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October 2011



ASBMB ANNUAL
2012 MEETING
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American Society for Biochemistry and Molecular Biology

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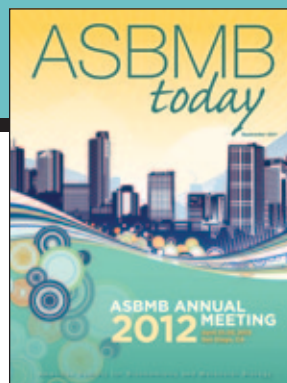
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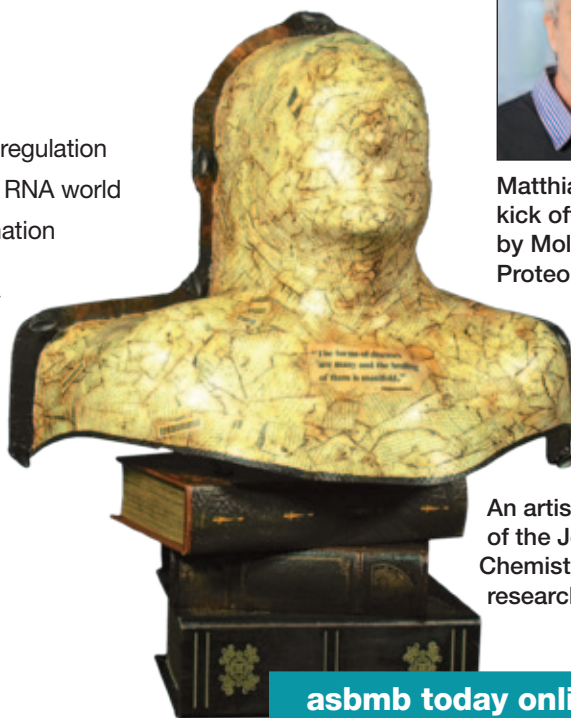
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asbmb today online

Go to the ASBMB Today website to check out our interactive timeline for Hispanic Heritage Month. See which researchers we've highlighted, and let us know about others who should be included in this dynamic teaching resource.

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Awards in biochemistry

BY SUZANNE PFEFFER

Of all the responsibilities assigned to an American Society for Biochemistry and Molecular Biology president, presenting awards is probably the most fun. Who wouldn't enjoy handing out checks and plaques to delighted scientists, thereby forever changing their résumés? You probably would be surprised to learn the number of award recipients who invite their mothers to hear their lectures and join us for a celebration dinner afterward. I personally don't think that we, as a community of scientists, do enough to recognize excellent science as well as significant contributions made in support of the community of scientists. It is important that the ASBMB recognizes outstanding research by presenting a dozen or so awards every year.

Some of our awards are made possible by generous, annual gifts: The ASBMB Merck Award is sponsored by Merck, and Avanti Polar Lipids sponsors two awards, one for a senior scientist and one for a more junior scientist. The Delano Award and Earl and Thressa Stadtman Awards are supported by endowments created by friends of the scientists in whose honor the awards were established. Other awards are supported by the ASBMB directly.

It was not that long ago that science was a much less populated vocation, and it was even possible to win more than one Nobel Prize. Fred Sanger did just that: In 1958, Sanger was awarded the Nobel Prize in chemistry for determining the primary structure of insulin, and in 1980 he shared the Nobel Prize (with Walter Gilbert and Paul Berg) for his novel method for determining the sequence of nucleic acids. There is no question that Sanger's contributions deserved two prizes, but today there seem to be many more scientists than available awards and many who deserve to be recognized but aren't.

I feel strongly that ASBMB awards should be given to scientists who may not already have been recognized for their contributions. When the community of scientists honors a small number of scientists with multiple awards, the field seems much smaller than it really is. By thinking hard and broadly about whom to honor, we do a better job of supporting the community — by providing role models for younger scientists and by identifying award recipients who can pass the torch to an even broader and more diverse group of future awardees. Our breadth and diversity as a community should be celebrated.

Why is it that a small group of scientists seem to get all the awards? Assembling a nomination package takes a reasonable amount of effort. A nominator must obtain a current curriculum vitae for his or her nominee and write a summary of that person's research contributions. Letters of reference must be obtained from scientists of stature (or sometimes from mentees) who agree that the nominee deserves to be recognized. All of this takes time — both on the part of the nominator and the letter writers. When a package already is assembled and the letters require only a change of date and recipient, nominating candidates for multiple awards is an easier path to take.

Some individuals are highly proactive in nominating their colleagues. Indeed, last year, two award winners came from a single, excellent department thanks to

Introducing the Alice and C.C. Wang Award in Molecular Parasitology

Thanks to the extraordinary generosity of Alice and C.C. Wang, I am delighted to announce the new Alice and C.C. Wang Award in Molecular Parasitology, which we hope will serve as an important part of C. C. Wang's legacy as a distinguished parasitologist.

About the award

The award will recognize active, established investigators who are making seminal contributions to the field of molecular parasitology. The areas of research are limited to protozoan parasites but otherwise are broadly defined, including biochemistry, molecular biology, gene regulation, metabolism, cell biology, development biology and host-pathogen interactions.

The recipient will be an internationally recognized scientific leader who already has made important discoveries in the field and who continues to lead an active effort at the cutting edge of research in this area.

The award will consist of a research grant for the recipient's laboratory, a plaque or commemorative medal, and travel expenses to the ASBMB annual meeting to present a lecture on his or her research.

We welcome nominations from ASBMB members, though the nominee need not be a member. The deadline for nominations for the first award is Dec. 1.

About the benefactors

Ching Chung ("C.C.") Wang was awarded a B.S. in chemistry from the National Taiwan University in Taipei and a Ph.D. in biochemistry from the University of California, Berkeley, in 1966. From 1969 to 1981, he was a senior investigator at the Merck Institute for Therapeutic Research, and since 1981 he has been a professor of chemistry and pharmaceutical chemistry at the University of California, San Francisco.

Wang has made seminal contributions to the understanding of the biology of many pathogenic protozoa. His early work



mapped the unusual glycolysis and nucleotide pathways in these organisms. Together with his wife, Alice, he discovered a double-stranded RNA virus in *Giardia lamblia*. His most recent research delineated the regulation of the cell cycle of *Trypanosoma brucei* (the pathogen responsible for African sleeping sickness) and the initiation of protein translation in *G. lamblia*.

Wang is an elected fellow of the American Academy of Microbiology and the American Association for the Advancement of Science, and he has received a number of other distinguished awards, including the Presidential Award from National Yang-Ming University in Taiwan.

The ASBMB is extremely honored to have been selected as the sponsoring organization to oversee this award, and we look forward to the opportunity to recognize the outstanding biochemistry and molecular biology that it will highlight and support. Thank you, from all of us, to the Wangs!

— Suzanne Pfeffer, ASBMB president

the efforts of a devoted chairman. In other cases, friends nominate one another for a variety of awards. Some scientists nominate themselves by preparing the packages and asking others to submit them on their behalf. This practice is actually more common than you might think and, in some cases, it is even recommended (1).

A number of demographic groups have not yet achieved a level of recognition commensurate with their presence in the halls of science. Anne Lincoln, Stephanie Pincus and Phoebe Leboy have noted (2) that "the proportion of women receiving service or teaching awards in

the past two decades is roughly equivalent to the proportion of women within the cohort-adjusted Ph.D. pool in that discipline, but only half of these have won scholarly awards." Using available data for 13 disciplinary societies, they found that the proportion of female prizewinners in 10 of them was much lower than the proportion of female full professors in the fields 1, 2). When lists of award recipients exclude any category of scientist, it can seem as if that category simply doesn't exist.

Award-selection committees must avoid conflict-of-interest issues — such as voting on their own nominees.

Come work with us!

Faculty Position in Biological Engineering Department of Biological Engineering

The MIT Department of Biological Engineering invites applications for a tenure-track faculty position at the assistant professor level, to begin July 2012 or thereafter. Applicants should hold a Ph.D. in a science or engineering discipline related to biological engineering. A more senior faculty appointment may be considered in special cases. The candidate should aspire to direct a leading research program that substantively fuses molecular/cellular bioscience with quantitative engineering analysis/synthesis/design approaches and should be capable of teaching in our biological engineering undergraduate and graduate core curricula. Faculty duties including teaching at the graduate and undergraduate levels along with research and supervision of student research.

We especially encourage individuals from underrepresented groups to apply because of MIT's strong commitment to diversity in engineering education, research, and practice.

Interested candidates should send application materials to the Biological Engineering Faculty Search Committee at: be-fac-search@mit.edu. Each application should include: a curriculum vitae, the names and addresses of three or more references, a strategic statement of research interests, and a statement of teaching interests specifically in the context of the Biological Engineering Department educational programs (<http://web.mit.edu/be/programs/>). We request that each candidate arrange for the reference letters to be sent directly to be-fac-search@mit.edu.

Questions may be directed to: Prof. Douglas Lauffenburger, Head, Department of Biological Engineering, MIT, 16-343, 77 Massachusetts Avenue, Cambridge, MA 02139-4307 or lauffen@mit.edu.

Application materials received by 15 November 2011 will be given priority.

MIT is an Equal Opportunity/Affirmative Action employer.

<http://web.mit.edu>

It is also important that they include a diverse group of members to address potential unconscious biases to which all of us can fall victim. The pool of female nominees for an award is usually quite small; the pool of minority scientists is even smaller.

Given that the FASEB Excellence in Science Award, which is expressly dedicated to honoring women scientists, receives as many as 50 nominations a year, one might have expected that some of those 50 women also would be nominated for other, gender-independent awards.

Unfortunately, many of us still think of women as nurturers and mentors rather than discoverers and thought leaders. The ASBMB is trying to correct this. With funding from the National Science Foundation, The Association for Women in Science is collaborating with seven U.S. science societies (including the ASBMB) and the RAISE Project (3) to raise the status of professional women through better recognition of their achievements. The ASBMB awards committee is actively soliciting nominations to diversify our nominee pool. You can help us by submitting nominations of talented folks who may not yet have been recognized.

What else can be done? Jim Wells of the University of California, San Francisco, suggests that we streamline the nomination process to make it easier for all of us to submit nominations. He also suggests that the ASBMB consider allowing self-nominations. If certain individuals write their own nominations anyway, why shouldn't everyone have this opportunity? Opening the nomination process has the potential to level the playing field, as long as those who have been under-represented take the initiative to promote themselves. Please let me know what you think of these suggestions, as the ASBMB council will be discussing them during its December meeting. And thank you to those of you who nominate candidates for recognition by the ASBMB. ∞∞∞



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

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1. P. Leboy (2008) *The Scientist* 22, 67
2. *Nature* 469, 472
3. www.raiseproject.org



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 is open now.*

See details at www.asbmb.org/meeting2012

Travel Award and Abstract Submission Deadline: Nov. 8



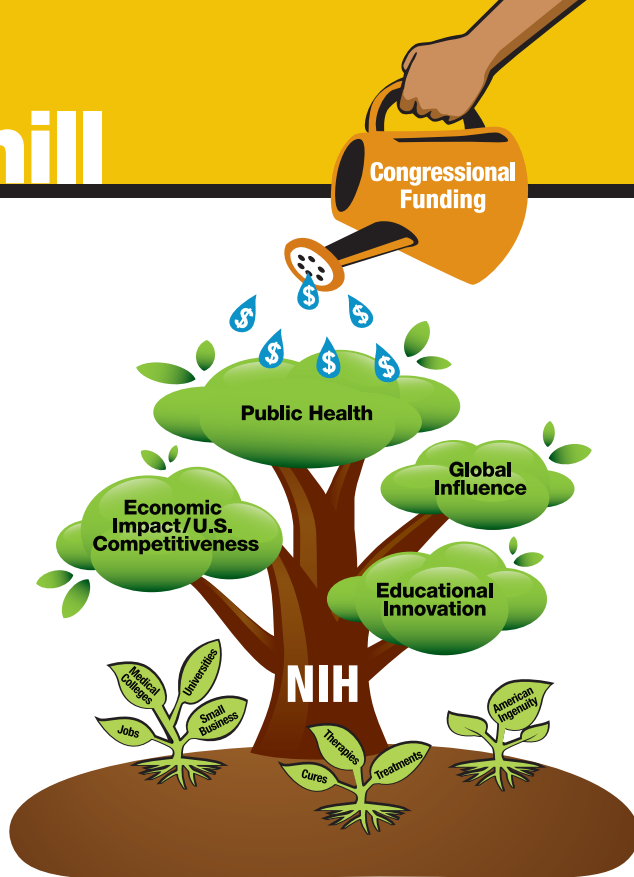
San Diego: a jewel for biomedical innovation

BY BENJAMIN CORB

The Public Affairs Advisory Committee often talks about how the work supported by the National Institutes of Health forms a tree that supports branches promoting small-business development, American innovation and job creation (see diagram). Crucially, the tree is watered by federal investment in biomedical research, and branches grow and expand only when congressional funding is both constant and plentiful. When ASBMB members descend upon San Diego for the Experimental Biology 2012 meeting, they will be visiting a living example of this illustration.

In the San Diego region, there are three major research institutions located within a mile of each other: the University of California, San Diego, the Scripps Research Institute and the Salk Institute for Biological Studies. Together, they receive about \$650 million annually from the NIH. With academic research flourishing, the biotechnology industry has quickly followed (see below), resulting in a staggering burst of innovation, investment opportunity and growth. Among the region's impressive statistics are the following:

- More than \$1.5 billion in venture capital investment in 169 biopharmaceutical firms since 1995
- Ten initial public offerings by biotech companies since 1998



- 33 publicly traded biotech companies with an aggregate market capitalization of nearly \$25 billion
- 31 firms with more than 100 employees
- 54 firms belonging to the national Biotechnology Industry Organization

While not every town associated with a biomedical research institute can boast as impressive a résumé as San Diego's, take a closer look around your own community and you probably will see some branches beginning to sprout. ☺☺☺



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



University of California, San Diego

UCSD is in many ways the grandfather of biomedical research in San Diego, having opened its doors in 1960. In the mid-1970s, UCSD professor Ivor Royston started Hybritech, the first biomedical research firm in the San Diego area and one of the first private spinoffs from academic research (something that is now commonplace). Hybritech became an overwhelming success through its development of prostate cancer diagnostic tests and became the model for private-university partnership in the biomedical field. Hybritech alone is responsible for 50 private spinoffs started by its own employees. ☺☺☺



ROSENBERG



STEITZ



STEITZ



SEIDMAN



GUENGERICH

Rosenberg wins genetics society's leadership award

Leon E. Rosenberg, an expert in inherited metabolic disorders in children, won the American Society of Human Genetics 2011 McKusick Leadership Award. "He and his colleagues discovered that children with a potentially lethal disorder of organic acid metabolism suffer from defective metabolism of vitamin B12. They then went on to demonstrate that supplements of B12 were remarkably beneficial clinically," the genetics society said in a statement announcing the award. "Furthermore, Rosenberg's work has also provided crucial insights into the basic mechanism by which proteins synthesized in the cytoplasm are transported into mitochondria. In this work, the X-linked disorder ornithine transcarbamylase deficiency was critical." Rosenberg is a professor at the department of molecular biology and at the Woodrow Wilson School of Public and International Affairs at Princeton University. He is studying the recent history of the medical research enterprise. He is examining the role of the key players — government, academia, industry, foundations, independent institutes and voluntary health agencies — and the policy issues that face them. He also is interested in the role of the physician-scientist in the medical research community. Rosenberg serves as an adjunct professor of genetics at Yale University School of Medicine, where he spent more than two decades as a researcher, teacher and administrator. Rosenberg is a member of the National Academy of Sciences and a fellow of the

American Academy of Arts and Sciences, the American Association for the Advancement of Science and the Institute of Medicine. In the 1990s, Rosenberg was the chief scientific officer at Bristol-Myers Squibb Co. and the president of the Bristol-Myers Squibb Pharmaceutical Research Institute. ∞∞∞

Thomas Steitz honored with fellowship from Royal Society

Thomas A. Steitz, Sterling professor of molecular biophysics and biochemistry and professor of chemistry at Yale University and a Howard Hughes Medical Institute investigator, was one of eight foreign scientists named as fellows of the Royal Society, the United Kingdom's national academy of science. The honor recognizes exceptional contributions to science. Steitz, the co-winner of the 2009 Nobel Prize in chemistry, was selected for his contributions to establishing the structures and mechanisms of the proteins and nucleic acids involved in gene expression, replication and recombination. Steitz and his colleagues at Yale determined the atomic structure of the 50S ribosomal subunit as well as the complexes the subunit forms with substrate, intermediate and product analogues. The researchers also have looked at complexes of the 50S ribosomal subunit with more than a dozen antibiotics. From those analyses, Steitz's laboratory found that the ribosome is a ribozyme, understood the mechanism of peptide bond formation and demonstrated how

several types of antibiotics function. The work has led to the creation of new antibiotics now in clinical trials. Future research directions for the Steitz research group include establishing the atomic structures of the ribosome captured in the act of protein synthesis in each of its conformational states with various factors as well as interacting with the proteins involved in protein secretion. ∞∞∞

Joan Steitz wins cancer research achievement award

Joan A. Steitz, Sterling professor of molecular biophysics and biochemistry at Yale University and a Howard Hughes Medical Institute investigator, won the Robert J. and Claire Pasarow Foundation's 2011 Annual Medical Research Award for Extraordinary Achievement in Cancer Research. The award is presented to increase public awareness of vital areas of investigation. Steitz is well known for the discovery and understanding of the function of small nuclear ribonucleoproteins (snRNPs, pronounced "snurps"). snRNPs occur only in vertebrate cells and don't have any genetic coding functions. Instead, they play a critical role in splicing pre-messenger RNA in the nucleus. snRNPs cut out introns from pre-mRNA and splice together the resulting segments to produce mature messenger RNA. Several aspects of Steitz's research have implications for cancer research. Her laboratory has been interested in the role of viral noncoding RNAs in instigating various cancer types, such as Kaposi sarcoma. Steitz's

work on snRNPs also may provide novel insights into the diagnosis and treatment of lupus, an autoimmune disease that develops when patients make antibodies against their own DNA, snRNPs or ribosomes. XXXX

Seidman wins prize in cardiovascular science from Ohio State

Christine E. Seidman, professor of genetics and medicine at Harvard Medical School and Howard Hughes Medical Institute investigator, was awarded the Jay and Jeanie Schottenstein prize in cardiovascular science from Ohio State University. This prize is awarded biennially to an international leader in the clinical sciences of cardiovascular medicine, cardiothoracic surgery or the basic sciences of molecular or cellular cardiology. Seidman, who is also the director of the Cardiovascular Genetics Center at Brigham and Women's Hospital, received the award for her research on gene mutations that cause heart disease. The main focus of her work is on cardiovascular conditions such as cardiomyopathy, heart failure and congenital heart malformations using molecular biology tools such as high-throughput nucleic-acid sequencing methodologies. Her laboratory also produces model organisms that carry human mutations and uses these models to determine how responses to gene mutations perturb or influence myocardial structure and specialized heart functions. In 2009, Seidman and colleagues published a paper in *Nature Genetics* that

Yale's Horwich wins Lasker award, one of science's top honors

Arthur L. Horwich, Sterling professor of genetics and professor of pediatrics at the Yale School of Medicine, was named co-winner of the prestigious 2011 Albert Lasker Basic Medical Research Award for discovering the class of cellular machines that controls the folding of newly manufactured proteins into their biologically active structures. Along with his co-winner, Franz-Ulrich Hartl of the Max Planck



Institute of Biochemistry in Germany, Horwich determined that these machines, dubbed "chaperonins" because of their assisting role, capture non-native proteins in an open ring via exposed hydrophobic surfaces and then release them into an encapsulated hydrophilic chamber, where they can fold in isolation without the possibility of aggregation. This work began in 1987, when members from Horwich's laboratory accidentally came across a protein-folding function in mitochondria during a genetic screen in yeast. The work has clinical implications in a set of human neurodegenerative disorders, such as Lou Gehrig's and Alzheimer's diseases, in which misfolded proteins form insoluble clumps in cells. XXXX

explored the genetic basis for blue baby syndrome, in which babies are born with malformed hearts that are unable to properly oxygenate blood. XXXX

Guengerich's work in toxicology, cancer honored with prize

F. Peter Guengerich, the interim chairman of Vanderbilt University's biochemistry department and an associate editor for the *Journal of Biological Chemistry*, last month won the American Chemical Society Division of Chemical Toxicology Founders' Award. The prize acknowledged his many contributions to chemical toxicology. "This means a lot to me in that I have worked in this area since I was a postdoc," Guengerich said in a statement. "I am grateful that I have had so many opportunities to contribute — and so much just plain fun doing the research

and training others." Guengerich has spent the past three decades pursuing a better understanding of how P450 enzymes metabolize drugs and carcinogens and how carcinogens interact with DNA to form adducts and how adducts produce genetic mutations. Guengerich's laboratory uses a number of methodologies to understand the catalytic functions of human P450 enzymes, such as site-directed and random mutagenesis, kinetic analysis and substrate-activity relationships. The laboratory also is pursuing the identification of reactions catalyzed by "orphan" human and bacterial P450s whose functions have not yet been characterized. Guengerich, one of the most highly cited researchers worldwide in the areas of biochemistry and pharmacology, has been a faculty member at Vanderbilt since 1975 and has served as director of the Center in Molecular Toxicology there since 1981. XXXX

Grants aim to enhance STEM education in middle and high schools

BY REGINA STEVENS-TRUSS

RATIONALE

As we all know, we are experiencing a national crisis in education — and science education specifically. Student interest in science, technology, engineering and mathematics has declined steadily since the mid-1960s (1). In addition, persistence in the STEM fields also has been on the decline, with minority groups experiencing a higher percent of STEM field attrition; about 50 percent drop out or change majors (2). As a nation, we are watching our competitive edge in science, engineering and technology slip away to other developed countries and to some developing countries (3). How are we as a nation to compete if the next generation is behind? As a scientific community, it is our duty to strap on our boots and to get on the ground to make sure the future of our country is secure.

One initiative pioneered by the American Society for Biochemistry and Molecular Biology, with some support from the National Science Foundation, is called Hands-on Opportunities to Promote Engagement in Science (HOPES). Led by the society's Minority Affairs and Education and Professional Development committees, the initiative began with a workshop at the annual meeting in April in Washington, D.C. There, middle- and high-school teachers were brought together with research scientists from the D.C. area to promote partnerships and to give educators seeking ways to enhance their teaching by incorporating hands-on classroom activities the opportunity to meet and connect with partners in this endeavor.

THE WORKSHOP

On the morning of April 9, workshop participants spent three hours hearing about partnership models, taking part in hands-on activities and networking with potential partners. The workshop had three goals. First, it aimed to remove one of the barriers — not knowing one another — that prevents collaboration between teachers and scientists. Second, it aimed to give participants examples of successful

partnerships as potential models for collaborative efforts. And, third, it offered NSF funds, in the form of seed grants, for 10 teachers to encourage and support the development of partnerships and classroom activities.

THE PROPOSAL EVALUATION PROCESS

More than 50 applications from teachers and scientists from across the country were received. A panel of four reviewers, two from the MAC and two from the EPD, reviewed and ranked the applications. Impact was judged based on the project rationale, the actual inquiry-based activity plan, feasibility and sustainability, and the direct effects on students. In addition, the project description, strength of the partnership and letters of support were evaluated. The final criterion used was the plan for assessment of the project. A long-term goal of our initiative is to encourage continued partnerships with scientists and teachers across the country. The dissemination of these projects could provide ideas, making assessments very valuable.

THE AWARDEES

The 10 recipients of \$2,000 seed grants and their partners are listed below:

Sandra Adams of Montclair State University (Montclair, N.J.) in partnership with **Ronald Durso** of Fair Lawn High School (Fair Lawn, N.J.). Durso is the K–8 technology supervisor and 9–12 science supervisor at Fair Lawn. The project, titled “Integrating molecular biology research techniques into the high school science class-



Adams



Durso



Bisogno



Shimizu

room,” will engage more than 150 students in grades nine through 12 annually in basic molecular biology methods while they participate in inquiry-based, hypothesis-driven activities.

Mary Jo Koroли of the University of Florida Center for Precollegiate Education and Training (Gainesville, Fla.) with biology teacher **Janet Bisogno** of Celebration High School (Celebration, Fla). The project, titled “Teach tech: increasing the use of biotechnology in high school science classrooms,” will help purchase equipment for the school’s biology students and support basic hands-on experiments. Bisogno’s colleague **Dominique Shimizu** will assist with professional development activities.

John T. Tanacredi of Dowling College (Oakdale, N.Y.) in partnership with science research teacher **Maria Brown** of Sayville High School (West Sayville, N.Y). The project, titled “Molecular ecology of the Atlantic horseshoe crab (*L. polyphemus*) as a mechanism to enhance inquiry-based STEM education at Sayville middle and high schools and beyond,” will expose about 100 middle- and high-school students and up to 10 minority undergraduate students seeking teacher certification at Dowling College to ecological studies of the increasingly endangered species.

Alvaro Estevez of the University of Central Florida (Orlando) in partnership with chemistry teacher **Marisa Fuse** of Bishop Moore Catholic High School (Orlando). The project, titled “The biochemistry of bacteria,” will teach about 100 sophomores and juniors about the diversity of bacteria and allow them to investigate biochemical reactions experimentally. Students will analyze how certain compounds are biologically transformed.

Michele Bahr of Woods Hole Marine Biological Laboratories (Woods Hole, Mass.) in partnership with **Whitney Hagins** from Lexington High School (Lexington, Mass.). Hagins, a veteran educator, has headed Lexington’s science department for the past four years. The project, titled “Wolbachia and students: Discover the scientist

within,” will give about 70 10th-graders molecular biology laboratory experience and focus on the symbiotic relationship between the bacterium *Wolbachia pipientis* and the 20 percent of insects that it inhabits. One future, postproject plan is to have the students talk via Skype with students at the Wettingen School in Switzerland about their joint *Wolbachia* studies.

Patricia Halpin of the University of New Hampshire at Manchester in partnership with fourth-grade teacher **Heather Cantagallo** of Sunapee Central Elementary School (Sunapee, N.H.). The entire fourth grade (about 36 students in 2011) will take part in the project, titled “Getting fourth-graders excited about the cardiovascular system.” Students will learn about the importance of exercise in their daily lives and be asked to devise hypotheses and methods to test them. Blood pressure and heartrate monitors will be purchased, and students will collect data and plot their results, which will facilitate discussion and allow students to draw conclusions about their results. The monitors will be used annually.

J. David Holtzclaw of Transduction Technologies (Omaha, Neb.) in partnership with **Kristin Swanson** of Norris Middle School (Omaha, Neb.), **Shelly Avery** of Santee Community Schools (Santee Indian Reservation, Niobrara, Neb.) and **Carol Moravec** of Lincoln Southeast High School (Lincoln, Neb.). Holtzclaw will continue work he began as an academic research scientist in collaboration with his three partner schools. The funds for the project, titled “Inquiry-based learning of K–12 physiology and nutrition concepts using pedometers,” will pay for pedometers, teaching stethoscopes and aneroid Sphygmomanometers with nylon blood-pressure cuffs. More than 100 students annually will conduct grade-appropriate studies by developing hypotheses, designing experimental approaches, collecting and analyzing data, validating results and learning to defend conclusions based on analysis of results.



Estevez



Fuse



Hagins



Halpin



Holtzclaw



Moravec

Monroe Duboise of the University of Southern Maine (Portland, Maine) in partnership with biotechnology teacher **David Nordstrom** of the Foster Technology Center located at Mount Blue High School (Farmington, Maine). The center houses the only high-school biotechnology program in the state, draws students from five rural high schools and engages students in extended laboratory-based research projects. The collaborative project, titled “Bacteriophage discovery and molecular characterization in a high school biotechnology program,” involves isolation, discovery and characterization of bacteriophages in the environment and will teach students about the importance of maintaining lab notebooks. Projects will culminate in student-created research posters or reports at a symposium.

Dorothy Belle Poli of Roanoke College (Salem, Va.) in partnership with **Amy Chattin** and **Ashly Dowdy** of Franklin County High School (Rocky Mount, Va.). Poli will engage the high-school students in research on the respiration and photosynthesis of bryophytes (mosses, liverworts and hornworts). Students will be introduced to the use of volumeters/respirometers and to techniques such as electrophoresis and protein concentration determination. Then students will be asked to hypothesize additional experiments. The project, titled “Bryological respiration and photosynthetic comparisons: a case to connect Virginia high-school students to active research,” will serve 30 students of various grades who are not enrolled in advanced-placement courses but who are likely to attend college.

Michael Wyss of The University of Alabama at Birmingham in partnership with **Mary Williams** and **Trudy Loop** of The Altamont School (Birmingham, Ala.). The Altamont School serves students in grades five through 12 who have excelled in science and recently have exhibited a heightened interest in neuroscience. Altamont science teachers actively nurture this curiosity by offering inquiry-based science classes and supporting science-fair interests. In addition, during the 2010–2011 school year, Altamont observed its first



Duboise



Nordstrom



Poli



Chattin



Dowdy



Wyss



Williams



Loop

Brain Awareness Week and participated in the first Brain Bee in Alabama, thanks in part to a partnership with the UAB Science and Technology Honors Program. The project, titled “Exciting students about neuroscience: The Altamont School-University of Alabama at Birmingham outreach partnership,” will extend the Altamont-UAB collaboration by supporting hands-on activities centered on neuroscience research.

The selection committee commends the successful applicants and would like to encourage all others to continue with collaborative plans. Each grant recipient will submit a report at the end of the upcoming academic year. The workshop will be replicated during the annual meetings in San Diego in April and in Boston in 2013. Funding to support the teacher-scientist collaboration also is being sought. XXXX



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Retrospective: Chris Raetz (1946 – 2011)

BY WILLIAM T. WICKNER

With Chris Raetz's passing, the scientific world lost a polymath, and I lost my oldest friend.

We met as freshmen at Yale University, two very nerdy chemistry majors yearning to excel and to get a date. Chris took notes for me on one occasion when I left campus early on a Friday for the latter purpose; his notes were elegant and clear except for the derivation of the Grabowski Equation of Thermodynamics.

Chris admitted he hadn't quite understood it either, so I asked the professor in Monday's class. The professor looked puzzled and then amused, realizing how thoroughly Chris had bamboozled me about an imaginary equation. We became fast friends.

When we realized we were to enter the same medical school, we decided to room together. In early September, I drove a rental van to New Haven, Conn., threw in his stuff on top of mine and walked his mother's hound while she made lunch for us. Chris confessed that he'd met "the one," the girl of his dreams, having talked to her on the deck of a boat returning from Europe while she threw up over the rail during a storm. Madeline was entering Brandeis, and in ensuing years we double dated and went hiking and camping in the White Mountains and later in the Sierras (see photo).

Chris' parents were chemists, and his knowledge and feeling for chemistry was profound. At Harvard University, we were both drawn to Eugene Kennedy's lab and the enterprise of actually purifying the enzymes of lipid metabolism. Postdocs Bill Dowhan and Carlos Hirschberg joined in morning forays for coffee and greasy donuts and shared the passion. After receiving M.D. and Ph.D. degrees and completing an internship year at the Brigham, Chris began his independent studies as a yellow beret in the Public Health Service at the National



Institutes of Health and then continued at the University of Wisconsin at Madison, where he met Joanne Stubbe.

Chris possessed an extraordinary breadth of knowledge, from medicine and pharmacology to biochemistry and genetics and on to organic chemistry. His work integrated each of these approaches to lipid metabolism.

In one seminal, elegant experiment,

Chris simply pulse-labeled *E. coli* with ^{32}P , then extracted lipids and ran a two-dimensional TLC. After a brief exposure to film, three prominent spots appeared, corresponding to phosphatidylethanolamine, phosphatidylglycerol and diphosphatidylglycerol. However, successively longer exposures revealed a galaxy of minor spots, which Chris identified through meticulous chemistry as the intermediates in Lipid A synthesis.

Chris identified the pathway, discovered the gene for each enzyme in the pathway, and purified and crystallized the proteins all the while seeking ligands with pharmacological potential. All this work, begun at Madison, was miraculously nurtured while at Merck and sprung into full blossom when Chris returned to academia at Duke University.

Our lives have been lived in parallel. We each have two daughters, and we each have one daughter who has become a physician. We both settled in countryside retreat homes. And we each, in our own way, spent our lives trying to emulate Eugene Kennedy. Chris came far closer. ∞∞∞



William T. Wickner (William.T.Wickner@Dartmouth.edu) is a professor at Dartmouth Medical School.

Mounting a campaign for a cure

BY ANGELA HOPP

When Deb Johnson called the Journal of Biological Chemistry offices in August 2010, she had a unique request: She needed a few copies of the journal that she could tear up and turn into art.

Although we get occasional requests for copies of the journal for research and teaching purposes, this was the first time I'd ever heard of anyone asking for copies to destroy. But, by just a few minutes into the conversation with Johnson, I sensed that she was a firm believer in the potential of research and that her project had merit. Our fulfillment office made it happen for her.

Nearly a year passed, and I didn't hear from Johnson. To be honest, part of me was a little nervous about what might have become of those journals. But any worry I might have had about the artist's style or tastes was vanquished this summer when Johnson unveiled her work.

The partner

For Marjorie Ebenezer, it all started with a small white patch on the right side of her tongue. It was 2005, and the lifelong public health worker promptly headed to an ear, nose and throat specialist. In its first manifestation, so said the pathology report, the lesion was benign. The specialist removed it, and Ebenezer went on with her life.

Two years later, in June 2007, the spot showed up again. This time, though tiny, it was found to be cancerous, officially invasive squamous cell carcinoma, and Ebenezer had it removed again. "I asked the surgeon about chemotherapy and radiation, but he said I was cured and did not need any further treatment," Ebenezer recalls. "The treatment for my tumor size was only surgery, and he did not order any further tests."

Ebenezer dutifully kept her follow-up appointments, and everything checked out, so she started making plans to retire early and move from Pennsylvania to Ohio, where she would be near her young grandchildren. That September, she made one last visit to her local ENT specialist, who gave her the clear but recommended a checkup in six months once she had relocated.

In March 2008, when Ebenezer was settling into life in Columbus, she noticed the lymph node on the right side of



Amid the patchwork of phrases and beneath the bronze glaze of Deb Johnson's mask, there is a quote that has been attributed to Hippocrates: "The forms of diseases are many and the healing of them is manifold." PHOTO COURTESY OF JOAN'S FUND

her neck was enlarged. Her new primary care physician, aware of Ebenezer's medical history, ordered a CT scan and a needle biopsy, which confirmed that the cancer had spread.

The impetus

Johnson was one of 26 artists in central Ohio who spent many months transforming head-and-neck cancer patients' used radiation masks into beautiful things. Fifteen artists from Studios on High Gallery, where Johnson's work is exhibited, participated.

Commissioned by the Joan Levy Bisesi Foundation for Head and Neck Oncology Research, more commonly known as Joan's Foundation, the artists' works of art will be auctioned off in October at a gala being held in Columbus in conjunction with a research retreat for The Ohio State University Comprehensive Cancer Center — Arthur G. James Cancer Hospital, otherwise known as the OSUCCC-James.

Today, the shredded JBC pages lay bonded, overlapped and

glossed — deconstructed and reconstructed in a meaningful way. Johnson titled the piece “Ascension: From Research to Treatment to Cure.”

“My goal was to create something with presence,” Johnson explains, “something that illustrated the significance of this disease and the research to help those affected. If the viewer’s eyes ascend from base to mask, the message is of research leading to treatments and at last, finally, a cure.”

The term “head and neck cancer” is used to describe various carcinomas in the nasal cavity, sinuses, mouth, throat or larynx. Most such cancers emerge first in the squamous cells that line mucosal surfaces. The National Cancer Institute estimates that head and neck cancers account for about 3 percent to 5 percent of all cancers in the United States.

For a long time, the disease was seen primarily in men and older patients, and common risk factors were thought to be smoking, chewing tobacco, drinking and exposure to certain environmental elements. Today, more attention is being paid to the occurrence of head and neck cancer among women, particularly younger women, and the role human papillomavirus might play is being explored.

The medium

Johnson, the artist, says there’s something a smidge unnerving about using a radiation mask as the foundation for art, because its original purpose is anything but pretty. Radiation therapy has to be done with precision so that only cancer cells are destroyed and healthy tissues are left unaffected. Each radiation mask is specially fitted to a patient. During the procedure, the patient puts on the mask, which is then screwed into the table, leaving

no wiggle room and little room for technician error.

“It’s so sad and scary,” Johnson says. “You lie on your back, encapsulated, and your head is literally screwed to the table.”

Even though the masks serve their immobilizing function well, it’s no surprise that patients are happy to be done

with them once their treatment regimens are completed. Some people even get creative when it comes to disposing of them.

“Some of these survivors talk about taking these masks and running them over with their cars,” Johnson says.

Using such an object as a medium was new for Johnson, who works mostly with textiles, and for most of her gallery colleagues, who are primarily painters and ceramicists, but Johnson says it gave them license to explore.

“There’s some kind of twisted, nice irony about having this torture device made into something beautiful and then having money raised to help fund this research.”

The survivor

While there were few guidelines to follow when it came to the planning and execution of the masks, the artists involved were paired with head-and-neck cancer survivors.

Johnson and Ebenezer were matched and had a lengthy visit, during which Ebenezer shared the details of her story. Ebenezer explained to Johnson that she was treated at the OSUCCC-James and that her daughter, who lives down the street and is herself a cancer survivor, dutifully chauffeured her to each treatment.

“My daughter was 25 years old when she was diagnosed in March 1996 with acute promyelocytic leukemia,” Ebenezer says. “She received her treatment (at the OSUCCC-James) . . . By God’s grace, she is doing well and has three beautiful girls ages 12, 8 and 6 years old.”

While illness and radiation therapy took a toll on the elder Ebenezer’s body and her relationships, today she is free of cancer and serves as a general practice physician at a free clinic run by her Lutheran church in the Columbus area.

“I am happy to help with the gifts that God has given me and to help those in need,” she says.

The namesake

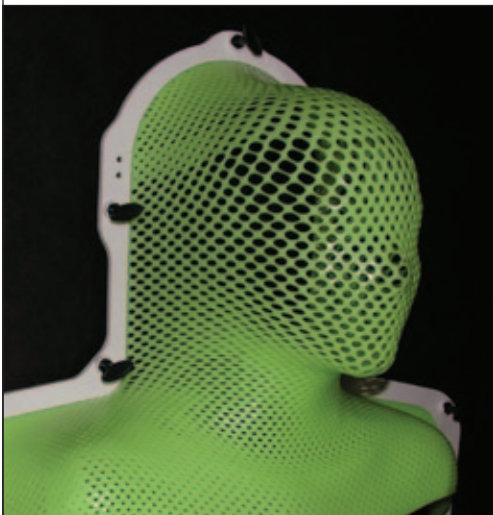
While Ebenezer’s experience heavily influenced Johnson’s vision for the mask, the artist already knew all too well what head and neck cancer could do to a person.

Joan’s Foundation, the organizer of the mask project, is named after Joan Levy Bisesi, Johnson’s distant cousin. In 1996, when Bisesi was just 29, doctors discovered that a tumor in her mouth was cancerous. Bisesi immediately underwent surgery and therapy to battle back the cancer with all her might. But on the eve of her fifth cancer-free year, in 2000, it returned, spurring another round of treatments.

As her treatment neared completion, Bisesi also discovered that she was pregnant. Although her health had taken a beating, she and her husband embraced the possibilities that lay



Textile artist Deb Johnson.



Each radiation mask is molded to fit a patient's face precisely. Plastic screws around the edges fasten to a table, immobilizing the head and neck for targeted radiation therapy.

PHOTO COURTESY OF JOAN'S FUND



Artist Deb Johnson, left, was paired with cancer survivor Marjorie Ebenezer so that she could learn about what it was like to undergo radiation therapy and then use that knowledge to inform her work.



Joan Levy Bisesi

ahead, and they prepared for the arrival of their daughter, whom they already had named Mira.

Meanwhile, Bisesi and her husband also set up Joan's Fund, an endowment fund to support head and neck cancer research at the OSUCCC-James. In an email soliciting donations from friends, she wrote in part, "I love flowers and cards, but I would rather be cured and be able to see

the flowers at Mira's wedding than to see them now."

As Bisesi marched onward, the disease that already had taken so much out of her refused to retreat. It returned for a third and final time, spreading to her brain and forcing doctors to take the baby a month early to give Bisesi another shot at surgery that, tragically, couldn't save her anyway. She died in 2001 when Mira was just 10 weeks old.

The show

In May, the re-envisioned radiation masks made their public debut at Studios on High Gallery. The opening marked the first of several shows across the region.

The exhibit is known as "Courage Unmasked," and it is an extension of the campaign by the same name that was founded by Bethesda, Md., resident Cookie Kerxton, who is also an artist and head and neck cancer survivor.

Kerxton conceived of the "Courage Unmasked" concept while undergoing radiation therapy and enlisted more than 100 artists to participate in the first event. The masks were displayed in September 2009 at American University in Washington, D.C.

Melinda Fenholt Cogley, executive director of Joan's Foundation, the fundraising arm for Joan's Fund, says the artists who participated in the Ohio project have expressed "a profound sense of responsibility" while creating the masks.

"They gave us an exhibit that's beautiful, emotional and informative, and I just love watching people as they take in each story and realize what each mask means," Cogley says. "Recently one person told me that we gave cancer a face that's approachable, which was wonderful to hear."

The small JBC contribution

I don't feign to know a lot about art, and my scientific education has been informal and remains nascent. But I do sense that the act of discovery is often as rough around the edges as the paper fragments that constitute "Ascension," Johnson's mask, and I feel honored to have supported the Joan's Foundations' mission, if only by facilitating a shipment of JBC back issues to Ohio. ∞∞∞



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Fostering diversity in science and public science literacy

The Young Scientist Program at Washington University in St. Louis has a history of changing lives through inspiration and scientific discovery

BY KATHERINE B. CHIAPPINELLI

Bart Bartlett was a junior in 1995 at Metro Academic and Classical High School in St. Louis when his science teacher put him in touch with an M.D./Ph.D. student at Washington University in St. Louis who was interested in bringing high-school students into his thesis laboratory.

The graduate student, James McCarter, was one of the founders of the Young Scientist Program, which brings scientific laboratory experiences directly to underprivileged middle- and high-school students and their teachers. Bartlett was in one of the first cohorts.

While Bartlett had taken science courses, this was his first exposure to research in a laboratory. Over the course of the summer, Bartlett performed an independent research project doing genetic analysis in the model organism *C. elegans*, a small worm. Bartlett says the most important part of the experience was working in the lab as part of a team.

“I learned by experience how the scientific method works to do cutting-edge research,” he says. “Knowing that scientists work together and have a lot of fun doing it reinforced a career in science.”

The experience changed his life. Bartlett went on to study chemistry in college, earn a Ph.D., do postdoctoral research and become an assistant professor at the University of Michigan. He credits much of this success to YSP and is currently initiating a similar one at his institution.

An obvious need

Few would argue that scientific discovery and progress benefit from the diverse perspectives of individuals in the field. Yet, while underrepresented minorities make up 29 percent of the U.S. population, they make up only 5 percent of full professors with science and engineering doctorates, according to the National Science Foundation’s 2011 report on Women, Minorities and Persons with Disabilities in Science and Engineering. While women made up 5 percent of

this group in 1979, that figure had increased to more than 20 percent in 2008. Meanwhile, underrepresented minorities made far fewer gains, with their numbers growing from about 2.5 percent in 1979 to 5 percent in 2008.

With these disparities in mind, the Young Scientist Program seeks to expose underrepresented minority students and those from disadvantaged backgrounds to experimental



Bart Bartlett is an assistant professor of chemistry at the University of Michigan. When Bartlett was in high school in St. Louis, he was one of the first participants in the Young Scientist Program. Today he is initiating a similar program at his institution.



Lesley Rankin scrapes off a colony of cells from a petri dish in the lab of Justin Fay, an associate professor of genetics at Washington University in St. Louis, while Devjane Swain Lenz, a Ph.D. student in molecular genetics and genomics, assists. Rankin was a 2008 participant in the Summer Focus program and continued to volunteer in the lab after finishing the program.

science and thus encourage science literacy and the pursuit of careers in science.

“YSP is unique in the United States, as the program is primarily run by volunteers, comprised of Ph.D. and M.D. students and postdoctoral fellows,” says Thomas Woolsey, the program’s faculty adviser.

Each year, YSP works in partnership with St. Louis public schools to engage more than 1,000 high-school students and teachers through a broad repertoire of programs. Over 20 years, about 500 volunteers have worked with more than 7,000 students. YSP was honored for its contributions to the St. Louis community when it received the 2011 Science Educator Award from the Academy of Science of St. Louis.

With the support of the university and community members, YSP continues to have a major impact by attracting

students from diverse backgrounds to pursue careers in science. In turn, YSP volunteers benefit from these programs, gaining a variety of skills and experiences not formally taught during graduate and post-graduate training.

Bartlett, who serves as a research adviser for graduate students, says he sees “the profound impact that instructing younger students, including high school students, has on their ability to communicate science.”

Summer Focus

YSP uses several unique initiatives to augment middle- and high-school science curricula and attract young people to scientific careers. One of them is the Summer Focus program, in which students from local high schools conduct independent research at Washington University for eight weeks.

Each student summarizes his or her discoveries in a formal research paper and presents his or her findings at a symposium at the summer’s end. He or she participates in a scientific writing course, attends career presentations by professional scientists, takes part in a journal club and is coached in making presentations.

Each student has both a laboratory mentor, who guides the student through an independent research project, and a tutor, who helps reinforce basic biological concepts. Bartlett says he remembers meeting with his tutor to build on what he had learned in freshman biology so that he could understand the genetics research he was doing in the lab.

“Learning a few functional lab skills to get going right away while also filling in the background information as the summer progresses is a pivotal aspect of keeping students productive and encouraged,” he says. “Focus too heavily on skills, and we become mere

technicians. Focus too much on background, and we’d be too overwhelmed to get anything accomplished. YSP has found the right balance.”

So far, more than 230 high-school students have participated in the Summer Focus program. Most have attended college, and many have majored in science, often with scholarship support, and have gone on to pursue advanced degrees in science and medicine.

Lesley Rankin, a 2008 Summer Focus student who attended Gateway High School, says she obtained laboratory, writing, reading and career skills from the experience.

“All of the sessions and lab research incorporated into the entire summer were the building blocks for my decision to continue a career in science,” she says. Rankin explains that before participating, she was deciding between a career in music or

science, and the program helped her decide on science.

Bartlett adds, “Kids who love science are viewed as nerds, and Summer Focus shows that nerds who work really hard get degrees and ultimately get very good jobs. I don’t think I even appreciated that as much at the time, but given today’s economy, it’s big.”

Teaching Teams

During the school year, teams of YSP volunteers develop and lead inquiry-based, hands-on science modules to increase science literacy in nine different fields: anatomy, chemistry, ecology, evolution, forensics, genetics and genomics, microbiology, neuroscience, and physics. The volunteers present interactive activities in classrooms, after-school programs and community organizations.

One such example is a genetics demonstration of DNA extraction in which students use household items, including shampoo, rubbing alcohol, salt and cheesecloth, to isolate DNA from fruit. The students are excited to find that DNA, the “blueprint” they have read about in textbooks, is a tangible substance that they can purify from living things.

St. Louis-area teaching team visits have expanded from 15 per year in 2001 (reaching about 350 students) to more than 60 per year in 2011 (reaching more than 1,000 students).

Rankin was first exposed to the Young Scientist Program at a genetics teaching team demo at her high school.

“The team leaders kept us engaged by asking many constructive questions related to the material,” she recalls. “The teaching teams allowed me to critically think through the logistics of any experiment.” The experience prompted her to apply for the Summer Focus program, in which she performed an independent research project on hybrid sterility in yeast.

Rankin is now a junior at Webster University majoring in biology with an emphasis on biotechnology. She plans to obtain a Ph.D. and start her own biotechnology company.

In addition to working with local schools, YSP volunteers bring teaching team demos to national scientific meetings to interact with fellow graduate students and engage high-school students in other areas of the country. The effectiveness of such activities in achieving scientific-concept learning is



Abby Buchwalter (second from left), then a Ph.D. student in cell biology and physiology, works with students at Vashon High School on an experiment about reduction-oxidation reactions. The students used heat and the sulfur in hardboiled eggs to tarnish pieces of silver and copper and then used hot water, baking soda and aluminum foil to remove the tarnish. The Vashon students visited the Washington University School of Medicine for Women in Science Day, sponsored by the Young Scientist Program and the Association for Women in Science.



Students at Central Visual and Performing Arts High School participate in an exercise in natural selection during a visit to the Washington University School of Medicine. The students used forks, chopsticks and spoons to pick up different sizes of beans to simulate trait variation and differential survival within a population of birds. Students competed against one another for food over multiple rounds (generations) and observed how natural selection can alter the frequency of different traits over time within a population. The activities were organized by the Young Scientist Program’s evolution/genetics/genomics teaching team.



Jennifer Lynch Yttri (center), a Ph.D. student in immunology, instructs Summer Focus participants Paris Guerin (left) and Cherise Gilmore in the proper use of a pipette. Guerin and Gilmore were participating in the Research Boot Camp, a two-day course in lab techniques and safety that Summer Focus students must complete before beginning work in their research labs.

evaluated using pre- and post-surveys of participating students.

The Teaching Teams initiative also gives high school students a chance to interact with experts in scientific fields who are young, bright, engaging and enthusiastic about science.

Lowenstein teaching kits

In 2010, thanks to financial support from the Leon Lowenstein Foundation, teaching kits were developed to expand YSP's reach. The stand-alone kits, some based on teaching team demos, can be checked out freely by St. Louis teachers.

Each kit focuses on a specific topic. It contains protocols, supplies and equipment for classes to perform experiments; an instructional video with background material on the topic; handouts and teaching points; and materials for evaluation and assessment of what was learned.

To date, teaching kits for DNA extraction

YSP components

Summer Focus: The initiative promotes science literacy and attracts underrepresented students and those with limited school resources into scientific careers through hands-on research and one-on-one interactions with scientists. Rising high-school seniors perform independent research and develop skills in critical thinking, practice scientific writing, evaluate research articles and conduct peer review. Students receive stipends for their work.

Teacher-Researcher Partnership: The initiative provides teachers with laboratory experience and researchers with classroom teaching experience. St. Louis teachers perform eight-week independent summer research projects with volunteers in a Washington University laboratory. The teacher-researcher pairs develop science activities to bring their research into classrooms. Volunteers continue to work with teachers during the school year to develop science curricula and also work with students. Several teachers who have participated subsequently pursued advanced degrees in science or education.

Teaching Teams: The initiative brings interactive scientific demonstrations into classrooms. Current teams focus on anatomy, chemistry, ecology, evolution, forensics, genetics and genomics, microbiology, neuroscience and physics. Stand-alone teaching kits are being developed to provide teachers with more classroom tools and reach the community more broadly through nonschool-related activities. Additionally, middle- and high-school students may take fieldtrips to Washington University School of Medicine to participate in demos and take tours of the Genome Center and anatomy laboratory.

Laboratory Equipment Recycling: The initiative provides lab

materials and equipment to St. Louis Public School teachers to incorporate hands-on science teaching as part of their curriculum.

Science Educator Colloquium: These short courses and seminars are available to YSP volunteers and are aimed at enhancing their mentoring, tutoring and teaching skills. The sessions also provide perspective on the profession of and challenges faced in science education.

Community Partnerships: YSP cooperates with both local and national organizations. These partnerships include a series of lectures for students and their families on medical topics, teaching at the St. Louis Science Center, projects with other universities in St. Louis, and presentations and demonstrations at national conferences. YSP also partners with St. Louis organizations UrbanFUTURE and the Youth Learning Center to expose middle-school students to laboratory science. YSP holds a special series of events for the annual Women in Science Day at Washington University in St. Louis.

Family Science Experience: This science camp for middle-school students and their families was started in July. Volunteers guide students through inquiry-based, hands-on activities for two days. Family members of students attend the evening of the second day, learning with and from the students. In the future, this will become a monthly science experience and dinner at which students and their families explore science together while learning basic science concepts in a fun, interactive atmosphere.

To learn more about the Young Scientist Program, please visit <http://ysp.wustl.edu/>.

Knowledge before and after neuroscience Teaching Team outings

Facts (N=34):

1. A stimulant excites the brain.
2. Withdrawal is the symptoms felt after stopping the use of a drug.
3. The hippocampus is the brain area representing touch.
4. The more sensitivity to touch, the more representation of that area in the brain.

	Before	After
1.	5.88%	10.71%
2.	51.52%	82.76%
3.	50.00%	74.29%
4.	75.76%	93.10%

At the 2007 Spring Brain Conference in Sedona, Ariz., the Young Scientist Program's neuroscience teaching team visited the Flagstaff Bordertown Dormitory, an educational residence for Native American high-school students. The evaluation showed a significant increase in students' knowledge of specific facts about the brain before and after the teaching team activities.

In addition, students showed statistically significant improvement in positive attitudes toward science. When asked to evaluate the usefulness of the demos and the extent to which they felt they had an opportunity to participate actively, students gave an average ranking of 3.5 on a scale of 1 (worst) to 5 (best) in response to both questions.

mean (all)	45.79%	65.22%
SD	29.10%	37.14%
t-test		NS
mean (2-4)	59.09%	83.38%
SD	14.45%	9.42%
t-test		p < 0.05



At Research Bootcamp, Derecka Travis, left, plates bacteria on petri dishes that contain the antibiotic ampicillin with Ph.D. student Zac Cusumano and Kenneth Stockard, right.

from fruit, surface tension and generation of a citrus battery have been created. YSP is working with a community organization, the Youth Learning Center, as well as St. Louis public school science teachers to get feedback to improve the kits. Graduate and medical students at other institutions can now take advantage of online teaching team demos and teacher kits by accessing the

online resources at <http://ysp.wustl.edu>.

Both participants and organizers agree that YSP is a proven and flexible model for a volunteer-based approach to improve science understanding and inspire future generations of science professionals, especially among under-represented groups.

"Summer Focus was one of the best things I have been a part of in my life,"

Rankin emphasizes. "Completing the program and, most importantly, walking away with a deeper passion for science was amazing. One day, I want to give a similar experience to young adults so they can explore their strengths and develop career goals. I want them to have that same life-changing experience that will make them strong and effective leaders."

The Young Scientist Program is supported by grants from the Howard Hughes Medical Institute, The Leon Lowenstein Foundation, Pfizer Inc. and Midwest Scientific. The Washington University Medical Center generously supports YSP through its alumni association, the Medical Scientist Training Program and the Medical School

Office of Diversity Programs. ∞∞∞



Katherine Bakshian Chiappinelli (kate.chiappinelli@gmail.com) is a Ph.D. candidate in developmental biology

and the student director of the Young Scientist Program at Washington University in St. Louis.

See you in San Diego!

BY RUSSELL A. DEBOSE-BOYD AND HONGTAO YU

Please join us in San Diego April 21 – 25, for the annual meeting of the American Society for Biochemistry and Molecular Biology, part of the Experimental Biology meeting. A wide range of scientists — from undergraduates to established senior investigators — will explore the breadth and depth of biochemistry and molecular biology through an exciting and comprehensive program we developed in collaboration with President Suzanne Pfeffer and the Program Planning Committee. The program includes award lectures honoring seminal scientific discoveries and achievements in biochemistry and molecular biology as well as exceptional plenary lectures.

The meeting will be composed of 11 thematic symposia that emphasize cutting-edge research in fields near and dear to the hearts of ASBMB members. These symposia consist of exciting lectures by invited speakers and short talks chosen from submitted abstracts. Special emphasis will be placed on choosing abstracts by undergraduate, graduate and postdoctoral trainees.

In this issue of ASBMB Today, we preview six of the scientific programs for the 2012 meeting. Look for more coverage in the November issue.



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2012 Program Planning Committee co-chairs.

IN THIS ISSUE

The **Gene Regulation** theme, co-chaired by Karen Adelman (National Institute of Environmental Health) and Yang Shi (Harvard Medical School), will include sessions spanning several topics, including basic mechanisms for gene regulation, regulation of gene transcription during growth and development, the relationship between chromatin structure and transcription machinery, and histone modification and recognition.

The **RNA** theme, co-chaired by Manny Ares (University of California, Santa Cruz) and Tracy Johnson (University of California, San Diego), will highlight advances in the molecular understanding of mRNA splicing, dynamics of RNA folding, RNA-mediated regulation and regulation of ribosome-mRNA interactions.

DNA Replication, Recombination and Repair, co-chaired by Peter Baumann (Stowers Institute for Medical Research) and Patrick Sung (Yale University School of Medicine), will include sessions that focus on underlying mechanisms of DNA repair and replication and how these events are coupled. In addition, a session on the roles of telomeres and telomerase in chromosome integrity will be provided.

The **Protein Synthesis, Targeting and Quality Control** theme, co-chaired by Jeffrey Brodsky (University of Pittsburgh) and William M. Clemons (California Institute of Technology), will include sessions that cover the folding and assembly of ribosomes, mechanisms for targeting and translocation of proteins to ER membranes, factors modulating protein quality control, and the contribution of protein quality control to disease.



The **Lipid and Lipid Signaling** theme is co-chaired by Dawn L. Brasaemle (Rutgers University) and Timothy F. Osborne (Sanford-Burnham Medical Research Institute). This theme features sessions on lipid droplet biology, channeling of lipids and metabolic branch points, lipid signaling in infection and atherosclerosis, and lipid-mediated regulation of protein function.

The **Metabolism and Disease** theme, co-chaired by Reuben Shaw (Salk Institute) and Benjamin Tu (University of Texas Southwestern Medical Center at Dallas), will focus on organismal metabolism, signaling and metabolism, metabolism of cancer cells and aging metabolism.

IN THE NOVEMBER ISSUE

Organelle Dynamics, co-chaired by David Chan (California Institute of Technology) and Benjamin Glick (University of Chicago), will consist of sessions that highlight the dynamics of mitochondria, quality control of organelles, secretory pathway organization and the dynamics of the endomembrane system.

The **Glycobiology** theme, co-chaired by Karen Colley (University of Illinois at Chicago) and Anant Menon (Weill Cornell Medical College), will focus on the role of glycoconjugates in signaling and development and in the invasion and virulence of pathogens. Additional sessions will highlight novel routes of glycoconjugate assembly and the roles of glycoconjugates in metabolism and disease.

Drug Development, co-chaired by Peter Jackson (Genentech) and Randall King (Harvard Medical School),

will consist of sessions that explore the link between tumor regression and cell death, highlight advances in targeted cancer drug development, and discuss methods for discovery of new drug targets.

Systems Biology, co-chaired by Steve Altschuler (UT Southwestern Medical Center) and Alexander Hoffmann (UC, San Diego), will include sessions that will explore the construction of networks and will examine them as a function of time, space and noise within systems.

The **Chemical Biology and Catalysis** theme, co-chaired by Philip A. Cole (Johns Hopkins University School of Medicine) and Jason K. Sello (Brown University), will have sessions focused on metabolomics, chemistry and medicine, metabolic engineering and mechanistic enzymology.

The **ASBMB Minority Affairs Committee** will sponsor a special symposium on tuberculosis co-chaired by Clifton Barry (National Institutes of Health) and Squire Booker (Pennsylvania State University). Sessions will focus on the biochemistry of M. tuberculosis and mediators of host-pathogen interactions.

Finally, the **ASBMB Education and Professional Development Committee** will offer a symposium entitled "Maximizing Competitiveness During Challenging Economic Times." This symposium, co-chaired by Peter Kennelly (Virginia Polytechnic Institute and State University) and Suzanne Barbour (Virginia Commonwealth University), will focus on maximizing institutional effectiveness, teaching effectiveness, marketability and global outreach. XXXX



The many modes of gene regulation

Epigenetics, chromatin and beyond

BY KAREN ADELMAN AND YANG SHI

Investigations in recent years have illuminated a multiplicity of strategies for regulating gene expression. From chromatin structure to noncoding RNAs to promoter-proximal pausing of RNA polymerase II, it is clear that cells have evolved a sophisticated and diverse tool kit for modulating transcription output. The 2012 annual meeting session on gene regulation will showcase the wide array of approaches, including structural biology, genetics, genomics and proteomics. In addition, speakers will describe gene regulation during cell differentiation and development and responses to stimuli.

Epigenetic readers, writers and erasers

Epigenetic changes to chromatin and DNA underlie developmental processes. The first session focuses on histone modifications and their recognition as well as the processes affected by these marks. The session begins with a talk by Yang Shi (Harvard Medical School and Children's Hospital Boston), who will present work on understanding mechanisms that regulate histone methylation dynamics and on effector, also known as reader, proteins that recognize histone methylation.

Dinshaw Patel (Sloan-Kettering Cancer Center) will present insights into how these covalent modifications are recognized and deposited from a structural perspective, providing a mechanistic basis for their function.

The importance of regulated modifications of histones during vertebrate development will be addressed by Joanna Wysocka (Stanford University), whose work has elucidated the roles of several readers and writers of epigenetic marks during cell-fate specification.

Looking under the hood to dissect transcription mechanisms

The second session will delve into fundamental mechanisms in gene regulation. Joan Conaway (Stowers Institute for Medical Research) will focus on the Mediator complex, which bridges interactions between transcription activators and RNA polymerase II, helping to recruit polymerase to a gene's promoter. New results from the Conaway lab reveal that Mediator also can enhance



transcription elongation through stimulating the release of paused Pol II.

Dylan Taatjes (University of Colorado at Boulder) will provide additional insights into Mediator and its interactions with the transcription machinery. Structural analyses of Mediator in complex with various transcription activators shed light on how Mediator translates activator binding to Pol II and the general transcription factors to influence transcription.

In addition to protein factors, RNA species are emerging as important regulators of gene expression. Ramin Shiekhetar (Wistar Institute) will present his recent findings on the roles of long noncoding RNAs in tuning gene expression. Shiekhetar will discuss the interesting relationships between transcriptional enhancers and noncoding RNA species that are generated from these enhancers under tissue-specific conditions.

Putting the puzzle pieces together

The third session, "Transcriptional Regulation During Growth and Development," is devoted to how gene

regulatory mechanisms are played out in vivo. Joaquin Espinosa (University of Colorado at Boulder) will describe his work on transcription regulation by the p53 network. Activation of p53 can lead to distinct outcomes depending on the signal and cell context, suggesting that cells employ different transcription co-regulators to tailor the p53 response to oncogenic stimuli.

Susan Mango (Harvard University) will describe the role of the FoxA family of transcription factors in establishing the foregut during development. Mango's findings illuminate how these factors provide the foundation for the transcription pathways that govern organ development in the *C. elegans* foregut.

Cell differentiation involves an integration of information provided by transcription-factor activity and chromatin structure. Ken Zaret (The University of Pennsylvania) will discuss the role of pioneer transcription factors in mammalian cell differentiation, describing how they uncover specific segments of the genome to make them accessible and amenable for activation.

Nucleosomes vs. the transcription machinery

The final session, "Interplay Between Chromatin Structure and the Transcription Machinery," will expand on the idea that the transcription machinery can serve as a barrier to chromatin formation. Karen Adelman (National Institute of Environmental Health Sciences) will describe how the pausing of Pol II during early elongation prevents nucleosome assembly near promoters, thereby enhancing gene expression and poising genes for robust activation.

Gordon Hager (National Cancer Institute) will discuss recent findings that signal-dependent binding of nuclear receptors to DNA often targets sites of pre-opened chromatin. This suggests that the pre-existing chromatin structure in a given cell type or condition can affect the activity of nuclear receptors significantly.

Transcription factors themselves also can be targets of post-translational modifications. Or Gozani (Stanford University) will describe how lysine methylation of both histones and transcription factors is regulated to affect gene expression. XXXX



Karen Adelman (adelmank@niehs.nih.gov) is a principal investigator at the National Institute of Environmental Health Sciences, and Yang Shi (yang_shi@hms.harvard.edu) is a professor at Harvard Medical School and Children's Hospital Boston.

The seven wonders of the RNA world

BY MANNY ARES AND TRACY JOHNSON

Right in the middle of the central dogma sits the RNA world, through which the information in DNA passes to create the functional state of the cell. This world is rife with nonprotein enzymes, mystery machines and unfathomed regulatory sophistication. Among its wonders are the ribosome, the spliceosome, catalytic RNAs, small transregulatory RNAs such as microRNAs and CRISPRs, large noncoding RNAs, riboswitches and RNA helicases. In the annual meeting thematic group "RNA: from Catalysis to Regulation," we will explore the surface of this world in four parts.

The elusive spliceosome

Eukaryotic genes are split such that the interpretation of what information should go into the mRNA is left to the spliceosome, a bevy of complexes that bind, arrange and splice exons together. The coordinated transitions from one complex to the next are so dynamic that structural analysis requires tricks to freeze the spliceosome in its tracks.

The first session, "The Spliceosome: Fitting the Pieces Together," will focus on this mystery. First up will be Soo-Chen Cheng (Academia Sinica in Taipei), who will relate spliceosome dynamics to function in either of the two reversible catalytic steps carried out by the yeast spliceosome.

How spliceosome function is influenced by the ongoing transcription that creates its substrate will be addressed by Tracy L. Johnson (University of California, San Diego), who will describe studies of co-transcriptional splicing and spliceosome dynamics.

Finally, Melissa S. Jurica (University of California, Santa Cruz) will describe key changes in protein composition and complex structure that accompany human spliceosome transitions in vitro.

Fate as a matter of folding

Some rules for RNA folding are simple: G pairs with C or U, and A pairs with U. These rules (plus stacking) generate an RNA-folding landscape that can include many stable solutions. The next layer is more obscure, with tertiary interactions and helical packing interactions that create the functional shape.

The second session, "RNA Dynamics: Function Follows Folding," will explore how these interactions affect the function of RNA elements.

The seven wonders of the RNA world *cont...*

Manny Ares (University of California, Santa Cruz) will describe a riboswitchlike pre-mRNA structure that folds differently under the influence of polyamines to regulate alternative splicing.

Most dynamic RNAs are aided by proteins that remodel RNA structure. This topic will be presented by Eckhard Jankowsky (Case Western Reserve University), who will describe in molecular terms how the RNA helicase family of enzymes works and how this explains their physiological roles.

Finally, the complex shape and function of a folded catalytic RNA will be dissected by Anna M. Pyle (Yale University), who will discuss group II intron architecture and its implications for the development of eukaryotic splicing systems.

**Fighting fire with fire:
RNA control of gene function**

Accurate molecular recognition is fundamental to correct regulation, and evolution has partly solved this problem by targeting RNA with RNA.

In the third session, “RNA-based Regulation: A Diversity of Mechanisms,” we will hear about how RNAs that mediate regulation are made and how they function. Among the speakers will be Richard Gregory (Harvard University), who has focused on the biogenesis of microRNAs that control stem-cell function and are affected in cancer cells.

In a still-breaking story, bacteria appear to have immunity systems that utilize RNA recognition. Rebecca M. Terns (University of Georgia) will explain how small RNAs from CRISPR loci guide silencing of invaders in prokaryotes.

Lynne Maquat (University of Rochester) will describe how RNA decay plays a central role in the ability of RNAs to keep their regulatory targets in check.

Delivering the message

Qualitative and quantitative protein output is the ultimate hallmark of cell function. Key mechanisms to control this are focused at two points: initiation of translation when the mRNA encounters the ribosome and a still-enigmatic step controlled by microRNAs. In the final session, “Ribosomes: Regulation of Access to mRNA,” we will explore these key steps.

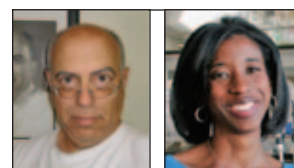
First, Tatyana Pestova (State University of New York Downstate Medical Center) will present her work on the mechanisms of initiation of prokaryotic protein synthesis.

Although prokaryotic ribosomes have informed our



understanding of eukaryotic translation, there remain important differences. Jon Lorsch (Johns Hopkins University School of Medicine) will explain how the mechanics of mRNA recruitment to the eukaryotic ribosome leads to control of initiation.

Finally, Nahum Sonenberg (McGill University) will treat us to his lab’s latest findings on the mechanism of action of miRNAs in controlling mRNA translation. XXXX



Manny Ares (ares@biology.ucsc.edu) is a professor at the University of California, Santa Cruz, and Tracy Johnson (johnsont@ucsd.edu) is an associate professor at the University of California, San Diego.

DNA replication, recombination and repair

BY PETER BAUMANN AND PATRICK SUNG

The three Rs — DNA replication, recombination and repair — are at the heart of proliferation, evolution and maintenance of genomes. Impairment of these processes results in genome instability and mutations that lead to cancer and other diseases. The four stimulating sessions in this year's theme will focus on homology-directed repair of DNA damage, the interplay between replication and other fundamental cellular processes, and the special challenges associated with the maintenance and protection of chromosome ends.

DNA repair

The first session, "Mechanism and Regulation of DNA Repair," focuses on various molecular aspects of the DNA homology-directed repair of damaged chromosomes.

Lorraine Symington (Columbia University) works with budding yeast to study the genetic mechanism of homologous recombination that is mediated by the RAD52 gene group and the involvement of recombination in DNA double-strand break repair, the maintenance of genetic stability and meiosis. She will discuss her recent work, which has shed light on the multifaceted role of several DNA helicases and nucleases in the early and late steps of the homologous recombination reaction.

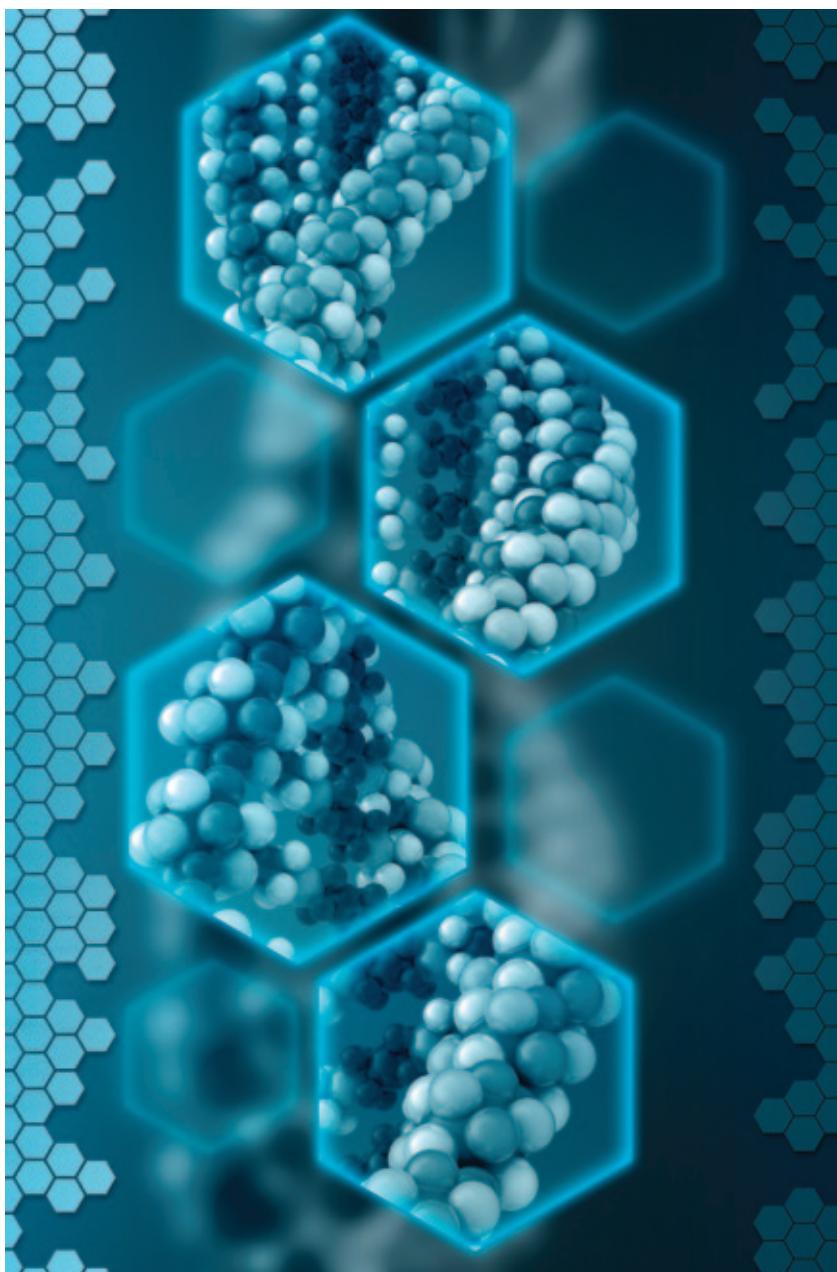
Hiroshi Iwasaki (Tokyo Institute of Technology) will describe his biochemical reconstitution of homologous recombination reactions with recombinase proteins and their accessory factors from fission yeast. The detailed analyses of these reconstituted reactions have provided considerable insights into the mechanism and regulation of the early steps of homologous DNA repair and the resolution of DNA intermediates made by recombinase proteins.

Sua Myong (University of Illinois at

Urbana-Champaign) has been at the forefront of applying single-molecule methodologies to examine the mechanism of action of DNA repair proteins and how the activities of DNA repair complexes are regulated. She will describe her recent work, which makes use of fluorescently labeled biomolecules and fluorescence cell imaging to define the mechanism of helicases and other enzymes involved in DNA repair and replication.

DNA replication

The second session, "DNA Replication Mechanism and Context," highlights recent advances in our understanding



DNA replication, recombination and repair cont...

of the assembly and regulation of replication complexes and explores the intricate interplay between replication and other nuclear processes.

John Diffley (Cancer Research UK) uses budding yeast and human cells to decipher the mechanism of DNA replication and its regulation at multiple levels. Biochemical reconstitution of initiation complexes has advanced significantly our understanding of replication origin choice, licensing and replisome assembly. He will discuss recent findings from his lab, including molecular studies that elucidate how checkpoints regulate origin firing.

Mike O'Donnell (Rockefeller University) studies DNA replication and its coordination with other nuclear processes, such as transcription, recombination and repair in *E. coli* and human cells. Recent advances at his lab have shed light on how replication forks survive collisions with transcribing RNA polymerases and how the replication machinery directly participates in diverse repair events.

Prasad Jallepalli (Memorial Sloan-Kettering Cancer Center) is broadly interested in the mechanisms that control the fidelity of chromosome segregation. Orderly progression through mitosis requires intact sister chromatid cohesion, which is established during and influenced by DNA replication. Single-molecule analysis has revealed that replication, in turn, is profoundly affected by cohesion, with defects in post-transcriptional modification of cohesin subunits compromising fork progression and leading to the accumulation of DNA damage.

Dependence of DNA replication on repair

The third session, "Coupling of DNA Repair and Replication," concerns the dependence of DNA replication on DNA repair and checkpoint pathways and how this functional linkage helps maintain genome stability.

Antony Carr (University of Sussex) uses fission yeast as a model to delineate the genetic mechanisms of DNA replication-restart and replication-fork repair pathways. His laboratory has developed a replication-fork arrest system that entails a replication termination sequence and an inducible protein factor that binds this sequence. He will discuss results showing a major involvement of homologous recombination in the restart of stalled DNA replication forks at the expense of frequent gross chromosomal rearrangements.

Fanconi anemia is a chromosomal instability syn-

drome that predisposes patients to cancer. The FA proteins function together to promote DNA damage tolerance and repair during S phase. Angelos Constantinou (French National Center for Scientific Research) will discuss his recent findings, which implicate the DNA translocase FANCM, mutated in FA patients of complementation group M, in the processing and remodeling of stalled DNA replication forks and in linking replication-fork restart and repair to checkpoint signaling.

Catherine Freudenreich (Tufts University) is interested in understanding the cellular mechanisms of triplet DNA repeat maintenance. The expansion of trinucleotide repeat sequences is the cause of a number of inherited diseases, including Huntington's disease (a degenerative neurological disease), Fragile X syndrome (the most common inherited mental retardation) and myotonic dystrophy (a type of muscular dystrophy). She will discuss how her work in the budding yeast sheds light on the mechanisms that cooperate to maintain DNA repeat length.

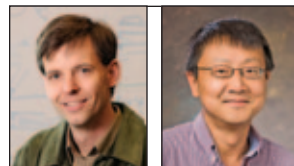
Telomeres and telomerase

The final session, "Telomeres and Telomerase," will focus on the challenges associated with the maintenance and protection of the ends of linear chromosomes.

Julie Cooper (Cancer Research UK, London) uses fission yeast to decipher the roles of telomeres in maintaining genome integrity and in guiding chromosomes through meiosis. Her recent work has uncovered a novel mechanism of chromosome end capping in cells that lack functional telomerase.

Madelena Tarsounas (Cancer Research UK, Oxford) studies how proteins involved in homologous recombination contribute to telomere replication and the establishment of protective cap structures. She will discuss results that implicate the tumor suppressor BRCA2 and the Rad51 recombinase in the maintenance of telomere integrity.

Telomerase has long been viewed as an attractive target for anti-cancer drugs, yet we still know little about the regulation of this enzyme. Peter Baumann (Stowers Institute) is interested in how the activity of this ribonucleoprotein complex is controlled at multiple levels from transcriptional regulation and complex assembly to post-transcriptional modifications and recruitment. XXXX



Peter Baumann (peb@stowers.org) is an associate investigator at the Stowers Institute for Medical Research, and Patrick Sung (Patrick.Sung@yale.edu) is professor at Yale University School of Medicine.

A most hazardous journey

The production, sorting and selection of newly synthesized proteins in eukaryotes

BY JEFFREY L. BRODSKY AND WILLIAM M. CLEMONS JR.

Proteins possess a mind-boggling array of activities, but before they perform their diverse functions they must be synthesized and fold with high fidelity. During or after synthesis, about one-third of all newly synthesized eukaryotic proteins enter the secretory pathway and therefore also must be transported into the endoplasmic reticulum, where they fold and are post-translationally modified. Secreted proteins that are improperly synthesized, transported or processed are recognized by components of a quality-control machinery that targets them for degradation. Because so many things can go wrong during the early life of a protein, it comes as no surprise that a significant number of human diseases are linked to protein biogenesis.

The four sessions in the “Protein Synthesis, Targeting and Quality-Control” theme will provide an overview and detail cutting-edge methods and discoveries related to these topics.

The ribosome and early folding decisions

Proteins start their lives at the ribosome. From here, they must begin the complicated process of folding and being transported to their final destinations. This session will highlight our current mechanistic understanding of early steps in protein biogenesis.

Jody Puglisi (Stanford University School of Medicine) has pioneered the use of single-particle studies to understand the dynamics of protein synthesis, directly visualizing independent components during the translation cycle.

Wolfgang Wintermeyer (Max Planck Institute for Biophysical Chemistry in Göttingen) also will speak to the dynamics of the translation process, focusing on the nascent chain and its interactions.

Walid Houry (University of Toronto) will illumi-

nate the roles of some of the ribosome’s partners, specifically discussing the role of chaperone assemblies.

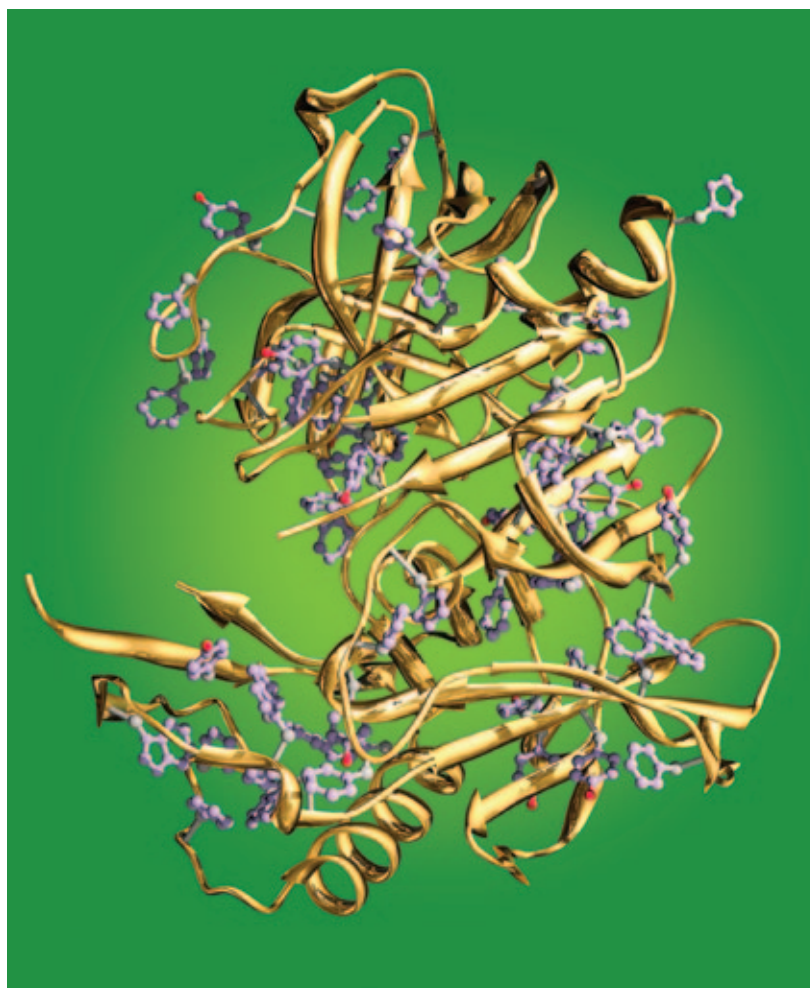
Protein targeting and translocation

Protein delivery is a highly regulated event, and we continually add additional levels of complexity to our understanding of this process. During this session, we will further our current understanding about the routes that proteins take on their journeys across membranes.

Peter Walter (University of California, San Francisco) has pioneered our understanding of protein targeting and will discuss novel insights into the events that deliver proteins to the endoplasmic reticulum membrane.

Gunnar von Heijne (University of Stockholm) will provide a detailed description of the requirements for transmembrane domain insertion mediated by the translocon.

William Clemons (California Institute of Technology) will describe new insights into novel pathways for the targeting of the special class of tail-anchored membrane proteins.



A most hazardous journey *cont...*

Are you a good protein or a bad protein?

The next session, “Factors Modulating Protein Quality Control,” will highlight recent advances in our understanding of how proteins in the endoplasmic reticulum and in the cytoplasm misfold and are then recognized by distinct quality-control processes.

Jeffrey Brodsky (University of Pittsburgh) will describe novel approaches in which factors required for endoplasmic-reticulum-associated degradation, or ERAD, have been identified and characterized.

Richard Wojcikiewicz (State University of New York Upstate Medical School) will provide a fascinating example in which the regulated ERAD of a housekeeping protein in the endoplasmic reticulum, the IP3 receptor, is achieved.

Tricia Serio (Brown University) will discuss how things can go wrong on the other side of the membrane: Prions are infectious proteins that aggregate in the cytoplasm and cause disease. Her talk will feature new data on how prion conformation and chaperone association are linked to aggregate formation.

Protein quality control and disease

The last session will highlight some of the connections between defects in protein biogenesis and associated diseases.

First, Edward Fisher (New York University) will describe how apolipoprotein B is degraded in cells, an event that is connected intimately to lipid metabolism, cholesterol transport and heart disease.

Phyllis Hanson (Washington University School of Medicine) will discuss the molecular basis for a neurological disorder that arises from a defective form of an ER-resident, chaperone-like protein.

Finally, Jason Gestwicki (University of Michigan) will discuss new approaches to identifying small-molecule modulators of chaperone action and their use in disease models. XXXX



Jeffrey L. Brodsky (jbrodsky@pitt.edu) is the Avinoff professor of biological sciences at the University of Pittsburgh, and William M. Clemons Jr. (clemons@caltech.

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Chewing the fat

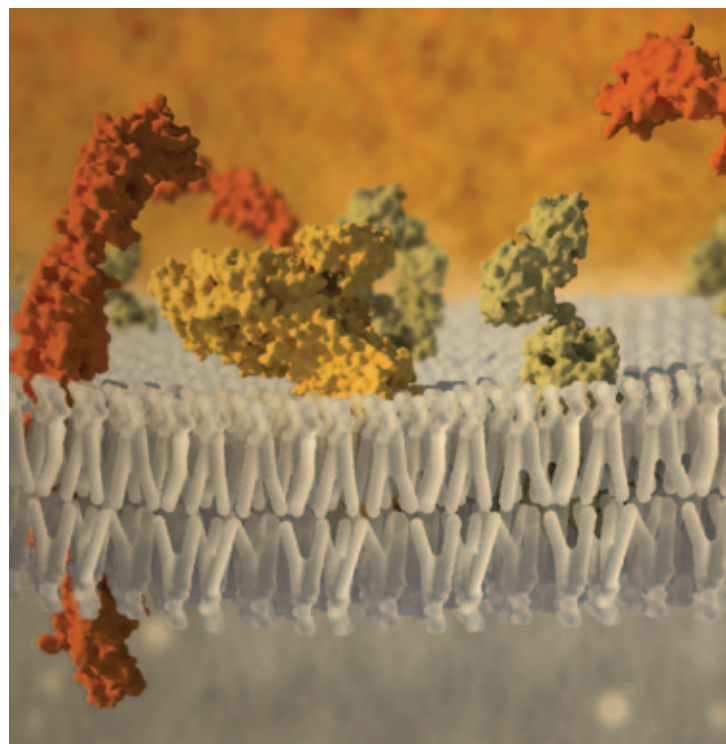
An expanding role for lipids in complex biological processes

BY DAWN L. BRASAEMLE AND TIMOTHY F. OSBORNE

Several areas of research into lipids and lipid signaling have experienced rapid growth in recent years, and the 2012 annual meeting sessions will highlight some of the most exciting new developments in lipid biology. Four general topics will be covered in four sessions, including the formation and dissolution of lipid droplets, metabolite partitioning in mammalian tissues and model organisms, the contributions of lipids to inflammation and infectious disease, and lipid signals that control protein function.

Lipid droplets

Recent research reveals that lipid droplets are an important storage compartment for signaling lipids, substrates for energy metabolism and intermediates for the synthesis of membrane lipids. Speakers in the first session, “Lipid Droplets: A Dynamic Subcellular Compartment,” will address current thoughts about lipid droplet formation and metabolism.





David L. Silver (Albert Einstein College of Medicine) will present evidence that members of the FIT family of proteins are essential for the packaging of triglyceride into nascent lipid droplets. FIT proteins are integral membrane proteins in the endoplasmic reticulum that facilitate the partitioning of triglycerides into lipid droplets and, as such, are required for lipid droplet expansion.

Tobias Walther (Yale University) will continue the theme by describing investigations into the role of phospholipids in lipid droplet formation and dynamics.

Finally, Dawn L. Brasaemle (Rutgers University) will describe how members of the perilipin family of lipid droplet-associated proteins fine-tune triglyceride storage in lipid droplets through control of lipase access to lipid substrates.

Metabolic branchpoints

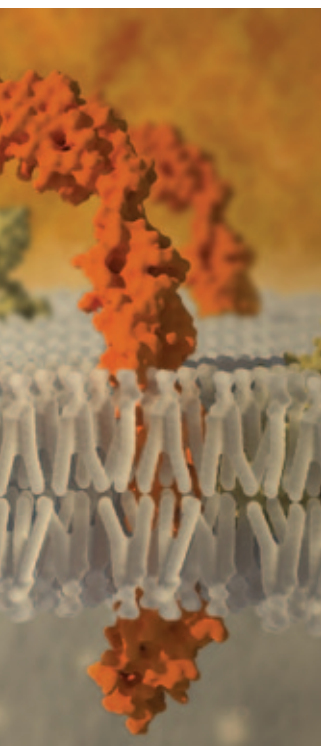
A developing area of inquiry is how lipids are channeled from biosynthetic or catabolic enzymes to specific fates in different subcellular compartments. Moreover, various proteins serve multiple functions, providing enzymatic activity against lipid substrates while influencing either lipid partitioning or transcription.

In "Metabolic Branchpoints and Lipid Channeling," Deborah M. Muoio (Duke University) will discuss the relationship between incomplete fat oxidation and the pathophysiology of insulin resistance in muscle as an example of

how altered flux of metabolites can perturb energy balance.

Kaveh Ashrafi (University of California, San Francisco) will describe recent whole-organism studies in *C. elegans* to identify novel pathways and compounds that influence fat storage.

The third speaker, Peter J. Espenshade (Johns Hopkins University School of Medicine) is the winner of the 2012 Avanti Young Investigator Award in Lipid Research. His award lecture will be delivered in this session and will examine the regulation of lipid metabolism by cellular sterol levels and hypoxia through modulation of the sterol regulatory element-binding protein pathway in fission yeast.



Lipids and inflammation

The third session, "Lipid Signaling, Infection, and Atherosclerosis," will explore the role of cellular lipid metabolism in modulating the host-pathogen interface. Christopher K. Glass (University of California, San Diego) will discuss oxysterols and cholesterol synthesis intermediates as LXR agonists for the regulation of gene expression related to Toll-like receptor signaling in macrophages.

Timothy F. Osborne (Sanford-Burnham Medical Research Institute) will expand on the link between the regulation of lipogenesis by SREBPs and innate immune pathways crucial for macrophage function.

Finally, Melanie Ott (The Gladstone Institute of Virology and Immunology) will describe the role that lipid metabolism plays in the propagation of the hepatitis C virus in the liver.

Lipid signals

The final session, "Lipid Regulation of Protein Function," will focus on lipid modulation of protein function through direct interactions as either ligands for transcription factors or modulators of intracellular signaling pathways.

Fraydoon Rastinejad (Sanford-Burnham Medical Research Institute) will describe his recent structural studies of full-length nuclear receptors bound to DNA and how unique protein-protein, protein-DNA and protein-lipid interactions have been revealed and have revolutionized our understanding of how ligands alter complex assembly to influence gene expression.

Benjamin F. Cravatt (The Scripps Research Institute) will present recent data on the enzymes required for metabolism of bioactive lipid amides known as endocannabinoids, which bind to G-protein-coupled receptors to initiate signals with diverse effects on pain perception, behavior, appetite and metabolism.

The third speaker, Jerrold M. Olefsky (University of California, San Diego) will discuss how macrophage-mediated inflammation influences lipid signaling that contributes to obesity-related insulin resistance. XXXX



Dawn L. Brasaemle (Brasaemle@aesop.rutgers.edu) is an associate professor of nutritional sciences at Rutgers University, and Timothy F. Osborne

(tosborne@sanfordburnham.org) is professor and director of the metabolic signaling and disease program at Sanford-Burnham Medical Research Institute, Lake Nona.

Metabolism re-emerges, triumphant

BY REUBEN SHAW AND BEN TU

In the past five years, there has been a dramatic resurgence in interest in metabolism as it has become apparent that deregulation of metabolism underlies the pathology in a wide variety of common diseases, such as cancer, diabetes and neurological disorders. The 2012 annual meeting's symposium on metabolism and disease will focus on the role of metabolism in the context of signaling pathways, cancer, aging and the whole organism.

Organismal metabolism

First, Joe Bass (Northwestern University) will talk about recent efforts to understand how metabolism and physiology are coordinated with circadian rhythms in mammals. Circadian rhythms have been linked to a variety of metabolic diseases, and it is of great interest and importance to understand this intimate relationship between the circadian clock and cellular metabolism.

Next, Manuel Llinas (Princeton University) will talk about the unique features of metabolism in the *Plasmodium falciparum* parasite that causes malaria. Understanding the metabolism of this organism and its relationship to the host may reveal novel opportunities for therapeutic intervention.

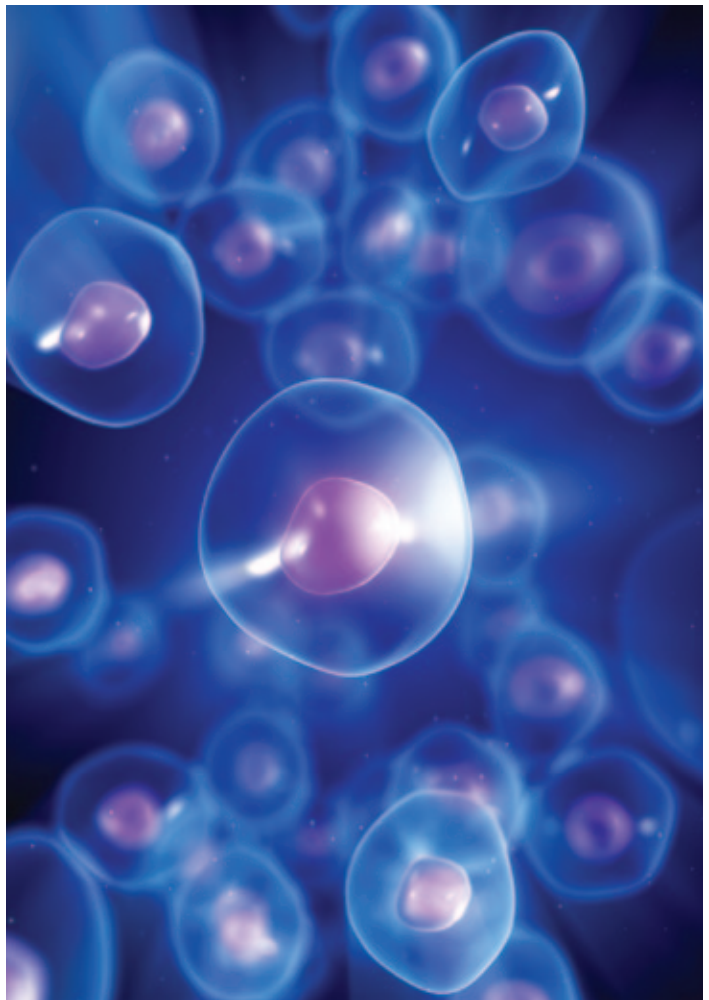
Then Benjamin Tu (University of Texas Southwestern Medical Center at Dallas) will describe his work, which focuses on understanding the role of metabolism and metabolic state in the regulation of cell growth and proliferation in budding yeast.

Signaling and metabolism

This round of talks will focus on how signal transduction pathways acutely control metabolism in response to different cellular stresses and environmental cues.

It will feature Jared Rutter (University of Utah), who will report on recent discoveries about a novel conserved mechanism by which mitochondrial protein turnover is connected to oxidative stress. Previously uncharacterized, conserved mitochondrial proteins play critical roles in a number of physiological circumstances.

Anne Brunet (Stanford University) will describe an unbiased biochemical approach to identifying new substrates



of the AMP-activated protein kinase that connect energy sensing and metabolism to cell-cycle progression.

Finally, Reuben Shaw (Salk Institute) will cover recent discoveries connecting energy metabolism to control of autophagy. Mechanistic coordination of metabolism with pro-growth signaling pathways through modulation of the AMPK pathway also will be discussed.

Cancer cell metabolism

This component will focus on how metabolic pathways are reprogrammed in cancer cells. Over a century ago, Otto Warburg discovered that tumor cells switch from oxidative phosphorylation to aerobic glycolysis as their primary form of glucose metabolism, which is now known as the Warburg effect.

The first speaker, Gregg Semenza (Johns Hopkins University), will address recent efforts to understand how hypoxia-inducible factor transcription factors contribute to the metabolic reprogramming of cancer cells. In particular, HIF-1a has been shown to regulate the

expression of many glycolytic enzymes and enzymes downregulating oxidative phosphorylation, which broadly contribute to the Warburg effect.

Eileen White (Rutgers University and the New Jersey Institute for Cancer Research) will discuss her lab's latest research decoding how autophagy plays key roles in tumorigenesis. Autophagy has emerged as a critical pathway normal and cancer cells utilize to maintain metabolic homeostasis, and deregulation of autophagy can lead to cancer.

Heather Christofk (University of California, Los Angeles) will highlight newly identified cellular mechanisms that cancer cells use in adapting their glucose metabolism and how such pathways may be exploited therapeutically.

Aging metabolism

This part will focus on the role of metabolism in aging and lifespan. First, Marc Van Gilst (Fred Hutchinson Cancer Research Center) will report on efforts to under-

stand the role of nutrition and food intake on reproductive longevity and stem-cell viability using *C. elegans* as a model system.

Charles Brenner (University of Iowa Carver College of Medicine) will cover efforts to elucidate the complex relationship between calorie restriction, metabolism and cellular lifespan using budding yeast as a model system.

Meng Wang (Baylor College of Medicine) will emphasize the important role of lipids and lipid metabolism in aging and reproductive lifespan using *C. elegans* as a model system. XXXX



Reuben Shaw (shaw@salk.edu) is an assistant professor at the Salk Institute for Biological Studies, and Ben Tu (benjamin.tu@utsouthwestern.edu) is an assistant professor at the University of Texas Southwestern Medical Center at Dallas.

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.

Rise and shine

Clock controls plasma lipids

BY M. MAHMOOD HUSSAIN AND XIAOYUE PAN

Light is a dominant external stimulus that entrains several activities of life. The eye transmits information about light to the brain. In the suprachiasmatic nuclei (SCN) of the brain, this information is processed to increase transcription of the *Bmal1* gene. *Bmal1* interacts with *Clock*, and this heterodimer binds to cis-elements in the promoters of *Cryptochrome* (*Cry*) and *Period* (*Per*) genes and enhances their transcriptions. *Cry* and *Per* heterodimers suppress *Bmal1* expression. This transcrip-

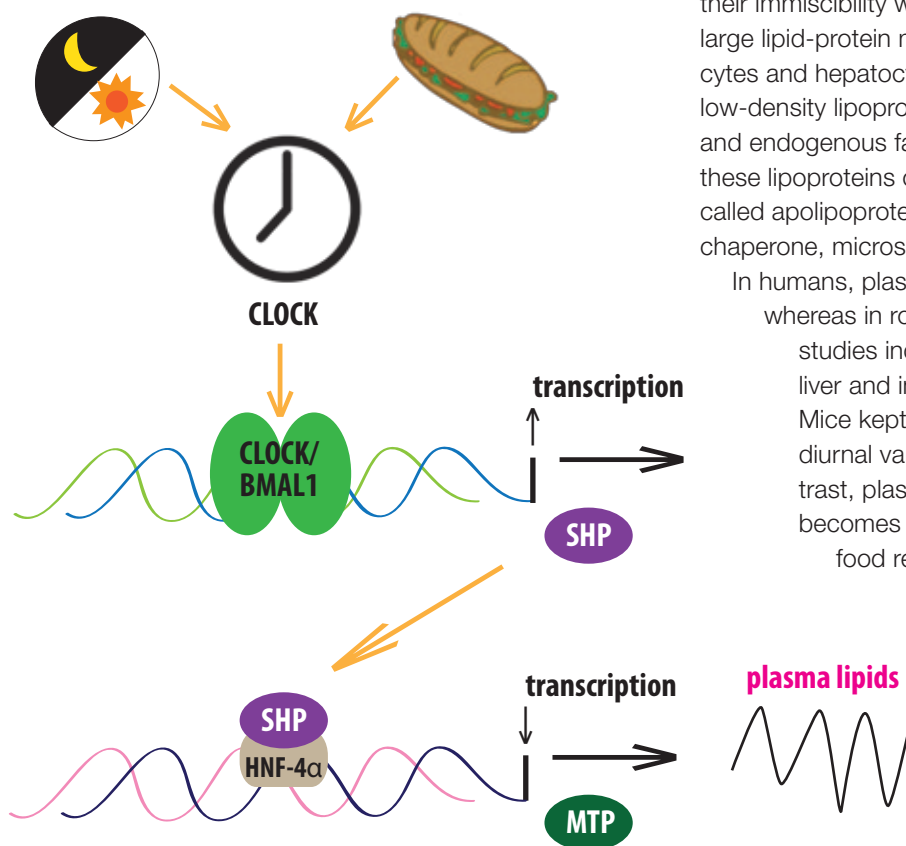
tional-translational feedback loop recurs every 24 hours and constitutes the biological clock (1 – 3). A critical feature of the biological clock is that it needs constant entrainment by external cues and daily exposure to light to maintain periodicity. Expression of these clock genes is not specific to SCN, but they are expressed in a rhythmic fashion in all the tissues.

The most important activity associated with sunrise is wakefulness. A major activity during wakefulness is eating. Lipids are one of the macronutrients in our food that provide the highest calories per gram. Because of their immiscibility with water, they are assembled into large lipid-protein micelles called lipoproteins. Enterocytes and hepatocytes assemble chylomicrons and very low-density lipoproteins, respectively, to deliver dietary and endogenous fat to other tissues. The assembly of these lipoproteins occurs around a large structural protein called apolipoprotein B, which is aided by an intracellular chaperone, microsomal triglyceride transfer protein.

In humans, plasma lipids are high in the daytime (4), whereas in rodents they are high at night (5). Our studies indicate that mobilization of fat by the liver and intestine is regulated by light and food. Mice kept in constant light or dark fail to show diurnal variations in plasma lipids. By contrast, plasma lipids peak in the daytime if food becomes available at that time. Surprisingly, this food response also is attenuated if mice are

kept in constant dark or light. Thus, proper light entrainment is required for temporal reprogramming by food.

How are these two external stimuli integrated to control plasma lipids? Both stimuli require normal *Clock* activity, as light- and food-entrained regulations are severely curtailed in mice that express a dominant negative mutant *Clock* (6, 7). At the onset of



Both light and food entrainment of plasma lipids requires *Clock*. *Clock/Bmal1* heterodimers interact with the *SHP* promoter to increase transcription. *SHP* interacts with activators, such as *HNF4α*, bound to *MTP* promoter and represses their activity, resulting in reduced *MTP* activity and plasma lipids. In mice expressing a dominant *Clock* mutant protein, *SHP* expression and its diurnal regulation is reduced and *MTP* expression is increased, leading to hyperlipidemia (7).

light, Clock binds to cis-elements in the Small Heterodimer Partner (SHP) promoter to increase expression. As concentrations increase, SHP interacts with activators of microsomal triglyceride transfer protein (MTP) gene to suppress expression. Low MTP activity is associated with reduced plasma lipoproteins. Hence, a transcriptional regulatory mechanism appears to control diurnal changes in plasma lipids (see figure).

The identification that Clock is a predominant regulator of daily rhythms suggests that disruptions in its activity might lead to abnormalities in lipid metabolism. Indeed, mice that express a dominant negative form of Clock show signs of metabolic syndrome (8). Besides normal periodicity of physiological processes, occurrences of several diseases, such as heart attacks, predominantly occur at certain hours of the day. High plasma lipids are risk factors for these diseases. It remains to be deter-

mined whether defects in Clock increase susceptibility to cardiovascular diseases such as atherosclerosis. XXXX



M. Mahmood Hussain is a professor and Xiaoyue Pan is a research assistant professor at The State University of New York Downstate Medical Center.

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minority affairs

Online exclusives

Hispanic Heritage Month

Help us build our new online teaching tool highlighting the contributions of Hispanic scientists who have helped shape our knowledge of biochemistry and molecular biology and who have otherwise made lasting impressions. Our interactive timeline features several notable researchers, such as Carlos Finlay, Severo Ochoa and Margarita Salas, but we welcome your contributions to make the resource more robust and comprehensive for classroom use. See the timeline at <http://bit.ly/mYKnsM>, and email asbmbtoday@asbmb.org to add other scientists to it. XXXX



Navigating the unexpected

Learn about the winding life journey that took member Hector H. Hernandez from school dropout to assistant professor of chemical engineering at the Masdar Institute of Science and Technology in Abu Dhabi. In an online interview with ASBMB Education and Professional Development Manager Weiyi Zhao, Hernandez cites the society's



1999 undergraduate poster competition, from which he took home the best poster award, as a pivotal point in his academic career. Today his research focuses on the role that soil microbes play in the global cycling of carbon dioxide. Hear what Hernandez has to say about his route and mentors at <http://bit.ly/nlYWiy>. XXXX

MCP MOLECULAR AND CELLULAR PROTEOMICS**MCP launches sponsored lectures**

BY R.A. BRADSHAW AND A.L. BURLINGAME

For the past 10 years — indeed, from its inception — Molecular & Cellular Proteomics, the American Society for Biochemistry and Molecular Biology's only homegrown journal, has enjoyed an almost unique leadership position in the development of its field and the role that proteomics is playing in helping unravel the mysteries of biological systems.

Proteomics, which in general terms involves using unbiased methodology to look at proteins and the entities with which they interact as ensembles (or unfractionated mixtures) rather than as individual molecules, clearly began to emerge in the '70s. The introduction of key mass spectrometric and array technologies greatly accelerated its development and the availability of genomic information aided it immensely. These enablers came rapidly to a head in the '90s, and thus the launch of MCP in the summer of 2001 was timely in helping usher in the era of proteomics.

As with any paradigm shift — and proteomics clearly qualifies for such a designation (1) — there were exaggerated hopes, promises and predictions for breakthroughs that would materially change our understanding of human biology and improve our existence and well-being. Not surprisingly, much of this has not come to pass, and proteomics has not yet proved to be quite the panacea that was predicted, for example, in revolutionizing the practice of human medicine.

But to focus on these apparent shortcomings is looking through a glass darkly and ignores the very considerable successes that have occurred. Among other major advances, we now appreciate the extent to which virtually all proteins interact with multiple partners and the fact that protein post-translational modifications are orders of magnitude more extensive than we ever realized. Such significant shifts in basic biological concepts rarely have occurred as quickly as those of the past several years and would not have been possible without proteomic technology. Practical applications also have not been neglected.

Detractors of proteomics are wont to point out that very few new diagnostics have come out of proteomic biomarker identification analyses. While that is true, it is more a failure of germane research and development programs than proteomics. Indeed, literally thousands of biomarkers have been



Mann



Aebersold

reported for a host of pathologies (and many of these in MCP), but they await validation before they can reach the marketplace.

Validation, however, is not the role or job of proteomics, and proteomics should not be blamed for the painfully slow movement of potential therapeutics and diagnostics through the pipeline. It is far too early to know what the long-term contributions of proteomics will be, but it is a very pessimistic individual who does not think that those contributions will be considerable.

MCP was founded on the principle that it would be proactive in advancing this exciting field, and it has been good to its promise. From the outset, it focused on the quality of data submitted to it and over several years developed guidelines for reporting peptide and protein identifications using mass spectrometry and clinically relevant data to ensure that this information was correct and reproducible. Both guidelines are viewed widely as the standards in the field.

Indeed, by a variety of metrics and peer recognition, MCP is arguably the leading journal in this area and is quite deserving of its position as one of the 100 most influential journals in biology (2). However, it is important to remember that the successes of the journal are the result of the efforts of a large number of people, starting with the associate editors and the members of the editorial board and including all the authors and scientists who have chosen to publish their outstanding work in the journal. The content of the journal is, in the final analysis, what dictates its quality. It has had 10 excellent years in this regard, and we look forward to the next decade and even better things.

As part of our 10th anniversary celebration, the editors of MCP are planning to introduce some new features and policies that we feel will not only maintain our tradition of excellence but also keep us fresh and innovative. One such feature is the introduction of MCP-sponsored lectures in germane meetings and symposia, which we initiated in August at the 10th International Symposium on Mass Spectrometry in the Health and Life Sciences in San Francisco and continued in September at the 10th HUPO Annual World Congress in Geneva. The organizers of the meeting selected the lecturers in each case, and two of the leading practitioners of the proteomic art kicked off this program: Matthias Mann and Ruedi Aebersold.

Matthias Mann received his bachelor's and master's degrees at the University of Gottingen and his doctoral degree from Yale University under the direction of John Fenn, who received the Nobel Prize for chemistry for the development of electrospray ionization (to which Mann contributed). Mann did postdoctoral work at the University of Southern Denmark in Odense with Peter Roepstorff and held

a professorship at the same university subsequently.

In between these appointments, he was a group leader at the European Molecular Biology Laboratory in Heidelberg. During his stay at that institution, he was instrumental in developing high-throughput protein identifications by mass spectrometry that were key to the advance of proteomics. In 2005, he became a director at the Max Planck Institute of Biochemistry in Martinsried (outside Munich), and he also holds an appointment at the University of Copenhagen.

Mann is an acknowledged leader and pioneer in the development of mass-spectrometric-based proteomics and has received numerous prizes and recognition for his extensive achievements. He and his co-workers have developed many important analytical techniques, including stable isotope labeling with amino acids in cell culture (SILAC labeling) (published in MCP) for quantifying MS data (3). He is particularly known for large-scale identifications of proteins and PTMs and the analysis of important complexes and samples of clinical significance. He has published more than 400 research articles (38 of which have appeared in MCP); he is also a member of the MCP editorial board. His keynote MCP lecture for the International Symposium on Mass Spectrometry in the Health and Life Sciences was titled "Technology and Applications of Deep Proteome Sequencing" and covered new developments in mass-spectrometric-based technologies and how these improvements are placing proteomics on par with genomics in terms of sample coverage.

Ruedi Aebersold received his formal training at the Biocenter at the University of Basel and did postdoctoral research at the California Institute of Technology with Lee Hood. He then held academic appointments at the University of British Columbia and the University of Washington, where he and his colleagues worked on a wide variety of proteins and made major contributions to their micro-characterization.

In 2000, Aebersold co-founded the Institute for Systems Biology in Seattle, which has been a leading proponent of the application of proteomic methods and techniques to understanding cell biology at an integrated level. In 2004, he returned to his native Switzerland as a professor at the Swiss Federal Institute of Technology Zurich and the University of Zurich to continue these efforts.

He was one of the earliest investigators to appreciate the importance and power of mass spectrometry in analyzing peptide and protein samples and has been one of the pioneers in the use of this technology.

Aebersold also has received substantial recognition and numerous awards, including the ASBMB Herbert A. Sober Award in 2010, for his studies, responsibilities and associations. He serves on seven editorial boards and was one of the founding associate editors of MCP (and has published in the journal 50 of his more than 500 contributions). His lecture at the 10th HUPO Congress was titled "The Organization of the Proteome in Time and Space" and reflected his contin-

ued interest in expanding our appreciation of living systems by better understanding the dynamics of the proteome.

Both Mann and Aebersold are prominent members of a small cadre of innovators who have birthed the field of proteomics and are now driving its still largely undeveloped potential to ask (and answer) increasingly complex questions. They perfectly represent the power of mass spectrometry and related technologies to eventually make good on the early promises of proteomics (and the other -omic sciences) to make significant inroads into the pressing problems associated with health, energy, food supply and the environment. As such, they are ideally suited to initiate the MCP lecture program. We look forward to this tradition continuing at other meetings and symposia. XXXX

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THE JOURNAL OF LIPID RESEARCH

Cells on fire: trans fats and the human body

BY MARY L. CHANG

In 2003, Denmark became the first country to ban all trans fats from food products produced within its borders, and a new study in the Journal of Lipid Research indicates that the move might have been a smart one.

Trans fat, the more common name for unsaturated fat with trans-isomer fatty acids, has been targeted by medical professionals and health departments around the world as the culprit of the growing obesity epidemic.

At the University of Copenhagen, Nathalie Bendtsen and her colleagues carried out a 16-week, double-blind clini-



cal trial to determine the effects of industrially produced trans fatty acids, or IP-TFA, on established biomarkers of inflammation, oxidative stress and endothelial dysfunction. (Partially hydrogenated vegetable oil is the primary source of IP-TFA.)

Inflammation occurs when chemicals are produced by the immune system; these chemicals cause damage to the body on a cellular level. Development of cardiovascular disease and type 2 diabetes may be accelerated by oxidative stress, an imbalance of the production of reactive oxygen and the impaired ability of the human body to clear toxic products containing reactive oxygen and to repair cellular damage caused by them. Endothelial dysfunction is the underlying cause of all vascular diseases; these diseases occur when blood vessels don't work as well as they should.

Consuming IP-TFA already has been positively linked to markers of low-grade inflammation and endothelial dysfunction. In their paper "Effect of industrially produced trans fat on markers of endothelial dysfunction and systemic inflammation: evidence from a randomized trial in overweight women," Bendsen et al. present the results of their clinical study in which every day they gave healthy, overweight, postmenopausal women IP-TFA partially hydrogenated soybean oil or control oil that contained no IP-TPA incorporated into two bread rolls. Participants underwent fasting blood tests at every clinical visit, 24-hour urine collection and abdominal fat biopsies. The samples were then analyzed.

Levels of tumor necrosis factor alpha ($TNF\alpha$), an inflammatory marker, increased in the IP-TFA group, whereas the levels decreased in the group that received no IP-TPA. However, there were no significant differences between the two groups when other markers in the blood, such as serum C-reactive protein (CRP), adiponectin and interleukin 6 (IL-6), and serum sE-selectin, a biomarker for endothelial dysfunction, were examined. Analysis of the urine samples indicated that the difference between the two groups in the amount of 8-iso-prostaglandin- $F_{2\alpha}$ ($PGF_{2\alpha}$), a marker for oxidative stress, also was not significant. When examining the biopsy samples, the researchers noticed that in the IP-TPA participants, there was a two-fold increase in the content of specific trans fat isomers present in adipose tissue (where fat is stored in the body) that was not observed in control participants' samples.

The study's results support previous research that the link between dietary IP-TFA and cardiovascular disease most likely involves activation of the $TNF\alpha$ system in the body. Partially hydrogenated vegetable oil, the primary source of IP-TFA, might seem harmless on the surface, but it looks like the powers that be in Denmark who decided to ban trans fats are definitely on to something. XXXX

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jbc THE JOURNAL OF
BIOLOGICAL CHEMISTRY

Introducing JBC thematic minireview series on asthma

BY RAJENDRANI MUKHOPADHYAY

Asthma is a disorder that causes the airways of the lungs to swell and constrict, making sufferers wheeze, cough and grapple with shortness of breath and chest tightness. The Journal of Biological Chemistry has played, and will continue to play, a critical role in better understanding the molecular basis for the illness and, ultimately, identifying improved therapies for patients. To highlight JBC authors' contributions to the study of the molecular basis of asthma,



the late JBC associate editor Dale J. Benos first conceived a thematic minireview series on asthma; the series was later completed by associate editor Luke O'Neill.

Asthma research is multidisciplinary and includes immunology, gene expression, signal transduction and ion channel regulation. In the first minireview, Miguel A. Valverde, Gerard Cantero-Recasens, Anna

Garcia-Elias, Carole Jung, Amado Carreras-Sureda and Ruben Vicente at the Pomeu Fabra University in Spain discuss ion channels. In the airways, ion channels are involved in the production of epithelial-based hydroelectrolytic secretions and in the control of intracellular Ca^{2+} levels that activate almost all lung cells. Ion channels are the focus of many studies that seek to better understand asthma pathophysiological mechanisms or to identify therapeutic targets. The review covers animal models, molecular and genetic studies, and clinical observations that relate ion channel activity to the pathogenesis of asthma.

Allergic asthma is a chronic, airway inflammatory disease in which patients exposed to allergens suffer from intermittent attacks of breathlessness, airway hyper-reactivity, wheezing and coughing. Allergic asthma stems from a complex interplay between genetic and environmental factors. The second minireview, by Anil B. Mukherjee and Zhongjian Zhang at the U.S. National Institutes of Health, discusses how genetic and environmental factors culminate in allergic asthma. The authors describe how difficult it is to study allergic responses in asthma because the complex array of sig-

naling reactions is not easily reproduced in animal models.

The third minireview also takes on certain aspects of allergic asthma. In particular, it focuses on elevated IgE levels and increased IgE sensitization as disease hallmarks. Genentech's Lawren C. Wu notes that IgE binding to high-affinity FcεRI and the low-affinity FcεRII/CD23 receptors should be an important goal of future research. Additional points for investigation include "novel cell surface and intracellular mediators of FcεRI activation, mechanisms of intracellular calcium signaling, and new inhibitory proteins that negatively regulate parts of the signaling network downstream of FcεRI activation."

Peter J. Barnes at Imperial College London covers signaling pathways of existing — and quite effective — therapies for asthma in the fourth minireview. Bronchodilators, like the β2-adrenergic receptor (β2AR) agonists, relax airway smooth muscle cells by increasing cyclic AMP concentrations and opening large conductance Ca²⁺ channels. Glucocorticoids are anti-inflammatory treatments that turn off multiple activated inflammatory genes. Beneficial molecular interactions

between β2AR and glucocorticoid-activated pathways exist. Barnes says that our relatively good understanding of how current asthma therapies work in terms of their biochemical mechanisms will help to tweak existing treatments and invent new ones.

This thematic minireview series, like its predecessors, aims to link biochemical processes to an important clinical challenge. Over the past 50 years, both the incidence and the severity of asthma have increased globally, further burdening national public-health services. Still forthcoming in this thematic series are two minireviews, one on exercise-induced asthma by Lisa M. Schwiebert at the University of Alabama and the other on myeloid-derived regulatory cells and redox control in asthma by David D. Chaplin at the University of Alabama.

Visit this thematic series online at <http://www.jbc.org/site/thematics/asthma>. ∞∞∞

Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is a senior science writer and editor for ASBMB.

Valuable work with blood vessels

HERBERT TABOR YOUNG INVESTIGATOR AWARD

Kayla Bayless, an assistant professor in the department of molecular and cellular medicine at the Texas A&M Health Science Center, was named the recipient of a Journal of Biological Chemistry/Herbert Tabor Young Investigator Award for her work toward better understanding how

biochemical and mechanical signals regulate new blood-vessel growth.

"We manipulate gene expression in endothelial cells and test the outcome in three-dimensional models of human endothelial cell sprouting," Bayless says. "This approach is complemented by biochemical assays, proteomics and microscopy to hone in on the function of a particular protein or a complex of proteins."

Bayless, a Texan, earned her B.S. in molecular biology in 1994 at Texas Lutheran University in Seguin and her Ph.D. in medical physiology in 1999 at the


Texas A&M University College of Medicine in College Station, where she worked with Gerald Meininger and George Davis. She completed postdoctoral training in the TAMHSC's pathology department with Davis. ∞∞∞



Kayla Bayless received her Tabor award at the Matrix Metalloproteinases Gordon Research Conference in August in Smithfield, R.I. It was attended by JBC Associate Editor Judith Bond.



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