SUBMIT YOUR LATE-BREAKING ABSTRACT FOR THE 2012 ANNUAL MEETING BY FEB. 23!

ASBMB today

February 2012

We love our amazing members!

American Society for Biochemistry and Molecular Biology

ASBMB ANNUAL MEETING SPOTLIGHT:
Effectively Communicating Your Science

sponsored by the ASBMB Public Affairs Advisory Committee

Monday, April 23, 12:30–2 p.m.
Convention Center, Upper Level, Room 6B

It has never been more important to communicate science and its value to the public. How can we make scientific discovery a high national priority? What can each of us do locally to make a difference?

Join Nobel laureate **Paul Berg**, NPR science correspondent **Joe Palca** and science communicator **Megan Palmer** for a panel discussion of how to get through to challenging audiences and make the best case for a long-term investment in and focus on science.

Find more information at http://bit.ly/wkuWG5.

2012 ASBMB
Special Symposia Series

Upcoming Events

Trypsin-like Proteases: Structure, Function and Regulation
June 7—10, 2012

LOCATION: Granlibakken Resort and Conference Center , Tahoe City, CA
ORGANIZERS: Enrico di Cera, Saint Louis University School of Medicine

March 1, 2012: Early Registration & Abstract Submission Deadline

Transcriptional Regulation: Chromatin and RNA Polymerase II
October 4—8, 2012

LOCATION: Snowbird Ski and Summer Resort, Snowbird, UT
ORGANIZERS: Raymond Trievel, University of Michigan & Ali Shilatifard, Stowers Institute for Medical Research

March 1, 2012: Platform Lecture Abstract Deadline

www.asbmb.org/specialsymposia

ASBMB
American Society for Biochemistry and Molecular Biology

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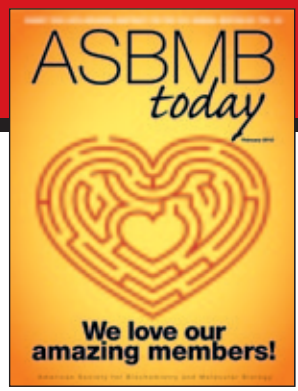

FEBRUARY 2012

On the cover: Happy Valentine's from your devoted and pun-slinging staff at ASBMB!

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asbmb*meetings*

The ASBMB annual meeting has a ton of programming for undergraduates. Find out more about the **Science Superhero Series** on **Page 18.**

Additional information is also available at **www.asbmb.org/superhero**

ASBMB today

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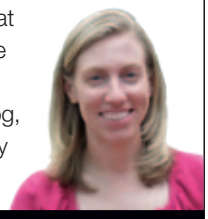
Rising stars

On ASBMB Today's website this month, read Q&As with winners of the Best Presentation awards at ASBMB's ATPase special symposium held in California in the fall. Also, find out more about the 2012 Special Symposia lineup by visiting **www.asbmb.org/specialsymposia.**

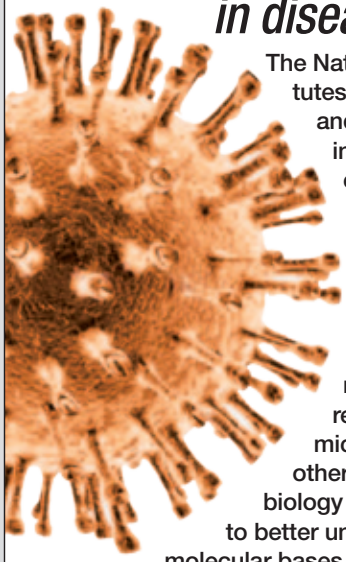
Policy Blotter

The beginning of 2012 yielded a flurry of activity at the National Institutes of Health as it received authorization to create a new center, the National Center for Advancement of Translational Sciences. Read ASBMB science policy fellow Julie McClure's reporting on the reorganization process at the NIH and updates on relevant legislation and President Obama's fiscal 2013 budget proposal at the ASBMB Office of Public Affairs science policy blog, the ASBMB Policy Blotter.



Visit www.asbmbpolicy.wordpress.com

'Living Lab' tackles molecular structures in disease



The National Institutes of Health and the scientific instruments company FEI have created the Living Lab Structural Biology Center. The lab will exploit near-atomic resolution microscopy and other structural biology techniques to better understand the molecular bases for diseases such as cancer and HIV/AIDS. Read more at www.asbmb.org/asbmbtoday.

BLOG REVIEW

In her monthly online column, ASBMB Today contributor Aditi Das reports on OpenHelix's "Tip of the Week" blog, which features visual tools from new and existing databases to answer questions about proteomics and genomics.

SPOTLIGHT: DIVERSITY

ASBMB Education and Professional Development Manager Weiyi Zhao's monthly online column features diversity consultant Alberto I. Roca. Read about how his post-lab career path led to his work with MinorityPostdoc.org, through which he helps grad students transition to postdoc training and helps grad students and postdocs find professional positions.

ASBMB publications: great value in modern times

BY SUZANNE PFEFFER

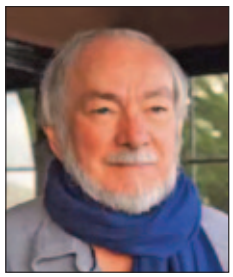
In 1983, while writing the introduction to my Ph.D. thesis, I wandered the library stacks at the University of California, San Francisco, to find historic articles related to my research. There were rows and rows of shelves holding bound volumes. I thumbed through those heavy books to study the glossy images and made photocopies of key papers to keep in my files. In those days, one could spend hours looking up a method or digging up the history of a particular finding. How strange that all seems today.

I used to subscribe to a number of journals that would pile up on my desk until I had time to read through them. Now I receive only a few science magazines; most of my journal reading is done online. How much time we save when a table of contents appears in our email inboxes, and papers can be captured as PDF files with a single click of a mouse and sorted by author or title on our desktops. When I need to find a method or a product, I can go online and within minutes have an answer or identify a vendor for a student sitting with me in my office.

This year, the Journal of Biological Chemistry has gone entirely online; Molecular and Cellular Proteomics has been published only online since 2010; and the Journal of Lipid Research is published in print and has been online since 1998. At least for the JBC and MCP, there are no more thick journals to occupy library shelves and fill up our mailboxes. For most of us, the heavy journals aren't really missed — we stopped ordering them many years ago. Now that journals are being published online, authors wonder why page charges are still required. This is an important issue that I will try to address here.

Martha Fedor of The Scripps Research Institute is editor-in-chief of the Journal of Biological Chemistry.

Joseph L. Witztum of the University of California, San Diego, is editor-in-chief of the Journal of Lipid Research.



Alma L. Burlingame of the University of California, San Francisco, is co-editor of Molecular and Cellular Proteomics.

Edward A. Dennis of the University of California, San Diego, is editor-in-chief of the Journal of Lipid Research.

Ralph A. Bradshaw of the University of California, San Francisco, is co-editor of Molecular and Cellular Proteomics.

First, whether a manuscript is published in a journal you can hold in your hands or in a journal online, staff members and editors are still needed to handle and assign it to referees. Reviews need to be tracked and decisions provided to authors in a timely manner. After acceptance, manuscripts need to be redacted — the text must be converted to the appropriate style and format, Internet links must be inserted, figures must be reviewed, optimized for the Web and scaled to the appropriate sizes, and the design of the manuscript must be converted to that of the online journal. These tasks require staff, and staff members must be paid.

American Society for Biochemistry and Molecular Biology journal authors are savvy Web- and mobile-content users. They expect our journals to be timely and available on multiple platforms — accessible when and where they want to read them. Readers also expect our journals to harness the most up-to-date multimedia offerings. To meet and exceed these high expectations, ASBMB journals invest significantly in online- and mobile-content functionality and multimedia features. Manuscript-tracking systems, online content-management systems, editorial services, online-publishing platform maintenance and enhancement expenses are just a few examples. Meanwhile, journal websites continue to add features, such as JBC's new affinity group platforms, that seek

to guide readers to papers of interest and provide extra value for specific constituencies. Our journals also need to invest in maintaining archival content. For example, the JBC's fully searchable archive dates to 1905 and is heavily utilized at no expense to readers. Video files and other enhancements now added to modern manuscripts must remain accessible to readers in the decades to come. Page charges today cover all these expenses.

Why are there special costs for publishing color images in online publications? Some journals do not charge for the publication of color figures. It is important to note that for almost every journal that offers free color figures, page charge costs are higher. Vendors charge us more for color figure management (although that fee has been reduced for online-only production), and we will continue to seek contracts that minimize color cost. In short, cost savings associated with moving online do not necessarily compensate for the investment required to supply online peer-reviewed content in the ways that our readers and authors demand today and will continue to demand in the future.

ASBMB journal editors have been pioneers in the area of online publishing and will continue to investigate online-publishing models that will yield cost savings that can be passed along to authors as well as reinvested in content improvements. ASBMB members very soon will be able to publish color figures at a very attractive low rate: $50 per figure. We will continue to work hard so that publication cost savings will continue to be shared. Our eventual goal is to be able to offer free color and all the features our authors expect, while maintaining reasonable pricing for our members.

In years past, scientific societies like the ASBMB offered journal subscriptions as a benefit of membership. This ensured a close link between readers of our journals and society activities. With the introduction of online journals, institutional subscriptions became freely available to our members, so there was less of an immediate, personal reason to maintain society membership. Since that change, the ASBMB has gone out of its way to be sure to provide value to its members.

There are many important reasons to belong to the ASBMB beyond discounted page charges for all of our publications. Being a member of a scientific society is an important way to support the discipline and practice of our field. The ASBMB exists to support the community of biochemists and molecular biologists by providing opportunities to present our science in ASBMB journals, exchange ideas by hosting outstanding scientific meetings, and support our field by vigorous advocacy efforts in Washington, D.C. We support mentorship and educational programs, travel fellowships and special programs for under-represented minority scientists, and we educate the public through our outreach efforts. Thanks for your membership in the ASBMB. Together, we do make a difference! XXX

ASBMB President Suzanne Pfeffer (pfeffer@stanford.edu) is a biochemistry professor at the Stanford University School of Medicine.

ASBMB-UAN biochemistry concept workshop in March

Join ASBMB members and other biochemistry and molecular biology faculty next month at an ASBMB-sponsored regional workshop that will focus on developing a biochemistry and molecular biology concept inventory.

The workshop is scheduled for March 3 at Moravian College in Bethlehem, Pa.

It is part of a national effort for faculty members to identify big ideas in biochemistry and molecular biology and to contribute to a pool of questions to help assess student learning.

The workshop will be led by Hal White, who is a professor of chemistry and biochemistry at the University of Delaware and a section editor of Biochemistry and Molecular Biology Education. It will be co-chaired by Shari Dunham and Steve Dunham, both of Moravian College.

Registration for the event is free. The workshop is part of a larger ASBMB project known as "Implementing Vision & Change: Developing Concept-Driven Teaching Strategies in Biochemistry and Molecular Biology through Concept Assessments."

To learn more and to register for the workshop, visit: www.asbmb.org/2012ne

The value of basic research shouldn't be lost in translation

We have to tell the story of the symbiotic relationship between fundamental and applied science

BY JULIE MCCLURE

On Dec. 23, President Obama signed into law the fiscal 2012 omnibus appropriations bill that allocated funding for multiple federal agencies, including the National Institutes of Health. The NIH received a modest funding gain of about $239 million for the 2012 fiscal year, which was generally viewed as a victory in this fiscally constrained environment. Also included in the appropriations bill was language that officially established a new NIH center, the National Center for Advancing Translational Science, whose mission is to develop ways to reduce, remove or bypass the bottlenecks often associated with the translational pipeline.

Since the NCATS was proposed in late 2010, the purpose, structure and funding for it have been steeped in controversy. Streamlining the translational-research process has been a specific goal of both NIH Director Francis S. Collins and Obama. While many in the research field agree this is a significant issue, there has been concern that the NCATS will pull the focus away from basic research, which always has been the core of the NIH mission.

Ultimately, basic and translational research are intimately connected. While it might be easier to explain how an HIV vaccine or prosthetic limb technology improves patients' well-being, the fact remains that basic research is the foundation of translational research. It is important for basic scientists to continue to emphasize the fundamental and critical role that basic research plays in the translational pipeline. For instance, it would have been impossible to create chemotherapy treatments without first understanding the molecular differences in cancer cells or to develop recombinant DNA technology, a concept upon which the entire biotechnology industry is based, without basic research on bacterial biochemistry.

An excellent example of the interplay between basic and translational research can be seen in the work done on G-protein-coupled receptors. In the 1970s, fundamental research on signal transduction mechanisms led to the discovery of G proteins. Representative G-protein-coupled receptors were subsequently discovered in studies of hormone action, vision and other processes. These receptors represent the targets of nearly half of all drugs, which have therapeutic actions across a wide array of human diseases ranging from allergic rhinitis and hypertension to schizophrenia. We're talking about 40 years of research that now represents a huge slice of the pharmaceutical pie. That's a story that needs to be told.

The initial work behind those therapeutics was not directed toward translation but rather fundamental knowledge. Without that basic knowledge, understanding the action of many drugs and developing assays for drug development would be essentially impossible.

The moral of the story is that an investment in basic research is indeed an investment in translational research. However, the payoffs of that investment probably won't be seen for many years. The treatments that are being developed now are the result of decades of basic research that laid the groundwork for their discovery. This is an argument that most basic researchers know well but is often lost on the public at large.

Translational research is entirely dependent on the basic research enterprise, and efforts to integrate these two fields more closely should be seen as beneficial to both. Now that the NCATS has the official seal of approval, it's important for the basic research community to support this new NIH endeavor. And it's equally important for researchers to spread the word about the long-term benefits of basic research.

Julie McClure (jmcclure@asbmb.org) is a science policy fellow at the ASBMB.

Yale researcher Elisabetta Ullu wins inaugural Alice and C.C. Wang Award

BY GEOFF HUNT

Elisabetta Ullu, professor of internal medicine and cell biology at the Yale University School of Medicine, has been named the winner of the American Society for Biochemistry and Molecular Biology's inaugural Alice and C.C. Wang award.

The award aims to recognize established investigators who are making seminal contributions to the field of molecular parasitology, focusing in particular on novel and significant discoveries on the biology of parasitic organisms. The award's namesake, Ching Chung "C.C." Wang, is a professor of pharmaceutical chemistry at the University of California, San Francisco, who has made key contributions to the understanding of the biology of many pathogenic protozoa.

Ullu received the award for her laboratory's work with the protozoan parasite Trypanosoma brucei, which causes African sleeping sickness, to uncover a novel mechanism of gene silencing known as RNA interference, or RNAi. While working on RNA synthesis and processing pathways in T. brucei, Ullu hit upon the phenomenon of RNAi, in which small, noncoding RNA molecules rather than proteins regulate gene expression.

> "I think Elisabetta is a fantastic choice and an ideal recipient of the award from the eyes of my wife, Alice, and myself."
>
> **C.C. Wang**
> *University of California, San Francisco.*

Ullu's discovery of RNAi "made a revolution in the ability to investigate the function of genes in parasites," said Shulamit Michaeli from the Israel Science Foundation in supporting her nomination. The importance of RNAi as a biological phenomenon was cemented in 2006, when the Nobel Prize in physiology or medicine was awarded to Andrew Fire and Craig Mello for describing the process in roundworm nematodes.

A native of Italy, Ullu received her Ph.D. from the University of Rome in 1973. She continued her work at the European Molecular Biology Laboratory in Heidelberg, Germany, before taking a position at Yale University in 1984, where she has been ever since.

Award namesake C.C. Wang praised Ullu's selection. "I think Elisabetta is a fantastic choice and an ideal recipient of the award from the eyes of my wife, Alice, and myself," he said.

ASBMB President Suzanne Pfeffer concurred. "Elisabetta Ullu is exactly the kind of recipient the society had in mind when this award was established by Alice and C.C. Wang. Her work has made, and will continue to make, extraordinary contributions to the fundamental principles of molecular parasitology."

"I am deeply honored to have been chosen as the inaugural recipient of the Alice and C.C. Wang award and incredibly grateful to Alice and C.C. Wang for this invaluable gift to the field of molecular parasitology. The award brings to the spotlight the contributions that the study of human protozoan parasites, such as Trypanosoma brucei, have made and continue to make to further our understanding of eukaryotic biology. I am proud to share the honor of this award with all the wonderful collaborators who have worked by my side over the years." **—ELISABETTA ULLU**

About the award

The Alice and C.C. Wang award consists of $35,000 for use by the recipient's research laboratory, a plaque and travel expenses for the recipient to attend and speak at the ASBMB annual meeting at the Experimental Biology 2012 conference in San Diego. Ullu will receive her award before delivering an award lecture at 3:45 p.m. April 22 in the San Diego Convention Center.

asbmb member update


CARMAN


JORDAN


WHITE

Rutgers' governing board recognizes Carman's work in food science and biochemistry

George M. Carman, associate editor for the Journal of Biological Chemistry and editorial board member for the Journal of Lipid Research, has been named a Board of Governors professor by the Rutgers University governing body. Carman, who founded in 2007 and serves as director of the institution's Center for Lipid Research, was lauded by Richard L. McCormick, president of the university, in a statement. "George Carman is acclaimed and respected by food scientists and biochemists around the world for his insightful and original work," McCormick said. "He has brought together researchers who literally might never have met without his help; he has taught hundreds of young people and mentored scores of young scientists."

Jordan wins ASPET's Goodman & Gilman receptor pharmacology award for 2012

V. Craig Jordan, scientific director of the Georgetown Lombardi Comprehensive Cancer Center in Washington, D.C., was named the 2012 recipient of the Goodman & Gilman Award for Receptor Pharmacology from the American Society of Pharmacology and Experimental Therapeutics. The award recognizes his discovery of Selective Estrogen-Receptor Modulators (SERMs) and his translational research with both tamoxifen and raloxifene for the treatment and prevention of breast cancer. In 2011, he received the St. Gallen Prize for Clinical Breast Cancer Research.

White receives Howard Barrows award for student engagement

Hal White, a professor of chemistry and biochemistry at the University of Delaware, has been recognized by McMaster University in Ontario, Canada, for his work in promoting student engagement through problem-based learning. White received the university's Howard Barrows Award, which is given in honor of the late Barrows, a former McMaster faculty member who is credited as an architect of self-directed, problem-based learning and who ushered in the concept of using simulated patients for the training of medical students. Since that time, problem-based learning has been adopted for use with undergraduates as well. In a statement, White explained, "With undergraduates, we come up with problems they have to solve, and, in finding the solutions, they research and learn the necessary material," he said. "A lot of the process has to do with students — not professors — asking the questions."

50 members elected to be AAAS fellows

Late last year, 50 ASBMB members were elected to become American Association for the Advancement of Science fellows. Their work and contributions will be acknowledged at the Fellows Forum to be held Feb. 18 at the AAAS Annual Meeting in Vancouver, British Columbia. The ASBMB members elected were:

Ruma Banerjee
Brenda L. Bass
Carl Bauer
Graeme I. Bell
George N. Bennett
Nancy M. Bonini
Richard G. Brennan
Judith Campisi
Bruce D. Carter
Christin Carter-Su
Xuemei Chen
Brian R. Crane
Sandra Joanne Friezner Degen
John M. Denu
Carmen W. Dessauer
Eleftherios P. Diamandis
Henrik G. Dohlman
Chen Dong
David M. Dooley
Mariano A. Garcia-Blanco
Susan P. Gilbert
Kathleen L. Gould
Jun-Lin Guan
Gretchen Hagen
Heidi Elizabeth Hamm
Dolph Lee Hatfield
Xi He
Eliot Herman
George C. Hill
Hideko Kaji
Min Li
Xiaoxia Li
Jennifer K. Lodge
Anastasios Melis
James E. Melvin
Neil M. Nathanson
Alexandra C. Newton
Jeffrey E. Pessin
Richard George Pestell
Caroline C. Philpott
Carl A. Pinkert
Paula Pitha-Rowe
Marjorie Robert-Guroff
Claudina Rodrigues-Pousada
John J. Rossi
Thomas D. Sharkey
Mark A. Wainberg
Gary A. Weisman
Lois S. Weisman
Jane Y. Wu

Retrospective: Masayasu Nomura (1927–2011)

BY MILLARD SUSMAN

Masayasu Nomura was born in Japan in April of 1927 and died on Nov.19 in California, where he was a professor of biochemistry at the University of California, Irvine. He was a pioneer in ribosome research, a brilliant experimentalist, and a mentor to two generations of graduate students and postdocs who have been outstanding contributors to the life sciences.

Nomura received his bachelor's and doctoral degrees from the University of Tokyo in the years when Japan was still emerging from the privations of World War II, and he thought he was destined to spend his life in hardscrabble labs working on projects related to agriculture or pharmacology, but his curiosity, scholarliness and bench smarts led to the opportunity to visit the United States in 1957 as a 30-year-old postdoctoral student. During a three-year sojourn in the U.S., Nomura worked with three towering figures in the burgeoning field of molecular biology: Sol Spiegelman, Jim Watson and Seymour Benzer. He discovered that he could hold his own at the frontiers of molecular biology research (1).

I was a graduate student at Caltech when I first saw Masayasu. He gave a seminar to Max Delbrück's group on the work he had done with Benzer. He showed that *rII* deletions of bacteriophage T4 behaved as one would expect real physical deletions to behave — in crosses, as the presence of a deletion in both parents shortened the recombination distance between flanking genetic markers. It was the sort of muscular, purely genetic experimental work that we admired in the Delbrück lab. Masayasu definitely passed the Delbrück test, according to which most seminars were met with "worst seminar I ever heard." Nomura, on the other hand, he declared excellent.

In the early 1960s, the genetics department at the University of Wisconsin–Madison was searching for a replacement for Ernst Freese, who had moved to the National Institutes of Health. The department somehow got permission to hire two people to fill the vacancy. I was one of them, and Masayasu was the other. I was delighted to learn that he was going to be my colleague in Madison, but I had no idea how much Masayasu would enrich my life. He was my neighbor on the third floor of the genetics building from 1963 until 1971 (when he moved a few blocks west to the Institute for Enzyme Research), and for eight years I had a front-row seat at one of the greatest science shows on Earth.

Although Masayasu had done some work on ribosomes before coming to Madison, his early work in Madison focused on colicins — bacteriocidal products produced by bacteria. Nomura feared that the ribosome field would be a rat race and believed that work on colicins would be the secret to a tranquil life in science. The work he did on colicins was fascinating. He studied three different colicins and discovered that they killed target bacteria by three different mechanisms (1). This promised to be a rich field of investigation, and I think it's fair to say that colicins were at least warm, if not rat-race hot, in the early 1960s, thanks to the work of the Nomura lab.

But Masayasu couldn't resist the enticements of the ribosome. In parallel with his colicin work, he did a few wind-up experiments on ribosomes and, in the process, got hooked. The Nomura lab quickly became one of the leading centers for ribosome research, producing one dazzling discovery after another. In his pre-Madison work, Nomura had found that some ribosomal proteins could be reversibly stripped from the 30*S* and 50*S* ribosome subunits, leaving smaller, core subunits of sizes 23*S* and 40*S*. In Madison, he showed that when these stripped proteins were added back to the core subunits, they yielded fully active 30*S* and 50*S* subunits (2). Nomura then demonstrated that the 70*S* ribosome that was formed by association of the 30*S* and 50*S* subunits could not directly enter into protein synthesis; the initiation of protein synthesis was a stepwise process in which the messenger RNA first formed a complex with a 30*S* subunit and an initiator transfer-RNA; only after that complex formed could the 50*S* subunit enter into the complex (3).

Nomura and his colleagues managed completely to disassemble and then reassemble the 30*S* ribosomal subunit of E. coli, demonstrating that the 22 parts of the subunit (a 16*S* RNA molecule and 21 different proteins) contained all the information needed to assemble all the parts into a functional whole (4). Later, the Nomura lab achieved the

total reconstitution of functional 50*S* ribosomal subunits of B. stearothermophilus from a mixture of separated components (two RNA molecules and about 30 different proteins) (5). These were landmark experiments on the self-assembly of complex biological structures. Toward the end of his years in Madison, Nomura examined the mechanism by which E. coli matches the rate of synthesis of ribosomal proteins with the rate of synthesis of ribosomal RNA. Much to everyone's surprise, it turned out that the regulation was at the level of translation: Several of the ribosomal proteins, if present in excess of the number needed to form ribosomes, would bind specifically to the messenger RNAs encoding ribosomal proteins and repress translation of ribosomal protein message (6).

I had the privilege of reading many of Masayasu's draft manuscripts describing these brilliant experiments. They came to me typed on yellow paper of the sort that was once used for carbon copies. The manuscripts were collages, assembled from small scraps that were taped together. Masayasu would first write and then rearrange his text by cutting and taping. The manuscripts had a wonderful, subtle aroma that I took to be some sort of soap or aftershave that Masayasu used, but I finally discovered that it was the odor of Scotch Magic Mending Tape, which I had never encountered in large quantity until I read his cut-and-tape manuscripts. Whatever the mechanism of their assembly, these draft manuscripts — not unlike ribosomes — ended up so well constructed that you could hardly imagine any way to improve them. Reading Masayasu's manuscripts was a lesson in recognizing important problems, and the wonderful logic of his writing could evoke in the reader's mind the transitory delusion that the reader could think (almost) as clearly as Masayasu.

Madison lost something irreplaceable when Nomura moved away. I pointed out at his goodbye party that "Nomura" is an anagram for "Our Man" and promised that we would always think of him as our man in Irvine. At Irvine, Nomura continued to work on ribosomes, but he turned from bacteria to yeast. He continued to be a major force in ribosome research and was active in research until the very end, discovering that the molecular genetics of yeast ribosomes was significantly different from that of bacteria and rejoicing at all the surprises that he encountered.

Nomura was much honored. He was elected to the National Academy of Sciences, the American Academy of Arts and Sciences, the American Academy of Microbiology, the Royal Netherlands Academy of Arts and Sciences, and the Danish Academy of Arts and Sciences. In 2002, he received the Abbott-ASM Lifetime Achievement Award from the American Society for Microbiology.

Masayasu is survived by his wife, Junko, his daughter, Keiko, his son, Toshi, and his grandson, Jack.

Millard Susman (msusman@wisc.edu) is professor emeritus of genetics at the University of Wisconsin–Madison.

REFERENCES

1. Nomura, M. (2011) Journey of a molecular biologist. *Ann. Rev. Biochem.* **80**, 16–40.
2. Hosokawa, K., Fujimura, R.K., and Nomura, M. (1966) Reconstitution of functionally active ribosomes from inactive subparticles and proteins. *Proc. Natl. Acad. Sci. USA* **55**, 198–204.
3. Guthrie, C. and Nomura, M. (1968) Initiation of protein synthesis: a critical test of the 30*S* subunit model. *Nature* **219**, 232–235.
4. Traub, P. and Nomura M. (1968) Structure and function of E. coli ribosomes. V. Reconstitution of functionally active 30*S* ribosomal particles from RNA and proteins. *Proc. Natl. Acad. Sci. USA* **59**, 777–784.
5. Nomura, M. and Erdmann, V.A. (1970) Reconstitution of 50*S* ribosomal subunits from dissociated molecular components. *Nature* **228**, 744–748.
6. Yates, J.L., Arfsten, A.E., and Nomura M. (1980) In vitro expression of Escherichia coli ribosomal protein genes: autogenous inhibition of translation. *Proc. Natl. Acad. Sci. USA* **77**, 1837–1841.

Retrospective: Paul M. Doty (1920–2011)

BY JACQUES R. FRESCO

With the passing of Paul Doty on Dec. 5 at the age of 91, the science of biological macromolecules lost one of its great pioneers. Even as he coordinated the research activities of his large laboratory of graduate students, postdoctoral fellows and visiting scientists, Doty managed to focus on his other passion, the bringing together of scientists from both sides of the Iron Curtain to assure that atomic war would not occur.

Paul Mead Doty was born June 1, 1920, in Charleston, W.V. His interest in molecular and physical sciences developed early, and, after completing his undergraduate studies at Penn State College (now University) in 1941, he went on to study chemical physics at Columbia University, where he ostensibly undertook his doctorate work under Joseph E. Mayer but in fact worked on the isolation of uranium for the Manhattan Project.

It was during this period that he developed a strong friendship with classmate Bruno Zimm, which led them jointly to accept positions in 1943 under the noted polymer chemist Herman Mark at what was then the Polytechnic Institute of Brooklyn. Out of their three-year scientific partnership emerged the important method of light scattering for the determination of molecular weight and asymmetry of macromolecules based upon earlier theoretical formulations derived by Peter Debye.

With Zimm focusing on the mathematical theory and Doty on the instrumentation and experimental methodology, they characterized the size and shape of a variety of synthetic polymers in papers that are still viewed as classics of polymer chemistry (1). In 1946, Doty went to Cambridge University for a year as a Rockefeller research fellow; then he joined the chemistry department at the University of Notre Dame and a year later the chemistry department at Harvard University, where he remained for the rest of his career. After two decades at Harvard, Doty founded the department of biochemistry and molecular biology.

It was after discussions with Max Perutz during his time in Cambridge that Doty made the critical decision to apply his unique knowledge of polymer science to the investigation of biological macromolecules. Doty went on to confirm that the polypeptides that Perutz had shown by X-ray diffraction of their fibers to be α-helices did exist in solution as well in the form of stiff, short-chain molecules of the same size and shape (2). At the same time, he undertook light-scattering investigations of carefully prepared DNA and shocked the Protein/Nucleic Acid Gordon Conference of 1950 by reporting that these nucleic acid molecules had molecular weights of many million and a stiffness sufficiently

great that they could not possibly be single chains but rather had to be multistranded (3).

With this beginning, the Doty laboratory went on to a variety of important investigations in the protein field. These resulted in significant contributions to our understanding of the solution conditions that determine polypeptide conformation and to the development of techniques, particularly optical rotatory dispersion, for determining the α-helical and β-sheet contents of various key proteins (4) (most notably myoglobin, the helical content of which was confirmed by John Kendrew's X-ray structure analysis) as well as the helical nature of the three-stranded protein collagen. And with nucleic acids, he investigated the effects of pH and especially temperature on the native properties of DNA, initiating the technique of thermal melting analysis of nucleic acid molecules and thereby contributing to an understanding of their thermodynamics and the conformational differences between duplex DNA and single-stranded RNA (5, 6).

With investigations of the conformational properties and interaction stoichiometry of polyribonucleotides of simple and complex sequence (7) and the separation of the complementary strands of DNA and then their renaturation to biologically active duplexes (8), the groundwork was laid for the complementary strand annealing that proved so critical in making gene cloning possible. In addition, the laboratory's decisive work on RNA provided the algorithm for RNA secondary structure (9) that today remains the basis for correlating RNA sequences with secondary structure prediction. This work was quickly followed by evidence intimating the existence of a class of RNA in ribosomes that hybridized uniquely to genomic DNA of the same species, but not to that of foreign species (10), what later came to be known as mRNA.

Although Doty continued to guide the scientific activities of his laboratory, he began in the late 1950s to do so at a distance because of his increasing concern with atomic disarmament issues. This new involvement, which began in 1957 when he served as chairman of the Federation of American Scientists, increased as he became more concerned about what atomic war could mean for the world. This concern led him to play a significant role in the creation of the Pugwash conferences and in other contacts with Russian scientists, sometimes at a personal level and at other times in back-channel negotiations at the behest of the U.S. government.

It was these interests as well that led Doty to take on a leadership role in the founding of the Belfer Center for Science and International Affairs, which later became a part of the John F. Kennedy School of Government at Harvard, where he influenced the training of many scientists who now hold important positions in government or academia.

Doty was a leader and a mentor to many. He was exceptionally articulate, wrote beautifully, always directed his focus on major questions and stressed the important. He was careful about experimental detail, accuracy and intellectual honesty, but he was in no way a data collector. He set a very high standard for the work done in his laboratory, inspired others and called for one's best. He rarely made an effort to teach, yet he taught by example. Ambitious as he was, he recognized the value of permitting the most talented and creative of his associates to function on their own; for such individuals, he had done enough to set the general goals, and he made them feel that there was freedom of operation in the Doty laboratory.

For most of his career, Doty was married to Helga Boedtker, his former graduate student, who did much to manage the laboratory during his nonscientific distractions. She predeceased him 10 years ago. He is survived by a son, Gordon, from his first marriage to the late Margaretta Gravatt, and three daughters with Helga: Marcia, Rebecca and Katherine.

Paul Doty maintained strong friendships with many who were associated with him. He will be sorely missed.

Jacques R. Fresco (jrfresco@princeton.edu) is a professor in the department of molecular biology at Princeton University.

REFERENCES

1. Doty, P. M., Zimm, B. H., and Mark, H. (1944) Some light scattering experiments with high polymer solutions. *J. Chem. Phys.* **12**, 144–145; (1945) An investigation of the determination of molecular weights of high polymers by light scattering. *J. Chem. Phys*. **13**, 159–166.
2. Doty, P., Holtzer, A. M., Bradbury, J. H., and Blout, E. R. (1954) Polypeptides. II. The configuration of polymers of γ-benzyl-L-glutamate in solution. *J. Am. Chem. Soc.* **76**, 4493–4494.
3. Doty, P. and Bunce, B. H. (1952) The molecular weight and shape of desoxypentose nucleic acid. *J. Am. Chem. Soc.* **74**, 5029 – 5034.
4. Yang, J. T. and P. Doty (1957) The optical rotatory dispersion of polypeptides and proteins in relation to configuration. *J. Am. Chem. Soc.* **79**, 761 – 775.
5. Rice, S. A. and Doty, P. (1957) The thermal denaturation of deoxyribose nucleic acid. *J. Am. Chem. Soc.* **79**, 3937–3947.
6. Doty, P., Boedtker, H., Fresco, J. R., Haselkorn, R., and Litt, M. (1959) Secondary structure in ribonucleic acids. *Proc. Natl. Acad. Sci. USA*, **45**, 482–499.
7. Fresco, J.R., and Alberts, B. M. (1960) The accommodation of noncomplementary bases in helical polyribonucleotides and deoxyribonucleic acids. *Proc. Natl. Acad. Sci. USA*, **46**, 311–321.
8. Doty, P., Marmur, J., Eigner, J. and Schildkraut, C. (1960) Strand separation and specific recombination in deoxyribonucleic acids: physical chemical studies. *Proc. Natl. Acad. Sci. USA*, **46**, 461–476.
9. Fresco, J.R., Alberts, B.M., and Doty, P. (1960) Some molecular details of the secondary structure of ribonucleic acid. *Nature*, **188**, 98–101.
10. Schildkraut, C., Marmur, J., Fresco, J. R., and Doty, P. (1961) Formation and properties of polyribonucleotide-polydeoxyribonucleotide helical complexes. *J. Biol. Chem.*, **236**, PC 2–4.

ASBMB women in academe report

Number of women among biochemistry teacher–scholar applicants is low relative to the number among postdoctoral trainees

BY ELIZABETH C. THEIL

The American Society for Biochemistry and Molecular Biology, for the first time, has surveyed members and directors of departments with biochemistry Ph.D. programs about women in academic biochemistry, complementing a 1986 informal analysis.

President Suzanne Pfeffer appointed a task force (Elizabeth C. Theil, chair; Melanie Cobb; Judith P. Klinman; Frederick R. Maxfield; Janet L. Smith; and JoAnne Stubbe); Massachusetts-based consulting firm AltshulerGray provided advice and conducted the survey. Questions were targeted mainly toward practicing biochemists, traditionally the dominant membership of the society, rather than biochemists in training. Respondents' comments indicated their appreciation of the opportunity to express opinions on the subject; a few respondents provided examples of inequalities in departmental resource allocation for women.

About the survey participants

There were 1,780 responses from 11,262 members and 48 responses from 204 chairs and directors — typical response rates for society member surveys, according to AltshulerGray.

Of the respondents, 45 percent were women, 54 percent men, 88 percent Ph.D.s, 85 percent in academe, and 72 percent in tenured or tenure-track positions. The respondents reported that, on average, 61 percent of their professional effort is devoted to research, with the remainder being teaching, administration and other activities. Family issues were major concerns among all respondents, of whom 75 percent had children and 90 percent were or had been married. Below is an overview of the data showing the largest differences between men and women biochemists and some of the factors that influence career choices.

Teacher–scholars in academic biochemistry

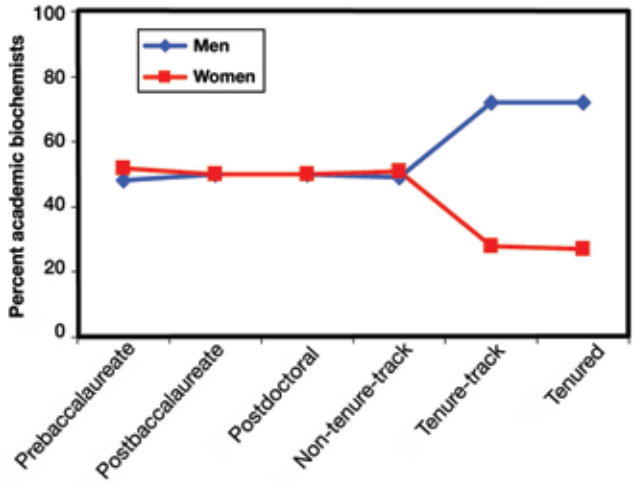
Teacher–scholars, who have the largest impact on the training of biochemists and future planning, are tenured or tenure-track faculty members engaging in teaching, research and institutional governance. By contrast, non-tenure-track faculty members, an expanding academic group, are involved in either research or teaching.

There are markedly fewer women than men among teacher–scholars in biochemistry, a sharp contrast with all other groups of biochemists in academe (Fig. 1). Particularly striking is the constancy in the distribution of female and male teacher–scholars as applicants (27:73), interviewees (34:66) and appointees (28:72), as well as tenured academic biochemists (28:72). Thus, once women enter the teacher–scholar pool, these data show, hiring and success are comparable for men and women biochemists. The barriers that inhibit women biochemists from entering the teacher–scholar applicant pool need to be identified.

Factors influencing career choices

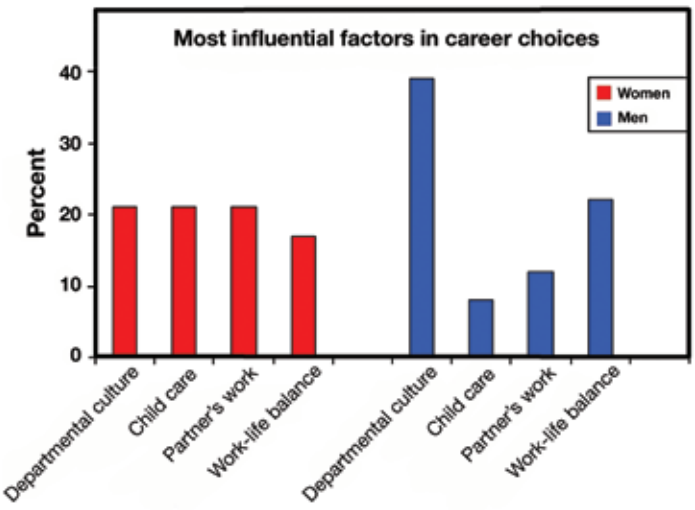
When asked to rank factors according to how much they influenced career decisions, men and women biochemists of all ages placed the same four factors at the top: departmental academic culture, child-care responsibilities,

Figure 1



spouse or partner work obligations and work–life balance. (Child bearing itself was not listed as a choice because of the small fraction of a professional lifetime affected.) The relative importance of each factor was strikingly different for men and women. The departmental academic culture was five times as important to men as child-care responsibilities, whereas for women they were equally important (Fig. 2).

Figure 2



When asked if they agreed that there was a well-defined mechanism for raising concerns about career progress, only 22 percent of respondents under the age of 50 agreed. When asked if they agreed that policies and criteria for tenure and promotion addressed non-academic responsibilities fairly, only 27 percent agreed. Agreement on the availability of information about the tenure-decision mechanism and the equality of applying criteria for tenure, equality of space and resource distribution was lower for women than men.

The striking and sudden imbalance in the distribution of men and women biochemists (Fig. 1) occurs at a point on the career trajectory between postdoctoral training and applying for teacher–scholar positions. Among postdoctoral trainees, numbers of men and women are equal, but among teacher–scholar applicants, men outnumber women 3 to 1. Part of the reason for this difference may be the different weight men and women place on departmental culture, child-care responsibilities and partner or spouse work obligations (Fig. 2). Men rank the influence of departmental culture on career decision as five times more important than child-care responsibilities, whereas women rank the influence as equal.

Family-friendly policies

Men and women rank family-related polices the same regardless of age. ASBMB members ranked the availability of child-care facilities as the most important factor influencing career decisions, followed by resources that address two-career problems, family leave time and delay of the tenure clock after childbirth. Chairs and directors selected the same four categories, but tenure clock after childbirth and child-care facilities were ranked equally.

Availability of some family-friendly policies is limited. Family leave time is common, but adequate child-care facilities and resources to address two-career problems for couples are rarer.

The dramatic differences observed in the distribution of women and men between the final periods of training (1:1) and applying, interviewing and hiring for teacher–scholar positions (1:3) could be caused by the different weight men and women place on factors influencing career decisions. On average, women place approximately equal weight on professional environment, child care, and spouses' or partners' work responsibilities when making career decisions. Men, on the other hand, place a very strong emphasis on professional environment relative to child-care responsibilities and spouses' or partners' work obligations.

To understand the abrupt change in the distribution of women and men biochemists in training and as teacher–scholars, the task force makes the following three recommendations:

1. Survey ASBMB on the progress of women in academe on a regular basis.
2. Survey younger biochemists to determine the factors influencing their career choices and the places trained women and men biochemists are practicing in addition to academe.
3. Analyze ways to make academia more acceptable to young women in biochemistry (changes to departmental academic culture, family-friendly policies, and so forth).

Elizabeth Theil (etheil@chori.org) is a senior scientist at Children's Hospital Oakland Research Institute and an adjunct professor at the University of California, Berkeley.

AVANTI AWARD IN LIPIDS

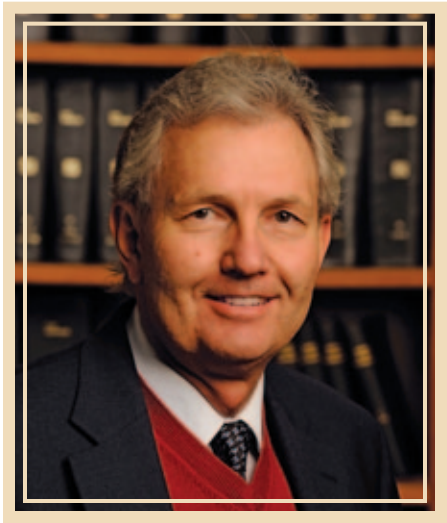
George M. Carman lauded for important work on phospholipid synthesis regulation

BY GEOFF HUNT

The American Society for Biochemistry and Molecular Biology has named George M. Carman, professor of food science and director of the Center for Lipid Research at Rutgers University, the winner of the society's Avanti Award in Lipids.

"I'm extremely honored by being chosen as the recipient of the Avanti Award in Lipids," said Carman. "It is a great tribute to be in the same company with some of the icons in the field who have also been recipients of this award."

Carman received the award for his seminal contributions to the understanding of the regulation of phospholipid synthesis, using the baker's yeast Saccharomyces cerevisiae as his organism of choice. Among Carman's most important contributions is his group's identification of the protein structure of the yeast version of mammalian lipins. These enzymes are crucial regulators of fat metabolism, and his work helped to establish a molecular basis for lipodystrophy and obesity, thereby identifying an important pharmaceutical target for the control of body fat in humans. Carman's work also has major implications for studies of diabetes and atherosclerosis.



> "(His) body of work involving meticulous application of biochemistry and molecular biology to the challenging study of membrane-associated enzymes is largely responsible for our current comprehensive understanding of phospholipid metabolism in yeast."
>
> **William Dowhan**
> *University of Texas Health Science Center at Houston*

Carman's "body of work involving meticulous application of biochemistry and molecular biology to the challenging study of membrane-associated enzymes is largely responsible for our current comprehensive understanding of phospholipid metabolism in yeast," said University of Texas Health Science Center at Houston researcher William Dowhan in nominating Carman for the award.

Dowhan's sentiments were echoed by David Brindley from the University of Alberta, who praised Carman for making "several seminal contributions to understanding the role of lipids and enzymes involved in lipid metabolism in regulating important physiological processes."

A graduate of William Patterson College, Carman obtained a master's degree in microbiology from Seton Hall University before going on to complete his Ph.D. at the University of Massachusetts in 1977. After a brief postdoctoral fellowship at the University of Texas Medical School in Houston, Carman accepted a position in the department of food science at Rutgers University in 1978, where he has remained ever since. In 2007, he was named director of the school's Center for Lipid Research.

Carman will receive his award during the Experimental Biology 2012 conference in San Diego, where he will deliver an award lecture. The presentation will take place at 8:30 a.m. April 22 in the San Diego Convention Center.

About the award

The Avanti Award in Lipids recognizes outstanding research contributions in the area of lipids. The award consists of a plaque, a $3,000 purse and travel expenses for the recipient to present a lecture at the ASBMB annual meeting.

ASBMB AWARD FOR EXEMPLARY CONTRIBUTIONS TO EDUCATION

Husband-and-wife team has achieved 'superstar status'

BY GEOFF HUNT

The American Society for Biochemistry and Molecular Biology has named Donald Voet, emeritus professor of chemistry at the University of Pennsylvania, and Judith Voet, emeritus professor of chemistry at Swarthmore College, the winners of the society's award for exemplary contributions to education.

The Voets are perhaps most well known for their seminal textbook "Biochemistry," a staple of campus bookstores and classrooms for more than 20 years. Since 2000, they also have edited "Biochemistry and Molecular Biology Education," an educational journal published by the International Union of Biochemistry and Molecular Biology, and have expanded the journal's coverage and raised its profile.

"We have spent much of our careers doing what we love: helping students develop the tools they need to further their careers in the biomedical sciences and fostering a biochemistry community dedicated to student learning," said Judith Voet on behalf of herself and her husband. "We could not have done so without the help and support of numerous colleagues. We greatly appreciate the recognition we have received from the ASBMB for these educational activities."

In addition to their publication duties, the Voets are highly sought-after speakers, appearing at seminars and education conferences worldwide, and have served on education committees for numerous organizations. In the words of Manuel João Costa, professor at the University of Minho in Portugal, the Voets are "the most influential contemporary personalities in biochemistry and molecular biology education."

> "(They are the) most influential contemporary personalities in biochemistry and molecular biology education."
>
> **Manuel João Costa**
> *University of Minho*

University of Delaware professor Hal White agreed: "Clearly, the Voets have achieved superstar status in the world of biochemistry."

Judy Voet received her Ph.D. in biochemistry from Brandeis University in 1969 and spent several years as a research associate in the greater Philadelphia area before joining the chemistry department at Swarthmore in 1978. Don Voet received his Ph.D. in chemistry from Harvard University in 1966 before completing a three-year postdoctoral fellowship at the Massachusetts Institute of Technology. He has been in the chemistry department at Penn since 1969.

The Voets will receive their award during the Experimental Biology 2012 conference in San Diego, where they will deliver an award lecture. The presentation will take place at 12:30 p.m. April 22 in the San Diego Convention Center.

About the award

The ASBMB Award for Exemplary Contributions to Education is given annually to a scientist who encourages effective teaching and learning of biochemistry and molecular biology through his or her own teaching, leadership in education, writing, educational research, mentoring or public enlightenment. The award consists of a cash prize of $3,000, and each winner presents a plenary symposium lecture at the society's annual meeting.

HERBERT A. SOBER LECTURESHIP

Peggy Farnham honored for her leadership and pioneering work

BY GEOFF HUNT

The American Society for Biochemistry and Molecular Biology has named Peggy Farnham, professor of biochemistry and molecular biology at the University of Southern California, the winner of the society's 2012 Herbert A. Sober Lectureship.

"Throughout my career, I have greatly enjoyed developing and refining protocols that enable new approaches for studying transcriptional regulation," said Farnham. "I was incredibly excited to be chosen to give the Sober Lectureship and feel honored to be included with such a distinguished list of previous recipients."

Farnham received the award for her extensive work analyzing transcriptional elements that are involved in regulation of cell-signaling pathways, developing new methodologies when current ones proved insufficient.

Barbara Graves, professor of oncological sciences at the University of Utah, credited Farnham's "major leadership role in moving the vertebrate transcription field into the genomic era."

Perhaps Farnham's most significant accomplishment was the development of chromatin immunoprecipitation (ChIP) technology that allows for the genome-wide identification of transcription factor binding sites in mammalian cells, revolutionizing the field by applying protein biochemistry techniques to the study of gene expression.

In his award nomination letter, Michael Stallcup, chairman of the department of biochemistry and molecular biology at USC, hailed Farnham as "a pioneer in the development of methods used by investigators worldwide to understand how, when and where transcription factors bind to regulatory DNA sequences and how such interactions regulate the activity of genes."

Thea Tlsty, professor of pathology at the University of California, San Francisco, concurred. "Farnham's accomplishments in developing techniques to study molecular aspects of transcription and epigenetic regulation have pushed the barriers of current analysis and place her in a rare group of individuals that successfully create new paradigms in modern biology," Tlsty said.

"Perhaps Farnham's most significant accomplishment was the development of chromatin immunoprecipitation (ChIP) technology that allows for the genome-wide identification of transcription factor binding sites in mammalian cells."

Farnham received her Ph.D. in molecular biophysics and biochemistry from Yale University in 1982 before accepting a postdoctoral fellowship at Stanford University. In 1987, she moved to the laboratory for cancer research at the University of Wisconsin, Madison. Returning to California, Farnham became the associate director of genomics in the Genome Center at the University of California, Davis, in 2005. In 2010, she moved to USC's Norris Cancer Center.

Farnham will receive her award during the Experimental Biology 2012 conference in San Diego, where she will deliver an award lecture. The presentation will take place at 9 a.m. April 25 in the San Diego Convention Center.

About the award

The Herbert A. Sober Lectureship, issued every other year, recognizes outstanding biochemical and molecular biological research with particular emphasis on the development of methods and techniques to aid in research. The lectureship provides a plaque, a $3,000 purse, transportation, and expenses to present a lecture at the ASBMB annual meeting.

ASBMB YOUNG INVESTIGATOR AWARD

Kim Orth's efforts said to be 'nothing short of dazzling'

BY GEOFF HUNT

Kim Orth, professor of molecular biology at the University of Texas Southwestern Medical Center at Dallas, has been named the winner of the American Society for Biochemistry and Molecular Biology Young Investigator Award.

Orth received the award in recognition of her seminal discoveries of the molecular mechanisms that virulence factors from pathogenic bacteria (including those responsible for the plague and food poisoning) use to manipulate host cell signaling systems to promote infection. These bacterial factors disrupt the host's defense mechanisms, allowing the bacteria to survive and replicate by tipping the balance of homeostatic signaling pathways in favor of the invading pathogen.

For Eric Olson, also from UT-Southwestern, Orth's work "represents a unique convergence of biochemistry and cellular biology with the basic mechanisms of infectious disease." Jack Dixon, vice president and chief scientific officer at the Howard Hughes Medical Institute, agreed. "Kim's efforts were nothing short of dazzling," he said.

"I feel extremely honored to win such a prestigious award for our scientific endeavors," said Orth. "I credit much of this success to the skilled people I have had the privilege to mentor, the first-class, collegial environment at UT-Southwestern, and my supportive friends and family." A scientist to the bone, Orth also made sure to credit the "clever bacterial pathogens that evolved magnificent mechanisms to manipulate cellular signaling and who make science so much fun."

> "These bacterial factors disrupt the host's defense mechanisms, allowing the bacteria to survive and replicate by tipping the balance of homeostatic signaling pathways in favor of the invading pathogen."

After an undergraduate career at Texas A&M University, Orth received her master's in biological chemistry at the University of California, Los Angeles, before moving to UT-Southwestern, where she spent three years as a research associate before beginning her Ph.D. program, which she finished in 1995. After a postdoctoral fellowship at the University of Michigan, Orth returned to UT-Southwestern in 2001, where she has been ever since.

Orth will receive her award during the Experimental Biology 2012 conference in San Diego, where she will deliver an award lecture. The presentation will take place at 2:55 p.m. April 24 in the San Diego Convention Center.

Geoff Hunt (ghunt@asbmb.org) is ASBMB's public outreach coordinator.

About the award

The ASBMB Young Investigator Award (formerly the ASBMB/Schering-Plough Research Institute Award) recognizes outstanding research contributions to biochemistry and molecular biology. The recipient must have no more than 15 years postdoctoral experience. The award consists of a plaque, $5,000, transportation, and expenses to present a lecture at the 2012 ASBMB annual meeting.

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A 'mad race to the finish'

A conversation with Philip Leder on the genetic code experiments that he began 50 years ago

BY RAJENDRANI MUKHOPADHYAY

In 1961, Marshall W. Nirenberg of the National Institutes of Health and his postdoctoral associate Heinrich Matthaei shot to fame for "breaking the genetic code." Their work launched the era of genomics, leading to the Human Genome Project, whole-genome sequencing and personalized medicine.

In the now-famous polyU experiment, Nirenberg and Matthaei showed that a synthetic RNA made of only uracils coded for the amino acid phenylalanine (1). But the polyU experiment was just the beginning. Scientists still had to work out how many bases were in a codon and which codon corresponded to which amino acid.

In 1962, a year after the polyU experiment, Philip Leder joined Nirenberg's laboratory as a research associate. He used artificial RNA sequences of three nucleotides in cell-free systems as an assay for the genetic code. The fragments were long enough to let ribosomes bind with the complementary aminoacyl-tRNA molecule and still be detectable. Leder and other members of Nirenberg's laboratory radioactively labeled one amino acid at a time in a mixture of the 20 amino acids and put the mixture through a filter. The filter let unbound aminoacyl-tRNAs pass through but caught the ribosomes. The sample in the filter was then tested for radioactivity. If radioactivity was present, then the labeled aminoacyl-tRNA matched the codon in the oligonucleotide; the sequence of bases in the codon was the code for amino acid carried by the tRNA.

With this assay, Nirenberg's group deciphered most of the codons by 1966. In 1968, Nirenberg shared the Nobel Prize in physiology or medicine with Robert W. Holley and Har Gobind Khorana for deciphering the genetic code.

Subsequently, Leder's career led to understanding the genetic underpinnings of the immune system and cancer. His work garnered him, among other things, the Lasker Award and the National Medal of Science. One of his seminal contributions was the introduction of oncogenes into laboratory mice to make transgenic animals. Leder recently retired from Harvard Medical School.

Leder spoke with ASBMB Today to reflect on the experiments he embarked on 50 years ago. Below are edited excerpts from the interview.

ASBMB: What prompted you to join Nirenberg's laboratory in 1962?

Leder: *It's an interesting story and says something about the history of the time. I graduated from medical school and was training to do primary care in internal medicine. In those days, anybody who was a physician got drafted. It was just about that simple. The Berlin Wall had gone up. People in the political and military circles were anticipating difficulties [during the Cold War], so that resulted in drafting all eligible physicians. I got drafted, so I applied for a position in the Public Health Service, which supplied physicians and scientists to the National Institutes of Health in Bethesda.*

A friend at NIH told me that I ought to meet Marshall Nirenberg because he was doing interesting experiments with the genetic code. Frankly, I didn't know anything about the genetic code. But I went to see Marshall, and he explained to me what he was doing and its importance. It was the most fascinating thing I'd ever heard. Marshall was quite a young guy at the time — I think in his late 20s or early 30s — and conveyed a lot of enthusiasm and excitement.

ASBMB: What was going on at the time with the genetic code?

Leder: *There was a mad race to the finish. We were competing with a large biochemical laboratory in New York University run by Nobel laureate Severo Ochoa. It was quite a horse race. The polyU experiment that Marshall and Matthaei did was essential to the beginning of the process. The race was a lot of fun to watch up close.*

ASBMB: How did the polyU experiment set the stage for your experiments?

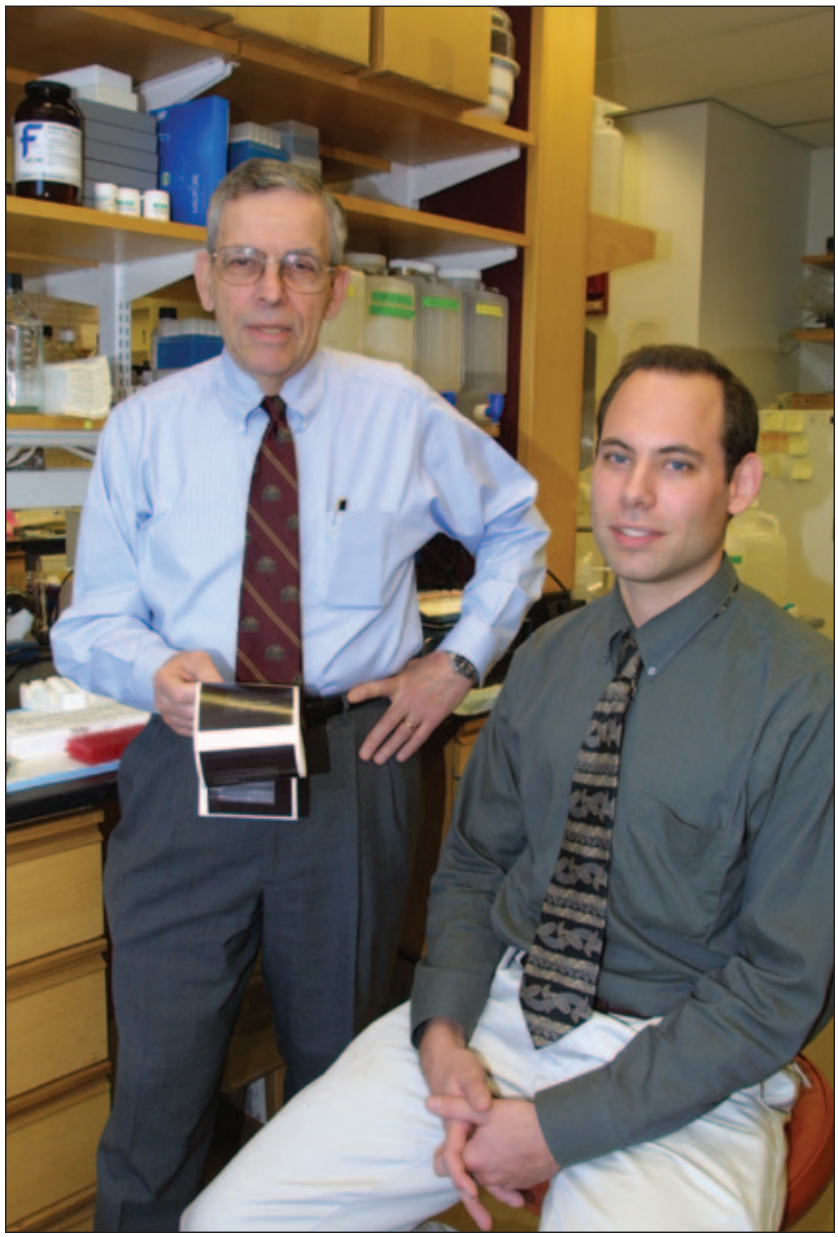
Leder: *By the time I arrived in the laboratory, the polyU experiment had been done. It had elucidated the fact that some sequence of uridylic acid resides constituted phenylalanine. But*

it didn't tell us what, for example, UCU coded for or what were the other codons. It didn't even tell us how many bases were actually needed in a codon. There was a lot of speculation. But that was the problem I worked on.

ASBMB: What did the assay that you and your colleagues in Nirenberg's laboratory designed reveal?

Leder: *By purification and enzymatic degradation techniques, we were able to develop very short oligoribonucleotide sequences and show that the code was triplet code. Two U's didn't induce the binding of phenylalanine-tRNA to ribosomes. But three nucleotides set up in a row did, in fact, induce the binding of phenylalanine. So from that we knew, for example, that the code word for phenylalanine was a series of 3 U's.*

I had noticed in a scientific magazine that a company in Germany was selling diribonucleotides. I bought all 16 diribonucleotides, which all had known sequences. I then systematically added a base to each of them to make triplets. [Ochoa's] large group in New York was very good and had developed an enzyme called polynucleotide phosphorylase. I used that enzyme to synthesize the oligoribonucleotides. I developed an array of what ultimately became 64 triplets. Most of them encoded an amino acid except, of course, the termination codons.



Philip Leder in 2002 in his laboratory at Harvard Medical School with then-graduate student Benjamin Leader. PHOTO COURTESY OF STEVE GILBERT

ASBMB: What was the atmosphere like?

Leder: *I couldn't sleep for days at a time because of the excitement! I must admit it was very competitive; there's no question about that. I would go to bed thinking about the next day's experiments and then jump out of bed in the morning and rush to the laboratory. I stayed late at night. It was a lot of work but the intellectual excitement was enormous.*

ASBMB: Were there any other projects going on in the Nirenberg laboratory?

Leder: *Oh, no. This was the only focus of the laboratory by that time. The nice thing about it was that it had a solid*

> *"Biology is so complex that it's unusual to have questions with simple and clean answers. But this is one example."*

Marshall Nirenberg (seated) with Heinrich Matthaei. The duo performed the first experiment that started the race to crack the genetic code.

PHOTO COURTESY OF NATIONAL INSTITUTES OF HEALTH/DEPARTMENT OF HEALTH AND HUMAN SERVICES

end-point — the code elucidated. Biology is so complex that it's unusual to have questions with simple and clean answers. But this is one example. The genetic code is the genetic code.

ASBMB: What lessons can young scientists draw from these experiments?

Leder: *First of all, I paraphrase Isaac Newton when I say we all stand on the shoulders of those who have gone before us in the acquisition of knowledge. The other [lesson] is the genetic code allows us to see the beautiful construct that evolution has created. The genetic code is exquisitely important and, at the same time, aesthetically pleasing.*

Even though the code has been known for a long time, there's still a lot that can be done with it that is important. Understanding diseases, all of which have genetic components, is one. It's going to be an important source of investigation for at least the next 20 years. There's nothing that can really beat this.

Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is the senior science writer for ASBMB Today and the technical editor for the Journal of Biological Chemistry.

REFERENCE

1. Nirenberg, M.W. and Matthaei, J.H. (1961) The dependence of cell-free protein synthesis in E. coli upon naturally occurring or synthetic polyribonucleotides. *Proc. Natl. Acad. Sci.* **47**, 1588–1602.

Meet F. Anne Stephenson, a new Journal of Biological Chemistry associate editor

BY RAJENDRANI MUKHOPADHYAY

In 2011, F. Anne Stephenson became an associate editor for the Journal of Biological Chemistry after serving as an editorial board member for more than eight years. Stephenson is a molecular neuroscientist at the University College London, where she was appointed professor in 1995. Her research focuses on fast-acting neurotransmitter receptors and the associated scaffolding and trafficking proteins. Stephenson has served on the British Neuroscience Association Committee and the Neurochemical Group of the Biochemical Society. She is a member of the Medical Research Council's College of Experts and recently completed a four-year term on the Molecular and Cellular Neurosciences Committee of the Wellcome Trust. Stephenson spoke with ASBMB Today about her research interests, her thoughts on the JBC and her perspective on life. Below are edited excerpts from the interview.

ASBMB: What does your group work on?

Stephenson: *We're interested in neurotransmission. When people were studying neurotransmitter receptors in the early days, they thought there was just one type of every neurotransmitter receptor. When molecular cloning came about, it became clear that there were families of receptors for each neurotransmitter molecule. We study two different families, NMDA and GABA receptors. Both receptor families are implicated in many neurodegenerative disorders. The aim of my laboratory for a long time was to determine the complexity of these receptors. We developed sequence-specific antibodies to distinguish between these very highly related proteins so that we could study their distribution and functional properties. That's how we started to study the scaffolding proteins, which are cytoplasmic proteins involved in the clustering and targeting of neurotransmitter receptors to the right place of neurons. We discovered [for example] the TRAK family of scaffolding proteins. TRAK proteins form a link between motor proteins and their cargoes and are involved in the mitochondrial transport in neurons. We're also studying interactions between NMDA receptors and the protein amyloid precursor protein that's implicated in Alzheimer's disease.*

ASBMB: What has been your career trajectory?

Stephenson: *I started out at Cambridge University, where I got a degree in natural sciences, which gives you a very broad scientific education. I went to do either physics or chemistry, but Cambridge was very male-dominated. I remember going to physics classes where I would be the only girl. I lost interest. In the second year, I took up biochemistry and really loved it. The molecu-*

lar aspects appealed to me, and it seemed to be more relevant because you could see the clinical applications. I still graduated in chemistry, but I did that one year of biochemistry.

After leaving Cambridge, I earned a master's degree in neurochemistry [at the University of London]. I had absolutely no idea that I was going to go into research, but I just loved my laboratory work. I then did a Ph.D. at the University of Bath in the U.K., where I studied the nicotinic acetylcholine receptor at the neuromuscular junction and its role in an autoimmune disease called myasthenia gravis. I next went to the United States [in the early 1980s] to Richard Olsen's lab, which, at the time, was at the University of California, Riverside, but is now at [the University of California, Los Angeles]. I wasn't there for very long, but I started to work on GABA receptors. Going to America was a big thing for me in those days. It introduced me to American science.

I went back to the U.K., got a fellowship from the Medical Research Council and joined Professor Eric Barnard. He was then at Imperial College in London. I carried on with GABA receptors. At the time, molecular biology was really starting to have an impact on neuroscience. Eric Barnard led that field in the U.K. I was very fortunate to get another fellowship [in 1983] from the Royal Society, which is analogous to the U.S. National Academy of Sciences. They had a scheme to try to hold onto young scientists by giving them quite long fellowships. The first year that the fellowships were announced, Professor Barnard put my name forward, and I was very lucky to get one of those. I held it for eight years. Although I was working under [Barnard's] big umbrella, I still had some independence, because I had my own salary.

I got my position at the School of Pharmacy [at the then-University of London in 1989] and set up my own lab. My lab still had the very old-fashioned huge teak benches, which I had to scrub down with help from Mike Duggan, my first postdoc! I then got some refurbished space, and I am still in that space now.

> *"I went to do either physics or chemistry, but Cambridge was very male-dominated. I remember going to physics classes where I would be the only girl. I lost interest."*

ASBMB: What role has the JBC played in your career?

Stephenson: *I have published a lot of papers in JBC, and it was always my first choice for publishing biochemistry papers. Publishing in JBC helps get your message across to a broad audience. I was so pleased to be invited to be an associate editor. I hold the journal in such high regard. But I did take some persuading. Marty [Fedor, JBC's editor-in-chief] told me: "It's your chance to give something back to the community."*

ASBMB: What are your hobbies?

Stephenson: *I like sports a lot. I like to play tennis. I run and ski. I love hiking in the hills. The best hikes I've done were in Italy and New Zealand.*

ASBMB: What is your motto in life?

Stephenson: *Work hard; play hard. No really, I believe that. As I've gotten older, the playing has gotten a bit more difficult! But for sure, when I was working with Eric Barnard in London, we just had a fantastic time. We were a group of young people who all worked hard and enjoyed science, but we played hard as well. I'm not sure if that happens as much now. When I look at the Ph.D. students now, I don't think there is as much fun around. There's much more pressure.* XXX

Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is the senior science writer for ASBMB Today and the technical editor for the Journal of Biological Chemistry.

ASBMB 2012 Special Symposia Series

NEW! Trypsin-Like Proteases: Structure, Function and Regulation

Trypsin-like proteases are responsible for digestion, blood coagulation, fibrinolysis, development, fertilization, apoptosis and immunity. Exciting new research reveals that conformational heterogeneity and allostery underpin the basis of biological activity in this class of enzymes. New mechanisms of regulation have emerged, along with unanticipated opportunities for therapeutic applications.

Thus, this research field must re-evaluate existing knowledge in the context of emerging new paradigms and exciting new trajectories. The meeting will bring together world-class structural biologists, enzymologists and protein engineers to discuss new developments in the field in a highly interactive environment.

ORGANIZER: ***Enrico Di Cera****, Saint Louis University School of Medicine*

DI CERA

June 7 – 10

Granlibakken Resort and Conference Center
(Tahoe City, Calif.)

Early registration and abstract submission deadline: March 1

www.asbmb.org/2012Proteases

June 27–29

Michigan State University
(East Lansing, Mich.)

Early registration and abstract submission deadline: March 28

www.asbmb.org/2012Mitochondria

NEW! Mitochondria: Energy, Signals and Homeostasis

In this inaugural symposium on mitochondrial biology, we will consider the expanding spectrum of physiological functions of this ancient organelle, often referred to as the powerhouse of the cell. Topics will explore the tightly regulated provision of cellular energy, control of intracellular ion and metabolite traffic, redox homeostasis and mediation of cell stress signals. Their centrality in cellular processes place mitochondria in a pivotal role in pathology and aging, and hence they are key targets of molecular pharmacology. Thus, the meeting will mark a departure from the consideration of mitochondria as a relic of its endosymbiotic ancestor or as an arrangement to provide a subcellular compartmentalization of various metabolic processes. Rather, we will fast-forward to these current concepts of its crucial role in the integration of cellular metabolism and its regulatory function in health and disease.

KAGUNI

JACOBS

ORGANIZERS: ***Laurie S. Kaguni****, Michigan State University, and* ***Howard T. Jacobs****, University of Tampere, Finland*

Sept. 4–9

The Banff Center
(Banff, Alberta, Canada)

Early registration and abstract submission deadline: June 1

www.asbmb.org/2012LipidBiology

NEW! Frontiers in Lipid Biology

Joint meeting with the International Conference on the Bioscience of Lipids and Canadian Lipoprotein Conference

D. VANCE

The conference will focus on the growing recognition that dysfunctional lipid metabolism underlies the development of many human diseases such as obesity, atherosclerosis, metabolic syndrome, liver and lung disease and neurodegenerative disorders. Short talks and posters given by trainees will be emphasized. Major talks will be given by internationally recognized scientists who were selected for their scientific excellence as well as their ability to present their work clearly and logically. The conference is jointly organized by ASBMB, the International Conference on the Bioscience of Lipids and the Canadian Lipoprotein Conference.

ORGANIZERS: ***Dennis Vance****, University of Alberta, and organizing committee members* ***Bill Dowhan****, University of Texas Health Science Center at Houston;* ***Fritz Spencer****, University of Graz, Austria;* ***Rene Jacobs****, University of Alberta;* ***Richard Lehner****, University of Alberta;* ***Spener Proctor****, University of Alberta;* ***Simonetta Sipione****, University of Alberta;* ***Jean Vance****, University of Alberta;* ***Dawei Zhang****, University of Alberta*

DOWHAN

SPENCER

JACOBS

LEHNER

PROCTOR

SIPIONE

J. VANCE

ZHANG

Transcriptional Regulation: Chromatin and RNA Polymerase II

How does RNA polymerase II coordinate the synthesis of messenger RNA, resulting in proper cellular regulation and organismic development? The sessions will cover new findings in transcriptional initiation, elongation and termination and the role of RNA polymerase II, its C-terminal domain and the associated factors in this process. New findings on the roles of chromatin, their interacting proteins and post-translational modifications, their numerous transcriptional properties and their role in development also will be addressed. The plenary lecture will be presented by Ramin Shiekhattar, who will describe his work on the functions of long noncoding RNAs in transcriptional regulation, development and disease pathogenesis. This year's meeting represents the 10th anniversary of this important and influential conference.

ORGANIZERS: ***Raymond Trievel****, University of Michigan, and* ***Ali Shilatifard****, Stowers Institute for Medical Research*

TRIEVEL

SHILATIFARD

Oct. 4–8

Snowbird Ski and Summer Resort (Snowbird, Utah)

Early registration and abstract submission deadline: Aug. 1

Platform lecture abstract deadline: March 1

www.asbmb.org/2012TranscriptionalRegulation

Post-Translational Modifications: Direction and Physiological Role

Post-translational modifications create the enormous structural and functional diversity required to integrate information regarding the nutrient and stress status of the cell and to regulate essential cellular functions. Recent technological advances, particularly in the area of mass spectrometry, are revealing new modifications and providing novel insights into the role of PTMs in integrating information and regulating signal transduction. This biannual meeting brings together leading experts in the study of a wide variety of different PTMs to allow cross-fertilization, presentation of the most exciting breakthroughs in the methodology and biological functions of PTMs and lively discussions of new concepts and approaches.

ORGANIZERS: ***Gerald W. Hart****, Johns Hopkins University School of Medicine, and* ***Lauren E. Ball****, Medical University of South Carolina*

HART

BALL

Oct. 11–14

Granlibakken Resort and Conference Center (Tahoe City, Calif.)

Early registration and abstract submission deadline: Aug. 1

www.asbmb.org/2012PostTranslational

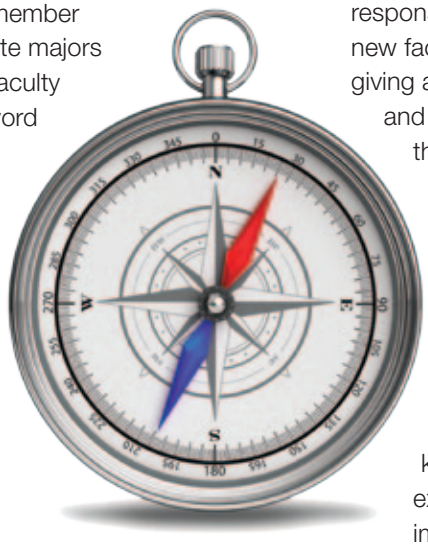
Stranger in a strange land

A primer on advising undergraduates

BY PETER J. KENNELLY

Duty or opportunity?

Most young faculty members arrive at their new jobs eager to establish their research programs, to guide the bright young students within their laboratory groups through those first critical steps on the path to a career in research and even, perhaps, to emulate those teachers who enlivened the classroom through their creativity and commitment to education. Rarely, however, will an aspiring young faculty member mention advising undergraduate majors as one of the attractions of a faculty career. Indeed, for many the word "advising" conjures up images of students lined up outside their office doors, a sea of uninterpretable forms and constant demands for signatures and letters of reference.



But in fact student advising can serve as an effective and surprisingly efficient mechanism for learning about your new institution and the students that it serves. After all, these students constitute both the *raison d'être* for your college or university and a prime source of revenue. Student advising not only serves as a vehicle for learning what biochemistry and molecular biology majors actually do when they are not taking your course, it also provides direct feedback regarding student perceptions of the intent, value and delivery of each item within the curriculum. The value of such firsthand testimony in informing the assessment and revision of curricula should not be discounted. In terms of your own self-interest, advising offers a venue for identifying and recruiting exceptional undergraduates for your research group.

Why do some prospective faculty members nonetheless view undergraduate advising as a burden, one that perhaps should be assigned to a staff member rather than an overburdened professor? Pragmatically speaking, while research, scholarship and teaching are all explicitly considered in making promotion and tenure decisions, little if any weight is given to generic student advising. The logical response for young faculty members caught between shrinking faculty numbers and an increasingly challenging research funding climate is to focus on those activities that are rewarded by the institution and minimize the time and energy invested in those responsibilities to which only lip service is paid. Many new faculty members harbor sincere reservations about giving advice regarding institutions that are, after all, new and strange to them. They see little value in having the blind leading the blind and are discouraged by the mass requirements, regulations, forms and deadlines with which they feel the need to become familiar.

Avoid the expectations trap

As with learning itself, navigating the college experience is the responsibility of the individual student. Yet most of the advisees who knock at your office door will exude the palpable expectation that it is your responsibility to provide immediate answers to their questions or facile solutions to their problems. This expectation often will be advertised by statements such as, "It's your job to help me, isn't it?" or (from parents), "What is it we're paying you for?" However, while most new faculty members have a good basic understanding of the responsibilities and relationship between a teacher and a student, all too frequently a new assistant professor will find himself or herself buying into the student expectation (or hope) that the job of an adviser is to serve as an infallible, all-knowing oracle.

A realistic job description

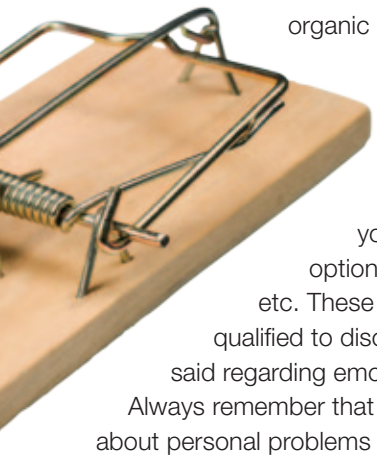
The key to being an effective and satisfied undergraduate adviser is to develop a realistic set of expectations.

According to the Second College Edition of the American Heritage Dictionary, "advise" means:

1. to offer advice to
2. to recommend; suggest
3. to inform; notify.

I would suggest that a faculty member's responsibility as an undergraduate adviser is to assist students in making informed decisions on academic matters. Although you will quickly acquire a surprising spectrum of relevant information, your job is to assist students in getting answers and making decisions — not to be the source of all answers and decisions.

Perhaps the most important aspect of being an undergraduate adviser is to serve as an interface between the student and the university bureaucracy, a user-friendly guide for identifying where the student can get the information needed. Don't know where to send the student? Call a colleague for advice. A second important duty is to serve as a mature sounding board regarding expectations. Often, struggling students will attempt to raise their grade point averages by taking course overloads. Now is the time when someone needs to ask how the student will get better grades while taking on more work. A third goal is to try and identify potentially serious errors. For example, at most universities a delay in taking organic chemistry will set back a BMB student's entire program of study, given that this course is a prerequisite for many required courses.



Students may turn to you for advice regarding career options, potential graduate schools, etc. These are all areas that you are well qualified to discuss. The same cannot be said regarding emotional or psychological issues. Always remember that when a student begins talking about personal problems you are hearing only one side of the story. Resist the urge to jump to conclusions. If you suspect that a student is experiencing emotional or psychological difficulties, contact the counseling office for advice on how to proceed.

Ideally, your institution offers training workshops to help prepare you for this important task as well as an experienced mentor to serve as a source of information and advice. If not, recruit your own mentor from the senior faculty. If your department has some sort of undergraduate coordinator, he or she generally will be more than happy to help. The chairperson of the curriculum committee also likely keeps well-informed about issues of importance to undergraduate BMB majors. If you aren't sure how to proceed, ask the department head or chairperson to help link you with a suitable mentor.

Beware of good intentions

A parent calls you up and asks how his or her son or daughter, one of your advisees, is doing. Your first instinct is to check the student's records and tell the caller the student's current GPA and the courses he or she is taking this particular semester and perhaps segue into a discussion of the student's strengths, weaknesses, work habits, etc. Before you say a word, however, determine whether the student has given you permission, generally in the form of a signed document, to disclose this information. Faculty advisers are bound by the Family Educational Rights and Privacy Act and relevant university policies. Although the parent may be paying for a son's or daughter's education, these contributions do not supersede the rights of the student. Nor does it matter if the caller is the editor of the hometown newspaper who wants to run a flattering story about a local young person or a friend or relation claiming an emergency: You have no discretion in this matter.

Should the caller be dissatisfied with your response, refer him or her to the university attorney's office for an authoritative explanation. As in all aspects of advising, take full advantage of the experience and expertise available on campus to promote the most constructive outcome possible.

Peter J. Kennelly (pjkennel@vt.edu) is a professor and head of the department of biochemistry at Virginia Tech and serves as chairman of the ASBMB Education and Professional Development Committee.

Adipose tissue de novo lipogenesis

Unanticipated benefits in health and disease

BY MARK A. HERMAN AND BARBARA B. KAHN

Fatty acids are essential macromolecular cellular constituents serving critical structural and energetic roles. Synthesis of fatty acids endogenously (known as de novo lipogenesis, or DNL, Fig. 1) is traditionally thought to serve the purpose of converting excess carbohydrates into lipids for storage, because lipid is much more energy-dense than carbohydrate and is therefore a more efficient storage form. It is increasingly clear that fatty acids and their derivatives are also important signaling molecules that affect many fundamental physiologic processes. DNL may produce lipid species with bioactivities distinct from those of lipids derived predominantly from the diet (1). Therefore, there is growing interest in the physiological role of DNL in normal biology and in disease states such as obesity, Type 2 diabetes and cardiovascular disease.

The two central enzymes of DNL, acetyl-CoA carboxylase and fatty acid synthase, use acetyl-CoA and malonyl-CoA derived from glucose or

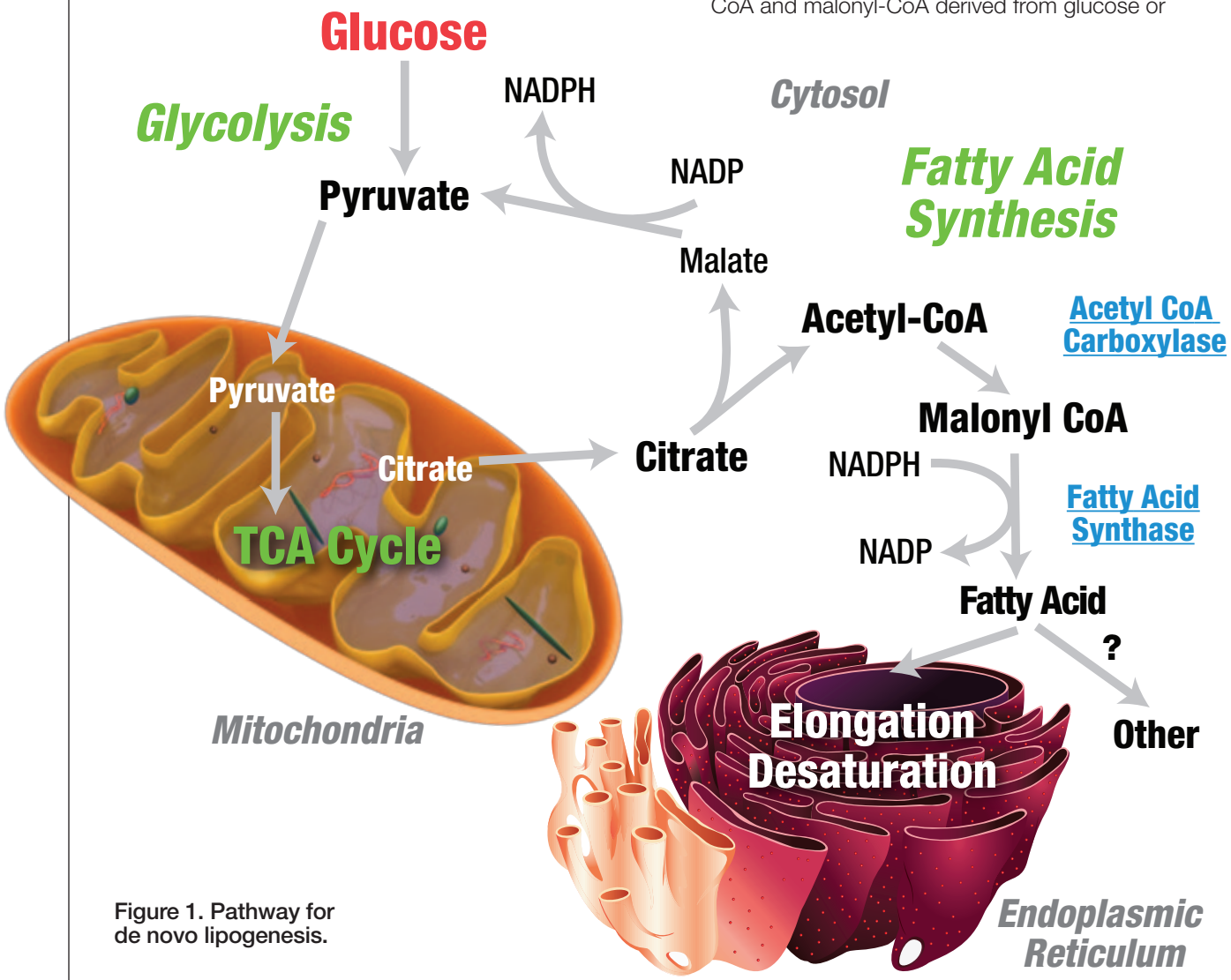


Figure 1. Pathway for de novo lipogenesis.

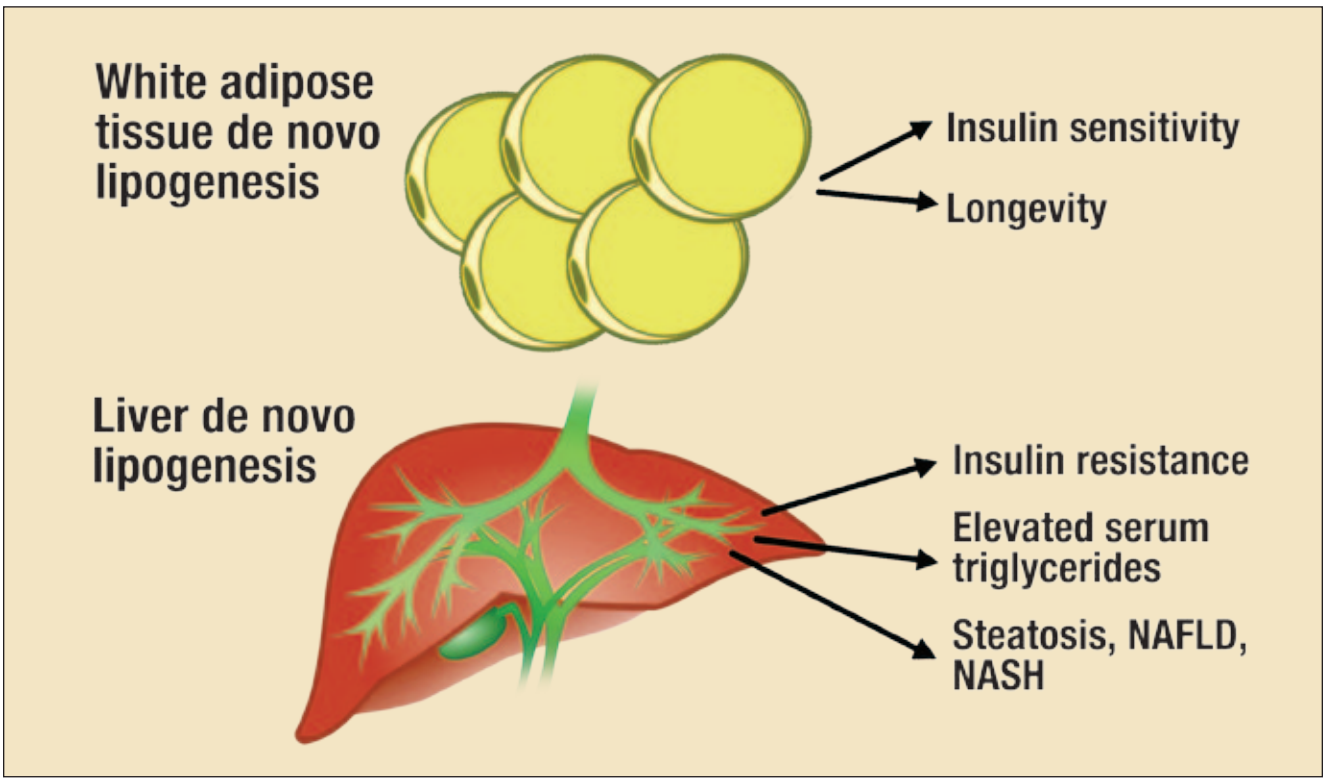


Figure 2. Divergent consequences of de novo lipogenesis (DNL) in adipose tissue compared to liver. NAFLD, nonalcoholic fatty liver disease. NASH, nonalcoholic steatohepatitis.

other carbon precursors to generate palmitate (Fig. 1). While palmitate may have detrimental effects, including enhancing production of proinflammatory cytokines and reactive oxygen species, other fatty acids have beneficial effects on metabolism, the immune system and cardiac function. For example, omega-3 fatty acids, though not synthesized endogenously, are used therapeutically to prevent complications of lipotoxicity in multiple tissues. Palmitate synthesized by DNL as well as dietary lipids can be modified by endogenous elongase and desaturase enzymes to produce multiple lipid species (Fig. 1). Many elongase and desaturase enzymes are coordinately regulated with other DNL enzymes (2). Thus, depending on the complement of enzymes in a specific tissue, the pattern of fatty acids produced by DNL may vary, and distinct fatty acids have very different biological properties.

In animals and humans, fatty acids are predominantly stored in adipose tissue as triglyceride. Most fatty acids in adipose tissue are obtained from dietary fat. Evolutionarily, the ability to store lipid conferred an advantage, because organisms that efficiently stored energy survived when food was scarce. Now, this propensity for storage contributes to the growing obesity epidemic and its associated comorbidities. Interestingly, when surplus food is available, excess carbohydrate generally is oxidized rather than converted to fatty acids by DNL (3). The oxidation of excess dietary carbohydrate in preference to dietary fat is energetically efficient (i.e., it consumes less ATP than converting the excess carbohydrate into lipid) but this energy efficiency may exacerbate the propensity for obesity when food is plentiful. In conjunction with increased carbohydrate oxidation during high-carbohydrate/high-fat feeding, conversion of carbohydrate to fatty acids is decreased by downregulation of DNL in adipose tissue (4). Understanding the cellular mechanisms by which high-fat intake downregulates DNL in adipose tissue could provide new insights into the pathogenesis of obesity and diabetes.

The absence of a simple correlation between carbohydrate ingestion and the quantity of DNL in humans supports the concept that DNL may serve physiological functions aside from its role in the macronutrient energy economy. While most cells perform DNL, liver cells and adipocytes are particularly well adapted. DNL in liver has detrimental effects, including elevating serum triglycerides

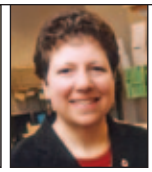
and increasing intrahepatic lipid (steatosis), leading to nonalcoholic fatty liver disease and steatohepatitis (Fig. 2) (5). In addition, elevated hepatic DNL strongly correlates with insulin resistance (6). In contrast, increased lipogenic enzyme expression in adipose tissue is associated with enhanced insulin sensitivity in humans (Fig. 2) independent of obesity (7).

DNL is driven by two master transcriptional regulators that are widely expressed – Sterol Response Element Binding Protein 1c and Carbohydrate Response Element Binding Protein. Both regulate expression of key lipogenic genes, such as fatty-acid synthase, acetyl-CoA carboxylase and ATP-citrate lyase (Fig. 1) (5). Insulin stimulates SREBP1c expression in the liver, and this is pronounced in hyperinsulinemic states such as Type 2 diabetes. In contrast, glucose and other carbohydrates regulate ChREBP activity. Expression of both DNL transcriptional regulators is elevated in liver in insulin-resistant states such as obesity. Knockdown of ChREBP in the livers of genetically obese ob/ob mice markedly improves insulin resistance and hepatic steatosis (8). In contrast, induction of ChREBP in adipocytes confers insulin sensitivity (4). Data suggest that adipose ChREBP may be involved in regulating whole-body insulin action and that ChREBP-driven DNL in adipocytes has beneficial metabolic effects (4) unlike the adverse effects of increased DNL in liver cells. SREBP1c appears to be a dominant regulator of DNL in liver but not adipose tissue, because SREBP1c knockout reduces hepatic but not adipose DNL enzyme expression (9). Hence, ChREBP is the dominant regulator of DNL in adipose tissue (4).

Investigation of the molecular mechanisms regulating DNL in liver and adipose tissue also supports the view that adipose DNL, unlike hepatic DNL, may be metabolically beneficial. Liver-specific deletion of SCAP, a protein required for cleavage of SREBP1c to its active form, reduces hepatic DNL (10). This is accompanied by a compensatory four-fold increase in adipose DNL associated with improved fasting glycemia, glucose tolerance and insulin sensitivity. In addition, genetically deleting adipose tissue lipid chaperones aP2 and mal1 increases adipose DNL and renders mice resistant to diet-induced obesity, fatty liver disease, insulin resistance and Type 2 diabetes (1). The improved metabolic phenotype has been attributed to insulin-sensitizing properties of palmitoleate, a potentially beneficial fatty-acid species produced at increased rates as a result of increased adipose DNL (1). These genetic studies causally link increased adipose DNL with beneficial effects on whole-body metabolism.

Additional recent observations support the possibility that adipose DNL may serve unanticipated beneficial physiological functions. Calorie restriction prolongs life span in numerous mammalian species and delays the development of aging-associated diseases such as diabetes and atherosclerosis (11). The mechanism is unknown. From an efficiency perspective, one might expect calorie restriction to reduce DNL, which is a wasteful energetic process. However, the opposite is observed. Calorie-restricted mice demonstrate a four-fold increase in adipose tissue DNL (12). It is not known whether this mediates the therapeutic effects of calorie restriction. But it is highly plausible that it mediates favorable metabolic effects, because enhanced DNL in adipose tissue confers improved glucose homeostasis (4).

Thus, growing evidence suggests that increasing adipose tissue DNL may provide beneficial health effects in contrast with the effects of DNL in liver tissue. Strategies to enhance DNL specifically in adipose tissue and to identify and administer salutary bioactive lipids may provide new therapies for metabolic and cardiovascular disease.

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REFERENCES

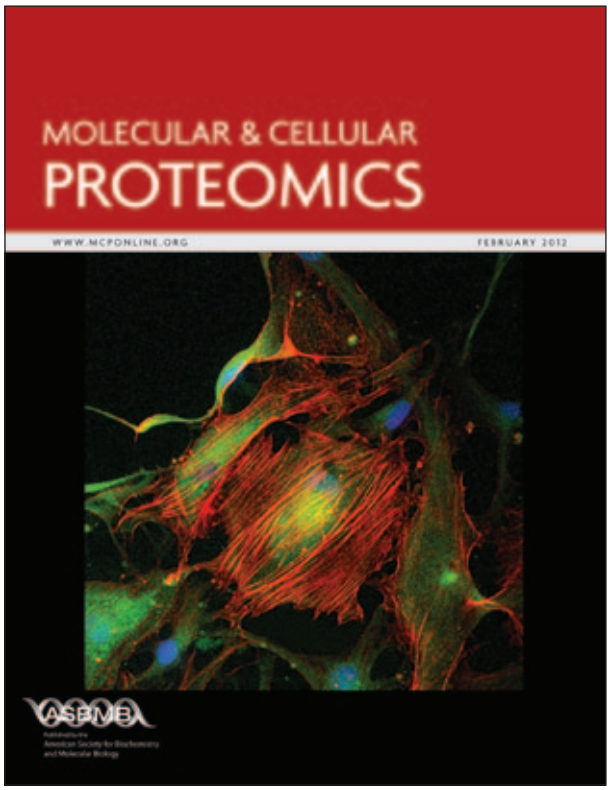
1. Cao, H., et al. (2008) *Cell.* **134**:933–944.
2. Wang, Y., et al. (2006) *Journal of Lipid Research*. **47**:2028–2041.
3. McDevitt, R.M., et al. (2001) *The American Journal of Clinical Nutrition*. **74**:737–746.
4. Herman, M.A., Peroni, O.D., Kahn, Barbara B. (2009) *Diabetes.* **58**: suppl. 1, A351.
5. Postic, C. and Girard, J. (2008) *J. Clin. Invest.* **118**:829–838.
6. Hudgins, L.C., Parker, T.S., Levine, D.M., Hellerstein, M.K. (2011) *Journal of Clinical Endocrinology & Metabolism.* **96**:861–868.
7. Roberts, R., et al. (2009) *Diabetologia.* **52**:882–890.
8. Dentin, R. (2006) *Diabetes.* **55**:2159–2170.
9. Shimano, H., et al. (1997) *J. Clin. Invest.* **100**:2115–2124.
10. Kuriyama, H., et al. (2005) *Cell Metabolism* **1**:41–51.
11. Heilbronn, L.K., Ravussin, E. (2003) *The American Journal of Clinical Nutrition.* **78**:361–369.
12. Bruss, M.D., Khambatta, C.F., Ruby, M.A., Aggarwal, I., Hellerstein, M.K. (2010) *American Journal of Physiology — Endocrinology and Metabolism.* **298**:E108–E116.

MCP MOLECULAR AND CELLULAR PROTEOMICS

A new crosslinker for proteomics

BY RAJENDRANI MUKHOPADHYAY

One of the things proteomic researchers want to figure out is how proteins interact with one another to form complexes. Chemical crosslinking combined with mass spectrometry is one way to understand these processes. But the problem is that most of the current crosslinking methods can tackle only simple protein mixtures and can't handle large protein complexes or networks of proteins. To address these issues, a team led by Jeffrey Ranish at the Institute for Systems Biology developed a new crosslinker, Biotin-Aspartate-Rink-Glycine (also referred to as BDRG, where D stands for aspartate), which they recently described in Molecular and Cellular Proteomics. BDRG "is the only crosslinker that contains an affinity handle along with a single mass spectrometric-labile bond," which is the Rink moiety, explains Ranish. The biotin group is the affinity handle that allows researchers to enrich for crosslinked peptides in a sample on an avidin affinity column. For the subsequent mass spectrometric analysis of the crosslinked peptides, the labile bond in the Rink moiety reduces the number of fragmentation products generated, which makes it easier for researchers to identify fragments in a spectrum. As proof of principle, Ranish's team used BDRG to study the architecture of a partially purified preparation of the 12-subunit RNA polymerase II complex that contained 90 copurifying proteins. Ranish cautions that, while the work "represents a major advance in the structural characterization of large protein complexes," BDRG is quite hydrophobic. The group is working on designing crosslinkers that are more hydrophilic with different affinity handles.



Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is the senior science writer for ASBMB Today and the technical editor for the Journal of Biological Chemistry.

jbc THE JOURNAL OF BIOLOGICAL CHEMISTRY

Potential antimalarial drug-target structure

BY RAJENDRANI MUKHOPADHYAY

Each year, 300 million people are stricken by malaria and more than 1 million people die from it. Plasmodium falciparum causes the most severe cases of the illness. As drug-resistant strains of the parasite emerge, there is an urgent need to identify new biochemical targets for developing antimalarial therapeutics. Phosphoethanolamine methyltransferase (PfPMT) catalyzes the methylation of phosphoethanolamine to form phosphocholine in P. falciparum. Because mammals don't make phosphocholine, which the parasite needs to make phosphatidylcholine for membrane biogenesis, PfPMT is critical for the parasite's survival. In a recent "Paper of the Week" in the Journal of Biological Chemistry, Joseph M. Jez at Washington University and colleagues described the structure of PfPMT. "This is the first molecular view of this enzyme," explains Jez. The investigators obtained a series of 1.19–1.55 Å resolution crystal structures of the enzyme bound to substrates, products and other molecules and identified Tyr19 and His132 as critical for enzymatic activity. The two amino acids carry out methylation of the phosphoethanolamine, lock ligands in the active site and arrange the site for catalysis. Jez says he was intrigued by how these two catalytic residues came from different parts of the enzyme and likely weren't organized as a functional dyad until both of the enzyme's substrates, phosphoethanolamine and S-adenosylmethionine, bound. Because PfPMT is

found in parasites that attack humans, animals and plants, it "might be possible to develop compounds of medical, veterinary or agricultural value to hit various parasites," Jez says.

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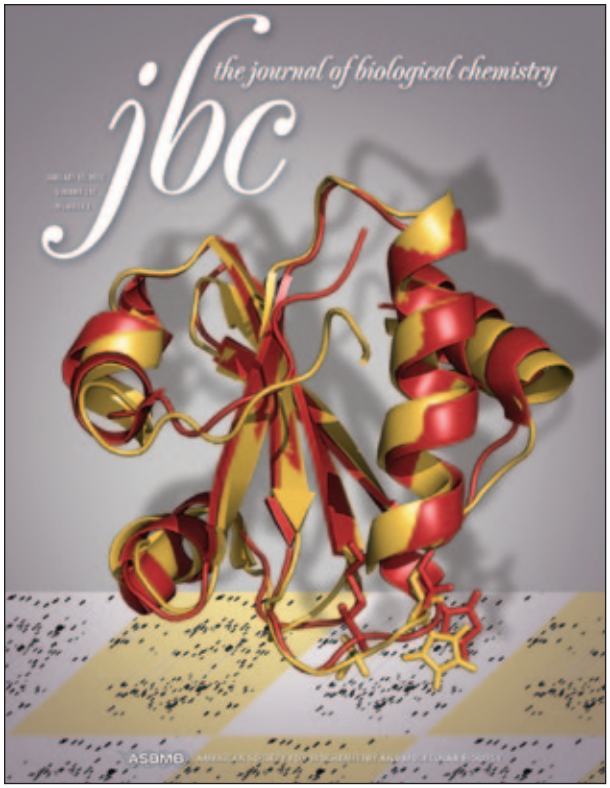


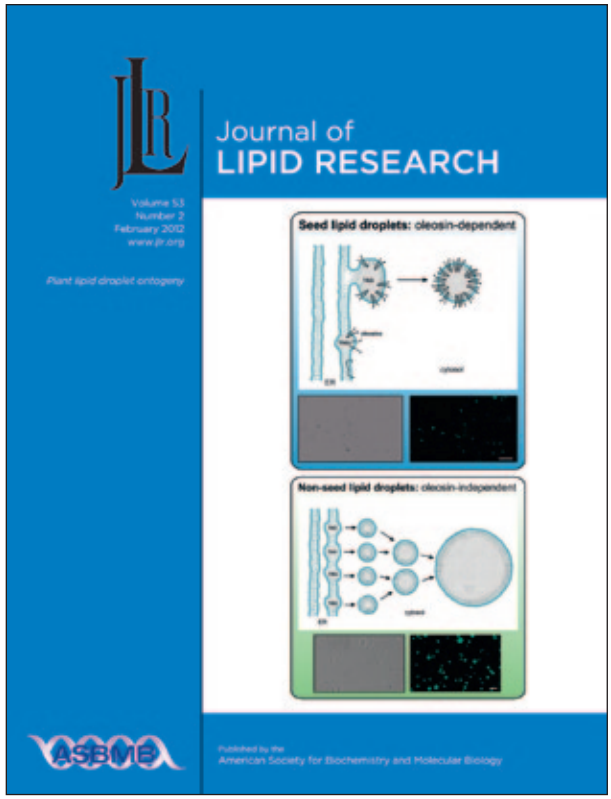
THE JOURNAL OF LIPID RESEARCH

Lipid droplets in plants: they're not just for energy storage anymore

BY MARY L. CHANG

In the February issue of the Journal of Lipid Research, Kent Chapman at the University of North Texas and colleagues examine the creation and functions of lipid droplets in plants. The article is part of an ongoing thematic review series on lipid droplets in eukaryotic model systems being coordinated by JLR editorial board member Karen Reue of the David Geffen School of Medicine at the University of California, Los Angeles. Plant seeds store large amounts of triacylglycerols in lipid droplets. After a seed germinates, these triacylglycerols serve as the primary source of fuel for the growth of the developing seedling before the plant can get energy via photosynthesis. Over the past couple of years of research, it has been found that lipid droplets in plants aren't simply for energy storage as long had been assumed. Stress response, pathogen resistance and hormone metabolism, although all very different processes, use the triacylglycerols in plant lipid droplets. There is also increasing evidence that the organelles in plants are more similar to their yeast and mammalian counterparts than previously thought. Chapman et al.'s review, "Biogenesis and functions of lipid droplets in plants," includes a section on approaches to identify novel proteins that are involved with lipid droplet biogenesis in plants. Notably, there are homologues in the Arabidopsis (rockcress plant) model system for human genes associated with lipodystrophy (the abnormal metabolism or redistribution of fat in the body). Several of these genes have been implicated in lipid droplet formation and the tissue-specific distribution of lipid droplets. It may seem like a stretch to compare plants to humans, but research points to the development of better treatments for debilitating lipid-related disorders in humans by taking the growing body of knowledge about lipid droplets in plants and using it in biotechnology applications.

Mary L. Chang (mchang@asbmb.org) is managing editor of the Journal of Lipid Research and coordinating journal manager of Molecular and Cellular Proteomics.



Research Spotlight in review

Each month, ASBMB's education and professional development manager, Weiyi Zhao, highlights the work and life of a minority scientist. In observance of Black History Month, here we look back upon what some of the scientists who've participated in the interview series had to say. You can read the complete interviews with these researchers and others at www.asbmb.org/spotlight.

Isiah Warner

Vice chancellor for strategic initiatives at Louisiana State University, Boyd professor and Philip W. West professor of analytical and environmental chemistry, Howard Hughes Medical Institute professor

In the beginning: "I always tell of my first chemistry experiment at the age of 2 when I tasted kerosene to see why it produced light. From that experience, I learned the first law of chemistry, i.e. do not taste the chemicals."

Geoffrey Kilili

Postdoctoral research associate, Purdue University

Navigating a new landscape: "If you are from a country that is not highly represented in (the) U.S.A.… or have difficulty speaking English, things can get lonely. Try to be patient. Pay attention to the reactions and signals from the people you interact with. Remember it is not for a day; it can be years before you ever get a chance to travel back or meet someone from you country. You, therefore, need to socialize or make the people around you see your social side."

Jason Sello

Assistant professor of chemistry at Brown University

Words of wisdom: "I would advise young people from under-represented backgrounds not to view their gender, race or ethnicity as an impediment. Science is not always a meritocracy. However, in this business, ideas are commodities, and publications are the currency. It is critically important to seek out good mentors, empathetic advisers and a network of supportive peers."

Heather Pinkett

Assistant professor in the department of molecular biosciences at Northwestern University

Forging a path: "Originally, I thought I wanted to be a child psychiatrist; I had even volunteered at Bellevue Hospital in Manhattan for a summer. When I went off to college, I majored in biochemistry and minored in psychology. Sitting in my psychology classes, I found I was fascinated not only by the discussions of behavior associated with mental disorders but also by our discussions on neurotransmitters. I wanted to know more."

Elizabeth McCullum

Postdoctoral fellow at the Baylor College of Medicine

Tips to take to heart: "Don't let science shape you; you shape science. Make sure you ask every 'dumb' question you have, and you will continue to reach your goals. Lastly, be sincere, honest, direct and humble in your efforts. People will appreciate these qualities and your work."

Marion Sewer

Associate professor at the Skaggs School of Pharmacy and Pharmaceutical Sciences at the University of California, San Diego, member of the ASBMB Minority Affairs Committee

In the thick of it: "I have found that biomedical research, particularly in academia, can be isolating and at times fraught with setbacks and disappointment. In spite of these adversities, I think the most important thing that I've learned is to not let speed bumps deter you from your goals and to not be afraid to take detours off a set path if these changes move you closer to a personally satisfying career."

Namandje Bumpus

Assistant professor at the Johns Hopkins School of Medicine

Rolling with the punches: "There are failures along the way, and a key example that many people mention is being turned down for a funding opportunity. I try to give myself time to absorb the initial disappointment before making any further decisions so that I am in a mindset to be able to think realistically and logically about my next steps. Whatever the situation has been, my mentors have played an important role in helping me identify areas where I can improve and work towards achieving a more favorable outcome.

Avery August

Professor and chairman of the immunology department at Cornell University College of Veterinary Medicine

What motivates him: "The satisfaction of seeing members of my lab make exciting discoveries, seen for the first time, and sharing that with them keeps me working. The satisfaction of seeing students come in not knowing how to use a pipette and leave brimming with excitement about a future in science makes it all worth it."

Tracy Johnson

Assistant professor at the University of California, San Diego

Lasting impact: "As a graduate student and postdoc, I was also able to develop my interest in teaching and outreach. I helped design and implement programs that promoted excellence in science by increasing the participation of members of underrepresented groups in science and research — such as a Saturday Science Academy for high-school students at Caltech. It was incredibly rewarding when, years later, one of these high-school students worked as a teaching assistant in my upper-division molecular biology class at UCSD!

Erika T. Brown

Assistant professor at the Medical University of South Carolina

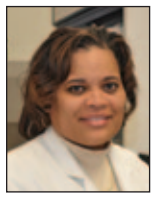
Finding a mentor: "As a junior faculty member, it is crucial to still have mentoring. Mentoring does not stop once the postdoctoral fellowship has been completed. In the early years of my independent position, I did not have a committed scientific mentor at my institution, because there was a lack of investigators who had a similar or overlapping research interest. I learned from this experience that, if your needs are not being met at your institution, it is imperative to seek assistance from outside senior faculty with expertise in your field of research.

Gloria Thomas

Assistant professor at Xavier University of Louisiana, member of the ASBMB Minority Affairs Committee

Lesson learned: "After my B.S. and before entering graduate school, I worked at the Albemarle Corp. in an R&D unit developing a synthetic product. I quickly learned that my worth as a chemist was primarily determined by meeting the color specifications of the marketing teams and the chemical engineers' existing plant designs. While I enjoyed working with the business teams and engineers, I wanted to experience more freedom in my science."

Kitani Parker Johnson



Assistant professor at Xavier University of Louisiana

Managing loss, setbacks: "I lost my major collaborator, who was also my husband, very suddenly. We had several projects going both between us and independently. To re-focus my research, I had to reach out to someone I not only respected but trusted scientifically and who could serve as a mentor during that incredible time of transition."

Kristala L. Jones Prather

Associate professor at Massachusetts Institute of Technology

An early start: "I don't think there was ever any particular moment that caused me to gain interest in science. I was always a tinkerer — the kid who had to set the VCR, program the satellite dish (when we lived beyond the reaches of cable in East Texas!), took apart the sink to retrieve lost jewelry, and fixed the toilet with paper clips. I think a career in science and engineering was inevitable for me!"

For more information

For the full-length version of these interviews, please visit the ASBMB Today website at **www.asbmb.org/asbmbtoday**.

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