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September 2011

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- ▶ outreach programs
- ▶ community service
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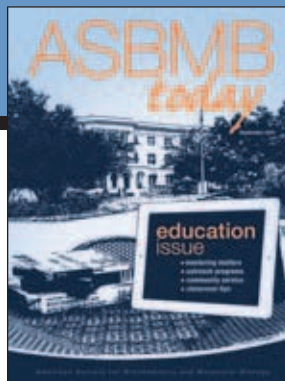


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The Microplate Reader Company

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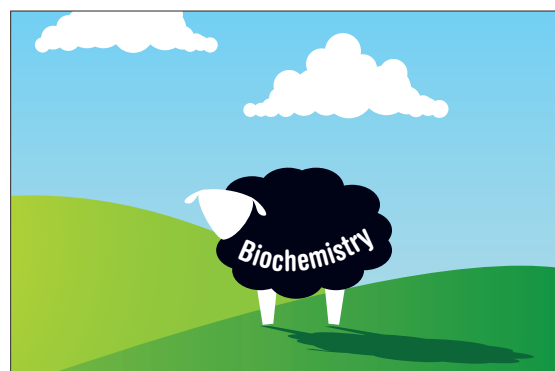
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The importance of mentorship

BY SUZANNE PFEFFER

Scientists become scientists by apprenticeship. We learn how to identify a question, design an experiment, publish and present our findings, write a grant application and lead a team. We learn how to get a job, keep a job and get promoted. We learn how to manage people and hopefully how to inspire them. We learn how to deal with ethical issues, and we learn about our responsibilities as scientists. Apprentices need mentors to teach them all these things, and different kinds of mentors are needed at each stage of our careers. It seems obvious that junior scientists need mentors; senior scientists need them, too.

Teachers and research advisers are obvious mentors during undergraduate, graduate and postdoctoral training. The identification of mentors at later career stages is not always as straightforward. Some institutions assign mentors to junior colleagues to meet with them annually (or more frequently) and provide feedback on how well they are meeting the requirements for promotion. Mentors can provide feedback on grant applications and project proposals and help with staff challenges or lab-management issues. The best mentors can promote you within the professional realm: They can recommend you as a speaker at a meeting, as a lead scientist on a project or as an author of a minireview for a prestigious journal. At later career stages, mentors can provide advice regarding new job opportunities or administrative roles. They can help nominate you for awards and recommend you for other professional activities. They can offer advice about negotiating difficult situations or transitions. The most successful scientists nurture informal relationships with multiple mentors. Just knowing that one has wise counsel and support from colleagues is important at every stage.

My mentors

I feel very lucky to have had wonderful and incredibly generous mentors throughout my career.



Chamberlin

When I was an undergraduate at the University of California, Berkeley, my mentor, **Michael Chamberlin**, took time to show me how to write an experimental protocol and a scientific paper. His writing skills were inspiring. I was drawn to Mike's lab because of the passion with which he described his research question: He wanted to understand how RNA polymerase selected a promoter to initiate transcription. I remember very clearly my first visit to his office to find out if he had space for an undergrad. He took to the chalkboard to draw out the location of

promoter sequences on T7 bacteriophage DNA. Chamberlin respected anyone who was 100 percent committed to his or her science, undergrads included. He regaled his lab members with tales of Paul Berg and Arthur Kornberg, his own mentors. All of us learned what Arthur (apparently) would have done if he found someone reading a newspaper during lab hours.



Kelly

My Ph.D. adviser at the University of California, San Francisco, **Regis Kelly**, was also a Kornberg mentee — and he taught me the importance of identifying a fundamental, unanswered question. When I joined Reg's lab, they were deep into analyzing the protein and lipid composition of synaptic vesicles purified from electric rays and just beginning to study the mechanisms by which peptide hormones are sorted for regulated secretion. Reg gave lab members a great deal of independence to conquer their projects and adopt the science as their own. In his lab, I learned the importance of sharing and discussing all the lab's science among all lab members. He shared with Chamberlin a great enthusiasm for science, and he pushed me to be fearless to do that key experiment that would either prove a new model or rip it to shreds. Reg encouraged fearlessness in multiple arenas: Few could match his skills when the entire lab would take a day for skiing at Squaw Valley or whitewater rafting and kayaking on a nearby river.



Rothman

My postdoc mentor at Stanford University, **Jim Rothman**, did not train with Kornberg, but Kornberg was one of his heroes. When I joined the Rothman lab, they had just established the first cell-free system that reconstituted the transport of a viral glycoprotein from one compartment of the Golgi to the next. There, I learned how to establish a cell-free assay for a membrane-trafficking event and how to try to obtain precise molecular information from such complex mixtures. Rothman showed me the value of strategy sessions to coordinate lab member contributions to achieve specific goals expeditiously. Rothman is a masterful orator, and I tried to learn from him how to grab and command an audience's attention during a lecture.

They come in many forms

Mentors include advisers with career experience willing to share their knowledge, supporters who provide encouragement, tutors who give performance feedback, sponsors who help open opportunities, and models of identity (1). Although at the time there were very few (if any) women in the departments in which I trained, I have benefitted from wonderful role models whom I came to know through membership in scientific societies and participation on extramural committees. Maxine Singer, Joan Steitz, Liz Blackburn, Lucy Shapiro, Heidi Hamm and Carla Shatz have impressed me with their tremendous leadership and diverse individual styles.

Most recently, Greg Petsko has been an outstanding mentor to me; working with Greg has been a real highlight of my term as ASBMB president. From Greg, I have learned the importance of speaking out for what you believe in. Greg has an unusual commitment to the people with whom he works, and he has earned a devoted fan club of scientists around the world. I will do my best to continue to nurture Greg's mentorship in the years to come, and there is no question that I also have much to learn from our incoming president-elect, Jeremy Berg. More junior colleagues also can be great mentors, and Pehr Harbury and I mentor each other here in the biochemistry department at Stanford.

Mentee-mentor relationships can bring great rewards to both partners. To those of you who mentor others, the act of mentoring honors your own mentors. Mentees, remember that there are many people around you who can provide invaluable advice, guidance and support at critical junctures. Seek those people out and develop those relationships. To all of my mentors, past, present and future, mentioned or not, thank you! ☺☺☺



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REFERENCE

1. Making the right moves: a practical guide to scientific management for postdocs and new faculty. At <http://www.hhmi.org/labmanagement>.

Retrospective: Nathan Sharon (1925 – 2011)

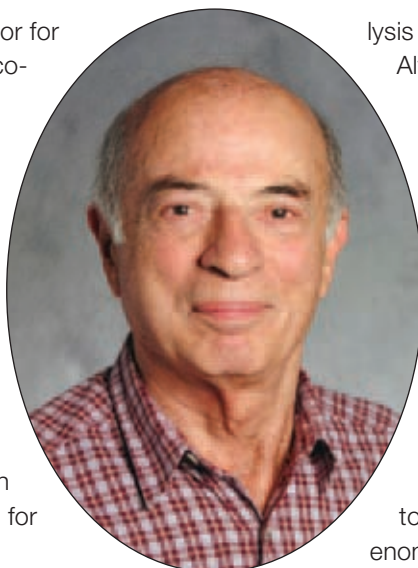
BY EVE IDA BARAK AND EUGENE A. DAVIDSON

Nathan Sharon, a lifelong ambassador for science and an accomplished glyco-scientist, died June 17. He was 85.

Sharon was born in 1925 in Poland and immigrated to Israel (then the British Mandate for Palestine) in 1934 at age 8. Later, he became involved in the military struggle for Israeli independence and served in the science corps of the Israel Defense Forces. He earned his bachelor's and doctorate in chemistry from Hebrew University and in 1954 joined Ephraim Katzir's biophysics department at the Weizmann Institute of Science, where he remained for his entire career.

Sharon started out working on bacterial polypeptides. In 1956, he went to Harvard University to learn more about peptide biosynthesis from Fritz Lippmann and consulted with Roger W. Jeanloz about a polysaccharide he found in a *Bacillus* (none was known then). Jeanloz urged him to publish his findings in *Nature* and invited him to Boston to characterize the polysaccharide chemically. This resulted not only in the discovery of novel bacterial sugar bacillosamine (2,4-diamino-2,4,6-trideoxyglucose, which has been implicated as the link in N-linked glycosylation of bacterial proteins), but it launched his career in complex carbohydrates.

Perhaps less known to the glyco community is his work with Daniel E. Koshland Jr. at Brookhaven National Laboratory. The paper that resulted in the *Proceedings of the National Academy of Sciences* had an unusual title: "Purified muscle proteins and the walking rate of ants." Not exactly glycobiology! The study tested William J. Crozier's 1924 hypothesis suggesting that in specific physiological processes a single enzymatic reaction served as the rate-determining step, and this control was exerted over a sufficiently broad temperature range to assess the activation energy of the reaction. Sharon and Koshland used purified myosin and live ants and measured temperature effects on the rate of ATP hydro-



lysis compared with the rate of ant walking. Although this study had nothing to do with carbohydrates, it can be reasoned that Sharon appreciated Koshland's creativity, a trait he too demonstrated as he asked (and answered) many key questions in the saccharide field.

Broad interests in natural phenomena were a hallmark of Sharon, and he was drawn to an old finding about cell aggregation. The first observations that some naturally occurring molecules (agglutinins) cause types of cells to aggregate date to the late 19th century. This phenomenon remained for decades in the category of "interesting observations," with little known about the nature of the interacting species, the mechanism or the basis for the apparent specificity. Unraveling this puzzle became Sharon's lifework. He defined the molecular nature of the saccharide recognition and was a founding father for the general area of cell-cell recognition.

In addition to maintaining a world-class research program, Sharon was active in administrative affairs, trained numerous successful investigators and brought science to the public as science editor of the *Haaretz* newspaper and editor of a radio broadcast on science.

To Sharon, science was personal. His travels took him all over the world to get to know his fellow glycoscientists personally. Those who knew him will always remember his personal warmth and graciousness. ∞∞∞



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Retrospective: Saul Roseman (1921–2011)

BY RONALD L. SCHNAAR AND GEORGE W. JOURDIAN

Saul Roseman, professor emeritus at The Johns Hopkins University, died peacefully July 2 after a career in science of nearly 70 years. He had profound effects on the field of glycobiology and our understanding of bacterial sugar transport. His enthusiasm and intensity were prodigious and contagious. He leaves a distinguished legacy of discovery.

Roseman earned a bachelor's in 1941 from City College of New York. He earned his Ph.D. in 1948 under Karl Link at the University of Wisconsin. His doctoral pursuit included a hiatus to serve as an infantryman in World War II. During post-doctoral studies at the University of Chicago with Albert Dorfman, he studied glycosaminoglycans, initiating a lifelong interest in hexosamine metabolism. In 1953, he joined the Rackham Arthritis Research Unit at the University of Michigan Medical School as an assistant professor.

At Michigan, his research initially concentrated on the metabolism of sialic acids, prominent cell-surface determinants and among the most abundant sugars that terminate the oligosaccharide chains of glycoproteins and glycolipids. Within a short time, he and postdoctoral researcher Don Comb convincingly proved that sialic acid contained N-acetylmannosamine, an unexpected finding because numerous investigators had concluded the hexosamine constituent of sialic acid was N-acetylglucosamine. Roseman's manuscripts reporting the correct structure of sialic acid were clear, rigorous, thorough and compelling, a style of research and communication that remained a hallmark.

The finding initiated a remarkably productive period of seminal discoveries in the Roseman lab, including pathways for the biosynthesis and degradation of sialic acids, isolation and characterization of CMP-sialic acid and its demonstration as the nucleotide sugar donor for the biosynthesis of sialylated glycans, enzymatic pathways for hexosamine biosynthesis, and characterization glycosyl-



transferase activities in tissues and bodily fluids.

During a summer stint in H. Gobind Khorana's lab, Roseman devised a chemical means to synthesize sugar nucleotides. The availability of these compounds in large amounts let investigators study the biosynthesis of the oligosaccharide chains of glycoproteins and glycolipids.

Roseman and his team were exploring the metabolism of N-acetylmannosamine by bacteria when they stumbled upon a finding that provided new insights into bacterial sugar transport.

As one of the controls for ATP-dependent hexosamine phosphorylation by *Escherichia coli*, phosphoenolpyruvate was added. Surprisingly, bacteria failed to transfer phosphate from ATP to ManNAc but robustly transferred phosphate from phosphoenolpyruvate. Eventually, the team purified and characterized the bacterial phosphotransferase systems that simultaneously transport and phosphorylate sugars. The biochemistry, thermodynamics and function of the PTS were explored vigorously. Later, Roseman focused on the roles of glycans in cell-cell recognition and chitin metabolism by *Vibrio* and other bacteria. His lab continues to pursue these goals, and Roseman had hoped to make substantial contributions well into his 10th decade. He never lost his enthusiasm and passion for the next experiment.

Roseman's seminal discoveries often were characterized as serendipitous, because both the correct structure of sialic acid and the PTS system were unexpected findings. Of this, Roseman once said: "The unexpected is just nature's way of telling researchers where to look for the really interesting and important stuff." Interesting, indeed! ☺☺☺

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Annual award winners named

Outstanding scientists to be honored at the annual meeting.

BY SNEHA RAO

The American Society for Biochemistry and Molecular Biology in July named 12 scientists the winners of its annual awards. The newly announced recipients and one winner from 2011 will give talks at the annual meeting April 21–25 in San Diego.



Stuart Kornfeld, a professor at Washington University in St. Louis, won the *Herbert Tabor/Journal of Biological Chemistry*

Lectureship. The award recognizes outstanding lifetime scientific achievements and was established to honor the many contributions of Herbert Tabor to both the society and the journal, for which he served as editor for nearly 40 years and now serves as co-editor.



Lovell Jones, a professor at both the University of Texas M.D. Anderson Cancer Center and the University of Houston as well as

director of the joint Dorothy I. Height Center for Health Equity & Evaluation Research, won the *Ruth Kirschstein Diversity in Science Award*. This award honors an outstanding scientist who has shown a strong commitment to the encouragement of under-represented minorities to enter the scientific enterprise or to the effective mentorship of those within it. Jones has been devoted to diversity issues in the scientific community, with a major emphasis on both addressing the under-representation of minorities at all levels in academia, industry and government as well as health disparities in the U.S.



Susan Marqusee, a professor at the University of California, Berkeley, and director of Berkeley's California Institute for

Quantitative Biosciences, has been named the winner of the *William C. Rose Award*. The award recognizes her outstanding contributions to biochemical and molecular biological research, particularly in the field of protein folding, and her demonstrated commitment to the training of younger scientists.



Barry Honig, Columbia University professor and Howard Hughes Medical Institute investigator, won the *DeLano*

Award for Computational Biosciences for his work in macromolecular interactions in biology. The award is given to a scientist for innovative and accessible development or application of computer technology to enhance research in the life sciences at the molecular level. Honig's software tools and their underlying conceptual basis are widely used by the general biological research community to analyze the role of electrostatics in macromolecular interactions.



George M. Carman, professor and director of the Center for Lipid Research at Rutgers University, won the *Avanti Award in*

Lipids. Carman, associate editor for the *Journal of Biological Chemistry*, has made many contributions to the understanding of the enzymology and

metabolism of phospholipids, and, most recently, his laboratory discovered the molecular function of the fat-regulating protein lipin as a phosphatidic acid phosphatase enzyme.



Peter Espenshade, an associate professor at Johns Hopkins University School of Medicine, won the *Avanti Young Investi-*

gator Award in Lipid Research. The award recognizes outstanding research contributions in the area of lipids by young investigators with no more than 15 years of experience since receiving their doctoral degrees. Espenshade researches the basic mechanisms of cholesterol sensing and has developed the simple eukaryotic cell *S. pombe* as an accessible genetic model for the investigation of cholesterol homeostasis and is pursuing the pathways controlling this fundamental cell process.



Peggy Farnham, a professor at the University of Southern California, won the *Herbert A. Sober Lectureship*. The

award, issued every other year, recognizes outstanding biochemical and molecular biological research with particular emphasis on development of methods and techniques to aid in research. Farnham studies chromatin regulation and its control of transcription-factor binding and function, and she is a pioneer in the development of the chromatin immunoprecipitation technique.



Xiaodong Wang, a Howard Hughes Medical Institute alumni investigator and researcher at the National Institute of

Biological Sciences in Beijing, has been named the winner of the **ASBMB-Merck Award**. This award recognizes outstanding contributions to research in biochemistry and molecular biology. Wang studies the functions of cell organelles and is credited with the discovery of a new function of mitochondria in programmed cell death.



David Sabatini, an associate professor at the Massachusetts Institute of Technology and a Howard Hughes Medical Institute

investigator, won the **Earl and Thressa Stadtman Scholar Award**, given to a scientist with 10 or fewer years of postdoctoral experience, including medical residency and fellowship. Sabatini is a leader in the ongoing elucidation of the mTOR pathway, a master regulator of growth. He is also a member of the Whitehead Institute for Biomedical Research.



Kim Orth, a professor at the University of Texas Southwestern Medical Center at Dallas, has been named the winner

of the **ASBMB Young Investigator Award**. Orth's most notable achievements include the discovery of novel post-translational modifications exploited by the virulence factors secreted by bacterial pathogens. One of these, YopJ from *Yersinia*, the causal agent of plague, transfers an acetyl group from acetyl CoA to a serine or threonine hydroxyl in mammalian MAP kinase kinase, inactivating the enzyme. Another virulence factor, YopS from *Vibrio parahaemolyticus*, a cause of debilitating diarrhea, is an enzyme that AMPylates (transfers AMP) to tyrosine,

serine or threonine hydroxyl in mammalian Rho GTPases, inactivating these enzymes. Her studies bring new insights to the field of eukaryotic signaling.



Judith Voet, professor emerita at Swarthmore College, and **Donald Voet**, associate professor at the University of Pennsylvania, won the **ASBMB Award for Exemplary Contributions to Education**.



The Voets have made significant contributions

to the teaching of biochemistry and molecular biology through their writing. Together, they have authored the comprehensive textbook "Biochemistry," co-authored "Fundamentals of Biochemistry" and co-edited the educational journal "Biochemistry and Molecular Biology Education (BAMBED)."



Christine Guthrie, a professor at the University of California, San Francisco, last year won the **ASBMB-Merck Award**, which recognizes

outstanding contributions to research in biochemistry and molecular biology. Guthrie, an American Cancer Society research professor of molecular genetics, pioneered the use of budding yeast as a model organism to elucidate the mechanism of messenger RNA splicing.

Look for more in-depth coverage of the award winners and their lecture topics in forthcoming issues of ASBMB Today and at www.asbmb.org.



Sneha Rao (srrao@live.unc.edu) is an undergraduate at the University of North Carolina at Chapel Hill.

RESOURCE: genomewide epigenetic maps

Researchers in the Reference Epigenome Mapping Consortium, part of the NIH Common Fund's Roadmap Epigenomics Program (<http://commonfund.nih.gov/epigenomics>), have begun creating a community resource of genomewide epigenetic maps in a variety of human primary cell and tissue types.

The data represent more than 100 samples, including adult and fetal cells and tissues and embryonic and induced-pluripotent stem cells.

The majority of reference epigenomes being generated contain information about DNA methylation, a core set of histone modifications, chromatin accessibility and gene expression.

A subset of reference epigenomes also will contain an expanded set of at least 20 additional histone modifications. The consortium's website (<http://roadmapepigenomics.org>) provides information about protocols developed by consortium members, information about data standards and links to a variety of sites where the epigenomic data can be visualized in a genome browser or downloaded for subsequent analysis.

Here we go again

BY BENJAMIN CORB

Have you heard the latest attacks on peer-reviewed science? Whether it's criticisms from well-respected interest groups or from fringe elements with specific social agendas, it seems that, everywhere you turn, peer review in agencies such as the National Science Foundation and National Institutes of Health is being questioned.

As groups grapple over a shrinking pile of federal dollars, once-sacred areas of investment, including basic biomedical research, have become political fodder for both sides of the aisle. Your public affairs staff at the American Society for Biochemistry and Molecular Biology headquarters has been working diligently to dispel and debunk rumors, innuendo and out-and-out lies by conducting more than 40 meetings with members of the U.S. House since the summer began. But we need your help. Here are some things you can do to help take the politics out of science.

Talk about your research. Whether it's in line at the grocery store, at a ballgame or at the bake sale after church, strike up conversations about your science. Did you know that one in four Americans cannot name a scientist? And half of Americans, when asked to name a scientist, could name only Albert Einstein. Surely, Einstein was great, but with 12,000 members in the ASBMB alone, our neighbors should know scientists.

I'm not asking you to discuss post-translational modification or cell-signaling cascades. I'm suggesting you get comfortable talking about the potential outcomes of your work. Will it help scientists understand molecular mechanisms that may one day lead to cures? Will it reduce the occurrences of birth defects or make a terminal disease a chronic one? Help the public know that science is well intentioned and promising so that, when criticisms are made in the public sphere, family members, friends and neighbors will defend the importance of research.

Get involved politically. No, I'm not asking you to become a fat-cat donor. And I'm not asking you to rack up frequent-flier miles to roam the halls of the Capitol. (That's my job!) I'm asking you to find out who represents you in Congress and to call, write or email him or her when an issue comes to your attention. Politicians are not always as narcissistic as we think, and they need to hear from the people they represent. If you hear about

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unfair critiques of the research enterprise in general or the peer-review process specifically, take a minute to set the record straight by making a phone call. Don't know whom to call or what to say? Contact us, and we'll provide you with info, encouragement and support.

What do elected people want to know about?

Probably not DNA methylation. But talk about what your research could yield. Talk about the people employed in your lab, department, university or company. Talk about how you use your grant funds strategically and efficiently. Talk about the lives that may be saved or changed.

Work with the ASBMB public affairs staff.

Our team is scientifically aware (thanks to the policy fellows and 15-member Public Affairs Advisory Committee) and politically astute. We meet with members of Congress, the administration and with partner organizations. One thing we're not is everywhere. If you see an example of science being politicized, let us know about it. If you'd like to host a lab tour for your representative, we'd be happy to help with that as well. If you want to write a letter to the editor of your local paper, we'll help you through the process, from editing to getting it placed for publication.

As Congress battles over funding levels and proposes massive cuts to everything from defense to social programs, we will continue to see the politicization of science. The best — and, frankly, the only — way to preempt or thwart these attacks is to put up a strong defense. You, with your years of experience and understanding of the scientific enterprise, provide us in Washington with the best ammunition to keep politics out of the laboratory. XXXX

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American Society for Biochemistry and Molecular Biology

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Targeting carriers of infectious tropical disease

BY ANGELA HOPP

Chun-Hong Chen, an assistant investigator at the National Health Research Institute in Taiwan, won a Journal of Biological Chemistry/Herbert Tabor Award for his work with engineering disease-refractory mosquitoes to prevent transmission of dengue fever.

A native of Pingtung county, Taiwan, Chen applied a microRNA-based RNAi system to knock down multiple dengue virus genomes in the yellow fever mosquito *Aedes aegypti*.

“Although there are several steps to go, if we can combine the resistant mosquito with a gene drive system, we will have an alternative way to fight against such vector-borne disease,” Chen says.

Chen earned his bachelor’s and master’s degrees in plant virology at National Taiwan University and his Ph.D. at National Yang-Ming University, where he worked with Soo-Chen Cheng on RNA splicing.

His postdoctoral training was completed under the direction of Bruce Hay at the California Institute of

Technology in Pasadena. Together, Hay and Chen created a gene drive system for population replacement in a *Drosophila* model. In 2009, Chen returned to his homeland and joined the National Health Research Institutes in Zhunan Town. XXXX

HERBERT TABOR --- YOUNG INVESTIGATOR AWARD



Chun-Hong Chen received his award at the Recent Advances in Pathogenic Human Viruses special symposium held July 24–26 in Guangzhou, China. The meeting was co-sponsored by the American Society for Biochemistry and Molecular Biology and attended by Journal of Biological Chemistry Editor-in-Chief Marty Fedor and Associate Editor Charles Samuel. PHOTO COURTESY OF WEN-LING CHEN.



Harvard med school investigator recognized

BY ANGELA HOPP

Amy Walker, an instructor at Harvard Medical School and the Center for Cancer Research at Massachusetts General Hospital, received the Journal of Biological Chemistry/Herbert Tabor Award for her studies of how metabolic pathways are linked to transcriptional programs and other aspects of cell biology.

"In my graduate and postdoctoral work, my primary interest was how transcriptional activators and the basal transcription machinery played roles in specific developmental processes," Walker says.

Today, Walker and colleague Ander Nääär focus on links between transcriptional regulation and lipid production. "In my lab, I use a combination of *C. elegans* and mammalian models to understand how regulation of lipid



Amy Walker received her award at the 52nd International Conference on the Bioscience of Lipids, which was held July 17–22 in Waterville Valley, N.H., and attended by JBC Associate Editor George Carman.

PHOTO COURTESY OF JOSEPH FERRARO.

and 1-carbon metabolism is related to mechanisms of transcription factor function, such as the sterol regulatory elements binding proteins," she says.

A Mobile, Ala., native, Walker completed her undergraduate studies in microbiology at Auburn University, graduate studies in molecular microbiology at the State University of New York, Stony Brook, and postdoctoral training at Harvard Medical School. ∞∞∞



Angela Hopp (ahopp@asbmb.org) is a science writer and handles public relations for ASBMB.

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HERBERT

Schekman tapped as the top editor of a new journal

Randy W. Schekman, a Howard Hughes Medical Institute investigator and editor of the Proceedings of the National Academy of Sciences, will lead the launch of a new open-access journal established by HHMI, the Max Planck Society and the Wellcome Trust.

Schekman, a professor at the University of California, Berkeley, has devoted the past three decades to better understanding the molecular machinery that enables proteins to be trafficked within cells. He has made many contributions in his field, including discovering how vesicles bud off from the cell's endoplasmic reticulum and transport proteins and identifying more than 50 genes involved in the process with his colleagues.

Schekman's important role has yielded several major awards, including the Albert Lasker Award for Basic Medical Research, the Gairdner Foundation International Award and the Louisa Gross Horwitz Prize. ∞∞∞

Diabetes group's Banting award goes to Corkey

Barbara E. Corkey, vice chair of research in the department of medicine at Boston University School of Medicine and director of the Obesity Research Center at Boston Medical Center, received the American Diabetes Association's 2011 Banting Medal for Scientific Achievement Award.

Named after Nobel Prize winner Frederick Banting, this prestigious award honors an individual who has made

significant, long-term contributions to the understanding of diabetes, its treatment or its prevention.

A leader in the fields of metabolism, diabetes and obesity for more than 35 years, Corkey works on the molecular basis of nutrient signal transduction and has improved significantly our understanding of health and disease. She developed the concept of glucolipotoxicity, in which elevated glucose and lipids cause tissue malfunction in diabetes, and found that anaplerosis, malonyl-CoA, reactive oxygen species and long-chain acyl-CoA esters are linked to fuel metabolism and control of insulin secretion in beta cells. ∞∞∞

Two JBC board members receive Japanese prizes

Journal of Biological Chemistry editorial board members **Kohei Miyazono** and **Naoyuki Taniguchi** were selected to receive the Japan Academy Prize. One of the most prestigious prizes in Japanese academia, the Japan Academy Prize is given to nine recipients who have made great contributions in their respective fields. The recipients come from a wide range of academic fields, including humanities, social sciences, formal sciences, natural sciences and applied sciences.

The Japan Academy Prize recognized Taniguchi for his pioneering accomplishments in glycobiology and his discovery of the significance of N-glycans in disease. His current research aims to study glycan-related cancers and infectious diseases through multiple approaches combining glycobiology, chemical biology, structural biology and bioinformatics.

Miyazono was given the prize for his achievements in identifying various functions of TGF beta in cancer. For the past 25 years, Miyazono has made great strides in signaling mechanisms in cancer cells. His most notable accomplishments include identifying various functions of TGF beta in cancer and revealing their signaling mechanisms and biological functions. ∞∞∞

Colman recognized for her outstanding publications, impact

Roberta Colman, professor emerita at the University of Delaware, was ranked 23rd in the list of journal Biochemistry's 50 most prolific authors. Colman was one of only four women included in the distinguished group.

Her research focuses on understanding the catalytic activity of enzymes in terms of protein structure. Colman's lab studies the enzyme glutathione S-transferase, which plays an important role in detoxifying foreign chemicals, and adenylosuccinate lyase, a shortage of which is related to mental retardation and autism.

Colman was ASBMB's Herbert A. Sober Award winner in 1996. ∞∞∞

IN MEMORIAM Yoshito Kaziro

Yoshito Kaziro, a longtime ASBMB member, passed away June 29 after a long battle with lymphoma. The son of famous hemoglobin researcher Kozo Kaziro, Yoshito Kaziro studied under Sumio Shimazono, a leader in vitamin biochemistry at the University of Tokyo. In 1959,

Scenes from the special symposia

The 2011 American Society for Biochemistry and Molecular Biology Special Symposia Series kicked off in July with meetings held in Guangzhou, China, and Richmond, Va. The Symposia Series continues with four fall meetings scheduled for September and October.

To learn more about the Special Symposia Series, visit www.asbmb.org/specialsymposia.



Journal of Biological Chemistry Editor-in-Chief Martha Fedor and Associate Editor Charles Samuel talk to keynote speaker Michael M. C. Lai of Academia Sinica and Ping Zhang of Sun Yat-sen University, Zhongshan School of Medicine, at the "Recent Advances in Pathogenic Human Viruses" meeting in Guangzhou, China, held July 24 – 26.

PHOTO COURTESY OF JLYNN FRAZIER



Suh-Chin Wu of National Tsing Hua University in Taiwan presents his poster at the "Recent Advances in Pathogenic Human Viruses" meeting at the Guangzhou Baiyun International Convention Center. The meeting was organized by Kuan-Teh Jeang of the National Institute of Allergy and Infectious Diseases and Douglas Lowy of the National Cancer Institute.

PHOTO COURTESY OF JLYNN FRAZIER



About 100 people attended the education symposium "Student-Centered Education in the Molecular Life Sciences II" at the University of Richmond from July 20 – 23. The meeting was organized by J. Ellis Bell.

PHOTO COURTESY OF JESSICA BELL

he joined the laboratory of Severo Ochoa at New York University, where he purified and crystallized biotin-dependent propionyl-CoA carboxylase. Kaziro had the opportunity to establish his own lab in the U.S. but instead returned to the University of Tokyo in 1963. His research focused on GTPases functioning in translation and in cell signaling. In 1992, he was appointed president of Sanyo Gakuen University. Recently, Kaziro mentored young life scientists at Kyoto University. XXXX

IN MEMORIAM Gary K. Ackers

Gary K. Ackers, professor emeritus at the Washington University in St. Louis, died May 20 at the age of 71. Born in Dodge City, Kan., Ackers attended Harding College and earned an undergraduate

degree in chemistry and mathematics. He received his Ph.D. in physiological chemistry from the Johns Hopkins University in 1964. Ackers joined the faculty at the University of Virginia before returning to Johns Hopkins University as a professor of biology. He then became the biochemistry department head at Washington University School of Medicine. Ackers was instrumental in establishing the molecular biophysics program and expanding the department of biochemistry and molecular biophysics. He was known for his sense of humor and his many contributions in biophysics. XXXX

IN MEMORIAM Jack D. Herbert

Jack D. Herbert, founding member of the board of directors of the Blue

Ridge Institute for Medical Research and professor emeritus at Louisiana State University Health Sciences Center, passed away June 22 at the age of 70. Herbert was born Aug. 2, 1940, in Hammond, La. He graduated from Rhodes College and then received his Ph.D. in biochemistry in 1967 from Louisiana State University Health Sciences Center. Herbert spent the entirety of his career at LSUHSC teaching and researching biochemistry and molecular biology. Herbert's main research interests included the intermediary metabolism of amino acids, amino acid nutrition, uric acid production and excretion, and gout. He was known for his distinctive lecturing style and his love for New Orleans' culture. XXXX

New faces and initiatives

The Undergraduate Affiliate Network remains committed to shaping well-rounded grads.

BY MARILEE BENOIRE

As researchers and educators, we understand the need for an academically rigorous curriculum for undergraduates studying biochemistry and molecular biology. Undergraduate training also should include opportunities for students to broaden and deepen their education through research and to engage in networking, leadership and community-service activities.

The ASBMB recognized the importance of the co-curricular experience by founding and supporting the Undergraduate Affiliate Network, a community of students and faculty members actively engaged in undergraduate biochemistry and molecular biology education and research. Supported by and working with the ASBMB Education and Professional Development Committee, UAN provides its members funding for research, travel and outreach projects and recognizes outstanding students and chapters through its honor society and the UAN Outstanding Chapter Award. UAN faculty advisers are also supported through this network of educators and receive ample opportunities to network at UAN regional meetings and at the ASBMB annual meeting.

News and best practices across the UAN community are shared through the UAN newsletter, *Enzymatic*. This year, Rebekah Waikel of Eastern Kentucky University takes over as the chief editor. She will be implementing some changes to the newsletter while preserving popular features, such as JBC in the Classroom, service-learning course guidelines and career articles. *Enzymatic* is available on the ASBMB website.

A new pilot project this year called UAN BOSS, for Borderless Outreach Strategies for Students, will bring together UAN chapters across the country to develop outreach projects and form a lateral support com-

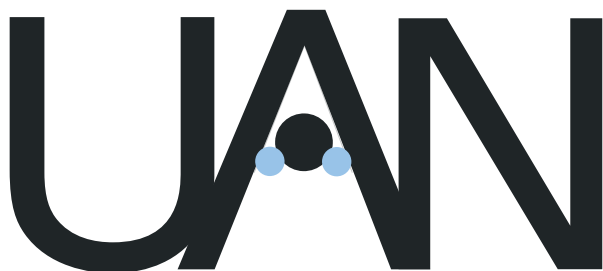
About the new UAN chair



Marilee Benore is a professor of biology and biochemistry and associate dean at the University of Michigan-Dearborn. She is active in mentoring undergraduates, especially women and minorities, and in conducting biochemistry education research. Benore has been a member of the ASBMB Education and Professional Development Committee, a co-chair of the undergraduate poster competition and a founding member of the UAN committee. She has served as a UAN regional director and, for the past few years, as the editor of the UAN newsletter, *Enzymatic*. She is a co-author of a lab manual titled "Fundamental Laboratory Approaches for Biochemistry and Biotechnology" and offers workshops on service learning and outreach and on incorporating diversity issues into the biochemistry curriculum.

munity. Members from UAN chapters will get to work with those on other campuses. Given the distinctive cultural differences of schools across the country, students will get "glocal" practice while working on a common theme. This year's theme is nutrition and food security. Look for details of the BOSS project in the next issue of *Enzymatic*.

As the new chair of the UAN, my goals this year are to engage my fellow UAN faculty members to expand the network, to recruit new members and to help members take full advantage of all the UAN resources. ☺☺☺



Want to get involved in UAN?

- Start an undergraduate affiliate network chapter on your campus.
- Support your campus UAN group by picking up the \$200 membership tab.
- Volunteer to judge undergraduate posters at the ASBMB annual meeting.
- Post a copy of the Enzymatic newsletter on your office door.
- Take the Enzymatic survey at <http://www.surveymonkey.com/s/Q2DB9VM>.
- Contribute an article to Enzymatic about
 - *your experiences in outreach or service learning,*
 - *unique courses,*
 - *cool projects,*
 - *how you use the Journal of Biological Chemistry in your classroom,*
 - *alternate careers or*
 - *video reviews.*
- Contact UAN at uancommittee@asbmb.org.

We need your input

Take one of the ASBMB surveys evaluating gender issues in academic science

BY ANGELA HOPP

An American Society for Biochemistry and Molecular Biology task force has launched two surveys about the roles of gender and family in the lives of biochemistry and molecular biology faculty members.

Led by Elizabeth C. Theil of Children's Hospital Oakland Research Institute, the task force designed the first survey for department leaders to collect information about the gender composition of both programs and candidates for academic positions advertised between 2005 and 2010.

"These new numbers will build on and contrast with an informal analysis ASBMB conducted in 1986," Theil explains. "That data made clear that a disproportionately small number of female ASBMB members held faculty positions."

In the decades that have followed, the loss of women from the academic science pipeline has been widely documented, and various mechanisms have

been implemented to plug the leak, Theil says.

"We hope that the new survey data will document marked improvement and also identify barriers that exist today so that new solutions can be forged," she says.

The second survey was designed for all ASBMB members to assess the role of gender and family issues in career development, promotion and mentoring. Completion should take about 10 to 15 minutes, and participants can enter a drawing for a \$25 Amazon gift card.

Both surveys were created in collaboration with AltshulerGray, a strategic consulting firm that serves biomedical research enterprises.

Appointed by ASBMB President Suzanne Pfeffer, the task force also includes Melanie H. Cobb of the University of Texas Southwestern Medical Center at Dallas, Judith P. Klinman of the University of California, Berkeley, Frederick R. Maxfield of Weill Medical College of Cornell University, Janet L. Smith of the University of Michigan Medical School, and JoAnne Stubbe of Massachusetts Institute of Technology.

The surveys will remain open through the end of September. ☺☺☺



Angela Hopp (ahopp@asbmb.org) is a science writer and handles public relations for ASBMB.

Survey for department and program leaders: www.surveygizmo.com/s3/577904/ASBMB-Dept-Chair-Survey.
Survey for all ASBMB members: www.surveygizmo.com/s3/578661/Survey-on-Gender-and-Family-Issues.

Students on the front lines of public engagement

Harvard's Science in the News program includes a variety of outreach activities and is being held up as a model.

BY MORGAN THOMPSON

When the H1N1 outbreak occurred in 2009, Jeff Teigler was starting a graduate program in virology at Harvard Medical School.

"I was the only person interested in viruses that most of my friends and family knew. In answering their questions — What is swine flu? How is it worse than regular flu? Why can't I just ask for antibiotics from my doctor? — I realized how big the gap was between scientists' understanding and how that translated into public knowledge about something as common as our yearly encounter with influenza," Teigler says.

Later that year, Teigler co-presented a public lecture at Harvard Medical School on swine flu, and today he helps run a program that focuses on scientific literacy.

Science in the News, a volunteer organization at Harvard University, was founded in 1999. Teigler has been co-director since January 2010, and Tammy Slenn joined him at the helm in January 2011.

Teigler describes SITN's mission as having three goals: 1) to fill the gap in access to science information after formal education, 2) to address cases of widespread misinformation and misunderstanding of science, and 3) to create an avenue for direct communication between scientists and the public.

"Graduate students already harbor a desire to share their passion for science," Teigler says. "SITN taps that enthusiasm, giving students varied outlets to communicate science that match their interests."

A decade of growth

SITN first started as and continues to hold a free, public lecture series each fall at which teams of three graduate students give two-hour, interactive talks on broad scientific



topics recently covered in the media. Slenn reports audience sizes currently range from 150 to 250 people per lecture, with about 30 attending post-lecture tours of the medical school's labs. In addition, SITN provides a

biweekly e-newsletter, the SITN Flash, written and edited by students.

In 2009, SITN expanded its effort to include participation in the Cambridge Science Festival, high-school outreach, and its own science café, Science by the Pint.

"Providing varied programming gives eager SITN volunteers a chance to share their love of science in a manner of their choosing," Teigler says, "but it also attracts and engages audience members of different ages, interests and backgrounds."

Motivated audience

Some audience members, like Michael Shapiro, say they attend SITN lectures for professional development.

"I am a mathematician by training and a mathematical biologist by trade. That means that my general biological education is full of holes and makes the SITN talks ideal for me," Shapiro explains. "They start at a very elementary level and almost always teach me something I didn't know."

Many participants are educators who want to stay current with cutting-edge science to bring back to their classrooms, provide their students with examples of early-career researchers and receive professional-development credits.

High school biology teacher Mary Ann Scheiner uses SITN's newsletter in her classes. "Most of my students don't really know what scientific research is. It's great when I can



A young participant peers down the microscope at zebrafish larvae at Science in the News' Model Organism Zoo at the 2011 Cambridge Science Festival. The exhibit explores fundamental genetic concepts of genotype and phenotype with the help of SITN volunteer "zoo handlers" and a selection of wild-type larvae and mutants with striking visual phenotypes.

find something to catch their interest — and they realize that they could be doing something like that in just a few more years," Scheiner says.

Lecture attendee James Yakura lauds the graduate students' motivation and enthusiasm: "The lectures are timely and understandable by anyone who has an interest in the topic, the instructors are knowledgeable and radiate excitement for their work, and the times are convenient to those of us with day jobs."

Initiative rewarded

SITN offers volunteers autonomy to start new initiatives with the organization's support, explains co-director Slenn, who developed Science by the Pint, the SITN science café, at which scientists give brief introductions to their research and answer attendees' questions about their work and the life of a scientist while mingling at a bar.

Middle school biology teacher Mike Hansen says he attends Science by the Pint to "stay abreast with what is happening on the front lines of science."

The events "allow me to be connected with researchers who I can hold up as exemplars to my students, as well as providing an excuse for a good pint or two," Hansen says. "The information I get at these get-togethers deepens my knowledge and provides relevancy to material that is part of my curriculum — and it's a fun time."

Slenn's interest in reaching out to a broader, adult audience comes from personal experience.

"I come from a town of blue-collar workers, teachers and a few businessmen, and I wanted to share the excitement of science with people who may not enjoy the lecture format," she says. "Talking to the public about my work reminds me of what excited me in the first place and helps me focus on big-picture implications of my research."

Today, 80 graduate students participate in one or more programs annually. Teigler says the most-cited reason for participation remains the satisfaction of applying specialized scientific training to serve others and give back to the community that supports the work. "However, SITN volunteers also gain practical benefits from the focus on high-quality oral and written science communication," he says, "which provides useful training and résumé-building opportunities for early-career researchers."

Recently, in collaboration with Harvard science faculty members and Nancy Houfek of the American Repertory Theater, SITN established a graduate-level short course called Science Presentation as a Performing Art.

Houfek distills theater techniques that aid effective science communication in an interactive workshop for faculty and staff members, postdoctoral researchers and students. Graduate students who take the course for academic credit have small-group follow-up sessions with science faculty members to hone the delivery of their presentations.

A good example

When students at Yale University's chapter of Scientists and Engineers for America heard of SITN's program, they decided to start their own lecture series, which they launched this spring.

"We were impressed by [SITN's] scope, longevity and the level of community involvement they were able to achieve," says Yale SEA chapter President Elizabeth Winograd-Cort. "These are our goals as well, and we had been looking for an effective way to communicate important and often controversial scientific breakthroughs to the New Haven community."

The Yale students took the SITN concept and ran with it, she says.



Throughout the opening Carnival Day of the 2009 Cambridge Science Festival, an all-ages audience filed by and stood in line to meet and greet a "zoo" of the major invertebrate model research organisms — including bacterial biofilms, plants, yeast, slime mold, worms, fruit flies, zebrafish larvae and mammalian cells — and their scientist "zoo handlers" at the Science in the News Model Organism Zoo.

"We realized that it was not possible or desirable to import the Harvard program wholesale. There are infrastructure disparities between the Harvard group and ours, the differences between Boston and New Haven, and [our] mission, which leads us in a more policy-oriented direction," Winograd-Cort explains. "We adopted a one-hour-long format and chose presentation topics not only because they are interesting but because of surrounding controversy, misunderstanding and lawmaking activity. We want our audiences to be better informed in order to make a difference themselves, either by writing to their representatives, by voting or by raising community consciousness."

Already, participants say, the Yale version of SITN has had a measurable impact.

8 steps to starting your own Science in the News program

- 1. Recruit volunteers:** You need a core group of dedicated, enthusiastic people with scientific expertise, plus a few contributing volunteers to staff specific efforts.
- 2. Focus:** Start by choosing a single event you want to host or participate in that serves an unfulfilled need in your community. Expand from there, and don't be afraid to try more than once.
- 3. Know your audience:** Design programs with a particular audience in mind. This will improve the quality and reception of the event as well as the effectiveness of advertising.
- 4. Secure funding:** Programs like SITN do not require a lot of funding. Be creative: Ask for donations and apply for public service grants.
- 5. Advertise:** Choose advertising strategies with your audience in mind, and capitalize on joint advertising with other groups or events. Collect data to guide future advertising decisions.
- 6. Quality control:** Determining how to evaluate, maintain and enhance program quality is the secret to long-term success. Ask for details on SITN's quality-control measures and the Science Presentation as a Performing Art course.
- 7. Collect data:** Design surveys and other metrics to gauge the impact and effectiveness of your programs. This will spur continued development in Steps 1–6. As you establish your program, don't forget to keep track of your volunteer alumni as well.
- 8. Contact SITN:** SITN has more than a decade of experience implementing public outreach programs and is happy to share successes, failures and insider tips. Start the conversation by emailing sitnboston@gmail.com.

“We’ve been invited to speak to New Haven high school students in summer programs and during the school year this fall,” Winograd-Cort says, “and we are dedicated to keeping our program running for years to come.”

Winograd-Cort insists that collaboration between the Yale and Harvard groups ensured success of the fledgling program: “Harvard’s SITN program gave us all kinds of support, from outlining where they spend their money to giving us funds to obtain and distribute advertising postcards. Ultimately, it was the knowledge that something like SITN existed that made us believe we could pull off such an undertaking.”

To read more about SITN and find out how you might start an outreach program in your own community, visit <http://sitn.hms.harvard.edu>. ∞∞∞



Morgan Thompson (mnthomps@fas.harvard.edu) is a graduate student at Harvard Medical School and served as co-director of Science in the News for two years beginning in January 2008.

Communicating science

Communicating science is a top priority for the ASBMB Public Affairs Advisory Committee. By working with Science in the News, the PAAC recognizes graduate students’ energy and passion for communicating science and aims to engage growing numbers of participants across the country — scientists and nonscientists — to talk about science and to enhance the public’s perceptions of scientists and the importance of our work. PAAC will continue to identify and explore effective science-communication programs and initiatives, examples of which will be reported in future ASBMB Today features or in the SciComm section. In addition, an ASBMB symposium at the 2012 Experimental Biology meeting in San Diego will highlight science communication. We welcome your feedback on science communications issues at publicaffairs@ASBMB.org.
—Lee Gehrke

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Experimentation from hundreds of miles away

Remote data acquisition offers some researchers access to instruments usually out of their reach

BY JIANFEI (JEFFREY) ZHAO

Picture this: You're in your pajamas, sitting in front of a computer. After a cup of coffee, you turn on the computer, log in to a secure website, start your favorite instrument remotely and begin to collect data. You then turn your attention to analyzing the data you acquired and downloaded from your earlier experiments. Occasionally, you check the progress of your experiment and modify some of the instrument parameters accordingly. And voilà, several hours later, the new data are ready for your next round of analysis.

Is this a dream? Science fiction? Admittedly, for most biomedical researchers, it is not yet reality, but for some privileged scientists, especially structural biologists, the remote access of rare and expensive instruments is both a reality and a necessity.

Remote X-ray crystallography

"You need an X-ray source with high intensity to solve the three-dimensional structures of large macromolecular complexes at angstrom resolution," explains Roy Mariuzza, a professor of cell biology and molecular genetics at the Institute for Bioscience and Biotechnology Research at the University of Maryland, College Park. "The X-ray source we need is only available in a few national labs in the U.S."

Although in-house X-ray crystallography equipment is ubiquitous, it cannot generate X-rays with intensity high enough for the Mariuzza group's research. "The molecular packing of the crystals of my protein complexes is often defective to various degrees," says Yiyuan Yin, who recently graduated from the Mariuzza lab.

Yin wants to understand the interactions between CD4, MHC II and the T-cell receptor — three proteins involved in multiple sclerosis — by solving the crystal structure of a CD4-MHC II-T-cell receptor complex. After producing

preliminary data using a local X-ray diffractometer, Yin relies on the Advanced Photon Source, a synchrotron facility at the Argonne National Laboratory, to refine the structure at a higher resolution.

She describes the synchrotron as a giant ring where electrons are accelerated to near light-speed to produce high-energy X-ray beams. With a nearly \$1 billion construction cost and an 80-acre footprint, it would be impossible for most academic institutions to build a synchrotron. Indeed, by the latest count from lightsource.org, a high-energy light source facility advocacy group, only five synchrotron facilities in the U.S. have the capability to solve the structures of proteins with imperfect crystallization that Yin creates.

However, using NoMachine, a commercially available desktop virtualization and remote-access management program, in combination with JBluice-EPICS, the beamline control software developed by APS and the Stanford Synchrotron Radiation Lightsource, Yin can control the X-ray beamline — a section of the synchrotron — and collect data through a secure network at her lab in Maryland without the hassle and cost of traveling. "The software is very user-friendly," says Yin. After initially being supervised by a colleague who is an experienced APS user, Yin was approved to independently operate the machine remotely.

Nagarajan Venugopalan, a crystallographer at the APS, says that, to schedule beamline time, Yin had to submit a proposal that was evaluated for scientific merit. After the proposal was approved, Yin was given a specific time during which she could



use the synchrotron. The usage of the beamline is free for users who are funded by the National Institutes of Health.

When the appointment approaches, Yin packs her crystals in a specially designed rack that can be handled by a robot system at the APS and ships the rack in a liquid nitrogen tank to Argonne. As Yin's host scientist, Venugopalan loads the crystals onto the beamline machine. From there, Yin takes over the machine through JBlueICE-EPICS and usually runs three continuous eight-hour sessions. "Running the marathon experiments in the familiar setting of our own lab reduces a lot of stress," says Yin.

During the experiment, Venugopalan is on call to assist Yin with any technical questions. He also provides scientific advice for data analysis and develops new X-ray technologies to help beamline users. Venugopalan explains that the beamlines undergo constant improvements. "We are in the planning phase of upgrading one of our beamlines to achieve a 1-micron X-ray beam size," he says. "It will help in achieving diffraction from extremely small crystals and also help in the reduction of radiation damage to the crystals."

Remote microscopy

For a few lucky scientists working with Sriram Subramaniam, a senior investigator at the National Cancer Institute, remote access to electron microscopes from home and around the clock is becoming the norm. With Virtual Network Computing, a desktop-sharing system, researchers in Subramaniam's group can remotely control the workstation that physically connects with the microscope and see the exact same screen that pops up on the microscope's workstation. Joel Meyerson, a graduate student working in the Subramaniam lab, says that the remote control provides flexibility to the lab members, especially to scientists who have young children.

Remote servicing

For Bruker Daltonics and Waters, two analytical instrumentation providers, remote access means cost efficiency and uninterrupted workflow. Doug Boyd, a sales representative at Bruker Daltonics, explains that Bruker service engineers use WebEx, a commercial software package similar to Virtual Network Computing and NoMachine, to diagnose their instruments remotely and help customers troubleshoot. "The engineers may detect a faulty part, order a replacement and even remotely teach the customer to install the part, which could potentially save the customer hundreds of dollars or more," he says, adding that remote work also saves time because many inquiries are "resolved without the need for parts or an onsite service visit."

Weibin Chen, principal chemist of the Biopharmaceutical Sciences group at Waters, says that remote access allows scientists at Waters to change parameters, such as solution gradients, of mass spectrometers and even to reset the instruments. When Chen, like most Bostonians, was kept at home by the heavy snowfall this past winter, he was able to control his mass spectrometer remotely and conduct his planned experiments.

For the David H. Murdock Research Institute in Kannapolis, N.C., the desire to offer remote access to some of its state-of-the-art instruments arises from its vision for collaboration. Mike Luther, president of the DHMRI, says that the institute supports research and development projects with partners who are located both on and off campus. The cost of each project is decided on a case-by-case basis.

Zhong Wang of the Bio-Imaging Facility at Hunter College, City University of New York, wants external users to share the facility's high-end microscopes, because smaller universities "may not have enough funding to support expensive instruments." Wang says that outside researchers can remotely access the confocal microscopes equipped with WebEx and a video-conferencing system.

The future of remote

The remote access of sophisticated instruments, except in the case of synchrotron facilities, largely remains off limits for academic researchers. Some instrumentation experts speculate that the low availability partly is due to the complexities of the operations. "Each lab member undergoes months of intense training before he or she can operate the electron microscope independently or remotely," notes graduate student Meyerson.

However, there is a growing need for remote access, as sophisticated instruments are "starting to cost more both in terms of purchase and maintenance," says Tobias Starborg, senior experimental officer of the electron microscope facility at the University of Manchester. He adds that "the only way new techniques get developed [by the facilities is to have] a constant flow of users wanting to try different things."

Remote control of instruments could be a double-edged sword, however. Chen predicts that remote control via smartphone will be the next step. "[But] would I really like to control the mass spectrometer on the beach?" asks Chen with a smile.



Jianfei (Jeffrey) Zhao (zhao_jianfei@yahoo.com) is a postdoctoral fellow at the National Cancer Institute.

Celebrating postdocs

They do the heavy lifting all year long in labs across the globe. The third week of this month is dedicated to showing our appreciation.

BY ROBERT BARRETT AND KATE M. SLEETH

National Postdoctoral Awareness Week runs from Sept. 19 through Sept. 23. Initiated by the National Postdoctoral Association in 2009, the observance is intended to highlight the contributions that postdoctoral scholars make to science and to spur institutions to show their appreciation in various ways. Here, Robert Barrett and Kate M. Sleeth of the National Postdoctoral Association explain how the observance came to be and how their organization can serve the postdocs that labs rely on every day.

National Postdoctoral Awareness Week initially began as a one-day event known as National Postdoc Appreciation Day, which was held Sept. 24, 2009. The inaugural observance was a great success, with more than 50 institutions in the United States and others as far away as Australia participating.

The one-day celebration subsequently was expanded to a full week in September to allow institutions greater flexibility. In 2010, more than 110 events were held in 30 U.S. states.

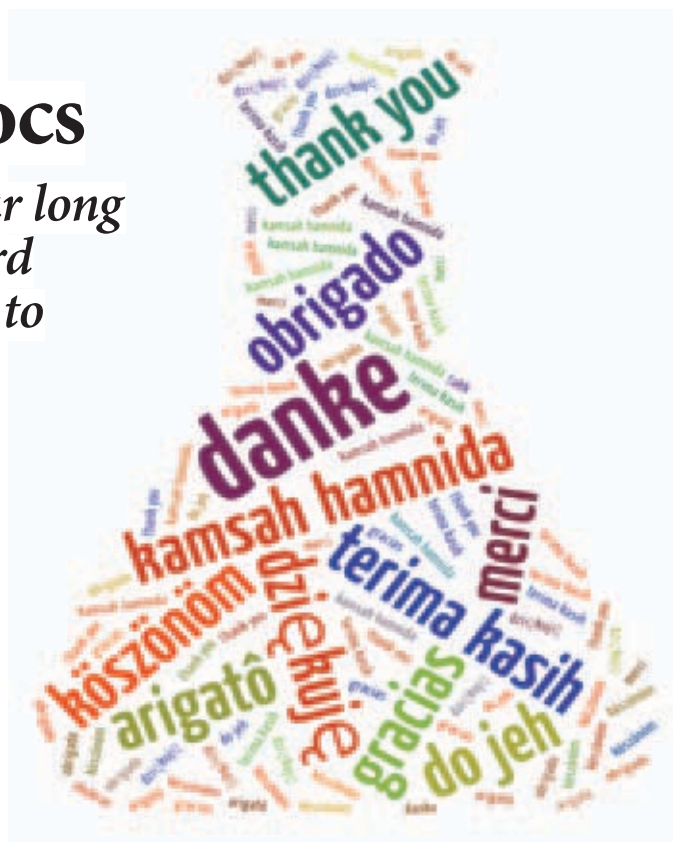
What happens during the observance

The events that are held vary widely depending on the needs and resources of the participating institutions. Some host symposia that allow postdocs to showcase their current projects. Others invite noted speakers to give lectures. Still others provide seminars on grant writing and careers outside of academia. Seminars also are used to showcase the latest technology available for use by postdocs. Almost all institutions support networking events with free food and drinks.

Why postdocs deserve recognition

The NPA initiated the observance so that institutions collectively could recognize the value of postdocs to campuses, facilities and the scientific enterprise in general.

The number of postdocs has been increasing steadily in the



U.S., and the training has become the natural next career step for newly minted Ph.D.s. The temporary period of mentored research or scholarly training allows them to acquire the skills needed to pursue independent careers.

In earlier years, there was no limit to how many years one could remain in a postdoctoral position, but new rules for National Institutes of Health grant eligibility have capped the experience at five years for many institutions.

Postdoctoral scholars are responsible for the majority of research output in the United States and drive the entire research enterprise in both academic and industrial settings.

In 2008, the National Science Foundation's Science and Engineering Indicators report estimated that there were about 89,000 postdoctoral scholars involved in research in the United States. In addition, although postdoctoral scholars often work up to 80 hours a week, they earn an average of only \$38,000 a year.

Postdocs are motivated by their passion for discovery and the scientific method and their wish to make a positive difference in the world. To fulfill these desires, many sacrifice financial security and often work in countries far from their families.

The National Postdoctoral Association

The primary aim of the association is to advance the U.S. research enterprise by maximizing the effectiveness of the

research community and enhancing the quality of the postdoctoral experience for all participants. The nonprofit was founded in 2003 by seven members at institutions throughout the U.S. Now headquartered in Washington, D.C., the NPA serves more than 1,500 members and more than 180 institutions that employ 40,000-plus postdoctoral scholars.

Throughout the years, the NPA continually has advocated for better conditions for postdocs, playing a prominent role in how the NIH and NSF have defined the position; advocating for the NIH Pathways to Independence award, which substantially helps postdocs transition to tenure-track faculty positions; and asking the NIH and NSF to expand their data collection regarding postdocs supported by research grants and to ensure that postdocs are properly mentored and trained. In September 2010, the awareness week was recognized by the U.S. House of Representatives.

Building a support network

The NPA also offers assistance and advice on how to form postdoctoral associations and postdoctoral offices at institutions. Associations are generally run by postdocs, and offices are generally run by academic faculty directors or nonfaculty directors or coordinators. Yet the aim of both is the same: to improve the postdoctoral experience. Associations often welcome volunteers who wish to capitalize on related networking opportunities.

If you are a postdoc and are unsure if your institution has either an association or an office, check with your graduate program leadership or your institution's human resources office. If there is no association on campus, combine forces with other dedicated and enthusiastic people and start one. Lots of associations across America have started as grassroots efforts.

Offices also have been opened by institutions that have strong Associations, which lobby the administration and communicate how important postdoctoral training and support are.

Even if your institution's association has limited funds or none at all, it is still possible to organize a postdoc awareness week event. For example, you can coordinate something as simple as a coffee hour in a local café or a happy hour at a bar or restaurant at which everyone purchases his or her own food and beverages. If your city or region is home to multiple research institutions, consider pooling resources and having one large event. ∞∞∞



Robert Barrett (Robert.Barrett@cshs.org) is a postdoctoral scholar in the Inflammatory Bowel & Immunobiology Research Institute in Cedars Sinai Medical Center, and Kate M. Sleeth (ksleeth@coh.org) is a postdoctoral fellow in the department of immunology at the Beckman Research Institute at the City of Hope.

Other ways to show your support

- Become a member of the National Postdoctoral Association. Visit www.nationalpostdoc.org.
- Purchase an item from the NPA store. There are items for every budget, including clothing, greeting cards, mugs, notebooks, bags and calendars — all with logos and fun slogans on them. Visit www.nationalpostdoc.org/store-merchandise.
- Participate in an awareness week event. Visit www.nationalpostdoc.org/meetings-and-events/appreciation.

reminder:onlinegraduation survey

The deadline for the 2010-2011 ASBMB Graduation Survey is Sept. 30.

If your department/program offers a degree in biochemistry and/or molecular biology, chemistry with a biochemistry track, or biotechnology, please check with your unit chair/head to see if a response has been sent.

Thank you,

James K. Zimmerman

Peter Kennelly,

Education and Professional
Development Committee

Squire Booker,

Minority Affairs Committee

Takita Sumter,

Minority Affairs Committee

Benjamin D. Caldwell,

Undergraduate Affiliate Network

Studying science. Serving others.

Course puts biochemistry students in real-world situations, teaching lessons they won't find in textbooks or the lab.

BY JONATHAN DATTELBAUM

When students enroll in Jonathan Dattelbaum's biochemistry course at the University of Richmond, they expect to learn about the basics of the field. But Dattelbaum's course is about the unexpected, and that's on purpose. Community-based learning extends the learning experience for students outside the classroom through interactions with the public. Here, Dattelbaum, an associate professor of chemistry and co-director of the Biochemistry and Molecular Biology Interdisciplinary Program at the University of Richmond, reflects on how sending students out into the world has proved to be a valuable teaching pedagogy.

Community-based learning experiences take many forms, including bringing in speakers from the community, producing documentaries, teaching course materials in primary and secondary schools, or conducting field work. I chose service learning, because it provides an excellent umbrella for student exploration of the connections between textbook concepts and real-world applications, particularly for medical and biotechnological fields.

Many science faculty members believe that science is learned by doing. Refining what it means to be actively engaged in teaching science is important for our students as they move through the curriculum and into the workforce.

In the sciences, one of the most common formats for active teaching is the lab-based science class, in which students learn important hands-on skills and applications. More recently, many schools have invested in undergraduate research programs that enhance experiential collaborations between students and faculty. While learning laboratory skills is an important part of science education, many science majors will not become research laboratory scientists. I believe that finding ways to develop life skills, such as studying the application of science in society, learning more about community and working with different population sectors, requires creating learning opportunities outside of traditional laboratory-based courses.

Building the course

The process for developing a community-based learning experience began as part of a biochemistry laboratory section I was teaching as a first-year faculty member. The goal was to provide a complementary learning experience for students and not to replace specific laboratory material.

This teaching module was developed in consultation with the Bonner Center for Civic Engagement at the University of Richmond. I wanted to challenge the biochemistry lab students to take part in community-based service where biochemistry plays a role. The pilot project asked students to complete at least three hours of service in the Richmond community at one of four selected organizations: the American Lung Association of Virginia, the CrossOver Clinic, the March of Dimes' Central Virginia Division and the National Kidney Foundation of the Virginias.

While the students participated in a variety of activities depending on the needs of the organizations, the connecting force was the interaction students had with clients at each site, allowing for personal observations of diseases, conditions and situations.

For their efforts, students received the equivalent of one problem set toward the laboratory grade in the course. To assess this activity, I designed a report sheet that asked each student to provide a short paragraph describing his or her experience and to reflect on how biochemistry was involved.

This lab module became a pilot project that ran for three semesters.

Evolution of the course

I later expanded the community-based learning experience into the lecture component to show students how the course material relates to society. The number of topics covered in lecture is greater, which allows the inclusion of more community organizations in the program. In the end, more than 40 students participated per year in the CBL project.

My students chose from selected sites in the Richmond community and worked for a minimum of 15 hours. While the selected sites were preferred because of the network of

contacts I developed at them, students were allowed to work at different locations with prior approval. They also were required to keep well-written blog journals summarizing their activities within 24 hours of each visit.

Here's one excerpt from an entry:

"I have come to learn that some days are better than others in the nursing home, both for the patients and the staff. The patient I visit was congested and had to get a chest X-ray but turned out to be fine and returned to the nursing home the next day. Since, she has been much less talkative (compared to the minimal amount she did). It is hard assessing how someone is doing/feeling when you can't really communicate with them, and incredibly frustrating on both ends, whether patient or nurse."

And here's another:

"I am TB negative! My skin test had a bump that was 1mm off of unacceptable size for being in a hospital setting. They injected me with tuberculosis antigen, (and) the size of my inflammatory response is dictated by the amount of TB antibodies I have. A person who has been exposed to TB in the past (and thus has a large AB count) will have a larger inflammatory response, hence a larger bump. If I had failed the size test, they would then have taken an X-ray to check for nodules in my lungs."

Student reflections and evaluations

At the end of the term, each student wrote a literature-based paper with a reflective component focused on some biochemical aspect related to the mission of his or her work site and experiences working with individuals there.

The students also completed an evaluation form that provided some quantitative feedback. After the first year of this project, the most important critique I received was that the service hours felt like extra work that was not really a part of the course. I, therefore, turned my attention to integrating the experience throughout the entire semester. I did this by explaining on the first day of class why I thought this project has value for learning biochemistry.

Additionally, I used class time every other week to let students present information about their experiences and explain how those experiences related to biochemistry.

For example, a student who volunteered with a local rescue squad described the treatment of a 19-year-old girl experiencing a possible sleeping pill or heroin overdose. Narcan, a potent narcotic antagonist that works by blocking opiate



University of Richmond student Heather Hollis's community-based learning site was the Fan Free Clinic in Richmond, Va.

Assessing impact

Student evaluations consistently showed that about two-thirds of students were serving in the community for the first time and that many students worked more hours than the course required. About two-thirds also said that they learned more in the course because of the community-based project.

receptors, was administered, and a violent reaction ensued, suggesting heroin overdose. The student presented this example in the context of a recent lecture on protein-ligand binding. Additionally, the age of the patient helped students see the significance of the concept of small-molecule binding and affinity, which is a difficult topic for some students.

A second student working at a local facility to transition drug addicts back into society observed the detoxification process and connected this with some of what we know about the biochemical processes in the brain that favor addiction and bring about pain during withdrawal. Additionally, she went even further to describe the socioeconomic diversity present in the facility, which was something this student had not expected to find.

The student presentations provided the most significant change in student attitudes toward the project. The number of students reporting that they were able to see how bio-



Biochemistry students, from left, Caroline O'Rourke, Tran Doan and Miles Johnson participated in the community-based learning module established by University of Richmond associate professor Jonathan Dattelbaum.

BY THE NUMBERS

Fall 2008	24 students
Spring 2009	21 students
Fall 2009	15 students
Spring 2010	26 students
TOTAL STUDENTS	86 students
	x 15 hours =
TOTAL HOURS	1,290 hours

chemistry subject material related to society rose from 67 percent in the first year to 92 percent in the second year. As a result of bringing the student presentations into the lecture, the learning was no longer isolated to individual students who went out into the Richmond community alone and wrote term papers that only I read. This became a powerful mechanism to share learning experiences in the classroom, where connections could be illustrated by students and not just by me.

Considerations

There are a few barriers to making the most of community-based learning experiences.

One important factor to consider is that, as the course instructor, you must give up a certain level of control over the amount of learning that occurs at the sites. Some will be better than others, and that must be accepted and com-

municated to students in advance. Developing relationships with volunteer coordinators is invaluable for finding projects that align well with course objectives. However, such organizations have high turnover and require constant re-evaluation. This extra time is an important factor to consider at the onset.

There is also a risk that not all students will be interested in participating for any number of reasons, and issues are likely to arise, including problems with transportation, with nonresponsive organizations and with extra time for the assignment. Student frustration comes out in course evaluations. If one has unsupportive departmental or administrative colleagues, this may be a particular concern for untenured faculty.

A teacher's reflections

Over the four semesters that I taught this community-based learning course, my students contributed more than 1,290 hours of service to the Richmond community. As research scientists, we can have a very positive impact on the training of a small number of laboratory students, but, as teachers providing opportunities like this one, there can be a multiplier effect in that our students take ownership of their learning to enhance the community in a meaningful way. XXXX



Jonathan Dattelbaum (jdattelb@richmond.edu) is an associate professor of chemistry and co-director of the Biochemistry and Molecular Biology Interdisciplinary Program at the University of Richmond.

Inquiry-based learning in K–12

BY MARGARET JOHNSON

Having received clear and inspiring directives for implementing change in the way we teach undergraduates science, we now can focus on mechanisms to initiate that change in instruction at an earlier stage in the education process. For the purpose of this article, we consider the science-education process as having two critical phases: an initial phase of inquiry-based learning (K–12 science) and a maturation phase of inquiry-based learning (undergraduate science education and beyond).

As you would suspect, it is much more difficult to initiate inquiry-based learning at the maturation phase than at the initiation phase. The question, then, is: What we can do to induce inquiry-based instruction at the initial phase so that students enter undergraduate courses in the questioning mode rather than the passive-recipient-of-information mode? Having students who enter college in the questioning mode will allow college science instructors to implement immediately the exciting changes a national conference organized by the American Association for the Advancement of Science and supported by the National Science Foundation recommended for improving undergraduate science education.

So how can the K–12 science teacher initiate the inquiry-based learning phase when there is little classroom time left to teach science and no resources to purchase science teaching materials?

One answer is that students don't need lots of classroom time or resources to ask questions that reflect an innate need to know or natural curiosity. Later, in college, they can learn how to formulate scientific questions and utilize scientific tools. Nature already has performed many of the experiments that can be used in K–12. In addition, nearby research institutions can help train K–12 teachers using faculty-based research. Thus, the teacher needs only to learn how to use nature's experiments to get the students to ask questions — questions such as “How do we know?”

Once students understand that scientific information is based on evidence and that they have the right to ask for that evidence, then they are ready to understand the scientific process.

Here's hoping that resource or time limits inspire numerous creative ways for K–12 teachers to initiate inquiry-based learning so that students enter undergraduate science courses in the questioning mode. ∞∞∞



Margaret Johnson (mjohnson@biology.as.ua.edu) is an associate professor at the University of Alabama.

A few ideas

Methods to induce inquiry-based learning at the K–12 level:

Use newspaper and Internet articles about current hot topics in science and research to start discussion. Stem-cell research is a favorite. Questions give the teacher the opportunity to incorporate biological principles into the discussion.



Invite local researchers to lead demonstrations. A real plus in doing this is that the scientist can bring portable equipment. The equipment should not be used for show and tell but as a starting



point for inquiry-based instruction. If I'm working on something without saying what I'm doing, then students will ask the following questions: What is that? Why are you doing that? How does that work? Who made that?

Perform an experiment to engage students in discussion. For instance, use your imagination to generate questions using only foil, a magnifying glass and soil from outside your building. After the first round of observations and questions, pour water on the soil.

Take advantage of a natural experiment. Bring agricultural and other natural resources to the classroom. Different colored vegetables (of the same kind) or flowers are real winners.



Biotic games

Play with living organisms

BY NANCY VAN PROOYEN

It's easy to imagine how computer games greatly improve verbal and mathematical proficiency, but can they be used to foster an interest in science? Stanford University's Ingmar Riedel-Kruse is convinced they can.

An assistant professor of bioengineering, Riedel-Kruse and his lab group have developed the first biotic games, which involve manipulating biological processes in real time. They use various visualization techniques to illustrate and monitor these processes on a computer screen with a gamelike interface.

The inspiration to create biotic games came from reading about the history of computers and video games, Riedel-Kruse explained.

"Computer development enabled video games. Since biotechnology is currently undergoing a similar revolution, it struck me that biotechnology could also be a medium for a new type of game," he said.

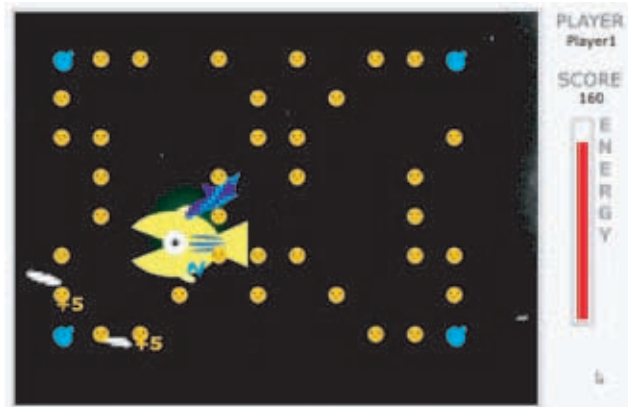
Many video games attempt to mimic real life, but biotic games use actual life forms, such as paramecia and yeast. Players learn about a variety of biological, chemical and physical properties without dealing with the rigors of formal experiments. Additionally, living organisms often respond in random ways, which makes them fascinating to watch.

"Biotic games enable interesting play experiences based on real-life phenomena, biological unpredictability or the stimulation of olfactory senses," Riedel-Kruse said. "We hope that, by playing games involving biology of a scale too small to see with the naked eye, people will realize how amazing these processes are, and they'll get curious and want to know more."

Riedel-Kruse designed three types of games inspired by classic video games. The results of the design efforts are reported in the 10th-anniversary issue of *Lab on a Chip*, published by the Royal Society of Chemistry.

The first set of games uses single-celled organisms that lack brains and the capacity to feel pain. Higher-level organisms are not being used, Riedel-Kruse emphasizes, as "safety and bioethical issues were considered in the design of the games."

One organism of choice was the paramecium, which is a ciliated single-celled organism that swims in a run-and-tumble motion and can be directed to move in a guided direction through both electrical and chemical signals. Paramecia can



be prompted to change directions, but they move in a random path, which makes the games challenging.

In a game inspired by the classic arcade game Pac-Man, which Riedel-Kruse's team has dubbed PAC-mecium, paramecia are placed in a square fluid chamber that has electrodes along each side. The player controls the swarm by applying electric fields along two axes with a hand-held controller. The motion of the paramecia is captured with a webcam and displayed on a computer screen. Points are scored by directing the paramecia to gobble up virtual yeast food shown on the computer screen. However, players have to help the paramecia avoid hungry virtual zebrafish larvae that move across the screen.

The second class of games involves risk and logic. Polymer-Race is inspired by horse racing, in which gamblers make bets on the order that horse-jockey pairings will reach the finish line. In the biotic version, the horse-jockey pairs are small DNA oligonucleotides, or primers, that bind with a range of affinities to DNA during a polymerase chain reaction, a common molecular technique used to replicate DNA sequences.

Players watch in real time the amplification of DNA and with each cycle obtain new information about the order and reaction efficiencies of the primer pairs. In each subsequent cycle, players make more bets; thus, the strategy is to balance risky, limited-information bets with secure, logic-driven bets.

The final class of games involves the use of olfactory senses. Prisoner's Smellemma is based on the classic problem in game theory known as the Prisoner's Dilemma, which demonstrates that people may not always cooperate even if it is in their best interests. Prisoner's Smellemma is played with yeast, which emit a vinegarlike smell similar to that of freshly baked bread. Each player receives a yeast strain and buffer. Players mix either buffer or yeast strain with their opponent's, smell the mixture and guess what the other player did. Players score points by guessing correctly whether their opponent is cooperating or opposing them.

These biotic games mark a milestone in the computer gaming

world. It's the first time a game has been created in which the player's actions influence living organisms in real time. It's easy to see how these games can be used for educational purposes, Riedel-Kruse said, especially in the classroom to get students excited about biology.

"Many computer experts discovered their love for computers when playing games," he said. "Biotic games could have the same inspiring effect for biology and biotechnology."

Riedel-Kruse said he also is optimistic that these games will inspire the public to contribute to biomedical research, because games can be used by small armies of players or researchers who run experiments and gather data as they play.

"Ideally we would like to structure a game so that many people will play, and each person feels like they are making a valuable contribution," he said. "The more people thinking about a common problem with different backgrounds, the more likely we are able to solve that problem." XXXX



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Examples of scientific crowdsourcing for fun

Other scientists have designed Internet-based video games to utilize the collective power of many people working on one problem. In the gaming world, this is referred to as crowdsourcing or citizen science, in which a task is delegated to a group of individuals with one common goal.

Vijay Pande at Stanford University created a protein-folding game (folding@home) that is run on the world's largest supercomputer to generate new ideas about how proteins fold.

In addition, EteRNA, a ribonucleic acid folding game, allows the public to create new RNA molecular structures. The players are scored based on known chemical properties of the RNA structure. The highest-scoring RNA molecules are tested in the laboratory. EteRNA was developed as a collaboration between the Carnegie Mellon University and the Bio-X.Game Center, an interdisciplinary research center at Stanford University.

LET'S PLAY!

ASBMB presents a new iPhone game about DNA replication and repair, and it is **FREE FOR MEMBERS.**

DNA DAMAGE CONTROL

Match base-pairs and repair UV damage to win. Compete with your friends for top score!



Search DNA Damage and Download from iTunes
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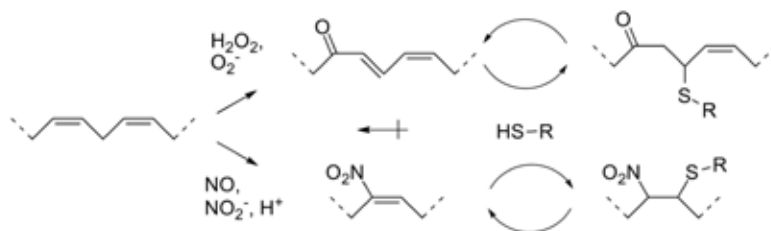
Electrophilic fatty acids: redox-derived signaling mediators

BY STEVEN R. WOODCOCK AND BRUCE A. FREEMAN

Recent advances from a variety of laboratories reveal that free radical-induced lipid oxidation products can mediate potent anti-inflammatory and beneficial metabolic reactions. Fatty acids, at first glance, are among the simplest of biological molecules: straight chain hydrocarbons with a single polar terminus and at most a few cis-double bonds in either a methylene-skipped or conjugated diene pattern. In polyunsaturated fatty acids, the low-bond dissociation energy of the doubly allylic methylene hydrogens renders them relatively reactive. Fatty acid ligation to proteins is typically accomplished by the formation of esters or thioesters, which increases lipophilicity, can modify protein function and alters the anatomic distribution of modified proteins.

In the context of cell signaling, the stereospecific oxygenation of not only arachidonic acid but also other polyunsaturated fatty acids can be catalyzed by the heme and nonheme iron-containing proteins cyclooxygenase-1 and -2 as well as 5-, 12- and 12/15-lipoxygenases. These products are typically viewed as ligands for specific G-protein-coupled receptors that propagate inflammatory responses. Notably, by virtue of their reactive dienes, fatty acids also are susceptible to more random oxidation by the adventitious oxidants produced during mitochondrial respiration, environmental oxidants, and the inflammatory activation of cellular nitric oxide (NO) synthase and superoxide ($O_2^{\cdot-}$) and hydrogen peroxide (H_2O_2)-generating NAD(P)H oxidase activities. These reactive species are not exclusively toxic, because recent advances show they also can serve as salutary signaling mediators by virtue of an ability to confer post-translational protein modifications.

Polyunsaturated fatty acids are easily oxidized to hydroperoxyl and hydroxyl derivatives, with multiple enzymatic mechanisms having evolved to further metabolize these intermediates. In the process of oxidation, double-bond rearrangements occur, such as from cis- to trans- and into conjugation with a neighboring double bond. This latter species is potentially reactive via the electron-rich conjugated diene and may be subject to further modification by electron-deficient or unpaired reactive species. Alternately,



tively, the hydroxyl may be directly oxidized via enzymatic or nonenzymatic pathways to an aldehyde or ketone. The α,β -unsaturated carbonyl, now conjugated to the diene, forms a powerful electron-withdrawing group. This moiety is labile to reaction with available nucleophiles, such as protein thiol or histidine residues. Similarly, NO-derived reactive species can instead nitrate the fatty acid by nitrogen dioxide-mediated free radical addition mechanisms. The resulting nitro-fatty acids are even more electron-deficient and thus are a strongly electrophilic and kinetically reactive species. The resulting oxidized or nitrated fatty acids, whether free or esterified, exhibit distinct structural and biochemical properties and can modulate the activity of multiple cell signaling pathways.

The electrophilic reactivity of both α,β -unsaturated carbonyl- and nitro-fatty acid derivatives is the basis for their signaling capacity. Double bonds conjugated to a strong electron withdrawing group are susceptible to Michael addition. This is the reversible addition of a nucleophile to the electrophile, accompanied by bond-rearrangement and proton transfer, to yield adducted (or alkylated) products. In the decidedly reducing cytosolic milieu, most biological functional groups are electron rich, and some are potentially nucleophilic. This redox balance is maintained by glutathione, which is a prevalent nucleophile as well as antioxidant. The adduction of electrophilic fatty acids to thiol- or amine-containing proteins via Michael addition introduces a post-translational modification of proteins, conferring altered cellular distribution, conformation and catalytic activity.

It is the combination of electrophilic adduction with the reversibility of this reaction that may be the most important aspect of this reactivity of soft electrophiles (figure). An irreversible reaction is essentially toxic, while a reversible modi-

fication conversely is a typical event; molecules are modified and remodified in continuous succession throughout the cell as a normal aspect of metabolism.

Detection of these fatty-acid products must consider their small proportion among free fatty acids while also accounting for the bioavailable pools that already are adducted to proteins. The reversible electrophilicity of these molecules has been exploited as an analytical methodology designed to take advantage of their intrinsic properties. To distinguish electron-rich fatty acids from oxidized or nitrated electrophilic species, simple methods for exposing the analyte to competing thiol-containing nucleophiles have been developed. Then trans-alkylation to low molecular weight or immobilized nucleophiles permits capture of electrophilic species that are either free or already adducted via Michael addition to GSH or nucleophilic amino acids of proteins. In this regard, β -mercaptoethanol serves as an effective electrophile trapping agent. After chromatographically separating β -mercaptoethanol-adducted electrophiles, these adducts can be identified and analyzed by loss-of-mass observations as they are cleaved under ionizing mass-spectrometric conditions. Through this methodology, new nitrated and oxidized fatty acid species are being

detected in both animal models and clinically (1, 2).

Why are electrophilic fatty acids relevant in biology? Multiple transcriptional regulation events and nuclear lipid receptors such as PPAR γ are potently modulated by these species, resulting in predominantly anti-inflammatory and beneficial gene expression and metabolic responses (3). One can envision that the redox-dependent generation of electrophilic lipid products thus links gene expression to the metabolic and inflammatory status of tissues. $\infty\infty$



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Undergraduate programs in BMB

What makes them distinct? What makes them complete?

BY PETER J. KENNELLY

A campus tour

An enthusiastic young undergraduate is leading a group of high school students and their parents on a tour of Generic State University.

As they walk across the quadrangle, the undergraduate confidently points out building after building as his audience inquires: Where is the psychology department located? Is that the biology building? Where's English? Where's biology? Where's engineering? Where is the department of molecular biology?

"I don't think we have one," the undergraduate replies.

"Where do students go if they are interested in studying enzymes, lipid metabolism or gene regulation?"

"I'm not sure. Some major in biology. You can major in biochemistry through the chemistry department, but you still have to take P-Chem..."

A heterogeneous array of program models

For the bulk of the 20th century, colleges and universities were organized on modular principles. Every subject area taught was the responsibility of an autonomous academic department possessing its own faculty, staff, unit leader and space. Large departments often merited their own buildings, with the collateral benefit of enshrining their disciplines in bricks and mortar for generations to come.

As new disciplines emerged — aeronautical engineering, psychology, computer science — during the steady expansion of the 1950s, colleges and universities added new departmental modules. Eventually, however, spiraling fiscal constraints rendered expansion by addition increasingly impractical, driving institutions to seek ways of covering new areas by rearranging or repurposing assets within the existing unit structure. As relative latecomers on the scene, biochemistry and molecular biology programs followed a variety of paradigms.

Many schools, especially the larger research universities, established classic autonomous departments. Other colleges and universities elected to add BMB to the portfolio of existing departments, with biochemistry frequently falling under the purview of the chemistry department and molecular biology under that of the department of biology.

In some cases, the title of the department was

expanded to acknowledge the addition; in others, it was not. Another popular option, especially among smaller colleges and universities, was to assign responsibility for the BMB major to a consortium of two or more departments that usually includes both chemistry and biology.

Does heterogeneity matter?

Do these various models affect the quality of BMB education nationwide? Does adding two or three BMB courses to the basic chemistry or biology curriculum offer the same learning opportunities as an integrated BMB curriculum designed from the ground up?

Some of these structures expose students to a diverse community of BMB faculty members. Others, however, make-do with one or two token biochemists or even some part-time instructors.

While many faculty members and instructors working as outliers within biology, chemistry or other departments are remarkable educators, it is difficult to believe that programs trying to get by with limited personnel and resources can maintain consistently high levels of quality as readily as dedicated units that award BMB top priority and access to the physical and human infrastructure generally associated with an autonomous department. This is not to say that departmental structure somehow guarantees quality instruction.

Heterogeneity lies in the definition of the degree itself. While many schools award a Bachelor of Science in biochemistry and molecular biology, others award degrees in biochemistry alone or molecular biology alone. How do they differ? Are the core concepts and expected competencies associated with a B.S. in molecular biology or biochemistry consistent across colleges and universities?

Should we care?

The American Society for Biochemistry and Molecular Biology Education and Professional Development Committee is committed to advancing the quality of our discipline. Undergraduate BMB programs allow for the imaginations of aspiring biochemists and molecular biologists to become either further inspired or to grow stale. Students either lay a foundation of analytical



reasoning skills, quantitative analysis, chemical functionalities and structural principles that promote success in the workplace and graduate and professional schools or simply get by through rote memorization and other tricks of the trade.

So, yes, ASBMB has a stake in the institutions and members who perform the vital task of preparing our next generation of scientific leaders.

When it comes to the issue of program infrastructure, accreditation programs such as the one being developed by ASBMB have proved successful in setting threshold standards for personnel, curriculum, etc. The American Chemical Society, for example, specifies that an accredited department must have at least four dedicated faculty members. The ACS also goes so far as to suggest a pre-

ferred suite of major instruments and require that libraries provide access to at least 14 journals recommended by the ACS Committee on Professional Training.

While we do not propose to be as prescriptive and detail oriented as ACS, there are several areas in which ASBMB would like to make its influence felt. Therefore, for a student to qualify for an ASBMB accredited degree, he or she must graduate from an eligible program. Key elements of an eligible program should include:

- 400 or more hours of hands-on, experiential learning across science, technology, engineering and math disciplines,
- access to extracurricular research opportunities such as undergraduate research or internships,
- professional-development opportunities for faculty members,
- opportunities for students to develop written and oral communications skills, and
- three qualified faculty members.

This last element is perhaps the most problematic to deal with. For many small schools, it may be difficult to identify three full-time faculty members, or the equivalent, whose primary allegiance is to the BMB program. Many small programs are getting by with only one or two faculty members. Should they be penalized just because they are small — a metric that does not correspond with quality? On the other hand, setting stan-

dards for the sole purpose of not leaving someone out is hardly an approach that can be expected to earn credibility and respect or to promote aspirational change.

The EPD is interested in hearing your ideas about what criteria should be used to identify programs that meet the expectations of the ASBMB community and why. Simply send an email to pjkennel@vt.edu. ☺☺☺



Peter J. Kennelly (pjkennel@vt.edu) is a professor and head of the department of biochemistry at Virginia Polytechnic Institute and State University. He also is chairman of the ASBMB Education and Professional Development Committee. A report from the Education and Professional Development Committee.



**THE JOURNAL OF
LIPID RESEARCH**

New risk marker for cardiovascular disease?

BY MARY L. CHANG

When red blood cells break down, so does hemoglobin. A byproduct of this breakdown, bilirubin, has been hypothesized to act as an antioxidant; some *in vitro* studies have suggested that low-density lipoprotein can be protected from breakdown by oxidation by bilirubin. This, along with the idea that bilirubin has anti-inflammatory properties, may explain why low concentrations of serum bilirubin are associated with a higher risk for cardiovascular disease.

Pernette R.W. de Sauvage Nolting and colleagues at the Academic Medical Center of Amsterdam, the Netherlands, investigate in the article “Serum bilirubin levels in familial hypercholesterolemia: a new risk marker for cardiovascular disease?” whether a statin can change blood bilirubin levels in people

with familial hypercholesterolemia, a genetic disorder characterized by high levels of cholesterol, especially LDL. They also investigated whether bilirubin level was a reliable risk marker for cardiovascular disease.

Male patients between 18 and 80 years old who had one copy of the hypercholesterolemia gene were given a daily oral dose of statin for two years and followed for the entirety of this cross-sectional study.

The statin was shown to reduce total cholesterol, LDL and triglyceride levels while elevating high-density lipoprotein; but, more importantly, median bilirubin levels increased from baseline after treatment.

This increase was more obvious in patients who had

been diagnosed with cardiovascular disease than those without cardiovascular disease.

While the study had limitations (particularly patients' concurrent aspirin use and their lifetime smoking habits), the publication appears to be the first to consider bilirubin level as a potential risk marker in an FH population and proposes that long-term use of a statin can protect that population from cardiovascular disease. XXX

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



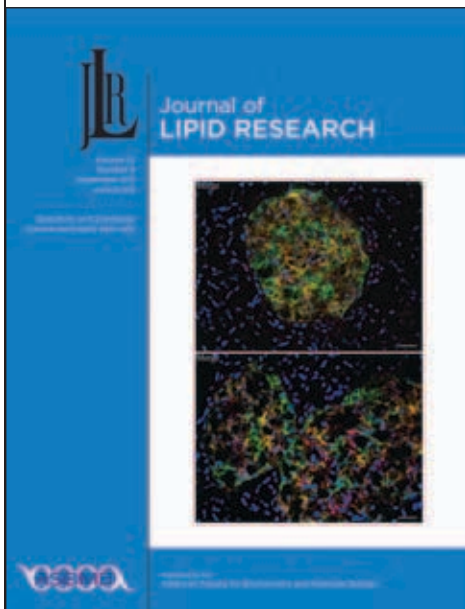
**THE JOURNAL OF
BIOLOGICAL CHEMISTRY**

‘Capsules’ will help authors tell their scientific stories

BY ANGELA HOPP

Last month, the Journal of Biological Chemistry rolled out a new feature aimed at providing readers with succinct snapshots of the latest papers being published and explanations of how those papers significantly advance our understanding of biological processes. Each regular paper now will be accompanied by a “Capsule,” a very brief, four-part synopsis written by manuscript authors and vetted by JBC reviewing editors and associate editors. Each “Capsule” will explain the background, results, conclusion and significance of the paper. To find out more about JBC “Capsules,” read Editor-in-Chief Marty Fedor’s editorial on the journal homepage. XXX

Angela Hopp (ahopp@asbmb.org) is a science writer and handles public relations for ASBMB.



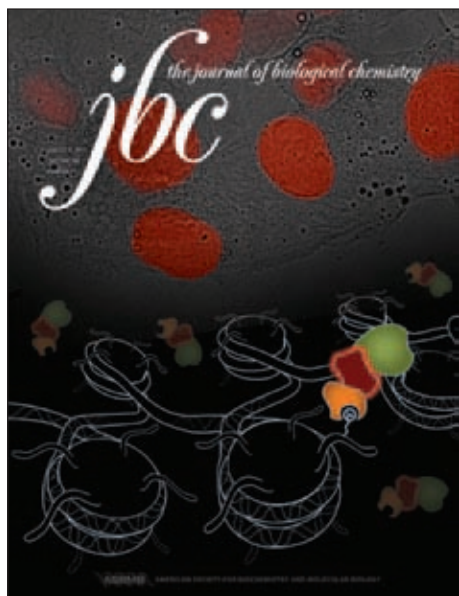
Example of a “Capsule”

Background: The hairpin ribozyme is a prototype of RNA enzymes that mediate catalysis without divalent cation cofactors.

Results: Self-cleavage activity decreases as the fraction of the protonated form of an active site adenosine increases.

Conclusion: The neutral, unprotonated form of adenosine interacts with the nucleophilic- or leaving-group oxygen to facilitate catalysis.

Significance: Learning how RNA functional groups participate in catalysis is crucial for understanding RNA-mediated processes in biology.



New editorial board website connects authors, editors

BY SARAH CRESPI

The JBC launched last month a new editorial board website that highlights the board's breadth of expertise and its newly formed affinity groups. The affinity groups reflect different areas of biological chemistry based on the journal's table-of-contents sections. Organizing board membership and journal content according to affinity groups is meant to help authors and readers focus on areas of particular interest within the broader field of biological chemistry. The goal of the new editorial site is to make it easier for authors to determine which board members are most suitable for handling their manuscripts before beginning the submission process. To this end, the new website enables searches by name, institution and keyword. XXXX

Sarah Crespi (screspi@asbmb.org) is the media and technology project manager for ASBMB.



ASBMB ANNUAL MEETING 2012

April 21-25, 2012
San Diego, CA

Travel Awards

ASBMB will award several travel awards and grants to assist first authors presenting abstracts at the ASBMB Annual Meeting from April 21-25 in San Diego.

*Only one application will be accepted per applicant.
The application site opens this month.*

- **Child-Care Grant**
- **Graduate Minority Travel Award**
Funded through the FASEB MARC Program
- **Graduate or Postdoctoral Travel Award**
- **Undergraduate Affiliate Network (UAN) Outstanding Chapter Award**
- **Undergraduate Affiliate Network (UAN) Travel Award**
For chapters to designate their chapter or regional meeting travel award winners only
- **Undergraduate Faculty Travel Award**
Faculty applicants must be the first authors on the abstracts associated with the travel award applications. Students submitting travel award applications and/or participating in the poster competition must submit unique abstracts on which they are the first authors.
- **Undergraduate Student Competitive Travel Award**



Travel Award and
Abstract Submission Deadline: Nov. 8
www.asbmb.org/meeting2012

ASBMB
American Society for Biochemistry and Molecular Biology

‘Life will happen and sometimes presents unforeseen challenges’



Kitani Parker Johnson, an assistant professor in the College of Pharmacy at Xavier University of Louisiana, was featured recently on the ASBMB website.

In her Q&A with ASBMB's education and professional development manager, Weiyi Zhao, Johnson reveals how she has successfully navigated the ups and downs of her professional and personal lives by calling on the special people in her support network. XXXX

Read the interview at <http://bit.ly/r57kdu>.

University of Wisconsin-Stevens Point Chemistry Department

FACULTY POSITION IN BIOCHEMISTRY

The University of Wisconsin-Stevens Point Chemistry Department (www.uwsp.edu/chemistry) invites applications for a tenure-track position in biochemistry at the assistant professor level. The appointment will begin in August 2012. Ph.D. in Chemistry, Biochemistry, or a related field is required: must be completed by August 1, 2012.

Candidates will teach courses in biochemistry and general chemistry as needs require. Applicants must show promise for excellence in teaching and will be expected to develop a research program involving undergraduates.

Send hard copies of curriculum vitae, a statement of teaching philosophy, plans for proposed research, undergraduate and graduate transcripts, and three letters of recommendation to: Chair of Search Committee, Department of Chemistry, University of Wisconsin-Stevens Point, Stevens Point, WI 54481. Application materials may not be sent electronically.

Letters of recommendation must come directly from references. Screening will begin on October 17, 2011, and will continue until the position is filled.

UWSP is an Affirmative Action/Equal Opportunity Employer. Women, minorities, Vietnam era veterans, disabled veterans, and individuals with disabilities are encouraged to apply.

Employment will require a criminal background check.

University of Cincinnati Department of Chemistry or Biological Sciences

ASSOCIATE/FULL PROFESSOR POSITION

As part of an initiative to develop an interdisciplinary cluster of researchers, the Department of Biological Sciences and the Department of Chemistry in the McMicken College of Arts and Sciences seek to fill a faculty position at the rank of Associate or Full Professor.

For this particular hire, the candidate's research should foster collaborations across chemistry and biology, as well as other disciplines, and address biological function or history. Themes of particular interest include chemical biology, molecular biology, "-omics" and single molecule bioanalysis.

The candidate will have the opportunity to collaborate with a variety of groups with research strengths in areas such as the evolution of biological processes, nucleic acid chemistry, behavior and neuroscience, nanotechnology, paleobiology, environmental genomics, sensors, and structural biology.

The ideal candidate should be an established, active researcher with a record of productive mentoring, consistent publication, and substantial extramural funding. Responsibilities will include interfacing with other researchers in the College, maintaining a vigorous, externally funded research program, mentoring of graduate students as well as postdocs, teaching at the undergraduate and graduate levels, and service to the university community.

Applications must be submitted online at www.jobsatuc.com and reference the job posting #211UC0035. Applicants must attach the following to their online application: a cover letter, a short (3-5 pages) statement of research interests, list of four selected publications, a curriculum vitae and contact information for four references. Review of completed applications will continue until the position is filled.

The University of Cincinnati is an equal opportunity / affirmative action employer. Women, people of color, people with disabilities and veterans are encouraged to apply.



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Partner with the American Society for Biochemistry and Molecular Biology to bring your community together! ASBMB Special Symposia provides you, as a specialized researcher, a unique opportunity to present cutting-edge science mixed with active networking opportunities in an intimate setting.

How We're Different:

- Format:** Majority of talks selected from abstracts, invited speakers, 2-4 days in length
- Attendees:** 75-200 attendees, including investigators, industry professionals, graduate and postdoctoral students
- Venues:** Unique locations for outdoor recreation and informal networking opportunities
- Funding:** ASBMB provides initial funding as well as complete meeting management!

Learn More About the Special Symposia Series and Proposal Submission Guidelines at

www.asbmb.org/specialsymposia