs, recognize viral DNA rather than RNA as previously predicted. Sontheimer points out that this discovery "set the stage for the recent revolution in genome editing that uses engineered versions of the CRISPR machinery in the cells of humans and other eukaryotes."

Rockefeller University colleague James E. Darnell Jr., who nominated Marraffini for the award, said, "Dr. Marraffini greatly contributed to our current general understanding of CRISPR immunity, elucidating how these systems discriminate between self and nonself sequence, how these systems prevent the transfer of genetic material between bacterial pathogens, the biogenesis of small crRNA guides, and the mechanism and consequences of CRISPR immunity against plasmid elements of bacteria."

As an independent investigator, Marraffini has published 20 highly cited papers in his short five years at Rockefeller. Collaborating with Feng Zhang at the Massachusetts Institute of Technology, Marraffini described the use of the CRISPR–Cas9 system to modify genomes of bacterial and mammalian cells. This tool has proved extremely useful for scientists in the laboratory and holds great promise to treat and cure human disease in the future.

Marraffini continues to study the mechanism of CRISPR–Cas immunity, including investigating the role of 45 mostly uncharacterized Cas genes. "In this rapidly moving field, Marraffini, with his comparatively small group, is steadily producing very high-quality, very original contributions," said Darnell. Marraffini adds this award to a growing list of accolades that include the National Institutes of Health Director's New Innovator Award, a Sinsheimer Foundation Award and the Hans Sigrist Prize from the University of Bern.

Marraffini will present an award lecture titled "CRISPR–CAS, the prokaryotic adaptive immune system," at at 2:15 p.m. Sunday, April 3, in Room 6B of the San Diego Convention Center.

Ulli Hain (hain.ulli@gmail.com) is a Ph.D. graduate in biochemistry from Johns Hopkins School of Public Health and a science writer at Palladian Partners, Inc.

HOWARD K. SCHACHMAN PUBLIC SERVICE AWARD

U.S. Reps. Upton and DeGette recognized for supporting science in bipartisan fashion

By Sarah K. Martin

U.S. Reps. Fred Upton, R-Mich., and Diana DeGette, D-Colo., have won the Howard K. Schachman Public Service Award from the American Society for Biochemistry and Molecular Biology for their championing of biomedical research and tireless efforts drafting and ensuring passage of the 21st Century Cures Act.

Howard K. Schachman served as chair of the ASBMB Public Affairs Advisory Committee for more than 10 years. To honor his legacy, the PAAC instituted the Schachman Award, which recognizes those dedicated to public service in support of biomedical science.

Chairman of the U.S. House Energy and Commerce committee, Upton partnered with DeGette to find a way to speed the discovery, development and delivery of therapies for diseases. Throughout most of 2014, Upton and DeGette were engaged in shepherding the 21st Century Cures initiative through that committee. They held numerous round tables and hearings on biomedical research and then drafted a bill that would increase funding for the National Institutes of Health and streamline the path for new drugs to reach patients.

The 21st Century Cures Act would establish an innovation fund to provide an additional $1.75 billion to the NIH budget each year for five years. The Accelerating Advancement Program, a grant-matching program to accelerate promising biomedical research projects, would receive $500 million from the innovation fund. The rest of the innovation fund would be divided among grants for early-stage investigators and research such as high-risk, high-reward projects and intramural research.

I'm honored to receive this prestigious award and to join such a distinguished group of past winners. Improving biomedical research and providing proper resources for our best and brightest is a top priority for us here in the House of Representatives. While we have much left to do as we work toward better biomedical research, I want to thank the American Society for Biochemistry and Molecular Biology for their partnership and ongoing support of our bipartisan efforts to deliver cures now. Working together, we'll get the job done.

– U.S. REP. FRED UPTON, R-MICH.

By investing in new biomedical research, removing barriers to research collaboration, incorporating the patient, and modernizing clinical trials, the 21st Century Cures Act has the ability to bring hope to millions of patients in need. I am proud of the work Chairman Upton and I did to bring leading researchers, industry experts, and patient advocates together in order to craft this bipartisan bill. With your help, we can finish that work and get 21st Century Cures through the Senate and on to President Obama's desk.

– U.S. REP. DIANA DEGETTE, D-COLO.

Upton and DeGette crossed the country and the aisle to meet with representatives and gain support for their bill. The 21st Century Cures Act was passed on the floor of the House in July by a resounding vote of 344 to 77.

Benjamin Corb, public affairs director of the ASBMB, said, "The ASBMB applauds Reps. Upton and DeGette for their bipartisan cooperation in drafting, managing and now passing the 21st Century Cures Act. And we appreciate the bipartisan support from the House of Representatives for biomedical research broadly — and the NIH specifically."

Both Upton and DeGette have been invited to give remarks and receive their awards at a reception after the ASBMB spring Hill Day.

Sarah K. Martin (smartin@asbmb.org) is the science policy fellow at the ASBMB.

AVANTI AWARD IN LIPIDS

Farese's dedication to important questions has yielded work with 'tremendous promise'

By Kamalika Saha

Robert V. Farese Jr., professor of genetics and complex diseases at the Harvard T.H. Chan School of Public Health, won the Avanti Award in Lipids from the American Society for Biochemistry and Molecular Biology for his seminal contributions to the understanding of neutral lipid metabolism and its relevance to homeostatic mechanisms in health and disease.

The Avanti Award recognizes outstanding research contributions in the area of lipids.

Tobias C. Walther, who runs a joint laboratory with Farese at the Harvard School of Public Health, says, "It is hard to overemphasize the truly groundbreaking discoveries of Dr. Farese, their lasting impact on the fields of lipid and metabolism research, as well as on human health."

Farese has made multifaceted contributions to the field of lipid research. One of his key contributions is the discovery of the DGAT enzymes, DGAT1 and DGAT2, which govern triglyceride synthesis and storage. (DGAT is short for diacylglycerol acyltransferase.) Using knockout and mutant transgenic mouse models, Farese demonstrated that DGAT1 knockout mice were resistant to the development of diet-induced obesity, diabetes and nonalcoholic fatty liver disease. This discovery led to the development of DGAT enzyme inhibition as a potential treatment strategy for these diseases. An interesting offshoot of this work is the potential utilization of these enzymes to increase oil production in biofuels.

Gökhan S. Hotamisligil at the Harvard T.H. Chan School of Public Health, who nominated Farese for the award, says, "Farese's research has revealed fundamental biology of these diverse enzymes, and by doing so, his work has shown tremendous promise for creating therapeutic targets to treat and cure common, chronic diseases."

I am truly honored to receive the Avanti Lipid award in recognition of our contributions to neutral lipid metabolism. I am very grateful to my many mentors who influenced me, the many trainees who contributed to our work, and in particular to Tobias Walther, my scientific partner for the past decade.

– ROBERT V. FARESE JR.

Farese was also instrumental in discovering other lipid synthesis enzymes, such as ACAT2 and MGAT enzymes, and elucidating their physiological role. His unique ability to transcend domains of science led to his pioneering contributions to the cell biology of lipid droplets. Lipid droplets are cytosolic organelles that contain the neutral lipids essential for energy and membrane synthesis. In collaboration with Walther, he identified a set of 227 proteins governing the number, size and cellular localization of lipid droplets. They discovered two classes of lipid droplets: smaller initial lipid droplets and larger expanding lipid droplets. Additionally, their key findings show that the formation of lipid droplets depend on the Arf1/COP-1 vesicular trafficking machinery and that the CTP: phosphocholine cytidyltransferase — the rate-limiting enzyme for phosphocholine, or PC, biosynthesis — regulates PC biosynthesis at the surface of lipid droplets.

One of Farese's recent interests is the role of lipids and lipid biology in neurodegeneration, particularly frontotemporal dementia. He is the co-founder of the Consortium for Frontotemporal Dementia Research, a cross-institutional initiative aimed at discovering the underlying mechanisms of this rare disease and identifying treatment strategies.

In his letter of support for Farese's nomination for the award, Rudolf Zechner at the Institute of Biomedical Sciences, in Graz, Austria, says, "What impresses me most is the quality of his science and the vigorous way he approaches the important questions in lipid research."

Farese received his medical degree from the Vanderbilt University Medical School and did a residency at the University of Colorado Affiliated Hospitals. He pursued his postdoctoral training at the Gladstone Institute of Cardiovascular Disease.

His award lecture, "Cellular energy metabolism: mechanisms of fat synthesis and storage," will take place at 3:15 p.m. Sunday, April 3, in Room 6B in the San Diego Convention Center.

Kamalika Saha (kamalika.saha@gmail.com) is a postdoctoral fellow at MedImmune.

MILDRED COHN AWARD

Nogales shows 'bold' use of cryo-electron microscopy

By Kathleen McCann

Eva Nogales at the University of California, Berkeley, has won the American Society for Biochemistry and Molecular Biology's Mildred Cohn Award in Biological Chemistry for her revolutionary application of structural biology to molecular-level insights of eassential large multiprotein complexes. The Cohn award honors scientists who have utilized physical approaches to make substantial advances in understanding biological chemistry.

Nogales is one of the preeminent leaders in the field of cryo-electron microscopy, or cryo-EM. Robert Tjian at the Howard Hughes Medical Institute wrote in support of Nogales' nomination: "She has been bold, innovative and rigorous in applying negative stain and cryo-EM to solving 3-D structures of very challenging biological macro-molecules." In his letter of support for Nogales' nomination, Carlos Bustamante, Nogales' colleague at Berkeley, said, "I can think of very few other scientists whose work has deepened and broadened our knowledge to anywhere near the same extent as Eva's achievements have done."

Nogales was trained as a physicist. She earned her bachelor's degree in physics at the Universidad Autonoma de Madrid in Spain and completed her Ph.D. in biophysics in the physics department of Keele University in the U.K.

It was as a postdoctoral fellow in the laboratory of Kenneth Downing at the Lawrence Berkeley National Laboratory that Nogales made her first significant contribution to the field of structural biology. She used electron crystallography to generate an atomic structure of alpha and beta tubulin. This was not only an important advance for the field of cell biology but also a landmark achievement in structural biology, since alpha and beta tubulin had been resistant to X-ray crystallographic approaches. Microtubules and their interactions with other proteins have remained an important focus of Nogales' research. She has published several seminal papers describing the structural basis of the complex dynamics of microtubules and their interactions with important regulatory proteins.

I feel most honored to receive the Mildred Cohn Award from the ASBMB. I also feel in debt to women like Mildred Cohn who paved the road for other women scientists and served as an example for us to follow. These are exciting times for the cryo-EM field, and I see this award as a tribute to how far this technique is taking us toward a mechanistic understanding of biological processes. I look forward to continuing using cryo-EM in our efforts to visualize large biological macromolecular assemblies at work.

– EVA NOGALES

"Her work has been at the forefront of microtubule cytoskeleton research and has set Eva apart in the whole macromolecular EM field," said Kenneth Downing, Nogales' postdoctoral mentor at Lawrence Berkeley National Laboratory. "There is no question that she is recognized throughout the EM-structural biology community as one of its rising stars and leaders."

Robert Glaeser of the University of California, Berkeley, emphasized Nogales' many important contributions beyond her work on the cytoskeleton. "Prof. Nogales is a structural biologist of extraordinary accomplishment. She has made major contributions in several different topics of protein structure and function," he said. Through continued refinement and development of advanced techniques, Nogales has been able to generate numerous impressive high-resolution structures of important multiprotein complexes including the CRISPR-associated complex, the 26S proteasome and the human transcription preinitiation complex.

Nogales is a Howard Hughes Medical Institute investigator and a member of the National Academy of Sciences. She has received the Protein Society's Dorothy Crowfoot Hodgkin Award and the American Society for Cell Biology's Early Career Award.

Nogales' award lecture, "Atomic structures of microtubules in different states: towards a mechanistic understanding of dynamic instability," will take place at 2:15 p.m. Monday, April 4, in Room 6B of the San Diego Convention Center.

Kathleen McCann (kathleen.mccann2@nih.gov) earned her Ph.D. in genetics from Yale University. She is now a postdoctoral fellow at the National Institute of Environmental Health Sciences.

ASBMB YOUNG INVESTIGATOR AWARD

Haynes' studies of mitochondrial stress response put him on 'an upward trajectory'

By Bree Yanagisawa

Cole Haynes, assistant member at the Memorial Sloan Kettering Cancer Center, won the American Society for Biochemistry and Molecular Biology's Young Investigator Award for elucidating pathways involved in the mitochondrial stress response.

Though still early in his career, Haynes' work has had a substantial impact on the understanding of the unfolded protein response, or UPR, that occurs in the mitochondria in reaction to stress. In letter supporting Haynes' nomination for the award, F. Ultrich Hartl at the Max Planck Institute of Biochemistry said, "Over a period of a few years, he has established himself as the international leader in the mitochondrial stress response field, an active and medically highly relevant area of research to which he has contributed the most incisive discoveries."

Haynes' research career began in the lab of Antony Cooper at the University of Missouri–Kansas City. Using yeast as a model organism to study stress response pathways in the endoplasmic reticulum ignited Haynes' interests in the UPR and led him to take a postdoctoral research position at New York University School of Medicine. While there, Haynes studied the role of the mitochondrial unfolded protein response, or mtUPR, as a mitochondrial stress pathway in another model organism, C. elegans. Though some human components are lacking in this model, Jodi Nunnari at the University of California, Davis, expressed confidence in Haynes' abilities to expand his conclusions from C. elegans to humans. In her letter of support for his nomination, Nunnari said the now Haynes "is making excellent progress identifying the human counterparts (of the mtUPR), which will have a major impact on the field."

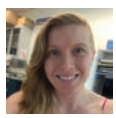
I am certainly honored and thrilled that our work on the mitochondrial UPR is being honored by the ASBMB with the Young Investigator Award. I am grateful to many including my laboratory members as well as those in the mitochondrial and stress response communities that make these areas of research so exciting.

– COLE HAYNES

In 2010 in the journal Cell, Haynes identified the activation of ATFS-1, a previously unexplored transcription factor that accumulates in the nucleus in response to stress. This accumulation triggers existing UPR pathways that in turn signal to the mitochondria that the cell is stressed. In more recent work, Haynes showed that not only is ATFS-1 important in the mtUPR response, but it also illustrates a completely novel method of gene regulation. ATSF-1 functions as a transcription factor in two separate locations within the cell: the nucleus and the mitochondria. These findings are fascinating on their own, and they may hold further value as potential therapeutic targets. Nunnari cited the potential of Haynes' work to both "provide much greater insight into diseases" and identify "new therapeutic approaches." As a result, she says, "while (Haynes) has already contributed seminal work, his laboratory remains on an upward trajectory."

Beyond his many scientific accomplishments, supporters praise Haynes' personability and desire to educate others. In her nomination letter, Marilyn D. Resh at Memorial Sloan Kettering Cancer Center cited Haynes' active involvement in graduate school teaching and mentoring and said he is a popular invited speaker for national and international meetings and seminars. Nunnari also praised Haynes for being "a real delight to spend time with in general," explaining that his dry wit helped him easily transition from a colleague to a friend.

Haynes' award lecture, "Adaptations to mitochondrial dysfunction via interorganelle communication," will take place at 4 p.m. Monday, April 5, in Room 6D of the San Diego Convention Center.



Bree Yanagisawa (breannwoelfel@gmail.com) is a graduate student at the Johns Hopkins School of Medicine and managing editor of the Biomedical Odyssey blog.

WALTER A. SHAW YOUNG INVESTIGATOR AWARD IN LIPID RESEARCH

Ejsing's mass spec work 'will be essential for further progress in the field'

By Preethi Chander

Christer Ejsing, associate professor at the University of Southern Denmark, is the recipient of the 2016 Walter A. Shaw Young Investigator Award in Lipid Research from the American society for Biochemistry and Molecular Biology. The award recognizes outstanding research contributions in the area of lipids by a young investigator who is an assistant professor (or equivalent) and has had no more than 10 years of experience since receiving a Ph.D. or MD.

Ejsing's research focuses on the development and application of mass spectrometry to understand how lipid metabolism is regulated on a global scale. He successfully has applied shotgun mass spectrometry methods to high-throughput lipidomics to characterize comprehensively the yeast lipidome — the first such analysis in a eukaryotic cell. Using this technique, Ejsing and collaborators also were able to describe lipid sorting during vesicle biogenesis in living cells. This is a feat that previously had been impossible with existing technologies.

On the experimental side, Ejsing has developed a new surface sampling method that streamlines lipid extraction for tissue imaging by mass spectrometry. On the computational front, he has created an open-source software platform, ALEX, to streamline data processing to extract quantitative lipid data from mass spectrometry data. In his letter supporting Ejsing's nomination for the award, Kai Simons at the Max Planck Institute talks about Ejsing's latest quantitative proteomics work on regulators of the cellular lipidome. Simons describes the work as "a truly impressive advance (that) will be essential for further progress in the field."

I am truly honored and humbled to receive this year's Walter Shaw Young Investigator Award. I am very grateful to my colleagues for the nomination. This award would not have been possible without the support of great mentors and contributions from colleagues, students and our funding agencies.

– CHRISTER S. EJSING

After an early education in Denmark, Ejsing went on to do his Ph.D. and postdoctoral training at the Max Planck Institute in Dresden, Germany. There he developed innovative experimental and computational tools to harness the analytic power of the new generation of mass spectrometers for lipidomics. Since 2009, Ejsing has continued his pioneering work in lipidomics at his own independent laboratory in Denmark. He is also the founding member of the Danish Lipid Research Society and serves on the editorial board of the journal Scientific Data.

In his nomination letter, Vytas Bankaitis at the Texas A&M Health Science Center said, "Christer Ejsing is simply a winner — he is driven, he has exactingly high standards, and he is a 'hard-core' analytical biochemist. In my view, he is at the very top of the young investigator cohort involved in studying lipidomics and is already a pioneer in that field." Tobias Walther of the Howard Hughes Medical Institute and Harvard University is a former Shaw award recipient who also supported Ejsing's nomination and describes him as "a humble and friendly colleague … always helpful," who has "the highest standard for his work."

Ejsing will deliver the award lecture, "Functional lipidomics: from lipid timelines to regulation of metabolic networks," Tuesday, April 5, at 4 p.m. in Room 6F of the San Diego Convention Center.

Preethi Chander (chander.preethi@gmail.com) did her Ph.D. in biochemistry and molecular biology and her postdoctoral work in eye and vision research and is interested in science policy and communications.

DELANO AWARD FOR COMPUTATIONAL BIOSCIENCES

Yeates an 'exceptional structural biologist'

By Jen McGlaughon

Todd Yeates, professor of biochemistry at the University of California, Los Angeles, won the 2016 American Society for Biochemistry and Molecular Biology's DeLano Award for Computational Biosciences for his exceptional contributions to the field of computational structural biology.

The DeLano Award is presented to investigators who develop accessible and innovative computational applications to advance the life sciences. Yeates has developed a number of computational tools widely used by the structural biology community in the areas of protein structure analysis, crystallography, comparative genomics, bioengineering and protein design.

One of Yeates' first major contributions was the computational program ERRAT, which validates the accuracy of protein structures. ERRAT has become a powerful tool for interpreting and refining X-ray crystallography data, is accessed on the UCLA Web server by researchers about 8,000 times per month, and has been cited more than 1,000 times.

Another widely used computational method he developed addresses the complex crystallography problem known as twinning. Twinning is the symmetrical intergrowth of two separate crystals, and Yeates' algorithms for analyzing these problematic crystals can be found in a multitude of available software programs. Exemplifying a key element of the DeLano Award, Yeates made the algorithms available to the community long before they were included in software packages.

Additional computational methods developed by Yeates and made accessible to the community include tools for making functional predictions about proteins from genomic data. These have had broad impacts on the field of comparative genomics, and the original paper on protein phylogenetic profiles has received more than 1,700 citations.

It is a special honor to be recognized by an award named for someone who made such a broad impact at the intersection of molecular biology and computing. Warren DeLano's vision to help others understand and appreciate macromolecular structure is an enduring legacy.

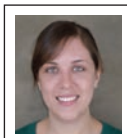
– TODD O. YEATES

Yeates received his Ph.D. in biochemistry from UCLA in the lab of Douglas Rees, where he played a key role in determining the crystal structure of the Rhodobacter sphaeroides photosynthetic reaction center. Rees wrote in his letter of support for Yeates' nomination of the award that Yeates is an "exceptional structural biologist with a unique focus on theory, experiment and computation." Yeates went on to complete his postdoctoral fellowship at The Scripps Research Institute, where he was later made an adjunct professor. In another letter of support, his Scripps colleague Ian Wilson said that Yeates' "teaching of the most complex subjects in crystallography and structural biology is exceptionally clear and profound" and that he considers Yeates the "go-to guy" for difficult protein structure determination or analyses.

Yeates continues to develop innovative and novel computational approaches to address issues in structural biology. His most recent work involves designing proteins that self-assemble into complex structures, such as cubic cages. As David Eisenberg at UCLA stated in his nomination letter, this work "will surely propagate and lead to a major long-term impact on the area of biodesign and nanobiotech."

Eisenberg goes on to say, "Yeates' work stands out with respect to its diversity, originality and impact," and Wilson praises Yeates for his pursuit of discovery with "tremendous imagination and flair." By sharing "his programs, advances and insights freely the community," Wilson adds, "all our research can be advanced, improved and accelerated."

Yeates' award lecture, "Symmetry and computational methods in the design of self-assembling protein materials," takes place at 3:15 p.m. Monday, April 4, in Room 6B of the San Diego Convention Center.



Jen McGlaughon (jla254@cornell.edu) is a graduate student in the molecular biology and genetics department at Cornell University.

BERT AND NATALIE VALLEE AWARD IN BIOMEDICAL SCIENCE

Nobelist Sancar 'an essential figure' in DNA repair

By Alexandra Taylor

Aziz Sancar at the University of North Carolina School of Medicine, a 2015 Nobel prize winner, won the American Society for Biochemistry and Molecular Biology's Bert and Natalie Vallee Award in Biomedical Science for his research on a type of DNA repair called nucleotide excision repair and the enzyme photolyase, which lead him to study the circadian clock. Both areas have implications for cancer prevention and treatment.

The award was established by the Bert and N. Kuggie Vallee Foundation in 2012 to recognize established scientists with outstanding accomplishments in basic biomedical research.

In his recommendation letter for Sancar, Jerard Hurwitz at the Sloan-Kettering Institute says, "Dr. Sancar's work has focused on the molecular mechanism of DNA damage repair, initially studied in E. coli and now in mammalian cells. His laboratory has also studied the circadian clock system, which depends on the photolyase system in lower forms and cryptochromes in higher eukaryotes. These somewhat disparate research efforts, primarily through Dr. Sancar's work, have been linked together since the cryptochrome system acts as a repair system in higher eukaryotes."

Paul Modrich at the Howard Hughes Medical Institute and Duke University, who has collaborated with Sancar on several papers and who was a co-winner of the 2015 Nobel, supported Sancar's nomination for the ASBMB award. He says, "Aziz Sancar's contributions to the DNA repair field are legendary. I can think of no one more worthy of the Vallee Awards in Biomedical Science."

(In December 2015, Sancar, Modrich and Tomas Lindahl, at Clare Hall Laboratory at the Francis Crick Institute, received the Nobel Prize for chemistry for their contributions to the field of DNA repair.)

I am honored to receive the Bert and Natalie Vallee Award and dedicate it to my Ph.D. mentor C.S. (Stan) Rupert who discovered DNA repair and to the students and postdocs who have worked in my lab for the past 33 years to understand the mechanisms of DNA repair.

– AZIZ SANCAR

Sancar "always impressed me by his intensity in pursuing his research goals, by his drive towards clarifying biochemical processes to the last detail, and by his highly infectious enthusiasm for research," writes Johann Deisenhofer at the University of Texas Southwestern Medical Center in his recommendation letter. He credits Sancar as "an essential figure in making DNA photolyases the 'best understood enzymes.'"

Sancar also was nominated for the award by Judith Bond at Penn State University and Henrik Dohlman at UNC, Chapel Hill, who say he "has provided valued service to our community. He has trained over 50 graduate students and postdoctoral fellows and hosted many international visiting scientists to his laboratory. He and his wife founded a Turkish cultural center near the UNC campus, as well as the Aziz and Gwen Sancar Foundation for educational and charitable purposes to increase understanding of Turkey, and to promote closer ties between the United States and Turkey."

Sancar earned his medical degree from the Istanbul University School of Medicine in Turkey and studied at Johns Hopkins for a year and a half on a NATO fellowship. The fellowship was distributed on the basis of merit to students who wished to pursue advanced degrees in science and technology in NATO countries. Sancar later earned his Ph.D. in molecular biology from the University of Texas at Dallas, where he conducted research under C.S. Rupert, who discovered the enzyme photolyase in 1958. During his postdoctoral fellowship at Yale University, Sancar invented a simple method for identifying plasmid-encoded proteins in E. coli, known as maxicells. He began teaching biochemistry and conducting research at UNC, Chapel Hill, in 1982. In 1997, he was named the Sarah Graham Kenan distinguished professor, a position he still holds today. Sancar was elected to the American Academy of Arts and Sciences in 2004 and the National Academy of Sciences in 2005.

Sancar's award lecture will take place at 8:55 a.m. Tuesday, April 5, in Room 6B of the San Diego Convention Center.

Alexandra Taylor (alexandraataylor@gmail.com) is a master's candidate in science and medical writing at Johns Hopkins University.

ASBMB–MERCK AWARD

Breaker 'vastly expanded our appreciation of the versatility of noncoding RNAs in biology'

By Nicole Parker

Ronald R. Breaker, of the Howard Hughes Medical Institute and Yale University, has won the 2016 American Society for Biochemistry and Molecular Biology–Merck Award. The award recognizes outstanding contributions to research in biochemistry and molecular biology.

Breaker has done pivotal work establishing the importance of ligand-binding RNAs in biology. He discovered and characterized more than 20 natural allosteric RNAs, called riboswitches, and showed that they demonstrate complex behavior, melding cooperative binding, dual ligand binding and intrinsic catalytic activity. In addition, he engineered the first examples of RNA switches and enzymes made of DNA. His group's development of key bioinformatics tools also paved the way for the discovery of numerous functional noncoding RNAs that are essential for bacterial survival.

In his letter nominating Breaker for the award, Thomas Pollard at Yale recounted Breaker's many discoveries, including riboswitches. "Breaker and his co-workers independently discovered and studied 24 of the 25 classes of metabolite-binding riboswitches reported to date," Pollard said. Riboswitches are regulatory segments of a messenger RNA molecule that can bind a small molecule, thereby changing the expression of the protein encoded by the mRNA.

As a result of selective binding to small molecules like co-enzymes, amino acids and ions, riboswitches control the expression of many key metabolic genes in all types of organisms.

Breaker and his group not only discovered riboswitches but identified that they are structurally complex and can function as cooperative or tandem "digital" switches, co-factor-mediated ribozymes and allosteric ribozymes. In addition, most riboswitches operate in the absence of proteins and as a result played a role in how our early ancestors were able to regulate complex biological processes prior to the evolution of proteins.

The scope of noncoding RNAs is vast, and it is so rewarding to work with a research team that brings many skills to bear. Our explorations require approaches ranging from bioinformatics and genetics to biochemistry and synthetic chemistry — which would exceed the abilities of any one person.

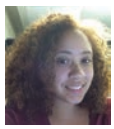
– RONALD R. BREAKER

Before the discovery of riboswitches, the Breaker group used directed evolution to create the first examples of engineered RNA switches and catalytic DNAs. As a result of his work, a field of RNA switch engineering has emerged, and the switches now are used as biosensors and as designer gene control elements in synthetic biology experiments. Their creation of the first catalytic DNAs led to the discovery that enzymes made of DNA or RNA can exploit cofactors to increase their catalytic power just like protein enzymes. This work validated DNA as the third natural polymer with enzymatic activity.

Breaker's work has established that riboswitches are in bacterial pathogens and can serve as antibacterial drug targets. His work also has established theoretical speed limits for various catalytic strategies by proteins, RNAs and DNAs. According to Pollard, "These studies using biochemical and molecular biological methods by Ron Breaker and his colleagues vastly expanded our appreciation of the versatility of noncoding RNAs in biology."

Breaker has a bachelor's degree in biology with a chemistry minor from the University of Wisconsin, Stevens Point, and a Ph.D. in biochemistry from Purdue University. He is a Howard Hughes Medical Institute investigator, and his honors include election to the National Academy of Sciences and the Eli Lilly Award from the American Society of Microbiology. He holds several patents for his discovery of riboswitches and methods for their use as well as nucleic acid catalysts.

Breaker's award lecture, "Prospects for noncoding RNA discovery in bacteria," will take place at 2 p.m. Tuesday, April 5, in Room 6B of the San Diego Convention Center.



Nicole Parker (nparke11@jhu.edu) is completing her Ph.D. in biochemistry and molecular biology at the Johns Hopkins School of Public Health.

HERBERT TABOR RESEARCH AWARD

Roeder 'a consumate biochemist and absolute perfect fit' for the honor

By Aditi Dubey

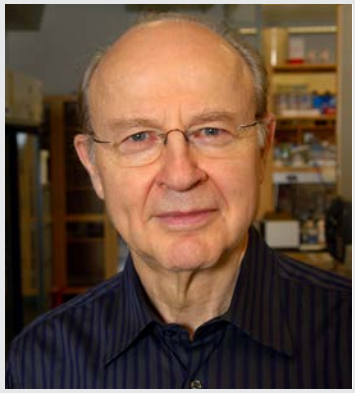
Robert G. Roeder, head of the Laboratory of Biochemistry and Molecular Biology at The Rockefeller University, won the Herbert Tabor Research Award for his pioneering work on eukaryotic transcription initiation.

The Tabor award recognizes outstanding scientific accomplishments, excellence in biological chemistry and molecular biology, and significant contributions to the community of scientists. The award is named after the Journal of Biological Chemistry's longtime editor.

Roeder's accomplishments include the identification of three distinct nuclear RNA polymerases, development of cell-free in vitro transcription initiation assays, and the characterization of dozens of proteins involved in transcriptional initiation and its regulation by gene-specific factors. His work also has played a significant role in elucidating the importance of histone and chromatin modifications for the regulation of transcription factor activity and, in turn, gene expression. A leader in this field, Roeder is known for his exceptional dedication and scientific rigor.

In support of Roeder's award nomination, Stephen Buratowski at Harvard Medical School says, "There are very few people who can justifiably claim to have given birth to an entire field of research, and even fewer who can remain at the cutting edge of that field for four decades. Bob Roeder is one of those rare individuals … Much of what undergraduates learn in basic molecular biology textbooks traces back directly to his work."

Roeder hails from Boonville, Ind. He completed a Ph.D. in biochemistry at the University of Washington while in the laboratory of William J. Rutter. There he discovered and worked on various forms of RNA polymerases found in eukaryotic organisms. He did his postdoctoral work with Donald D. Brown at the Carnegie Institution of Washington and thereafter continued to work on the isolation and functional characterization of RNA polymerases and to demonstrate accurate transcription of specific genes with purified enzymes and associated factors isolated from cellular extracts. At Washington University School of Medicine, and now at Rockefeller, Roeder has researched the most fundamental aspects of eukaryotic transcription mechanisms, as well as regulatory factors implicated in cell growth and differentiation, oncogenesis and homeostasis.



Given my personal admiration of Herb Tabor for his lifelong scholarly biochemical research and profound contributions to the scientific community through his dedication to the JBC and the ASBMB, it is a distinct and immeasurable honor to receive the Herbert Tabor Research Award. And while this award is personally rewarding in view of my own 45-year devotion to the arts and pleasures of biochemistry and molecular biology, I hope it will continue to serve as inspiration for others, including my many trainees, to pursue excellence in these disciplines.

– ROBERT G. ROEDER

"Our understanding of the absolutely central biological events of primary RNA transcript initiation and the enormously complicated set of proteins involved in regulation of initiation has profited more from the work of Robert G. Roeder than any other scientist in the world," says James E. Darnell Jr., emeritus professor at Rockefeller in his letter nominating Roeder for the award. "Having known Herb Tabor at a distance when I was in Harry Eagle's lab in 1956–60, I admired him greatly and am very pleased for my very great friend Roeder."

A member of the National Academy of Sciences since 1988, Roeder has won the 2003 Albert Lasker Award for Basic Medical Research, the 2010 Salk Institute Medal for Research Excellence, the 1999 General Motors Cancer Research Foundation's Alfred P. Sloan Prize (shared with Tjian), the 2000 Gairdner Foundation International Award and the 2002 ASBMB–Merck Award (shared with Roger Kornberg), the 1986 National Academy of Sciences U.S. Steel Award in Molecular Biology, the 1999 Louisa Gross Horowitz Prize (shared with Robert Tijian and Pierre Chambon), and the 2012 Albany Medical Center Prize in Medicine and Biomedical Research (shared with Darnell).

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Steven McKnight at the University of Texas Southwestern Medical Center at Dallas and president of the ASBMB, says of Roeder, "He has done more to elucidate the mechanisms controlling transcription in eukaryotic cells than any person in the world, dead or alive … Bob is a consummate biochemist, an absolute perfect fit for the Tabor award. Very much like Herbert Tabor, Bob is impeccably honest and unusually humble and understated relative to the enormous impact of his science."

Roeder's award lecture, "Eukaryotic transcription mechanisms: from nuclear RNA polymerases to general initiation factors, gene-specific activators, coactivators and chromatin," takes place at 6p.m. Saturday, April 2, in Room 20 B/C of the San Diego Convention Center.

Aditi Dubey (dubeyad@nyu.edu) is a postdoctoral associate at New York University studying mechanisms of placode development in Xenopus.

HERBERT A. SOBER LECTURESHIP

Sligar lauded for nanodisc disovery and generosity

By Kristian Teichert

Stephen Sligar at the University of Illinois, Urbana–Champaign won the American Society of Biochemistry and Molecular Biology's Herbert A. Sober Lectureship for his discovery, development and use of nanodisc technology. The Sober lectureship recognizes outstanding biochemical and molecular biology research, with a special emphasis on the development of methods and research techniques.

A significant portion of Sligar's research encompasses membrane-bound proteins, such as cytochrome P450, which is involved in critical activities such as hormone synthesis. According to Robert B. Gennis at the Illinois, Urbana, who nominated Sligar for the lectureship, researchers who study membrane proteins long had been faced with the lack of a "simple and reproducible procedure for isolating these systems in a monodisperse and functional form." Simply put, it was extremely difficult to isolate the proteins in order to study them.

While studying human high-density lipoproteins, Sligar was struck by their discoidal shape and thought that perhaps by self-assembling membrane proteins into the bilayers he could create a situation where the membrane protein was in its native environment and the entire entity was soluble in solution. These assemblies consist of small lipid discs held together by a scaffold protein — a derivative of apolipoprotein A1. By properly controlling the stoichiometry, single-membrane proteins can be embedded in the discs. Additionally, the size of the discs can be controlled by engineering different lengths of the scaffold protein.

Progress in scientific discovery requires two major pieces. One is the innovative idea that brings new perspective to a perplexing problem. Equally important is the technological infrastructure to bring the thought to reality. When we discovered the self-assembly of membrane proteins into nanodiscs over 10 years ago, we initially thought of this as an immediate solution to a roadblock in our own work. The broad applicability, however, has moved us into completely new research areas such as cancer signaling — the most exciting and fulfilling aspect of academic research!

– STEPHEN G. SLIGAR

This format allows researchers to circumvent challenges such as solubility and functionality and proceed with studies of the structure and mechanistic determination of the proteins. In his letter of support for Sligar's nomination for the award, Joshua Wand at the University of Pennsylvania says, "The nanodisc is literally revolutionizing access to details of integral membrane protein structure, dynamics and function." Even more to his credit, Sligar freely distributed each construct and component of the nanodisc system to anyone who asked for it.

While a remarkable achievement, Sligar's revolutionary insight did not begin with nanodiscs. In studying cytochrome P450, Sligar noticed that specific, site-directed mutants would be instrumental in further understanding the mechanisms of this protein.

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William Atkins at the University of Washington says that, in a time before recombinant protein production was a common activity, Sligar "exploited the power of molecular biology and became the first to utilize synthetic gene technology for any heme protein with a codon-optimized, restriction site optimized" gene. These manipulations allowed for simplified mutagenesis and high expression of proteins, such as rat cytochrome b5 in bacteria. As with the nanodisc system, Sligar distributed both wildtype and mutant constructs of rat cytochrome b5 freely.

This technology later was used to generate recombinant sperm whale myoglobin, human hemoglobin and the HIV protease. Truly a milestone in the field of biochemistry, recombinant DNA technology has allowed researchers to generate quantities of proteins required for biophysical analyses, such as crystallography or nuclear magnetic resonance studies.

Sligar received his undergraduate degree in physics from Drexel University in Philadelphia. He then pursued both a master's and Ph.D. in physics at Illinois. Sligar continued his postdoctoral training in biochemistry at the University of Illinois, Urbana, and began his independent academic career at Yale University. He returned to Illinois in 1982 and is now a tenured professor in the biochemistry department.

Sligar's award lecture, "Revealing the structure and function of membrane proteins through nanotechnology," will take place at 3:10 p.m. Tuesday, April 5, in Room 6B, of the San Diego Convention Center.

Kristian Teichert (Teichert.k@husky.neu.edu) is a biochemistry student at Northeastern University.

RUTH KIRSCHSTEIN DIVERSITY IN SCIENCE AWARD

August 'unselfish proponent of access to STEM careers'

By Allison Frick

Avery August, professor of immunology and chair of the department of microbiology and immunology at the Cornell University College of Veterinary Medicine, won the 2016 Ruth Kirschstein Diversity in Science Award for his advocacy and mentoring of underrepresented minorities in the sciences.

The award honors outstanding scientists who are committed to helping underrepresented minorities enter the scientific enterprise and thrive within it. August was selected as this year's winner by the American Society for Biochemistry and Molecular Biology's Minority Affairs Committee.

Throughout his career, August has been an advocate for underrepresented minorities. He established the Bridges to the Doctorate Program at Pennsylvania State University. Funded by the National Institutes of Health, the program helps students from Alcorn State, a historically black college, matriculate into doctoral programs at Penn State. August also obtained funding from the Alfred P. Sloan Foundation's Minority Ph.D. Program to recognize Cornell as a Sloan University Center of Exemplary Mentoring. The MPHD program supports students who self-identify as African-American, Hispanic or American Indian/Alaska Native and are pursuing doctorates in engineering, the physical and natural sciences, or mathematics. August's mentorship achievements at Cornell extend to the university's Broadened Experiences in Scientific Training program. As a primary investigator for BEST, Avery researches ways for graduate students and postdoctoral fellows to get experiences that will prepare them for career opportunities beyond traditional positions in academia.

Ruth Kirschstein was a huge advocate for diversity at the National Institutes of Health. So to be considered even worthy of being considered in that company is just a huge honor for me.

– AVERY AUGUST

August says he wants to create an easier path for the next generation of underrepresented minorities in science. "I've been really, really lucky … to have gotten help from people who came before me … Seeing the paucity of scientists of color in meetings, in the academy, in the industry … that really drives me," he says.

When August was 16 years old, he immigrated to Los Angeles from Belize with his mother and siblings. He says he soon was bored at his L.A.

high school and didn't want to wait to study more advanced material. Against a school counselor's advice, August dropped out of high school in his junior year and took and passed the General Education Development tests. He went on to community college and later earned a bachelor's degree in medical technology at California State University, Los Angeles. This was followed by a Ph.D. in immunology from Weill Cornell Graduate School of Medical Sciences. He was a distinguished professor of immunology and director of the Center for Molecular Immunology and Infectious Disease at Penn State before accepting his current position at Cornell.

August says he keeps a framed copy of his GED in his office because it represents the start of his academic journey and is a reminder that he didn't let someone else's opinion stop him from paving his own road to success.

"That GED has just opened the door for so many things for me," said August. "It opened the door for me to go to community college, and that opened the door for me to go to California State University, which opened the door for me to go to Cornell."

August's honors include plenary lectureships at the Annual Biomedical Research Conference for Minority Students in 2005 and 2014 and the 2014 E. E. Just Lecture Award from the American Society for Cell Biology, which recognizes outstanding scientific achievement by a minority scientist.

In his letter nominating August for this award, Squire Booker, at Penn State, says, "(August) is an outstanding biochemist/molecular biologist, an outstanding teacher and mentor, an outstanding leader, and an unselfish proponent of access to STEM careers by underrepresented minorities."

By studying immune system cells and the enzymes that control the activation of these cells, August seeks to understand how the immune system takes on invading infections and allergens, how allergies and asthma develop, and how symptoms can be reduced or prevented. His team already has found that when specific enzymes, Tec family tyrosine kinases, are targeted in mice, the mice do not develop asthma or allergies.

August's award lecture, "Chemical genetic analysis of mast-cell activation," will take place at 2:40 p.m. Sunday, April 3, in Room 6B of the San Diego Convention Center.

Allison Frick (africk@asbmb.org) is the ASBMB's print and digital media specialist.

WILLIAM C. ROSE AWARD

Baserga honored for work on ribosomes and commitment to teaching and mentoring

By Mariana Figuera–Losada

Susan J. Baserga, professor of molecular biophysics and biochemistry, genetics and therapeutic radiology at Yale University, is the winner of the American Society for Biochemistry and Molecular Biology's William C. Rose Award for her valuable contributions to ribosome biogenesis research and her dedication as a teacher and a mentor. Joan Steitz and Karla Neugebauer at Yale nominated Baserga for the Rose award, which is given to scientists who have made outstanding contributions to biochemical and molecular biology research and have a proven commitment to the education of younger scientists.

Baserga has a long-standing interest in fundamental aspects of ribosome biogenesis, the nucleolus, human diseases of making ribosomes (ribosomopathies) and the impact of ribosome biogenesis on cell growth, cell division and cancer. Her work established the small subunit (or SSU) processome as the large ribonucleoprotein required for processing and assembly of the small ribosomal subunit. She continues to study 17 new proteins first described in a 2002 report in the journal Nature, to define their role in making ribosomes as part of a large RNA–protein complex. Mechanistically, Baserga was the first to show that nucleolar RNA helicase activity was regulated by protein co-factors and demonstrated RNA-bind-

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Utterly surprised, utterly grateful, utterly happy to be doing science!

– SUSAN J. BASERGA

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ing protein Esf2 activation of Dbp8 ATPase activity in vitro. Furthermore, she proposed the Utp24 protein as a pre-rRNA cleavage enzyme for the first time. In collaborative work, she has studied the effect of lack of ribosome biogenesis on the cell cycle and of deubiquitination on ribosome biogenesis. Recent work includes a collaborative publication with crystallographer Traci Hall of the National Institute of Environmental Health Sciences on a novel fold in the RNA-binding protein Puf-A/Puf6.

Baserga has published key initial studies on the molecular pathogenesis of North American Indian Childhood cirrhosis as a potential disease of ribosome biogenesis. Because of the increasing number of ribosomopathies that are being described, almost all of which are congenital diseases, Baserga has moved recently to the study of ribosome biogenesis in embryonic development in fish, with collaborator Pam Yelick of Tufts University, and frogs, with collaborator Mustafa Khokha of the Yale University School of Medicine. To recapitulate the phenotypes of these ribosomopathies and to study their molecular basis, the Baserga lab uses yeast and human cell lines as well as animal models and has established a bench-to-bedside connection fundamental for the advancement of biomedical research.

In his letter of support for Baserga's nomination for the award, Joseph G. Gall at the Carnegie Institution of Science wrote, "Susan is not afraid to tackle difficult molecular problems. She has been unusually successful in elucidating the complexities of RNA-based cellular machines and the way they control everything from transcription and transcript processing to translation by the ribosome." Jonathan Warner at Albert Einstein College of Medicine also supported Baserga's nomination, writing "She had the insight to select an important problem and to pursue it from a variety of angles, digging deeper and deeper, learning new and important facts leading to new and important concepts."

At Yale, Baserga is a driving force for education at the undergraduate, graduate and postgraduate levels. She chairs the Beckman Scholars Program, which funds research for Yale undergraduates, and has served on the steering committee of the Howard Hughes Medical Institute Undergraduate Science Program; her school's Teaching Support Committee; and the Undergraduate Advisory Committee of the Science, Technology and Research Scholars Program. The latter supports underrepresented minorities and economically underprivileged students studying science, technology, engineering and medicine.

Baserga also has been the associate director of Yale's M.D./Ph.D. program and was a member of the National Institute of General Medical Sciences study section for training-grant review. She is the program director for the largest graduate training grant at Yale (in cell and molecular biology), is the director of medical studies and has been the course director for the medical student biochemistry course since 2002. In 2014, Baserga won the Charles W. Bohmfalk Prize for teaching in the basic sciences.

Baserga earned her bachelor's and master's degrees at Yale, a medical degree at the Yale School of Medicine and a Ph.D. from Yale's department of human genetics. She was an assistant professor at the Yale School of Medicine and has been a professor in the departments of molecular biophysics and biochemistry, genetics, and therapeutic radiology at the same institution since 2007.

Baserga's award lecture, "When good ribosomes go bad," is scheduled for 2:35 p.m. Tuesday, April 5, in Room 6B of the San Diego Convention Center.

Mariana Figuera–Losada (fmariana@hotmail.com) is an associate scientist at Albert Einstein School of Medicine in the Bronx.

ASBMB AWARD FOR EXEMPLARY CONTRIBUTIONS TO EDUCATION

Brenner is devoted to 'cutting-edge education' and serving the biomedical community

By Samarpita Sengupta

Charles Brenner, professor and head of the biochemistry department at the University of Iowa, won the 2016 American Society for Biochemistry and Molecular Biology Award for Exemplary Contributions to Education. The award recognizes those who encourage effective teaching and learning of biochemistry and molecular biology through their own teaching, education leadership, research, mentoring, writing or public enlightenment.

Debra Schwinn of the University of Iowa, who nominated Brenner for the

award, says that Brenner exemplifies commitment to "cutting-edge education" by going above and beyond to ensure that educational opportunities are broadened for students. At Iowa, he helped develop a new semester-long biochemistry course for first-year dental students that builds on their undergraduate training in biochemistry. In addition to teaching undergraduate biochemistry, he helped craft a program that allows biochemistry postdocs to be appointed instructors of a biochemistry laboratory course for a semester.

Brenner's most recognizable contribution to education is in the area of premedical education. When the Association of American Medical Colleges began the planning process to revise the Medical College Admission Test, it became clear that core competencies in biochemistry would be required for premeds. However, the AAMC made no recommendations about the courses or educational structures necessary for students to attain these competencies. Brenner realized that about 500,000 U.S. college students a year begin their studies as premeds, such that curricular changes could have a profound effect on many more students than the approximately 20,000 that annually matriculate in medical schools. In March 2012, Brenner and Dagmar Ringe of Brandeis University published premedical curriculum recommendations in ASBMB Today that were endorsed by many leading biochemists. Additionally, in peer-reviewed articles in the journal Biochemistry and Molecular Biology Education and the Journal of Chemical Education, Brenner advocated for a rigorous grounding in genetics, chemical reactivity and biochemistry and the inclusion of data analysis in laboratory courses. These changes are expected to improve medical preparation and benefit the multitude of students who begin in premedical tracks and end up doing something else.

Since moving to Iowa, I have had the pleasure of teaching metabolism to undergraduates and engaging with fellow educators in chemistry and biology, and in graduate, medical, physician assistant, dental and pharmacy programs. While there is always some inertia and there are the challenges brought by more students and limitations of resources, I have been pleased to see undergraduate institutions adapt to meet student needs and that some medical and professional schools continue to understand that biochemistry has not simply become an undergraduate subject. It is a language and a set of tools that researchers, educators and people in the health professions use to understand health and disease. There is still much work to be done to focus the premedical chemistry curriculum on the organic chemistry of functional groups, to improve our students' understanding of statistics and genetics, and to ensure that biochemical understanding is extended en route to medical, dental and pharmacy degrees. I appreciate the support of ASBMB in helping to spread these messages.

– CHARLES BRENNER

Brenner is also active in science outreach. Brenda Schulman of St. Jude's Children's Research Hospital and a member of the ASBMB Council, whow wrote in support of Brenner's nomination for the award, notes that Brenner "champions raising general interest in molecular biology and biochemistry through what I can best describe as 'fun' content in ASBMB."

Brenner received his Ph.D. with Robert Fuller at Stanford University. After postdoctoral training with Gregory Petsko at Brandeis, he began his independent academic career at Thomas Jefferson University before moving to Dartmouth University and finally to Iowa. Brenner has served as chairman of the ASBMB Publications Committee and currently chairs the editorial advisory board of ASBMB Today. Milestones of Brenner's research include the discovery of the eukaryotic nicotinamide riboside kinase pathway and dissection of the roles of DNA methylation and demethylation in the epigenetic regulation of tumor suppressor genes.

Brenner's award lecture, "Biochemistry and molecular biology education in a transforming academy and a molecular world," will take place at 12:30 p.m. Sunday, April 3, in Room 6B in the San Diego Convention Center.

Samarpita Sengupta is a scientific research writer in the neuroscience research development office at the department of neurology and neurotherapeutics at the University of Texas Southwestern Medical Center.

Chasing the North American dream

By Eleftherios P. Diamandis

On a warm October day in 1986, I boarded a jumbo jet in Athens, Greece, with my wife, my 5-year-old daughter and my 3-year-old son. It had been only a week since I had finished my medical degree at the University of Athens, and my wife and I, both of us Greek natives born on the island of Cyprus, had chosen to leave our country behind. We were bound for a new life in Toronto.

Why did we make such a choice? At the time, both my wife and I held tenured positions as assistant professors at the University of Athens, and our decision to give them up and chase the North American dream seemed crazy to everyone we knew in Athens. But our motivations were clear to us.

The financial troubles Greece is facing today were not much different in 1986. At the time, the university was offering us a research budget of $100 per year and no other opportunities to apply for competitive funding. To do our research, we used to look around and see which reagents were available, then plan our experiments. It was very clear that real research was going to be impossible under such conditions. We felt we had no other choice; if we wanted to stay in the field and our research to thrive, we had to go somewhere else.

In between my medical studies in Athens, I'd taken two years off to train as a clinical biochemist in Toronto. During that time, I'd met a lot of people who expressed interest in employing my wife and me, were we to come back.

Looking back at this move after 30 years, I can cite a lot of positives. But more interesting to me now are the many difficulties we faced that I had not anticipated when we made the decision to go.

The successes

We were a professional success in Toronto. I ascended to the highest ranks of academia, opened a research lab and published extensively. My wife still enjoys her work as a senior scientist at a major hospital. Along with our professional accomplishments came financial success.

In 1974, while in Greece and Cyprus, we tasted the bitterness of a war that had exploded between the Greek and Turkish Cypriots, severing Cyprus into two and turning half of the Greek Cypriot population into refugees. During this period, I was called to the army, and I saw firsthand that the wildest animal on Earth is a man at war. Our transition to Canada immediately relieved our family of the mishaps of a war that continued on for years after we left.

Being an academic that worked abroad also gave me a lot of prestige in my native country, and my wife and I started getting invitations to give lectures and act as consultants for the government. We received awards, including corresponding membership to the prestigious Academy of Athens.

When we came to Canada, our thinking was rather simplistic. We would concentrate on our professional success and our family. At first, as we worked hard to become established, we didn't pay attention to the issues of acculturation that were slowly but steadily arising for all of us.

Living outside of your natural habitat

In our native Cyprus, the winters were short and mild. When we wanted to see snow, we had to wait until January and then take an excursion from our village to the highest mountain in the country. When we arrived in Toronto, we thought we would grow accustomed to the colder weather and it would not become an issue for us. Unfortunately, acclimatizing is not as easy as it sounds. I now think that the human brain is wired to live in its natural habitat and that some of our brain circuitry malfunctions under totally different environmental conditions. Immigrants are known to suffer from anxiety disorders much more frequently than native populations, and I now believe that vastly different weather and other foreign stressors can render the unprepared brain vulnerable to psychological disorders.

Typically sunny day near the beach in Protaras, Cyprus.

The Toronto skyline in winter. WIKIMEDIA USER JOHN VETTERLI

Family disconnect

When we left Cyprus, we left behind our aging parents and many siblings. Our children have grown up deprived of interaction with their grandparents and vice versa. In our culture, staying close to your immediate family is the norm. Immigration to a distant country is painful for those who leave and for those who stay. The situation becomes more difficult as time goes by, because even if you visit regularly, you often cannot be home in times of need.

Friends and community

Immigrants initially try hard to establish themselves and often do not have much time to develop friendships and participate in community activities. Many immigrants also tend to want to stick together but can have a hard time finding others from their home countries and ultimately develop only limited circles of friends.

Culture

We came from a country rich with history and culture. But we've found it is extremely difficult to preserve our culture in a large and mixed society. Somebody told us that second-generation immigrants who cannot speak their native language can no longer preserve their culture, and we find this to be true. To try to counter this loss early on, we enrolled our children in Greek school on Saturdays and Sundays. Naturally they rebelled, insisting weekends should be about pleasurable activities, not schooling to catch up with your parents' culture. We have now accepted that our culture likely will not be passed on through our children.

Children

When we came to Canada, my two children could not speak English, and the first few years in local schools were a nightmare for them. My son became aggressive because he could not communicate and was frustrated with people talking to him in a language he did not understand. It took a few years for them to get accustomed to all that was different about their new country, and it was tough for us to see them struggling.

When they eventually grew up, we started thinking of their future families. As is customary in our culture, we originally thought that they would marry people from our own nation, but finally we had to agree with them that their best spouses would be the ones they most liked, independent of what our culture suggests.

Epilogue

Our transition from a poor country to a rich and advanced country has been a grand professional and financial success. But I've come to believe that the true measure of success should include the happiness of children, parents and other family and take into account cultural and health issues. When we are young, our focus is mostly on professional and financial goals, and other factors are not anticipated or considered. Would I have made a different decision that October day if I had had to consider everything that my family and I ultimately would go through? I will never know.

Eleftherios P. Diamandis (ediamandis@mtsinai.on.ca) is a professor and head of the clinical biochemistry division at the University of Toronto. He holds an endowed chair in prostate cancer biomarkers at Mount Sinai Hospital and University Health Network in Toronto, Canada.

Research spotlight

A Q&A with University of Arkansas' Clemencia Rojas

By Andrew Macintyre

Tell us about your current career position.

I am an assistant professor in the department of plant pathology at the University of Arkansas in Fayetteville. I use tools from molecular and cellular biology to understand how pathogenic bacteria cause diseases in plants and how plants sense and respond to pathogen threats. The ultimate goal of this research is to contribute to the development and implementation of strategies to counteract the effects of plant diseases in crops. This in turn will lead to improved food production for the growing human population.

Clemencia Rojas

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

Every single experience in my life has contributed to my career. I was exposed to an academic environment early in life. My parents are professors at Colombian universities and instilled in my brother and me a passion for education. They also set very high standards for us, and, as a result, we both wanted to study in the best universities in Colombia and abroad. I attended Universidad de los Andes in Colombia, and two professors recommended me for an internship at the International Center for Tropical Agriculture in Colombia. That experience was fundamental to shaping my career path, because my project involved working with a fungal pathogen that causes disease in rice. Our main collaborator in that project, Morris Levy, invited me to work in his lab at Purdue University as a research assistant. While I was working at Purdue, I took graduate-level classes and later obtained a master's degree in genetics. I decided to continue with my Ph.D. and was admitted to Cornell University, where I studied a bacterial pathogen that causes rot in a wide range of plants. To complete my training, I joined the Samuel Roberts Noble Foundation and worked with Kiran Mysore to investigate how plants defend against pathogens. Having expertise in both pathogen strategies to cause disease and plant defense responses gave me enough confidence to establish my own lab.

How did you first become interested in science?

One day, when I was about 8 years old, I saw on TV a cartoon about a man in a white lab coat mixing things in a lab with smoke coming out of some test tubes. I thought that looked pretty cool, and from then on I wanted to be a chemist. However, because my target university for undergraduate studies did not offer a chemistry degree, I decided to join the microbiology program, which

required taking chemistry classes every semester. In the second semester, while taking my first bacteriology class, I observed bacteria under the microscope, and I was in awe. I fell in love with the field of microbiology and continued pursuing it.

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

I am a very positive person, and hence I don't consider any of my bad experiences as failures. In one way or another and in retrospect, all of the difficult experiences and the consequences of my bad choices have had positive outcomes. Of course, living through them was not fun, but I tried to remain in control, considered all the scenarios, asked for advice and made rational rather than emotional decisions.

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

Regardless of background, science is a very competitive field, and average performance is out of the question. You have to be committed to everything you do, strive for excellence and challenge yourself to come out of your comfort zone. If you feel your background is a limitation, seek mentors; you will be surprised to find that a lot of people are very generous and willing to give advice and help.

What are your hobbies?

Spending time with my family.

What was the last book you read?

I do not have time for leisure reading, but my 9-year-old son introduced me to Rick Riordan's "Percy Jackson & the Olympians" and "The Heroes of Olympus." I was hooked on these books, and so they became my leisure reading in addition to giving me quality time to spend with my son. Of course, I also have to read "Berenstain Bears," "Thomas the Train," "Curious George," "Mercy Watson," etc. to my 4-year-old.

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

As a woman, my mom has been a role model, because she went to college when it was not customary in Colombia for young women to do so. Although she was a college graduate, she stayed at home with my brother and me until we started school. When we were older, she started acquiring more responsibilities, and now, at age 73, she is the dean for the school of social sciences at a Colombian university. She has understood her priorities at the different stages of her life and has fulfilled her roles as wife, mother and career woman to the fullest. She has shown me that it is possible to strike a balance between a family life and an academic life, and that is something with which I constantly struggled.

My scientific role model is my Ph.D. adviser, Alan Collmer. He is a symbol of excellence, integrity and leadership. He is also an outstanding human being and a bona fide mentor who is able to appreciate the differences among people and extract the best from everyone.

What is it that keeps you working hard and studying science every day?

The thrill of discovering something nobody knew before. It is not easy, and it is frequently challenging to figure things out, but, after you do, the result is well worth the effort.

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