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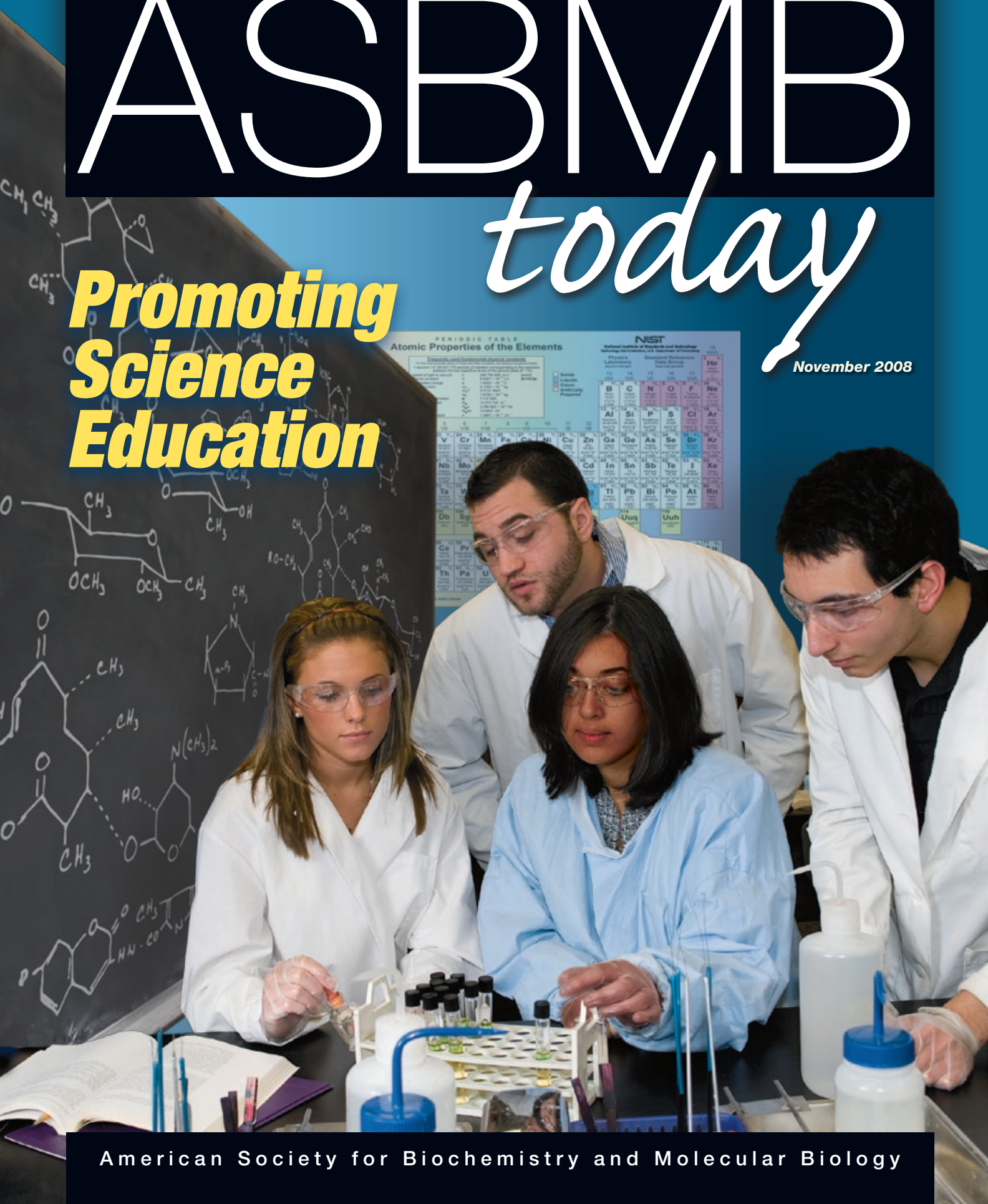
ASBMB today

Promoting Science Education

November 2008



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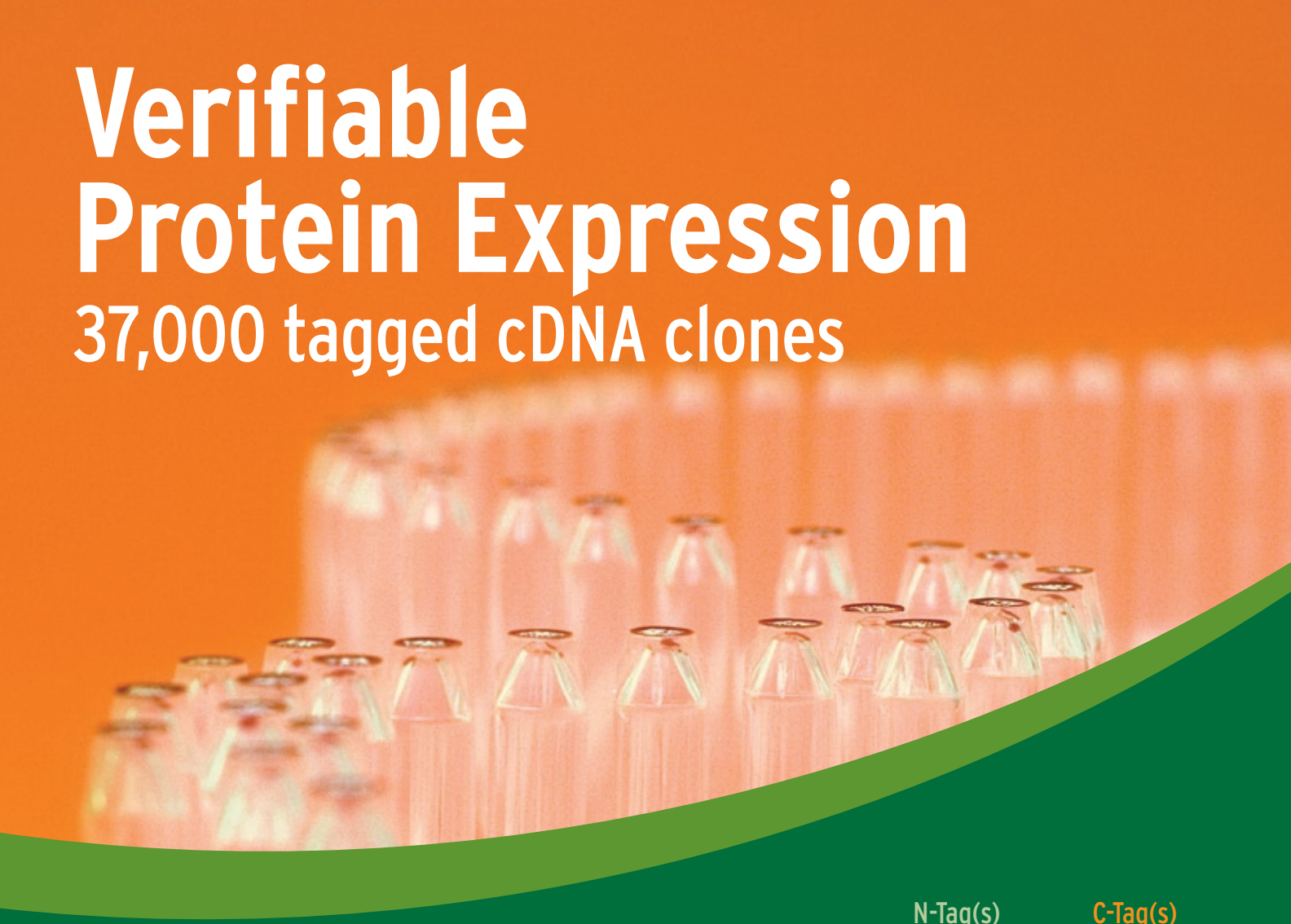

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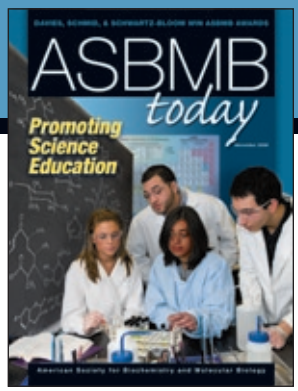

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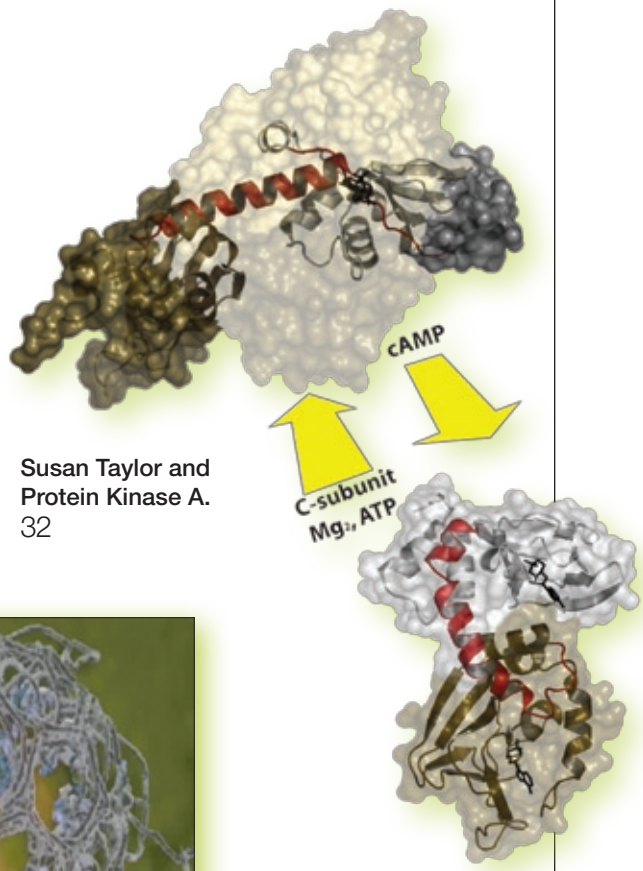

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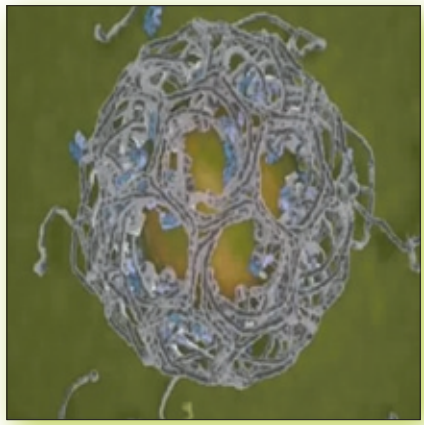

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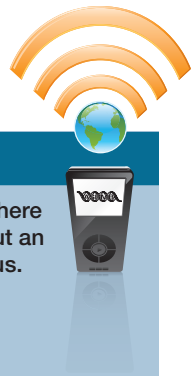

podcast summary

Check out this month's *JBC* News Podcast where we interview a Paper of the Week author about an interesting enzyme isolated from a marine virus.

For this and other ASBMB AudioPhiles podcasts go to:
www.asbmb.org/audio.aspx

ASBMB today

A monthly publication of
The American Society for
Biochemistry and Molecular Biology

from the **editor**

ASBMB and Education

BY NICOLE KRESGE

The Society's Education and Professional Development Committee (EPD) was formed in 1959. Over the years, the committee has been involved in a variety of activities to promote science education including providing grants to high school teachers so they could spend a summer in a research laboratory, sponsoring numerous sessions and tutorials at the ASBMB annual meeting, hosting graduate and undergraduate poster competitions at the annual meeting, organizing an undergraduate Honor Society, and providing K-12 and public outreach tools for ASBMB members.

The EPD also launched the ASBMB Undergraduate Affiliate Network (UAN), which links groups of students and faculty members from research institutions around the nation. By interacting with scientific and educational communities outside their own institutions, students and faculty members benefit from increased research, learning, and networking opportunities. UAN members also have access to FASEB career resources, get discounts on annual meeting registration fees, and receive a subscriptions to *ASBMB Today* and *Enzymatic*, the UAN newsletter. To learn more about the UAN, visit www.tinyurl.com/5bKz3K.

The EPD published a recommended biochemistry and molecular biology undergraduate curriculum, the first version of which became available 16 years ago. In spite of publishing these goals, ASBMB has never systematically asked departments how these skills are imparted or what outcomes were expected if they were put into practice. In Nov. 2006, ASBMB received a grant from the Teagle Foundation to do just that. Using surveys, interviews, and open discussion at the annual meeting, a working group of ASBMB members assessed how the skills and competencies of the recommended curriculum were incorporated into programs at a range of institutions. The results were recently published in a report which can be downloaded from our web site (www.tinyurl.com/6h6772).

This coming summer, ASBMB will be sponsoring a meeting for undergraduate educators. Attendees of the three-and-a-half-day meeting will learn about educational approaches, materials that they can use in their classrooms, and will also be provided with plenty of mentoring and networking opportunities. You can read more about the meeting in the Education column on p. 24 of this issue.

In conjunction with the Society's efforts to promote science education, this issue of *ASBMB Today* contains several education-related articles. One such article offers the reader a glimpse of the University of Delaware's Undergraduate Summer Research Program. Other education-related articles in this issue include: a look at the 2009 ASBMB William C. Rose Award and Exemplary Contributions to Education Award winners, an overview of a program that aims to increase the number of minority M.A. students who continue on to the Ph.D., and finally, a discussion on defining a successful postdoctoral fellowship.

letters to the editor

Intelligent Design: Is the Debate Over?

To the Editor:

I wanted to comment on Gregory A. Petsko's essay "It Is Alive" in the August 2008 *ASBMB Today*.

I am in complete agreement with the gist of the article, *viz.* that "intelligent design" or "creationism" is not science, is malarkey, and it is very unfortunate that some bodies politic choose to include it in the teaching curriculum. Unfortunately, the making of bad decisions is always a risk with democracy, and unless you advocate another system to make choices about what is taught to people's children, you are stuck with democracy (*e.g.* 51 percent trumps 49 percent).

I am very leery when a scientist asserts that "the debate is over" and that there is no further point to open debate about a scientific subject. I agree that intelligent design is not science and not open to analysis from a scientific viewpoint (how could you even propose a hypothesis that could falsify it?); however, the issue of the mechanisms of climate change certainly have not been decided, and I do not agree that that debate is over. The problem with the Louisiana Senate Bill 733, signed into law by Gov. Jindal, is not that it proposes to allow "open debate" on various subjects (evolution, the origins of life, global warming, and human cloning), but that it includes evolution (meaning a discussion of "intelligent design") among those subjects.

Moreover, the criticism of Ben Stein's idiotic film "Expelled: No Intelligence Allowed," although entirely deserved, should not have been extended by reference to Stein's speech writing for Richard Nixon to "demonstrate his faulty judgment." Stein is, in addition to being, as mentioned, an attorney and entertainment figure, also a very fine and well-respected economist, which only shows that you can be an idiot about some things while being very smart about others. There is no need to smear the man as an all-around know-nothing, as he is not.

Political jabs have no legitimate place in a scientific journal, and they should have been edited out.

Sincerely,
Sandy Shaw, Tonopah, NV

Response:

If *ASBMB Today* were a scientific journal, what's in it would be peer-reviewed. It's a magazine, and I write an opinion piece. The fun in that is being able to give my opinions, leavened, I hope, with a bit of humor, on pretty much whatever strikes my fancy. That includes using metaphors and comparisons. Feel free to disagree, and to disapprove, but I'm going to keep doing it.

Gregory A. Petsko

Intelligent Design: Get Involved

To the Editor:

This is in reference to the president's message ("It Is Alive", *ASBMB Today*, August 2008) that discusses the enactment of a bill by the governor of Louisiana to promote "critical thinking" in public schools. The critical thinking bill is seen by many as a back door attempt to introduce "creationism" and "intelligent design" into school classrooms.

The message has the feel of "preaching to the converted" and ignores a noticeable increase in the traction that the creationist argument is slowly gaining in the education boards of some American states (and a very tiny minority of privately funded schools in the UK). Biological societies, through their members, can do more by greater involvement in schools and putting forward the counter arguments to state legislature or by simply writing to their representatives that creationism and intelligent design have no place in a science curriculum.

Incidentally, the current governor of the state of Louisiana is a biology graduate of Brown University and obtained a Master's in political science at Oxford University. Are we to conclude that Oxford is highly effective at teaching political science but Brown is not at teaching biology?

Aamir Ahmed
University College London
London, England

Response:

I agree—my message is preaching to the converted. I guess that's inevitable, given that I'm writing to a bunch of scientists. And Dr. Ahmed is right about the necessity for involvement; I made exactly the same point in my article "Qui Tacit Consentire" in the September issue of *ASBMB Today*.

As for the virtues of an Oxford education *versus* a Brown education, well, I went to Princeton, and my D.Phil. is from Oxford, so I'd better not comment...

Gregory A. Petsko

Intelligent Design: Is ASBMB Today *Anti-Christian?*

To the Editor:

I'm a new member, and my first impression of the *ASBMB Today* publication is that I'm highly offended by the liberal tone of the columns. It's obvious that the slant of the magazine is anti-Christian. I'm a Christian as well as a biochemist, and I'd like to tell Gregory Petsko (and the other liberal contributors) that, if they want to turn the entire Christian community away from science as a career, just keep writing the same way. Please save the postage and cancel my subscription to your magazine (I'll stick to reading scientific, peer-reviewed journals).

Antony Harvey
Thermo Fisher Scientific
San Jose, CA

Response:

I have never said that science is incompatible with being a Christian—or a Muslim, or a Jew. I have said, and will continue to say, that fundamentalist religious doctrine, no matter what religion it's from, has no place in science education—even, or maybe especially, if it cloaks itself in the mantle of pseudo-science. That is not a defense of either liberalism or, for that matter, conservatism. It is a defense of science. What should be offending the Christian community is the attempt by certain of its individuals and groups to distort, ignore, or demonize science in the name of indoctrinating children with a particular religious viewpoint. I would hope that thoughtful Christian scientists would be in the vanguard of the fight against that.

Gregory A. Petsko

Intelligent Design: Tone It Down

To the Editor:

It is apparent that the new President of the ASBMB is a loose cannon. In my opinion it is totally inappropriate for him to comment on his disdain for Presidents Nixon and Bush in his editorial in the August issue of *ASBMB Today*. Indeed, the vitriolic nature of this editorial goes far beyond what one might expect from a clear thinking, rational scientist or even that in common discourse. It was even worse for him to suggest that the ASBMB take punitive action against New Orleans and Louisiana's political leaders, in general, by refusing to hold meetings in New Orleans in the future.

His outburst just makes more difficult a clear scientific discourse on the origins of life and the role of evolution in molding speciation.

It is clear that he needs to be more judicious in his comments as President and therefore, as the representative of the ASBMB.

Sincerely,
Frank Q. Nuttall
University of Minnesota
Minneapolis, MN

DISCLAIMER: *The article on p. 14 of the October 2008 issue of ASBMB Today titled "McCain, Obama, and Biomedical Research" was written by Angela Hvitved while she was the 2007/2008 ASBMB Science Policy Fellow. She has since moved to the National Science Foundation, but the views expressed are the personal views of the author.*

Tell Us What You Think

We appreciate receiving letters that are suitable for publication regarding issues of importance or comment on articles appearing in ASBMB Today. *Letters should be sent to the editor at the address found in the masthead. Letters must be signed and must contain the writer's addresss and telephone number. The editor reserves the right to edit all letters for clarity and length. Opinions expressed in letters do not necessarily reflect ASBMB policy.*

ASBMB Publishes Report on BMB and Liberal Education

In November 2006, ASBMB received a grant from the Teagle Foundation to examine undergraduate programs in biochemistry and molecular biology (BMB) and evaluate the success of their graduates. Using surveys, interviews, and open discussion at the annual meeting, a working group of ASBMB members considered how ASBMB's recommended undergraduate curriculum was incorporated into programs at a range of institutions, and also looked at the broader question of what BMB contributes to a liberal education. The findings of this study are now available for download at www.tinyurl.com/6h6772.

Big Event in the Big Easy

BY GREGORY A PETSKO

Only 209 days to go as I write this. No, I don't mean the remaining time left in the U.S. presidential campaign—that just seems like 209 days. Nor do I mean 209 shopping days until Christmas. If only there were.

I'm referring, of course, to the ASBMB annual meeting. On the 18th of April, 2009, 209 days from today (September 20, 2008), our society will commence five days of great scientific talks, good fellowship, and important discussions about the assault on evolution and the central role of science education, among other things. Abstract submission opened on September 1st and will continue until November 5th. The deadline for applying for travel awards is November 12th, but you must have submitted an abstract by November 5th to be eligible for one. You can register right now at www.asbmb.org/Page.aspx?id=146, and I hope you will. If you're waiting for an invitation, you have one.

The meeting will be held in New Orleans, LA, a.k.a. The Big Easy. New Orleans was my father's favorite city, but not for the reasons you might think. He did love the food, though he thought the fancy French cuisine overpriced (he was always careful with money, befitting a man who never had much of it). He believed—and I agree—that the Cajun and Creole cooking was not only a better value but also among the great American contributions to world culture. He never passed up an opportunity to hear the jazz and blues music that permeates the atmosphere of the city either. But what he loved New Orleans most for was, he said, the way its residents enjoyed life. They understood that life was to be savored, that food and drink were more than necessities, and that the pursuit of pleasure needed to be taken seriously.

Hurricane Katrina did its best to cast a permanent pall on The Big Easy, but people there have a way of bouncing back from adversity. The city's population still hasn't completely returned to its pre-disaster level, and we all know what an appallingly incompetent job the Bush Administration did, and continues to do, in rebuilding those areas that were most severely affected. But the French Quarter is as vibrant and exciting as ever, and the people who have returned to live in New Orleans have lost none of their trademark friendliness and charm.

If you've never been there, you're in for a treat. Stroll the Riverwalk and see the Mississippi, the Father of Waters, as it rolls, in Abraham Lincoln's wonderful phrase, unvexed to the sea. Treat yourself to a muffaletta, a sandwich of cold cuts, cheese, olive salad, and spices that is to the pedestrian sub, hero, or hoagie what the Mona Lisa is to graffiti. (My favorite spot to get one is the Central Grocery on Decatur Street in the French Quarter—they invented it in 1906—but you can find them in lots of other places.) Try some of the world-class cooking by local, but world-famous, chefs like Andrea Apuzzo, Emeril Legasse, or Paul Prudhomme. Have breakfast at Brennan's or a jazz buffet brunch at the Court of Two Sisters (my father's favorite French place). Sample Cajun cooking at Tony Moran's or Creole food at Begue's, which might just be the best-kept restaurant secret in New Orleans.

Treat your ears as well as your stomach. New Orleans is alive with music. Whatever else you do, make a pilgrimage to Preservation Hall, where the finest Dixieland jazz musicians alive, some in their eighties, get together to play the greatest music ever to come from these shores. There are no reservations, and you will probably have to wait in line a half hour or more to get in, but it's worth it. Believe me, it's worth it.

Oh yes, and there's also a scientific meeting going on, so I suppose you ought to spend at least some time at it. This year our Annual Meeting is being held in conjunction with FASEB's Experimental Biology 2009 meeting, so between the two there should be a plethora of symposia, exhibits, and other stimulating activities. Our Program Co-Chairs, Joan W. Conaway of the Stowers Institute for Medical Research and James H. Hurley of NIDDK (NIH), together with their 2009 Program Committee, have put together a wonderful program that features both the traditional areas of interest in the Society and the new fields of research that are being opened up, seemingly every year.

Featured themes will include DNA replication, repair and recombination; chromatin regulation; gene regulation; RNA; protein synthesis and turnover; protein folding, aggregation and chaperones; enzymology; membrane proteins; drug discovery and design; membrane dynamics and organelle biogenesis; metabolism and diseases mechanisms; receptor signaling; lipid signaling and metabolism;

education; and minority affairs. Not to mention the exciting topics that Experimental Biology has planned.

A special highlight of this meeting will be a symposium at 5 p.m. on April 20th entitled "The Evolution of Creationism." Cosponsored by the ASBMB, the American Society for Pharmacology and Experimental Therapeutics, and the American Physiological Society, the symposium, which I am honored to chair, includes the following confirmed speakers: Barbara Forrest, Southeastern Louisiana University, author of *Creationism's Trojan Horse* (a great book I hope you all will read); Federal Judge John E. Jones—who presided at the *Kitzmiller v. Dover* trial in 2005 and whose landmark decision, one of the most brilliantly reasoned and beautifully written you will ever find, once and for all branded "intelligent design" as creationism in sheep's clothing; Ken Miller, Brown University, author of *Finding Darwin's God* and other terrific books on the battle over the teaching of evolution, and Eugenie Scott, the Executive Director of the National Center for Science Education, Oakland, CA, who for many years has been on the front lines in this continuing battle. Since Louisiana has recently passed (and Gov. Bobby Jindal has, in the dead of night, signed) a state law, now being challenged as unconstitutional by a number of organizations, that is designed to facilitate the teaching of religious doctrine in science courses under the guise of promoting "critical thinking," this symposium represents one of our first efforts as a Society to take the fight to the creationists' own territory. Come and be enlightened, outraged, concerned, and, I hope, motivated to go back home and stand up for science.

A word of advice for our international members and attendees preparing to travel to New Orleans: please visit the U.S. Department of State website (www.travel.state.gov/visa/temp/without/without_1990.html) for information regarding the Electronic System for Travel Authorization (ESTA). You may have heard that the U.S. is harder to get into these days than it used to be. I wish I could say that wasn't true, but I'm afraid it is, so please start soon in case you hit any snags. We'd hate to miss seeing you.

It would be great if all of our 12,000 members came to the meeting. I think you'll have a wonderful time if you do. The ASBMB knows how to throw a good party, scientifically speaking of course. And parties, non-scientifically speaking, are New Orleans' specialty. John Petsko, my father, died a few years ago, so he won't be there, but I will be. In his memory I'm going to do many of the things he would have done. I'm hoping my friends will join me. See you in April.

FASEB Welcomes New Legislative Director, Unveils NIH Advocacy Website

BY CARRIE D. WOLINETZ

Although Congress has ended the current session and is unlikely to return before the new year, FASEB's NIH advocacy program has seen some new developments. On October 14th, FASEB welcomed Jennifer Zeitzer as FASEB's Director of Legislative Relations. Previously, Zeitzer was with the Alzheimer's Association where she served as the Director of Congressional Relations and led that organization's efforts in support of federal funding for research. She will be responsible for directing FASEB's legislative agenda, serving as the organization's principal representative on Capitol Hill.

"I am very pleased that Jennifer Zeitzer will be joining our public affairs team. She comes to us with an outstanding reputation as an advocate for the NIH and will provide us with creative, energetic leadership on Capitol Hill," said Howard Garrison, FASEB's Deputy Executive Director for Policy. "Her familiarity with the NIH and medical research funding is a great asset for us."

While at the Alzheimer's Association, Ms. Zeitzer served as chair of the Government Relations Affinity Group for the National Health Council. "Her excellent relationships with the patient advocacy groups will enable us to strengthen our collaboration with other stakeholders in the research community," said FASEB's President Richard Marchase. Zeitzer has worked with FASEB in the past, organizing joint Congressional meetings with leadership from both the patient advocacy and scientific community.

FASEB has also launched a new website (www.nihadvocacy.org) as a resource for the biomedical research advocacy community. "There are many organizations and individuals interested in promoting the extraordinary medical breakthroughs funded by the National Institutes of Health (NIH)," said Garrison. "We wanted to make it easier for the research community, policymakers, and members of the public to find the data and materials they need to advocate for this lifesaving agency."

The NIH Advocacy Clearinghouse comprises links to data resources, reports, educational materials, NIH resources, and tools for scientist-advocates. "After years of flat-funding, it is more important than ever for the biomedical research community, from scientists to patients to research institutions, to be united and engaged in making the case for the NIH," Garrison stated. "There is a wealth of compelling information out there, and it is our hope this resource will provide a common ground for NIH advocates to pool our collective talent and resources." Scientists interested in advocating for the NIH in their own community or on Capitol Hill can find data on the site related to success rates, funding by Congressional district, and institution-specific information. In addition, the site links to materials developed by the FASEB member societies, such as ASBMB's video on meeting with your member of Congress.

"After years of flat-funding, it is more important than ever for the biomedical research community, from scientists to patients to research institutions, to be united and engaged in making the case for the NIH."

Thus far, the response from the community has been positive. "This comprehensive site is useful and convenient. I appreciate having all of these valuable resources in one place," said Claudia Louis, Government Relations Manager for the American Heart Association, "It will be a real timesaver." The site was featured in the Congressional newspaper, *The Hill,* which lauded the site as "one-stop shopping" for NIH advocacy. FASEB plans to regularly update the site and welcomes feedback and contributions from the advocacy community. Other agencies, such as NSF, are being considered for similar compilations.

Carrie D. Wolinetz is Director of Scientific Affairs and Public Relations for the Office of Public Affairs at FASEB. She can be reached at cwolinetz@faseb.org.

A2 Submissions Being Phased Out, the NIH Announces

BY PETER FARNHAM

On Oct. 8 the NIH announced that starting early next year, the agency will accept only a single amendment to an original grant application. According to the NIH, "Failure to receive funding after two submissions (i.e., the original and the single amendment) will mean that the applicant should substantially re-design the project rather than simply change the application in response to previous reviews."

The new policy takes effect Jan. 25, 2009, and applies to all new and competing renewal applications submitted on or after that date. An application already in the pipeline that is submitted before Jan. 25, 2009 will be permitted an A2 resubmission, but after Jan. 7, 2011, A2 resubmissions will no longer be permitted for these "grandfathered" applications.

This change is being implemented in hopes that it will lead to higher-quality first applications with fewer resubmissions.

Background

The NIH has been reviewing its peer review policies for about two years, and this action implements one of the major recommendations resulting from the review. One of the NIH's concerns has been the decrease in the number of first submissions being funded. Funding trends also show that review committees are more likely to fund amended applications than original applications, resulting in more review work for already hard-pressed study sections, as well as delays in funding good science.

Whether or not the new policy will work is, of course, an open question. One of the worries expressed by the scientific community is that applicants will simply resubmit their old grant with a few minor changes and call it new, thus causing an even greater increase in the number of applications. Aware of this possibility, the NIH seeks to prevent it by using a strict definition of "new application." An applicant can resubmit after two submissions, according to the notice, "…but only if the application is fundamentally revised to qualify as new. A new application is expected to be substantially different in content and scope with more significant differences than are normally encountered in an amended application. Note that there is no time limit for the submission of the original and subsequent A1."

The policy applies to all types of grant applications except for Requests for Applications, which have an even more rigorous resubmission requirement. Currently, no amendments are permitted for applications submitted in response to an RFA unless the RFA indicates resubmissions are accepted.

Applicants with questions are strongly encouraged to contact their program officers. You can also contact the Division of Receipt and Referral at the Center for Scientific Review at: EnhancingPeerReview@mail.nih.gov.

Peter Farnham, CAE, is Public Affairs Officer of the Society. He can be reached at pfarnham@asbmb.org.

The NIH Begins to Implement Peer Review Changes

On Sept. 30, after an extensive, yearlong review, the NIH announced that it would begin implementing changes to enhance its peer review system . According to the notice, "…the increasing complexity and interdisciplinary nature of modern research has created a number of new challenges and demands on the system that merit enhancements in critical areas."

"These changes help ensure that the NIH continues to be the world-renowned peer review system," Elias A. Zerhouni, M.D., NIH director stated. "We did the review through a deliberative process, and we are going to implement the changes in a similar way… with a phased approach, and carefully evaluate the impact of these changes in real time."

Although many changes of the priority areas are still in the process of being developed, the first set of key changes for the 2009-2010 calendar years include:

- Reducing application length to 12 pages for Jan. 2010 receipt dates.
- Reducing the number of resubmissions (see the accompanying story regarding this change, announced on Oct. 8).
- Beginning in 2009, the NIH will "increase flexibility of reviewers' tour of duty" and may begin experimenting with virtual meetings as an alternative for in-person meetings. Additional training will also be provided.

Congress Heads Home, Again Having Failed to Approve New Budget

BY PETER FARNHAM

In what has become almost the norm in the appropriations process in recent years, Congress adjourned to return home and begin their campaigns, leaving most of the federal government funded at 2008 levels under a continuing resolution that includes the NIH, NSF, and most other science agencies. In effect through Mar. 6, 2009, President George W. Bush signed the bill on Sept. 30 after it passed overwhelmingly in both the House and Senate earlier that month.

In fact, the situation is actually worse than ever regarding funding for the NIH, NSF, and the Department of Energy's Office of Science. The CR provides *less* money than these agencies received in fiscal year 2008, ever since the legislators excluded the collective $275 million that the supplemental 2008 spending bill Congress passed in June allocated to them.

The only agencies funded at 2009 levels are those in the defense, homeland security, and military construction-VA bills. The CR also includes funds for disaster relief. The only bright spot for scientific research is that the medical and prosthetics research program at the Department of Veterans Affairs received an increase of more than 24 percent over 2008 levels.

One of the major problems for NIH grantees is that all grants remain funded at the 2008 level since it is a part of the Department of Health and Human Services (HHS), which is one of the agencies overlooked in Congress's resolution. Until the final fiscal year 2009 appropriation is enacted (which is not expected before next spring), the NIH has indicated that it will issue non-competing research grant awards at a level about 10 percent less than the amount indicated on the most recent Notice of Award. The NIH says it "will consider upward adjustments to these levels" after the final appropriation is enacted, but in the meantime expects institutions to monitor their expenditures carefully. However, given that under earlier CRs, the NIH funded type five grants at 80 percent levels, the fact that they are funding them now at 90 percent is at least somewhat of an improvement.

The notice announcing this policy is online at www.grants.nih.gov/grants/guide/notice-files/NOT-OD-09-002.html.

What Might Have Been...

There were a few promising signs over the summer that research funding might receive better treatment through congressional action. A $56.2 billion economic recovery plan had been introduced in the Senate to provide emergency supplemental appropriations for fiscal year 2008. Cosponsored and released by Senate Majority Leader Harry Reid (D-NV) and Senate Appropriations Committee Chairman Robert Byrd (D-WV) on Sept. 25, the bill included an additional $1.2 billion for the NIH and $150 million for the DOE's Office of Science "to meet international and domestic research priorities."

The plan's summary noted that the NIH funding has "…failed to keep up with biomedical inflation in fiscal year '08 for the fifth year in a row, a trend that has discouraged many young scientists from this field and puts the nation at risk of losing a generation of talented investigators. The second stimulus includes $1.2 billion to restore some of the purchasing power of the NIH that was lost because of inflation in the past five years and allow the NIH to award at least 3,300 new research project grants that could lead to cures and treatments for cancer, Alzheimer's, heart disease, and many other devastating diseases."

ASBMB began to mobilize its Local Advocates Network (LAN) to write to their members of Congress and senators in an effort to support this package. However, in an uncharacteristically rapid resolution of a funding issue, Senate democrats were unable to muster the 60 votes needed to invoke cloture, and thus cut off debate of the bill. Senate republicans sided with the president, who had vowed to veto the bill on Sept. 26.

Will Funding Improve in 2009?

There is no doubt that there will be changes in policy regarding science and funding starting next year, since both candidates for president have indicated that they differ from the Bush administration in several areas, including spending on science. However, in order to bring about significant increases, one has to wonder how it could be funded.

Consider the massive fiscal problems our country currently faces. One must take into account the wars in Iraq and Afghanistan, a $12 trillion national debt, and annual budget deficits in the hundreds of billions. Other urgent issues in our economy include growing Social Security spending needs due to the aging "baby boomer" population, and a new and expensive drug benefit under Medicare Part D. And, who could forget the recent $700 billion "bailout" of the investment banking industry, which may grow to $1 trillion or more in coming years?

Thus, there is very little money left to pay for domestic discretionary spending without resorting to some combination of unpalatable alternatives: increased deficit spending and/or raising taxes. While ending the war in Iraq would obviously free up some funds, there remains the possibility of deterioration in the region in the event of a hasty American withdrawal. It seems likely that even Sen. Obama (who has vowed to "end" the war there) may find his options limited due to the situation on the ground.

Consequently, the likelihood of large spending increases on biomedical and other scientific research, even with an otherwise sympathetic administration and Congress, may be limited.

asbmb member spotlight

Ehlers Receives Award for Breakthrough Research

Michael D. Ehlers, a Howard Hughes Medical Institute Investigator and professor in the Department of Neurobiology at the Duke University Medical Center, won the North Carolina Biotechnology Center's 2008 Life Sciences Achievement Award for Breakthrough Research.

The award is given jointly by the North Carolina Biotechnology Center and the National Multiple Sclerosis Society to a North Carolina researcher who has contributed significantly to the life sciences. Ehlers received the award at the Eastern North Carolina Chapter of the National Multiple Sclerosis Society's annual Dinner of Champions this past September.

Ehlers received the award in recognition of his work at the interface of cell biology and neural circuit plasticity. His research is directed at understanding protein trafficking and turnover in dendrites and its relationship to synapse formation and function. Using a combination of live-cell imaging, protein biochemistry, and electrophysiology, Ehlers studies the molecular and cellular mechanisms which regulate the trafficking of ionotropic glutamate receptors; the dynamics and regulation of secretory organelles and the endocytic machinery; the control of protein stability at the postsynaptic membrane; and the role of membrane trafficking in generating and maintaining neuronal morphology and architecture.

Eisenberg Honored with Harvey Prize

David Eisenberg, a Howard Hughes Medical Institute Investigator and professor at the University of California, Los Angeles, received the 2008 Harvey Prize in Human Health from the Technion—Israel Institute of Technology. The prize was given to Eisenberg for his research on how proteins interact with each other and how these interactions are related to disease.

The Harvey Prize is awarded annually by the Technion in a variety of disciplines within the categories of Science & Technology and Human Health. The award will be presented to Eisenberg at a ceremony next spring at the Technion.

Eisenberg, who is also director of the UCLA-DOE Institute for Genomics and Proteomics, studies protein interactions using X-ray crystallography, computational analyses, and biochemical methods. He has a long-term goal of understanding and manipulating the functioning of cells through the interactions of their constituent proteins. The crystallography projects of Eisenberg's lab fall into two groups: understanding the structures that underlie the pathologies of amyloid and prions; and studying the structural biology of *Mycobacterium tuberculosis*, with particular focus on protein-protein complexes.

Korn to Become Vice Provost for Research

David Korn, a longtime leader in research policy and science administration, will become Harvard University's vice provost for research this November.

A distinguished pathologist who was also dean of the Stanford University School of Medicine for more than a decade, Korn has served in senior roles at the Association of American Medical Colleges since 1997, and most recently was the Association's chief scientific officer.

In his new role at Harvard, Korn will be responsible for the review, development, and implementation of policies related to the conduct of academic research, especially in the sciences, as well as to aspects of the university's relations with industry. In addition, he will work with the provost, deans, the executive vice president, and others to identify and ease practical impediments to interdisciplinary collaboration in research. Korn's expertise in the field of research will be valuable as Harvard increasingly pursues academic ventures involving multiple schools, departments, and affiliated institutions whose policies and practices sometimes vary in ways that can constrain opportunities for cooperative work.

"I see this job as arguably the most challenging of my career, because it does not, like most such posts, come with its own history, roadmap, or culture," said Korn.

Jimenez Honored as ACR Master

Sergio A. Jimenez, Professor of Biochemistry and Molecular Biology at Thomas Jefferson University, was honored as an ACR Master at the American College of Rheumatology Annual Scientific Meeting in San Francisco this past October for his distinguished career as a researcher and clinician in the molecular biology of rheumatological diseases.

Jimenez is currently Director of the Scleroderma Center, Co-Director of the Jefferson Institute of Molecular Medicine, and Director of the Division of Connective Tissue Diseases at Thomas Jefferson University. His research activities have focused on the application of biochemical, molecular biological, and genetic approaches to the study of scleroderma, fibrotic disorders, and osteoarthritis. His major contributions include identifying the mechanisms of cytokine regulation of collagen gene expression and of the interactions between inflammatory cells and fibroblasts. Other contributions by Jimenez include the study of the role of transforming growth factor in tissue fibrosis, and the identification of cartilage gene mutations in osteoarthritis. Finally, his demonstration of microchimeric fetal cells in affected tissues from scleroderma patients, supporting the hypothesis that fetal cell transfer across the placenta during pregnancy may cause the disease, shows Jimenez's formidable researching ability.

Shulman Wins Korsmeyer Award

Gerald I. Shulman, a Howard Hughes Medical Institute Investigator and Professor of Medicine and Cellular and Molecular Physiology at Yale University, received the 2008 Stanley J. Korsmeyer Award from the American Society for Clinical Investigation.

The Korsmeyer Award is named in honor of Stanley J. Korsmeyer, the first recipient of the award in 1998 who passed away in March 2005. The annual award is presented by the ASCI to one of its members for significant contributions to the understanding of human disease and to mentoring future researchers.

Shulman is being recognized for his contributions to furthering the understanding of the mechanisms underlying the pathogenesis of type 2 diabetes mellitus (T2DM). According to the ASCI, he "has pioneered the use of magnetic resonance spectroscopy (MRS) to non-invasively examine intracellular glucose and fat metabolism in humans. This has afforded a dynamic view of intracellular metabolism in humans, not before possible, that has led to several fundamental discoveries in our understanding of the regulation of liver and muscle glucose metabolism in humans and its dysregulation in patients with T2DM."

Sonenberg Receives Gairdner International Award

Nahum Sonenberg, a professor in the Department of Biochemistry and McGill Cancer Centre at McGill University in Montreal, was named the recipient of a 2008 Gairdner International Award.

Sonenberg was recognized "for his pioneering discoveries in cellular translation of genetic information." Sonenberg's primary research interest has been understanding the control of protein synthesis. He identified the mRNA 5' cap-binding protein, eIF4E, and discovered the IRES (internal ribosome entry site) mechanism of translation initiation in eukaryotes, as well as the regulation of cap-dependent translation by the eIF4E binding proteins (4E-BPs). Sonenberg's research also revealed that eIF4E is a proto-oncogene and demonstrated that rapamycin inhibits eIF4E activity. Finally, while generating 4E-BP knock out mice, he and his colleagues found that this translation inhibitor plays critical roles in the metabolism of adipose tissue, learning, and memory.

"The Gairdner International Award consistently identifies some of the world's greatest scientists, a disproportionate number of whom go on to win Nobel prizes," said Denis Thérien, Vice-Principal, Research and International Relations at McGill. "McGill is very proud to be the home of such a scholar. Dr. Sonenberg is truly among his peers in this group and we are delighted to celebrate this success with him."

Four Members Elected to Royal Society of Canada

The Academies of Arts, Humanities and Sciences of Canada recently elected Miodrag Belosevic, Eleftherios P. Diamandis, Jean E. Vance, and André Veillette to the Royal Society of Canada.

Miodrag Belosevic, a professor in the Department of Biological Sciences at the University of Alberta, studies the immune mechanisms of host-pathogen interactions at both organismal and molecular levels. His research crosses disciplinary boundaries and includes the development of novel animal models to study infectious diseases, the elucidation of the mechanisms of host defense in mammals and lower vertebrates, and inactivation of waterborne pathogens.

Eleftherios P. Diamandis is a professor in the Department of Pathology and Laboratory Medicine at Mount Sinai Hospital in Toronto. He is internationally known for his contributions in the area of prostate cancer diagnosis-prognosis. His pioneering work has established the complete genomic organization of the prostate-specific-antigen proteinase family, their cell biology, enzymology, activation of cell signaling, and their involvement in cancer and skin disorders. His work has improved patient care and transformed the way cancer is diagnosed and treated.

Jean E. Vance, a professor in the Department of Medicine and in the Group on Molecular and Cell Biology of Lipids at University of Alberta, focuses on phospholipid and cholesterol metabolism. Her work on specialized membranes associated with mitochondria changed the way biologists think about intracellular lipid transport. She has developed and characterized three new strains of knock out mice and her research provides key insights into mechanisms of cholesterol and phospholipid transport in the brain.

André Veillette is a Howard Hughes Medical Institute International Research Scholar and a Research Unit Director in the Laboratory of Molecular Oncology at the Clinical Research Institute of Montreal. He is interested in elucidating the molecular mechanisms that control the activation and differentiation of immune cells, in particular T cells and natural killer cells. Currently, he is using a combination of biochemical approaches and mouse genetics to understand how immune cells control health and disease.

Founded in 1882, Royal Society is Canada's senior and most prestigious scholarly organization. Election to Royal Society of Canada is the highest honor a scholar can achieve in the Arts, Humanities and Sciences. A total of 72 new Fellows and two Specially Elected Fellows were invited to join the Academies of the Royal Society by their peers in recognition of outstanding scholarly, scientific, and artistic achievement in 2008.

In Memoriam: Roger A. Davis (1945-2008)

BY ALAN D. ATTIE, JOSEPH L. WITZTUM, PETER A. EDWARDS, AND A. JAKE LUSIS

On Jun. 17, 2008, the lipid research community lost a beloved friend and scholar, Roger A. Davis. Roger was a major contributor to our understanding of the regulation of lipoprotein production, bile acid metabolism, and atherosclerosis.

Roger gravitated to science at an early age; he loved to tinker and felt that the truthfulness of science provided a refuge from the conflicting religious orthodoxies between the two sides of his family. During his senior year of high school in Wilmington, Delaware, he befriended prominent DuPont chemist Howard Simmons, who taught Roger how to smoke cigars, drink scotch, and perhaps most importantly, love organic chemistry. Roger took to Simmons' teachings, as he pursued chemistry for both his undergraduate and graduate degrees. After earning his doctorate in organic chemistry at Washington State University, he studied the biophysical aspects of bile acids in Fred Kern's laboratory at the University of Colorado. But, it was in Dan Steinberg's laboratory at UCSD where he first fell in love with biology and began what would become a lifelong involvement in the assembly and secretion of apolipoprotein B-containing lipoproteins.

Throughout his career, Roger, who served on the faculties of Louisiana State University, University of Colorado, and San Diego State University, exuded an insatiable curiosity that led to his unusually broad view of important biological problems. Although he liked to refer to himself as a chemist working in biology, his interests encompassed diverse fields including nutrition, metabolism, immunology, and genetics, and he was not afraid to employ techniques from each of these areas.

One of Roger's most influential discoveries occurred in 1987 when he found that a substantial fraction of synthesized apoB was actually degraded somewhere along the secretory pathway. In fact, the amount of secreted apoB is determined by the amount rescued from degradation.[1] In elegantly constructed and technically challenging experiments, Roger then demonstrated that critical segments of the apoB molecule require an interaction with microsomal triglyceride transfer protein (MTP) to be translocated across the ER membrane.[2] He also demonstrated that apoB secretion was highly sensitive to MTP but not to free fatty acids or triglycerides.[3] Of note, these significant findings preceded the appreciation of proteasomal and ER-associated degradation, now very active research fields in their own right.

Roger was prescient in other areas as well; as early as 1983, he showed that, contrary to widespread scientific belief, bile acids do not exert direct feedback inhibition on bile acid synthesis.[4,5] Subsequent discoveries would confirm his findings, clearly establishing that bile acids, through FXR, induce the intestinal expression of FGF 15

which in turn mediates the indirect feedback on hepatic bile acid production through a signaling pathway involving the suppression of Cyp7A in the liver.[6-9] Roger also showed, prior to the discovery of LXR, that cholesterol is a positive effector of bile acid synthesis.[5]

One of Roger's greatest interests was developing new therapeutic approaches. He reasoned that hepatic macrophages (Kupffer cells) could provide a useful vehicle for delivery of protective genes in the liver, which has unrestricted contact with the blood. To test this principle, he created transgenic mice expressing the atherosclerosis-protective enzyme paraoxonase-1, and transplanted their marrow into hyperlipidemic recipient mice treated with gadolinium chloride (to destroy their endogenous Kupffer cells). This clever strategy resulted in a dramatic reduction of atherosclerotic lesions.[10]

In recent years, Roger focused his attention on the role of thioredoxin interacting protein (txnip) in metabolism. Studying *txnip* knockout mice, Roger found that this gene plays a key role in mitochondrial function in muscle. In a landmark study, and his last research publication, Roger showed that mice deficient in muscle *txnip* have a profound defect in fatty acid and ketone body oxidation and a dramatic increase in insulin sensitivity; the latter phenotype was associated with a suppression of PTEN and argued that this was a consequence of an altered NAD^+/NADH ratio.[11] Roger was passionate about this new direction and shortly before his death, obtained an NIH grant for this project.

Roger brought his passion for science to his battle with prostate cancer. He was simultaneously fascinated and frightened by his illness. He studied it and devised several novel therapies, all of which were attempted. And, perhaps due to his interventions, he lived far longer than his doctors predicted.

Roger was deeply devoted to his wife of 36 years, Kathy, his daughter, Kimmie, and his son, Harley. He enjoyed having intimate gatherings with friends and was especially proud of his Louisiana gumbo and jambalaya. He enjoyed sailing, golf, and was a lifelong avid motorcycle rider, with a special fondness for Harley-Davidson bikes.

Roger had an extraordinary capacity for friendship. He developed a wide network of lifelong friends from all walks of life and continually nurtured those friendships with his warmth, wit, companionship, and *joie de vivre.* Within his scientific milieu, he was deeply appreciated for his razor-sharp judgment, his inclination to stimulate critical discussions, and his ability to speak with scientific authority without ever being pretentious or pedantic. His love of science emanated from his belief in its integrity and authenticity. He had low tolerance for scientists who exaggerated or oversold their data. His sardonic, sometimes corny wit, his hilarious puns, and his ability to make us take ourselves less seriously added much-needed levity to scientific conferences, committee meetings, and *Journal of Lipid Research* Editorial Board meetings. We all miss him terribly.

Alan D. Attie is a professor in the Department of Biochemistry at the University of Wisconsin-Madison. Joseph L. Witztum is a professor in the Department of Medicine at the University of California-San Diego. Peter A. Edwards is a professor in the Department of Biological Chemistry at UCLA. A. Jake Lusis is a professor in the Department of Human Genetics at UCLA.

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A memorial gift can be sent to:
The Roger Davis Memorial Scholarship Fund
P.O. Box 48, Solana Beach, CA 92075

University of Delaware's Undergraduate Summer Research Program: *Turning Students into Scholars*

BY NICK ZAGORSKI

On the afternoon of August 13, the campus of the University of Delaware is experiencing a typical summer day; a few students meander along the grassy mall known as 'The Green' while some others set up a volleyball net to take advantage of the weather. It's a relaxed atmosphere, where the biggest buzz is provided by the cicadas droning away from the treetops.

Inside McKinly Lab, however, there is a buzz of a different sort. Over 120 undergraduates (along with faculty and some other interested visitors) are milling around the halls of this building, looking over and discussing posters made by their peers. With studies that span disciplines from biology to chemistry and engineering, these posters represent the culmination of Delaware's Summer Undergraduate Research Enrichment Program, wherein dedicated students take their first careful steps toward becoming independent-thinking scientists.

As Hal White, professor of Chemistry and Biochemistry as well as Director of UD's HHMI Undergraduate Science Education Program (of which the Enrichment Program is one aspect), describes it, the program is not just about providing research opportunities to undergraduates—"we're not in the business of padding resumes," he says; rather, it tries to enable the transition from studentship to scholarship.

"The skill set required by today's graduate students is quite demanding," notes Louis Guillette, a professor of Zoology and HHMI Professor at the University of Florida who kicked off the poster section with an engaging plenary lecture on environmental influences on alligator development. "But in focusing more on experimental design and results and not scholarly thinking, mentors face the risk of creating Ph.D. technicians as opposed to actual scientists."

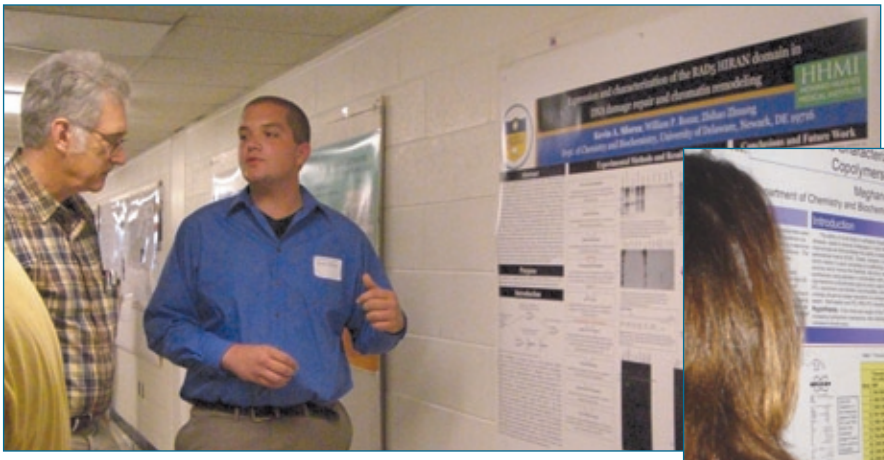
That's why instilling the proper frame of mind has been a major emphasis of Delaware's summer research program. Although the selected students (who apply to one of six potential fellowship programs that sponsor the program) do spend a lot of time in the lab, conducting their own project over a 10-week period from early June to mid-August, they also attend weekly seminars given by Delaware faculty and guests that touch on issues pertinent to future researchers. Such topics include science ethics, health disparities, managing a lab, and of course, how to get into the best graduate programs.

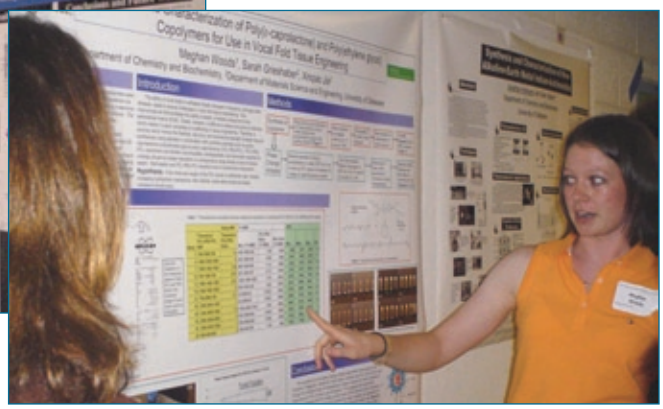
And then there are the posters, which to White represent more than just a slapdash collection of figures and results. "Effective communication is still of paramount importance in science," says White, "and unfortunately, is still often overlooked."

That's why the poster session is a significant—and required—element of the program. White believes that if a student can assemble the most pertinent findings of their research into a coherent summary, and then explain that summary to other individuals, then that helps them truly understand their work. "It's not just telling me what you found," White says. "You should know why the experiments were done, what limitations your study has, and importantly, why the results are relevant."

White likes to have the poster session mimic those at scientific conferences as closely as possible. He and other faculty wander around and ask tough questions of the presenters and encourage students to do the same (knowing how to ask the right questions is as important as knowing how to answer them). He also brings in external guests, such as HHMI staff and members of local industry to help round out the crowd. The session even includes a series of oral presentations that are judged by a panel of experts from local industry.

Having such a grand atmosphere helps the students because many of them will go on to present their work at national meetings. In fact, around 10-15 of the posters at each session are eventually submitted for the Undergraduate Poster Competition at the ASBMB annual meeting. And over the next several months, these chosen undergraduates present their posters at many regional events and receive plenty of feedback to prepare for the competition. "We train them quite a bit," says White, "and we give them advice on every detail; how to make the title eye-catching, the best use of colors, what data are missing. Then we make them redo the poster."





Left: Hal White talks to a student about his poster.

Below: Meghan Woods presents her poster to an onlooker.

Junior Tyler Bazzoli, who has been working on a project identifying biomarkers for the major histocompatibility complex (MHC) gene, went through the whole process last year on the way to ASBMB 2008 in San Diego. "I had to remake my poster six times," he says. "I saved all my previous versions, too, and sometimes I would look back and think, "Wow, I can't believe I left out that piece of information."

But all the critique and practice sessions, which culminate in a mock competition on the Delaware campus a few weeks before the ASBMB annual meeting, have certainly paid off. At this year's meeting in San Diego, Delaware undergraduates took home three of the four top prizes, and also claimed six honorable mentions. This impressive tally was no fluke either; since Delaware began their HHMI program eight years ago, their students have won more awards at ASBMB meetings than any other participating school.

Such national accolades are impressive, as are the exceptional graduate programs that the summer researchers eventually move on to, but White and other Delaware faculty involved with the undergraduate research program are more impressed with how their students have really come to embrace research. "This program has had such a positive impact on me," says incoming senior Meghan Woods—a sentiment that is shared with almost all the other presenters.

Woods has in fact just taken over as president of Delaware's ASBMB Undergraduate Affiliates Network (UAN), a group aimed at helping science undergraduates move forward in their careers. "We try to get the word out to students about all the wonderful research opportunities at the school, especially in other non-biology departments," she says (Woods herself has been working in the Materials Science Department on elastin-mimetic hydrogels for vocal cord therapy). The UAN has also been very active in trying to initiate a seminar series geared toward undergraduates, as well as recurring debates on hot-button topics like stem cells and evolution; thus, it may come as no surprise that in addition to the individual awards, Delaware was awarded the Outstanding UAN Chapter Award at the past annual meeting.

Biology Professor David Usher, who serves as assistant director of the HHMI Program, says that "we wanted to impart the sense that, for any student interested in science or medicine, undergraduate research is something you *must* do, not something you *can* do. And it has taken hold."

Usher points out that when the first Summer Enrichment Program started in 2001, 30 students took part; in just seven years that number has swelled to 124 (though in fact this year's program was down slightly from the 168 students who took part in 2007). As almost all the summer fellows are sophomores or juniors, most of whom continue with their research projects for the rest of their undergraduate time, the program's biggest problem has quickly changed from generating interest to generating space.

"Faculty saturation is definitely a main concern," says White. "Over 90 percent of our science faculty have taken on undergraduates, and we've already expanded into areas like engineering, earth sciences, even physical therapy. We recently opened up a new research partnership with the Alfred I. DuPont Children's Hospital in Wilmington to help meet some of our demand."

White's second biggest concern? Well, that the secret to the University of Delaware program's success might now be out.

Nick Zagorski is a science writer for ASBMB. He can be reached at nzagorski@asbmb.org.

Exchanging and Publishing Proteomics Data: A Report from HUPO2008

BY ROBERT CHALKLEY

The Human Proteome Organization (HUPO) 7th Annual World Congress recently took place in Amsterdam. During the main meeting and during several satellite meetings, there was extensive discussion on the issues involved in exchanging and publishing proteomics data.

The International Proteomics Summit

A few days before the main meeting, the National Cancer Institute (NCI) organized an international summit entitled "Proteomics Data Release and Sharing Policy." Speakers at this summit included representatives from major proteomics data repositories, including the European Bioinformatics Institute (EBI), the Global Proteome Machine (GPM), and the NIH, which is in the process of launching its own proteomics data repository. There was also strong representation from various journals and funding agencies.

The summit started with discussion of the different challenges that are associated with sharing proteomics data compared with other data types such as genomic data. It was acknowledged that the greater variety of information that can be extracted from proteomics data, from protein identification through modification identification to quantitative measurements, means that very different levels of information are required depending on the goals of the study. The range of different analogous software tools in use in the community for acquisition and analysis of mass spectrometry data also creates significant challenges in allowing the exchange of data between labs or repositories.

The next session discussed what journals and data repositories are currently doing to deal with the publishing and exchange of data. The data repositories can be grouped into two camps: those that report the submitter's interpretation of the data they upload to the repository (for example, the PRIDE repository[1]), and those sites that choose to interpret the data that is submitted themselves, so that a consistent measure of reliability is attached to all data in the repository (for example, the GPM database[2], where all data is processed using the X!Tandem software). Both approaches have their advantages; having consistency in the quality of the presented results is obviously important, but presenting the researcher's interpretation is clearly required if the data are linked to a scientific publication in a journal.

There are mechanisms already in place to exchange data between repositories through the ProteomExchange consortium[3], so if data are submitted to one repository in the consortium it will be distributed throughout the consortium. So, does it make any difference to which repository a researcher submits their data? PRIDE differs slightly from the other repositories in that as well as storing the results it tries to capture "metadata" about the experiment, such as the source of the samples and methods of analysis. The capture of this information could potentially be of importance for journal submissions, and is discussed below.

Journals and Repositories

When a journal publishes the results of a study, it is implicitly stating it believes the results are reliable. However, until fairly recently there was no mechanism in place to make sure proteomic data reliability could be assessed. The production of publication guidelines for proteomic data has been driven by *Molecular and Cellular Proteomics*. A meeting sponsored by the Journal in 2005 brought together key members of the proteomics community, including researchers, search engine developers, instrument manufacturers, and representatives of most journals publishing proteomic data. The result of this meeting was a set of rules referred to as the "Paris Guidelines" that document the minimal information required in a proteomics manuscript to be able to assess the reliability of results.[4] *MCP* is currently the only journal enforcing these requirements at the editorial level for all pertinent manuscripts, whereas other journals recommend the use of these, or similar guidelines, but rely on reviewers to highlight missing information.

At the current meeting, it was discussed whether data

repositories and journals could work together—perhaps if journals required the submission of data to a repository, then repositories could ensure that germane information about the experiment is submitted to the data repository before the submission is accepted. Repositories agreed this would be possible but only practical if all journals had the same requirements, as they did not want to have to develop separate checking systems for each journal. It was felt among journal representatives that a minimal list of required information could be agreed upon. This list would not cover all of a journal's publication guidelines, but would reduce the amount of information that needed to be checked in the editorial or reviewing process.

The production of publication guidelines for proteomic data has been driven by *Molecular and Cellular Proteomics*.

The suggestion that journals should require submission of results to a data repository was met with widespread support, especially from funding agency representatives, who want the best value from their financial investments in research. Data repository representatives warned that they would need to increase capacity to deal with this potential data influx, but thought they would be able to cope. Indeed, PRIDE reported a significant increase in submissions within the last few months that has coincided with the journal *Proteomics* recommending submission of results to this repository.

There was discussion about whether authors should also submit raw data in either instrument vendor format or a common standard format. It was agreed that in most cases the raw data are not necessary, and the extra space (and cost) required to store raw data means it is not worth asking for it. If raw data are to be supplied, most people felt that the instrument vendor format is better than translating it into a common format such as mzML[5], as there is always some information loss during translation, combined with the fact that the instrument format is invariably a much smaller file.

For the final part of the summit, the attendees broke into working groups to draw up metrics for data quality, policies for ensuring data quality, and determining policies for non-mass spectrometric proteomics data. A white paper will be produced by NCI that will summarize the output from these working groups.

A Publishing in Proteomics Workshop

Similar topics were discussed during the main HUPO conference at a workshop entitled "Publishing in Proteomics: A Dialogue of Investigators and Journals." In this session, representatives from the four journals that publish the majority of proteomics data (*MCP*, *Proteomics*, *Journal of Proteome Research*, and the *Nature* group of journals) gave presentations on their experiences handling proteomics data and presented their issues and concerns.

After the formal presentations there was further debate by the panel and audience. Debate topics included whether common publication guidelines should be used for all proteomics publications; mechanisms for enforcing guideline compliance; how to deal with the large amount of data that may need to be submitted to support publications; what formats are acceptable for supplementary data; and a discussion of ethical issues, such as the potential complications of presenting unpublished results at a conference without the danger of later being "scooped" for publication in a journal. There was a lively level of discussion, and both panel and audience felt it was a useful and unusual opportunity to have direct discussion between authors and journals. Hence, it was suggested that similar sessions should be held at future conferences.

The amount and complexity of proteomics data being produced has exploded over the last five to ten years, and journals and repositories were initially slow to adapt to these new challenges in data assessment and exchange. The discussions at the HUPO Congress show that the problems are now well recognized and some policies are in place, but there is still work to do, and it will be important to adapt policies to handle new methods and technologies as they become available to the community.

Robert Chalkley is an Assistant Adjunct Professor at the University of California, San Francisco and a member of the *MCP* Editorial Board. He can be reached at chalkley@cgl.ucsf.edu.

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Alzheimer vs. Alzheimer's—Are You Confused?

This article is ninth in a series on publishing your research in the *Journal of Biological Chemistry*. The articles are written by Cadmus Communications, a Cenveo company, which is responsible for the editing, production, and printing of *JBC* articles.

The Eponymic "War of the Apostrophe"

Do you ever wonder why some scientific journals prefer to use Alzheimer disease instead of Alzheimer's disease, Down syndrome instead of Down's syndrome, or Parkinson disease instead of Parkinson's disease? Historically, Western medicine has named diseases after the physicians who discovered them, patients, or locales—for example, Osler-Weber-Rendu disease, Lou Gehrig disease, and Silk Route disease.[1] Eponyms illustrate an excellent example of "evolution." Or rather, the evolution of the apostrophe or lack thereof…

Recently, a trend to eliminate eponymous naming altogether has taken place. Several reasons as to why this is happening include: (a) it is frequently impossible to know who actually deserves the credit for disease discovery, (b) as the underlying pathology for diseases becomes known, it is more accurate for disease names to reflect that pathology, and (c) there tends to be a strong Western bias to eponymous naming that may ignore the contributions of other cultures.[2]

One of the measures implemented to help achieve the above-mentioned goal was to omit the infamous apostrophe "s." A major step toward the preference for the nonpossessive form occurred when the National Down Syndrome Society advocated the use of *Down syndrome*, rather than *Down's syndrome*, arguing that the syndrome does not actually belong to anyone.[3]

The *JBC* follows Stedman's Medical Dictionary 27th Edition, which has acknowledged the crusade, stating, "Reflecting the current trend in current publications, this edition of *Stedman's* has dropped the possessive for eponymous terms".[4] One of the journal production managers, who currently works on the journal and was affiliated with the *JBC* during the time of the transition, quotes an author challenging the revised style point, "If it's according to *Stedman's,* then how come it isn't *Stedman*?" Well, it's probably a safe bet that many others vehemently shared the author's opinion!

Another popular reference used by many authors and editors, *Scientific Style and Format, The CSE Style Manual, Seventh Edition*, agrees with *Stedman's*, noting specifically, "CSE recommends that the possessive form be eliminated from all eponomic terms to allow clear differentiation from true possessives".[5] *The AMA Manual of Style, 10th Edition,* probably contains one of the most comprehensive sections focused solely on the correct usage of eponyms and elaborates on why the transition makes grammatical sense. "…Although eponyms are possessive nouns using proper names, they are structurally adjectival and should not convey a true possessive sense. For example, the name Addison, in describing "Addison's disease, is used as a noun modifier".[6]

In addition to the *JBC,* many scientific journals have adopted the use of the nonpossessive form of the eponym, including *Pediatrics* and *JAMA*. It is important to keep in mind that when journal searches are conducted, using the previous style *Alzheimer's* you may not find the newer articles, which use *Alzheimer.* To overcome this problem, we have created a special patch for the *JBC* online, which allows users to locate articles containing both *Alzheimer's* and *Alzheimer* when they enter the search term *Alzheimer.* This patch has been extended to include *Parkinson* and *Parkinson's* as well.

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Reflecting on NIH Director Elias Zerhouni

BY ALLEN DODSON

In testimony before the House subcommittee on health in early September, NIH Director Elias Zerhouni emphasized the need for adaptability in research funding. Zerhouni touted the success of initiatives started during his tenure to allow the Director the flexibility to pursue advances as research developed. In some ways, the testimony represented Zerhouni's farewell address; he announced his resignation later that month.

Flexibility and Adaptability

During Zerhouni's term, the NIH implemented a "common opportunity fund," that the Director was then free to direct towards interdisciplinary, cross-institute projects. ASBMB President Greg Petsko praised this initiative, stating that the NIH director needed access to discretionary funding in order to proceed with these projects. Petsko noted that the approach "was typical of [Zerhouni's] thoughtful, insightful approach to many of the problems he had to deal with."

Zerhouni testified to Congress that the common opportunity fund has allowed him to adapt the Institutes' medium- and long-term plans; for example, he has been able to direct funds towards new areas of interest as increasing amounts of data accumulate from Genome-Wide Association Studies. This ability to affect the direction of research has proven especially crucial in an era of tightened NIH budgets.

Training and Translation

Since the NIH budget doubling ended in 2003, subsequent budgets have failed to keep pace with inflation for the past five years. And, due to a continuing resolution passed amidst the financial crisis in late September, the NIH budget would not receive any increases above 2008 levels until at least March of 2009—see Peter Farnham's article on page 8 for more on these developments). This trend has forced difficult choices at the NIH; Petsko said that the job of being director during such distressing times "must make you feel like the little Dutch boy with his finger in the dike, trying to hold back the sea."

Despite the challenge posed by these financial constraints, Zerhouni proceeded to chart a course towards two major priorities in training and translational research during his tenure at the NIH.

Under the auspices of the National Center for Research Resources, the NIH has pursued an ambitious, if occasionally controversial, plan for facilitating the translation of basic research discoveries into clinical research directed at treatments for human disease. This agenda has required substantial funding, most prominently through the Clinical and Translational Science Award (CTSA) program. Additionally, as part of an effort by the Institutes' Center for Scientific Review to evaluate and improve the peer review process, the NIH is considering the possibility of "clustering" clinical research applications for review together in the future. Some are questioning whether these budget priorities leave sufficient resources for basic scientific research, but these programs also have the potential to help speed up the process of adapting new discoveries from the bench to the clinic. (For more information on this topic, see the sidebar.)

In regards to training, Zerhouni lamented the effects of tightened budgets on the scientific workforce before Congress. He observed that researchers, especially early in their careers, are extremely vulnerable to loss of funding when budgets fail to keep pace with inflation. By some estimates, thousands of young researchers leave the field each year due to the uncertainty that comes with unstable budgets, in what Zerhouni called the long-term consequence of short-term funding decisions. One step the Institutes have taken to mitigate these concerns is the institution of a revamped Early Stage Investigator designation, announced in late September. Starting with the February 2009 application cycle, investigators who are fewer than ten years beyond their terminal degree (or the completion of their residency for MD's) will be clustered together with other early-stage investigators for peer review.

continued on page 20

Looking Towards the Future

With U.S. elections looming large in the political landscape, the NIH will face continuing budget questions, as well as an ongoing investigation into the conflict of interest rules in science. Zerhouni took the first steps towards addressing the latter issue with a ban on outside consulting payments to intramural NIH researchers, but ongoing congressional interest in the topic—and the occasional scandal—are likely to keep the issue in the news through the term of the next NIH director.

Beyond these concrete issues, Zerhouni's replacement will be required to fill some big shoes. In a statement after the resignation was announced, ASBMB President Petsko commented that "Dr. Zerhouni played the cards he was dealt with class, dedication, and a constant striving to preserve the values of NIH." Petsko remarked that "in recent years being NIH Director has been a thankless job", and concluded that "all of us in the life sciences community owe Dr. Zerhouni those thanks now, along with our best wishes for the future."

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For further information:

- **The NCRR, which oversees the CTSA program, recently released its 2009-2013 strategic plan, which is available at: www.ncrr.nih.gov/strategic_plan/**
- **ASBMB will be hosting a public affairs symposium titled "The NIH Challenge of Advancing Biomedical Technologies in Parallel with Clinical and Translational Programs" at its 2009 annual meeting in April; Barbara Alving, director of the NCRR, will be speaking at the event.**
- **Details on the NIH revamp of peer review can be found at: www.grants.nih.gov/grants/guide/notice-files/not-od-08-118.html**
- **Information on the changes to the Early Stage Investigator grant applications are available at: www.grants1.nih.gov/grants/guide/notice-files/not-od-08-121.html**

The 2009 William C. Rose Award: Sandra Schmid

Sandra Schmid, an investigator at The Scripps Research Institute, will be honored with the William C. Rose Award at the upcoming ASBMB annual meeting in New Orleans. The award recognizes outstanding contributions to biochemical and molecular biological research as well as a demonstrated commitment to the training of younger scientists. Schmid will deliver her award lecture on Monday, April 20th at 2:10 p.m.

"Schmid is an internationally recognized biochemist who has been a pioneer in our understanding of the molecular basis of receptor-mediated endocytosis," said Suzanne Pfeffer, Professor of Biochemistry at Stanford School of Medicine.

Receptor-mediated endocytosis is the process by which receptors are collected into clathrin-coated pits at the cell surface and internalized by membrane invagination. Nutrients, growth factors, viruses, toxins, and immunoglobulins are among the many ligands known to bind with high affinity to receptors on the cell surface. Clathrin-coated pits are specialized regions of the plasma membrane that concentrate these integral membrane receptors and then pinch off into the cell, delivering vesicles harboring receptors and ligands.

Working as a graduate student with James E. Rothman at Stanford University, Schmid and her colleagues discovered an ATPase that catalyzes the depolymerization of clathrin coats. This ATPase later turned out to be Hsc70, the first of the chaperone molecules involved in cell cycle regulation. Wanting to focus on the endosome, Schmid became a postdoctoral fellow with Ira Mellman at Yale University. There, she was able to devise techniques to isolate early and late endosomes, work out their properties *in vitro*, and show that they were distinct organelles.

In 1988, Schmid was recruited to the new cell biology department at The Scripps Research Institute. Working at Scripps she continued her work on receptor-mediated endocytosis and was among the first to reconstitute the process *in vitro*. She then used this system to distinguish between initial coated pit formation and the actual pinching off process and then connected these events *in vitro* and formulated a role for the dynamin GTPase in nascent bud constriction.

Much of Schmid's subsequent work has involved looking at dynamin function during receptor-mediated endocytosis. This includes the co-discovery that purified dynamin polymerizes into ring structures in a nucleotide state-dependent manner and characterization of the roles played by Rac and Rho in receptor mediated endocytosis. Schmid has also studied the kinetics and functions of a large series of dynamin mutants to understand how an intrinsic GTPase activating domain and other dynamin sequences couple GTP hydrolysis by this enzyme to the pinching off of a nascent endocytic vesicle.

Schmid's stellar record of biochemical contributions is matched by her mentoring contributions to the scientific community. Not only has she trained over 30 postdoctoral fellows and graduate students, but she has also presented workshops on various topics related to scientific development at many institutions in the U.S. and abroad including "Time Management," "How to Write a Scientific Paper," "How to have a Successful Postdoc," and "How to Write Grants." She was an instructor for the Woods Hole Physiology Course, "Cell and Molecular Biology," and is often selected by graduate students for special lectureships at meetings and universities.

Schmid has also been very active in promoting women in science. She has made major contributions to the Women in Cell Biology group at the American Society for Cell Biology and is a frequent panel member on Association for Women in Science symposia on topics such as balancing family and career, career advancement, and finding a job.

"Sandy makes people a priority, whether it be the postdocs/students in her lab needing to tap into her encyclopedic storehouse of knowledge, junior faculty in the department seeking words of wisdom on grantsmanship, or a technician needing personal and/or professional advice," said Sean Conner, Assistant Professor at the University of Minnesota, who did a postdoctoral fellowship with Schmid. "With professional demands that would make any sane person close his/her office door, Sandy was always encouraging, optimistic, and eager to help."

Sandra Schmid is currently Professor and Chairman of the Department of Cell Biology at The Scripps Research Institute. She was a founding editor of *Traffic* and is currently Editor-in-Chief of *Molecular Biology of the Cell*.

The 2009 Herbert Tabor/*Journal of Biological Chemistry* Lectureship: David Davies

David R. Davies of the National Institute of Diabetes and Digestive and Kidney Diseases at the National Institutes of Health has been selected to give the Herbert Tabor/*Journal of Biological Chemistry* Lectureship at the 2009 ASBMB Annual Meeting. The award was established to recognize the many contributions of Herbert Tabor to the *Journal of Biological Chemistry* and the Society. Davies will present his lecture, entitled "Fifty Years of Structure and Function: from Myoglobin to the Innate Immune System," in New Orleans on Saturday, April 18 at 6:00 p.m.

Davies was born in the village of Pontardulais, Wales. The first member of his family to attend college, Davies was accepted at Magdalen College at Oxford University. He eventually earned his B.A., M.A., and D. Phil. in Physics from Oxford. After graduation, he remained at Oxford to work in the crystallography laboratory under the supervision of H. M. Powell and determined the structure of quinaldil.

In 1952, Davies moved to California with the offer of a postdoctoral fellowship at Caltech with Linus Pauling and Robert Corey. There, he developed a least squares procedure to refine individual atomic anisotropic thermal vibration parameters and used it to elucidate the crystal structures of parabanic acid and succinamide. After finishing his postdoctoral work, Davies returned to England and spent a year as a research associate at Albright and Wilson, where he determined the crystal structure of sodium triphosphate. In 1955, he returned to America as a visiting scientist at the Mental Health Institute at the NIH and began a research program , which aimed to elucidate the structure of RNA. Eventually, Davies was able to assign structures to several RNA complexes and also observed the first G-quartet structure from fibers of GMP.

After several years, Davies decided to move on from nucleic acids and turned his attention to proteins. He attended Cambridge University for six months and became part of a team that solved the structure of myoglobin. Upon his return to the NIH, Davies was made chief of the Section on Molecular Structure in the Laboratory of Molecular Biology at the National Institute of Diabetes and Digestive and Kidney Diseases. He continued to work on protein crystallography and determined the structure of γ-chymotrypsin. Davies then turned his attention to immunology and grew the first crystals of an intact antibody, which he used to solve the low-resolution structure of the T-shaped molecule. He later determined higher-resolution structures of several Fab fragments alone and in complex with lysozyme.

Eventually, Davies shifted his research towards an investigation of the human immunodeficiency virus type 1 (HIV-1) integrase. Davies and his colleagues determined the structure of the catalytic core domain of HIV-1 integrase as well as the structure of an inhibitor bound to the active site of the enzyme. Currently, Davies is continuing to pursue this study with the hopes of providing structures for more lead compounds that can be used for drug design.

Davies is also currently investigating the structure of the yeast prion protein, Ure2p. He and his colleagues have determined the structure of the active domain of the protein, which is a member of the superfamily of glutathione *S*-transferase proteins.

Davies has received several awards and honors in recognition of his contributions to science. These include the Stein and Moore Award from the Protein Society (1998), the Presidential Meritorious Executive Award (1982), the Distinguished Service Award from the Department of Health and Human Services (1982), and the Distinguished Presidential Award (1987). He was also elected to the National Academy of Sciences in 1978 and the American Academy of Arts and Sciences in 1980.

ASBMB 2009 Women Scientists Networking Session
Recovering from Hurricane Katrina
Tuesday, April 21, 2009 • New Orleans Convention Center

The 2009 Award for Exemplary Contributions to Education: Rochelle Schwartz-Bloom

The ASBMB Award for Exemplary Contributions to Education will be presented to Rochelle Schwartz-Bloom, Professor of Pharmacology and Cancer Biology at the Duke University Medical Center. The award, administered annually by the ASBMB Education and Professional Development Committee, is given to a scientist who encourages effective teaching and learning of biochemistry and molecular biology through their own teaching, leadership in education, writing, educational research, mentoring, or public enlightenment. Schwartz-Bloom will present her award lecture at the Annual Meeting in New Orleans on Sunday, April 19 at 12:30 p.m.

"Dr. Schwartz-Bloom shares my interests in offering educational opportunity and inspiration to those without it, opening eyes to science and its possibilities, and strengthening and supporting those who teach science," said Peter Agre, Nobel Laureate in Chemistry and Director of The Johns Hopkins Malaria Research Institute. "I have been awed by her dedication to science education, by the breadth of her work to increase science opportunities for students at all levels and from a variety of backgrounds, and by her track record of success in developing, building, and implementing educational programs that work."

Schwartz-Bloom earned her M.S. in Forensic Toxicology from George Washington University and her Ph.D. in Pharmacology from Georgetown University. After doing a postdoctoral fellowship at the National Institutes of Mental Health (NIH) she joined the faculty of Duke University Medical Center where she established a research program that centered on investigating novel pharmacological approaches to prevent neuronal death caused by cerebral ischemia associated with cardiac arrest and stroke. She and her colleagues explored and deciphered how gamma-aminobutyric acid (GABA) neurotransmission dysfunction contributes to the death of hippocampal neurons after ischemia. These studies included, among other approaches, detailed mechanistic biochemical and pharmacological analyses of GABA receptor-gated ion channel structure and function and downstream signaling mechanisms.

While her research program flourished, Schwartz-Bloom embarked on a series of science education activities that have continued to grow, earning her a national reputation in the field of science education.

"Many of us realize the great divide that exists between exciting discoveries in the laboratory that contribute to our knowledge of life processes and the transmission of that sense of excitement to young students," said Duke University Medical Center Professors Anthony R. Means and Dennis J. Thiele. "Over the past nearly 20 years Shelly has worked tirelessly toward the development of novel science curricula, from basic chemistry and biochemistry to pharmacology and biology. She has worked at this interface at virtually all levels of education from K-12 to undergraduate, graduate and medical students, and ultimately, for educators themselves to facilitate the amplification of this information and these approaches."

Schwartz-Bloom's science education activities are numerous. She has served as Director of Undergraduate Studies in Pharmacology at Duke University for more than 18 years. In this role, she developed a curriculum in pharmacology for undergraduate biology and chemistry majors at Duke and also designed (and still teaches) an undergraduate pharmacology course.

Schwartz-Bloom has also created several programs to improve science education in schools and to provide students from all backgrounds access to science. For example, she launched an independent study in science education program to allow Duke undergraduate students to have service-learning experiences in science curriculum development and assessment for grades K-16.

Reaching science teachers directly has also been one of Schwartz-Bloom's goals. She developed self-sustaining curricula for elementary schools to teach students about the dangers of drugs, as well as multi-module programs for teachers and health care practitioners to teach the science and dangers of drugs like cocaine, marijuana, ecstasy and alcohol. She also launched the RISE Program (Raising Interest in Science Education) at Duke to develop and provide novel science education curricular materials to the K-12 and college community.

Schwartz-Bloom has also taken an active role in reaching underrepresented and underserved students in the Durham area by developing programs to provide educational and research opportunities to these students.

Most recently, Schwartz-Bloom obtained a Provost Award to establish a Duke Center for Science Education. This Center, which Schwartz-Bloom will direct, will encourage interdisciplinary collaboration across the Duke campus and enhance research in science education, curriculum development, and community outreach.

Student-Centered Education in the Molecular Life Sciences

BY ELLIS BELL

This coming summer, ASBMB will sponsor a three-and-a-half day meeting designed for educators engaged in teaching undergraduates. The goals of the meeting are to supply attendees with educational approaches and materials that they can implement in their own classrooms and institutions and to provide them with networking and mentoring opportunities.

The meeting, which will be held at Colorado College in Colorado Springs early next August, will focus primarily on emerging pedagogies in the education of students in the molecular life sciences.

While the main focus of the meeting will be on the workshops, there will be several plenary talks, including:

- Teaching Biochemistry and Molecular Biology—Strategies and Methods (Problem-based Learning, Pogil, Prowl, Service Learning, etc.)
- Incorporating Math in Biochemistry and Molecular Biology
- Mentoring (Faculty, Students, Conflict Resolution, Broader Issues)
- Communicating Science (Classroom, General, Manuscripts, Grants)

The principal focus of the meeting will be a series of hands-on workshop sessions similar in style to Project Kaleidoscope, with ample time for networking. Each session will be run by a team of established educators, with a focus on small group participation as well as individual mentoring.

The four workshops will be:

1. Sharing Laboratory Ideas: What Works and Doesn't Work in Undergraduate Biochemistry and Molecular Biology Labs
2. Starting and Sustaining Undergraduate Research: Effective Management of the Undergraduate Biochemistry and Molecular Biology Research Lab
3. Service Learning and Outreach Activities for Biochemistry and Molecular Biology Students
4. Using Protein Databases and Molecular Visualization in Education

Each of these workshops will be offered twice, enabling attendees to participate in all of the workshops during the meeting.

Additionally, there will be a two-session grant writing workshop which will provide attendees with in-depth mentoring on grant writing. These sessions will involve evaluation, revision, and critique of abstracts and will be run by a number of highly successful, predominantly-undergraduate institution (PUI) faculty members with well-funded, established programs and by representatives from the major funding agencies. Participants will have the opportunity to follow-up with a mentor during the following year to help in the preparation and submission of their own grant applications.

The meeting will also include sessions related to the recent white paper produced by ASBMB titled, "Biochemistry/Molecular Biology and Liberal Education: A Report to the Teagle Foundation" (see box on p. 4). Members of the working group will lead discussions focusing on how to implement some of the report's recommendations. Topics will include: moving research and critical thinking skills earlier in the curriculum, rethinking required skills to include scientific as well as other skills related to engaging the public, improving communication between undergraduate and graduate institutions and between undergraduate institutions and employers, developing better assessment tools, and expanding active-learning pedagogies to all types of institutions.

Full details about registration for this meeting will be available in the next several months. The costs of the meeting will be held below $500 per attendee (including on-campus housing and meals) and it is hoped that a number of travel awards will also be available to facilitate attendance by faculty members from smaller institutions and institutions serving under-represented minorities.

Ellis Bell is currently Professor of Chemistry and Chair of the Biochemistry & Molecular Biology Program at the University of Richmond. He is also Chair of the ASBMB Education and Professional Development Committee. He can be reached at jbell2@richmond.edu.

Defining Successful Scientific Training Using a Competency Model

BY EMIL CHUCK

Competency. It's a buzzword that has taken human resource departments by storm over the past decade or so when it comes to evaluating the performance of individuals within a company or establishing standards of performance and conduct within a profession. Managers, librarians, physicians, engineers, teachers, and lawyers are among the many careers for which specific competencies have been identified and discussed to define the ideal professional and his/her relationship with society.

It has been generally accepted that postdoctoral training for most biomedical scientists and many other physical scientists is a rite of passage that provides an initiation into the research profession. Traditionally, postdoctoral training was relegated to an apprenticeship model that was highly customizable but lacked any quality control for the training, infrastructure, and research resources that were invested into the newly-minted Ph.D. With recent policy moves by the NSF and NIH on investigating the effectiveness of postdoctoral training, the National Postdoctoral Association created a subcommittee to discuss the competencies that could define the research profession and areas that postdoctoral fellows must become more fully aware of as they progress to career independence.

What Qualities Define a True Scientist?

The NPA Core Competencies Subcommittee defined six major competencies that describe the "perfect scientist" (see table). First, while a scientist must have a solid grasp of their own disciplinary dogmas, they must also be able to understand other disciplines' techniques and theories to adapt their own research orientation towards new challenges or innovative approaches. *Scientific knowledge* goes hand-in-hand with competency in *research skills*—the tools of discovery that should be common among all scientists, such as the ability to formulate hypotheses or rigorously analyze and interpret data. *Communicating* these hypotheses in peer-reviewed articles, literature summaries, grant proposals, posters, scholarly presentations, and general lectures is vital to disseminating new discoveries and advancing an individual's career path.

The committee also identified three other equally important competencies: *professionalism* addresses the individual's comfort with an identity as a scientist, respect for others on the research team (supervisors or reports), and the general public (including family members). Professionalism requires an acknowledgement of diverse identities as scientists whether by visible criteria (such as demographics, country of origin, or disabilities) or invisible criteria (sexual identity, personal interests, illness, family status, seniority), and the important contribution of diverse perspectives to advancing innovative discovery. Developing *management skills* also addresses the necessary personal and interpersonal skills that help get the most out of one's own project and other collaborators. Finally, being *responsible* in one's research acknowledges respect for the gold standard of reliable data, the safety of work colleagues, and the integrity of science for the benefit of society.

Six core competencies for success in science

1. Scientific knowledge
2. Research skills
3. Communication skills
4. Professionalism
5. Management skills
6. Responsible conduct in research

These competencies provide a starting point for appropriate discussion, self-assessment, and formal evaluation of all scientists-in-training from pre-college level up to the most senior scientific administrators. By building evidence that allows trainees to begin to show mastery of these skills, postdoctoral trainees may ameliorate the transitional difficulties to career satisfaction and independence. Formalized evaluations can use these competencies to identify mileposts on the road to a successful career in science, including non-bench careers such as teaching, law, business, and health that have similarly articulated competencies. Institutional or contract practitioners who train scientists through programs, workshops, or interactive modules can begin to measure for themselves the effectiveness of their training programs and success outcomes. By teaching postdoctoral fellows how to set goals and raise the bar to more proficient levels of competency, it is hoped that the overall scientific training system can be improved and thus raise the overall quality of innovation.

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Science Goes Straight to Video

BY SARAH CRESPI

Browsing around the popular video website, YouTube.com, a quick search can unearth quite an interesting array of "science videos." One can find virtually hundreds of short video clips of ordinary people exploring the amazing properties of cornstarch and water, the explosive combination of Mentos and Diet Coke, or even a clip of the "Weird Science" song.

Most of my favorite videos on Youtube.com involve people trying out experiments on their own (without hurting themselves of course). Even the more technical science videos are presented at an easy-to-follow elementary level, aimed at helping teachers in classrooms. A quick search also yields a hotbed of science TV shows.

For the more serious, science-savvy individuals, however, there are a couple of specialized sites that take it to the next level.

The *Journal of Visualized Experiments* (JoVE.com) is a peer-reviewed, video-only journal that started out in 2006 with a mission—to utilize the strength of video to show how something is actually done to improve

Sci.tv's homepage.

A coordinated Mentos and Diet Coke video. Note the 7 million+ views.

the communication of protocols between scientists. Normally, scientists spend countless hours learning new techniques and are extremely lucky if they can find someone to walk them through the steps of a complicated protocol. Otherwise, it can be hit-or-miss for months. Poking around JoVE's site will convince anyone that there is an easier way. A great example can be found in a video-article titled "Generation of Bone Marrow-derived Murine Dendritic Cells for Use in 2-photon Imaging" by Melanie P. Matheu and colleagues from the University of California, Irvine. It shows viewers detailed steps from mouse dissection to 2-photon imaging. Some of this process might have been difficult to deduce from a set of written directions, but the video makes the complicated procedure crystal clear.

While the videos were a little clunky during JoVE's first year, these days, the production values are excellent. For each accepted paper, the journal offers to send a member of its distributed network of documentarians to the lab to shoot and edit the entire procedure.

Two recent developments seem to indicate that JoVE is here to stay. One, JoVE is now indexed in PubMed, the first video-only journal to be added (at the moment however, only articles from 2006 are available). The PubMed entries for JoVE reports link to free articles at PubMed Central and through that site back to JoVE itself. There is no login or charge for viewing current or past content on the JoVE site.

JoVE's video methods take the mystery out of bone marrow cell culture.

Dnatube.com brings together the best in cellular animations.

The second good omen for JoVE is its recent partnership with several publishers to produce and host methods videos for their various journals. It will be interesting to see if other science journals incorporate useful video content now that this site has been around for a while.

While JoVE focuses on conveying methods, another video site, SciVee.tv, uses video for different purposes. SciVee is run by PLoS but is not a peer-review video journal. The site hosts videos uploaded by authors in which they talk about a peer-reviewed paper or poster on camera. SciVee aims to help scientists better explain the trickiest concepts using video and to help promote their research. SciVee has also incorporated an interactive layer in some of their videos. As you watch, headings appear and you can click them to make the poster and the video appear side-by-side. Outside the scientist/presenter domain, SciVee also offers a channel for teachers and students.

A few more video sites are worth mentioning. If you're looking for some help in the college classroom, Dnatube.com is home to some amazing molecular biology animations. One animation depicts clathrin-mediated endocytosis just as I'd always pictured it in my mind. Similarly, a video on ATP synthase brilliantly illustrates the relationship between protein structure and function. The Dnatube experience is much like YouTube: users upload videos and visitors watch as much as they want, at their own risk. Despite what seems like a free-for-all attitude, the videos seem to be of high quality. A glance at the "About" page on the site hints that graduate students review the uploaded videos.

If you've actually made a science video you may find yourself weighing where to post it. YouTube will give it mass exposure but will anyone who needs this information be able to find it? As there is no rule against publishing previously published videos on any of the websites, the most feasible option seems to be placing one's content on all three: YouTube, SciVee, and Dnatube. YouTube provides exposure to a much wider audience, and the other two sites offer those with a special interest in the sciences a filtered and more professional array of scientific videos. In order to get published on JoVE's website, all prospective videos are sent through their peer-review process.

This column will also appear at our slowly-building blog: Chiral Comments. Pop over there and use the comments to let us know about your own experiences with science videos on the web.

Have you made a science video? Where did you post it? What's your favorite one out there? Have you been fooled by realistic faux science content?

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Bridging the Masters and Doctorate Degrees

BY AVERY AUGUST, BETTAIYA RAJANNA, AND ROBERT SIZEMORE

Walter Massey, former director of the National Science Foundation and current president of Morehouse College in Atlanta, made the following statement almost nineteen years ago:

"…Every department in every school in the United States that grants the Ph.D. to make a commitment to double (+1) the number of minority graduates obtaining Ph.D.'s in their disciplines over the next six years. (I use the +1 because in most cases, the initial number would be zero, so that doubling it would be meaningless)."

Unfortunately, Massey's remark still rings true within the academic fields of science and technology: most biomedical science departments have few minority students and even fewer minority faculty members.

While a number of programs aimed at remedying this imbalance rightly focus on K-12 and undergraduate students, there remains a group who has received even less attention: students who have already received undergraduate degrees in the sciences and are working on their Master's degrees. By having already demonstrated a commitment to the sciences, these scholars represent a fertile pool of candidates who can be groomed and recruited to continue on to the Ph.D. degree.

The National Institutes of Health Division of Minority Opportunities in Research (MORE) program, Bridges to the Doctorate, was initiated to target such students. Below, we describe a recently-developed Bridges to the Doctorate program between Alcorn State University and The Pennsylvania State University. The goal of the program is to increase the number of minority M.A. students who continue on to the Ph.D.

Why These Programs Are Essential

According to the most recent data set forth from the NSF (2001), there are more than 57,000 students enrolled in graduate programs in the biological cciences, 78.6 percent of which are U.S. citizens or permanent residents. While much has been written about the increasing numbers of minorities in the U.S. (currently 28.8 percent of the population), only 10.8 percent of students in the biological sciences belong to minority groups. This is intolerable—a major portion of the American population should not be excluded from the group of researchers responsible for the discoveries that drive our nation's health care.

Increasing these numbers require attention to the pipeline that feeds the pool of biomedical scientists. In 2003, 15.23 percent of undergraduate degrees were awarded to minority students but only 5.23 percent of doctorate degrees in biological sciences went to minorities. The good news is that while there was a 24 percent increase in students earning master's degrees in biological sciences between 1985 and 2003, the number of minority students earning master's degrees during that same time period witnessed an increase of 91 percent.

The Historically Black Colleges and Universities (HBCUs) have had a long track record in producing black graduates in the sciences and also in enrolling a large number of students in master's degree programs. The HBCUs represent a good place to start to increase the percentage of minority students going on to the Ph.D.

The Alcorn State:Penn State Bridges to the Doctorate Program

This program was developed three years ago to tackle areas that were not being fully addressed in summer programs that aimed to increase the number of minorities that go on to the Ph.D. Most of these programs involve minority students traveling to a majority campus to do scientific research. While the programs succeed in engaging and exciting the students, thereby improving their chances of recruitment, these programs sometimes miss a vital component that significantly affects the success of these students as they enter Ph.D. programs: socialization on a majority campus.

The environment on an HBCU campus is significantly different from that of a majority campus. Many students who arrive on campus for summer programs tend to experience some form of dissonance, which negatively affects their performance and success. A number of studies have concluded that overcoming these socialization barriers can lead to increases in student retention in the biological sciences. Out-of the-classroom contact with faculty members as well as mentoring relationships with minority peer groups tend to alleviate this problem. Careful monitoring and advising can reduce the numbers of students who are unsuccessful due to lack of the appropriate resources or help outside the classroom. The Meyerhoff program at the University of Maryland at Baltimore County, in particular, brilliantly illustrates these concepts at work, and is now renowned for the number of minorities it graduates in the sciences and places in doctoral programs.

Alcorn State was the first state-supported institution of

higher education for African Americans in the U.S. It enrolls almost 3,000 students, more than 97 percent of whom are African American, and has been ranked fifth in the nation for producing black graduates with bachelor's degrees in biological science by the journal, *Black Issues in Higher Education*.

We have modeled the Alcorn State:Penn State Bridges program primarily on the concepts of faculty and peer mentoring, socialization into graduate school, and personalized monitoring. The program consists of four main components: coursework, research training, mentorship, integration, and monitoring.

Coursework. Most summer programs have minimal coursework. In contrast, the ASU:PSU program views coursework as a crucial component of socialization. Taking classes with other graduate students at Penn State allows the Bridges students to experience this critical aspect of the Ph.D. program and get the required credit for their coursework. More importantly, it prepares them for the potential differences that may occur between classes at Alcorn State and at Penn State. Students are also given the chance to interact with professors whom they might not have met previously, especially if they spent all their time doing lab research. In some cases, there are also Bridges-specific discussion groups that provide additional resources to ease students' transition into their classes. To further ease their transition onto a new campus, Bridges students spend seven months at Penn State, rather than four months over the summer. This acculturation period allows the students to get used to being on a majority campus for an extended period of time. Students also participate in workshops on writing and presentation, GREs, applying to graduate school, survival skills, ethics, and time-management.

Research Training. Of course, a major part of the program is research training. All Bridges students spend much of their seven months at Penn State in the lab, carrying out research that counts towards their master's thesis. Special attention is made to ensure that these students receive realistic projects that will provide them with the necessary training while balancing the time they have at Penn State. Students write regular progress reports on their projects to ensure that they are moving forward and to determine whether mid-course corrections are warranted.

Mentorship. We believe that this component is the most critical for success in the program. All students eventually have five mentors: two faculty mentors and two research mentors (one of each from Alcorn and Penn State) and a graduate student peer mentor at Penn State. The peer mentor is usually a student who has gone through the Bridges program and can share their experiences with the new student. We feel it is important for students to have mentors who are affiliated with the institution but not directly involved in their research programs to guide them through difficult times or to give advice they cannot get from their research mentors. Students also receive career counseling as they progress through the program.

Integration and Monitoring. Another important key for the success of the program is monitoring the students' success. Two offices have been set up at Penn State to facilitate this: the Office of Graduate Equity and the Directors of Multicultural Affairs. These offices provide another vehicle through which students are able to receive even more support during their transition to the majority campus.

Lessons and Future

As with any new program, we have learned a great deal. To start, we have found that a student's cultural acclimation to a new campus is as necessary as socialization and that students need to be challenged to think critically in order to succeed. The success of the program continues to inspire the participating students and faculty. In addition, the administrations of both universities recognize the value of the program for the students and faculty. We see evidence that both institutions have been rewarded amply for their vision and will continue to flourish from the funds invested by the NIH.

Despite the success of the program, a few changes could be made to further increase the success of future Bridges students in pursuing a master's degree. The NIH (and the scientific research funding enterprise) should support more research infrastructure at minority-serving institutions in order to give students exposure to cutting-edge research and equipment. Furthermore, the institutional culture at some minority-serving institutions needs to evolve in order to allow students to take better advantage of programs such as the Bridges programs. And finally, in this era of reduced research funding and hard-to-find opportunities for training grants, graduating Bridges students would highly benefit from portable research fellowships, which would in turn make them more attractive to top Ph.D. programs.

For more information on the Alcorn State:Penn State University Bridges to the Doctorate Program, go to www.vetsci.psu.edu/bridges.cfm.

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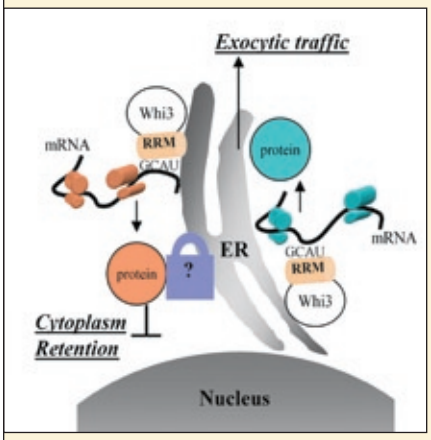
Whi3 Modulates Protein Fate

Many secreted and membrane-bound proteins have an N-terminal signal peptide sequence that is recognized by the signal recognition particle (SRP) during translation; this signal facilitates the trafficking of the nascent protein across the endoplasmic reticulum (ER) membrane. However, considering that not all ER-associated proteins have these SRP tags and that SRP-deficient cells still function normally, there must be other cellular determinants for protein localization. In this article, the researchers propose the yeast RNA-binding protein Whi3 as one candidate for regulating localization. Whi3 is known to bind the mRNA for cyclin Cln3 and retain its translation near the ER, but using an affinity purification procedure, the researchers identified more than 300 additional potential mRNA binding partners. These Whi3 mRNA targets are enriched in CGAU clusters, suggesting that this sequence is a cis-determinant of binding.



Speculative model of the role of Whi3 in regulating protein localization.

Significant portions of these mRNAs encode cell wall- and cell membrane-associated proteins, and consistent with this fact, WHi3-deficient mutants displayed compromised cell wall integrity.

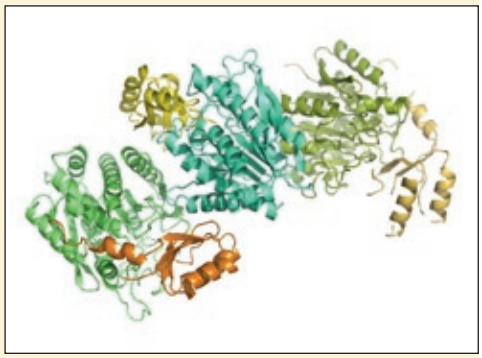
Whi3, a developmental regulator of budding yeast, binds a large set of mRNAs functionally related to the endoplasmic reticulum

Neus Colomina, Francisco Ferrezuelo, Hongyin Wang, Martí Aldea, and Eloi Garí

J. Biol. Chem. 2008 **283,** 28670–28679

Pulling the TAFI

TAFI (thrombin-activable fibrinolysis inhibitor) is a drug target of critical importance that is currently under investigation by several pharmaceutical companies. TAFIa, the mature protein, is an unstable metallocarboxypeptidase that clips off the C-terminal lysines from coagulated fibrin, stabilizing blood clots. TAFI also participates in the inflammatory response by inactivating anaphylatoxins (complement-derived inflammatory peptides). The high-resolution crystal structure presented in this study corroborates other research that indicates the TAFI proenzyme is itself an active enzyme responsible for low-level activity. The structure demonstrates that the active site is accessible and in the active conformation. Researchers also suggest a possible binding site for heparin, known to stabilize the mature enzyme; the heparin site coincides with an unstable region that contributes to the short half-life (~10 min) of TAFIa, a key aspect of the tight regulation of this important molecule. This novel structure may help in the design of TAFI inhibitors, which could serve as thrombolytic agents.



Asymmetrical arrangement of the three TAFI monomers.

The crystal structure of thrombin-activable fibrinolysis inhibitor (TAFI) provides the structural basis for its intrinsic activity and the short half-life of TAFIa

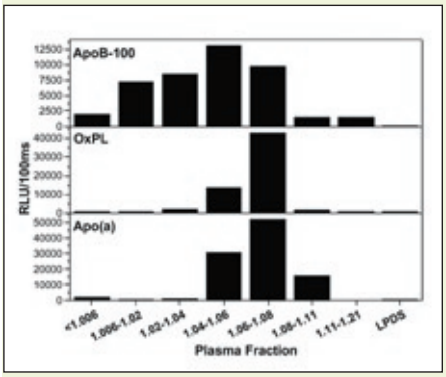
Kanchan Anand, Irantzu Pallares, Zuzana Valnickova, Trine Christensen, Josep Vendrell, K. Ulrich Wendt, Herman A. Schreuder, Jan J. Enghild, and Francesc X Avilés

J. Biol. Chem. 2008 **283,** 29416–29423

An Intriguing Role for Lp[a]

In this study, the authors propose that Lp[a] may have the intriguing role of binding to and transporting proinflammatory oxidized phospholipids (OxPLs).

Immunoprecipitation of Lp[a], which consists of an LDL particle attached to a carbohydrate-rich apolipoprotein[a]molecule, from human plasma with the E06 antibody (which recognizes the phosphocholine headgroup of oxidized but not native phospholipids) resulted in a co-IP of more than 85 percent of OxPL activity, while ultracentrifugation experiments showed that nearly all OxPLs were found in fractions containing apo[a], as opposed to other apolipoproteins. Subsequent *in vitro* transfer studies revealed that oxidized LDL preferentially donates OxPLs to Lp[a] and not LDL. Together, these data demonstrate that Lp[a] is the preferential carrier of PC-containing OxPL in human plasma. This unique property of Lp[a] provides insights into its function and also explains its relation to cardiovascular disease risk at higher concentrations, as it would bind to arterial intimal proteoglycans with more affinity than native LDL.



Ultracentrifugation demonstrates that OxPLs in human plasma are present almost exclusively in the density fractions containing Lp[a].

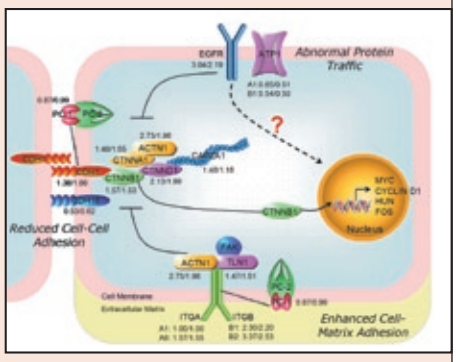
A novel function of lipoprotein [a] as a preferential carrier of oxidized phospholipids in human plasma

Claes Bergmark, Asheesh Dewan, Alexina Orsoni, Esther Merki, Elizabeth R. Miller, Min-Jeong Shin, Christoph J. Binder, Sohvi Hörkkö, Ronald M. Krauss, M. John Chapman, Joseph L. Witztum, and Sotirios Tsimikas

J. Lipid Res. 2008 **49**, 2230-2239

A Strategy to Study Membrane Proteins

Using a combined approach of gel-assisted digestion, iTRAQ labeling, and LC-MS/MS, the authors of this study identified as many as 520 membrane proteins from the membrane fractions of HeLa cells with high accuracy and precision. They then applied their technique to delineate the proteome alterations in kidney cells of mice with autosomal-dominant polycystic kidney disease (ADPKD). They characterized 791 plasma membrane proteins, of which 69 and 37 showed ≥ two-fold up-regulation and down-regulation, respectively, in *PKD1* knockout mice compared to wild-type. Several of these differentially expressed membrane proteins are involved in the mechanisms that underlie major ADPKD abnormalities, including epithelial cell proliferation and apoptosis, cell-matrix interactions, fluid secretion, and membrane protein polarity. This method demonstrates the potential of comparative membrane proteomics, and could lead to a better understanding of the mechanisms and treatment options of ADPKD and other membrane protein-associated disorders.



Some of the differentially expressed proteins and pathways identified in mice with polycystic kidney disease. The ratios indicate the fold change of protein expression in *PKD* knockout compared to control mice.

A multiplexed quantitative strategy for membrane proteomics: opportunities for mining therapeutic targets for autosomal-dominant polycystic kidney disease

Chia-Li Han, Chih-Wei Chien, Wen-Cheng Chen, Yet-Ran Chen, Chien-Peng Wu, Hung Li, and Yu-Ju Chen

Mol. Cell. Proteomics 2008 **7**, 1983-1997

Susan Taylor: Patron of Protein Kinase A

BY NICK ZAGORSKI

One can never underestimate the power of a compelling, well-written paper. It can make a researcher shift the focus of their work or even inspire them to embark upon a completely new research path. Just ask Susan Taylor.

Back in 1972, Taylor, currently a professor in the departments of Chemistry & Biochemistry and Pharmacology at the University of California, San Diego, as well as an HHMI Investigator and former president of ASBMB, had just started up her own lab at UCSD, where she was continuing her post-doctoral studies detailing lactate dehydrogenase (the enzyme that creates lactic acid during anaerobic respiration). It was valuable work that would have led to a productive career in its own right, but then one day her colleague and former post-doctoral advisor, Nathan Kaplan, dropped a recently published article on her desk.

"He just told me that researchers had identified an interesting protein and I might want to consider studying it," she says. It was a paper by Fritz Lipman, Kaplan's former mentor, describing the receptor for cyclic AMP, an important second messenger. So, Taylor read through the paper, which highlighted a new type of mammalian kinase—recently discovered by noted scientists Edwin Krebs and Donal Walsh—that was dependent upon cAMP, an ancient second messenger that goes back to bacterial times. "This enzyme had allostery, it had second messengers, and, with its regulatory and catalytic subunits, it reminded me of my favorite enzyme, aspartate transcarbamylase." Taylor was hooked, and the rest is history.

Today, Taylor has contributed some of the most important discoveries surrounding this cAMP-dependent protein kinase, otherwise known as protein kinase A (PKA). Along with colleagues at UCSD and elsewhere, she has made great strides in determining the structure, assembly, dynamics, localization, and modulation of perhaps the most important signaling molecule in humans.

"Some isoform of PKA is active in every cell in the body," Taylor says, "and PKA and cAMP regulate virtually every vital process; development and differentiation of embryos, learning in neurons, metabolism in liver and muscle, and water retention in the kidneys are just a few. Defects in PKA can result in autoimmune disorders like lupus, cardiac diseases, and of course, cancer." In addition, Taylor's groundbreaking crystallography with the subunits of the PKA enzyme has provided invaluable knowledge to researchers studying all manner of kinases, be they yeast or human, serine/ threonine or tyrosine.

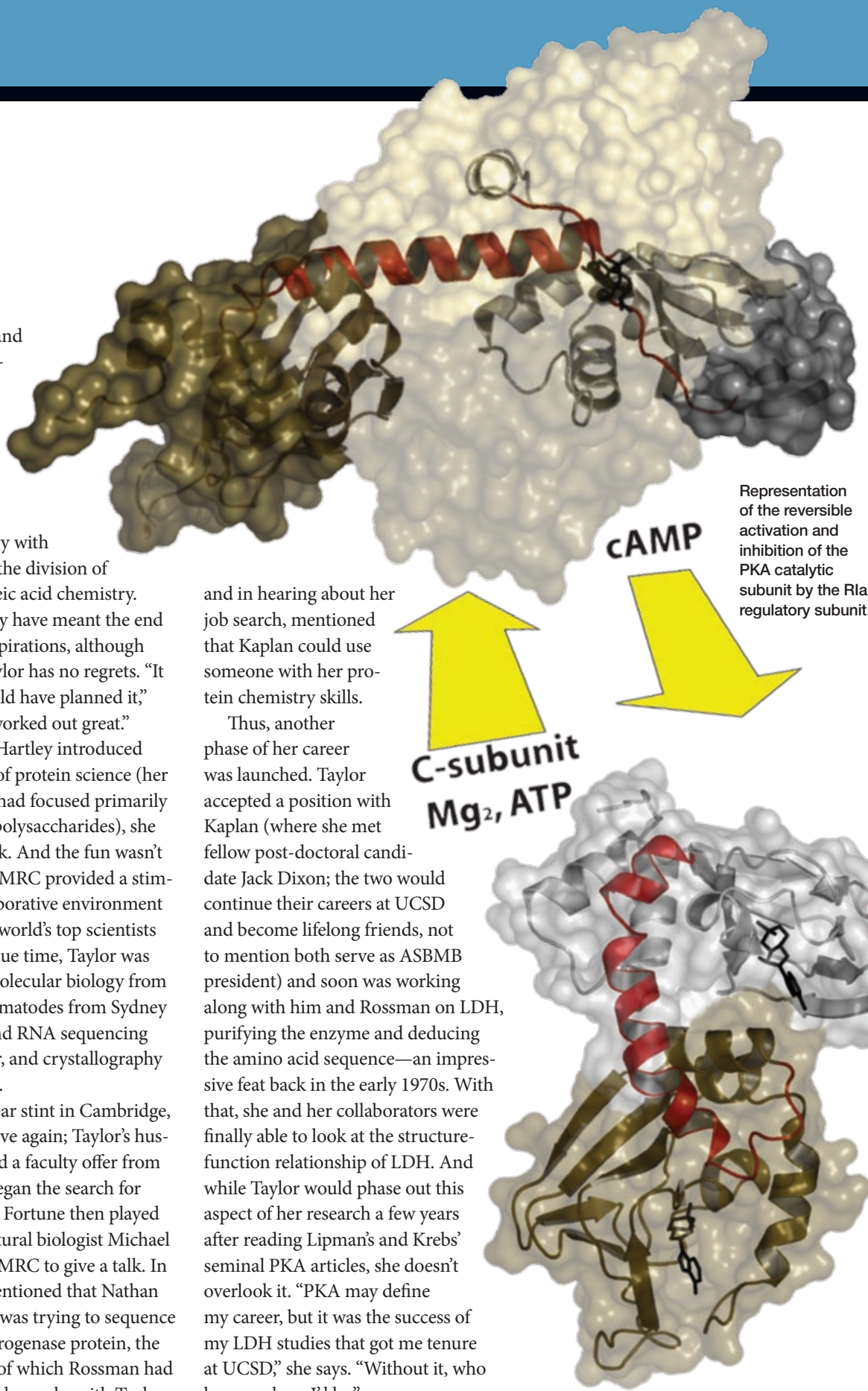
So a word of the wise to all aspiring scientists: the next time your advisor or colleague suggests you check out an interesting paper, it may be worth a look.

On the Move

While Taylor's foray into the world of PKA came unexpectedly, it was at the same time par for the course of her career. In fact, just one decade before receiving that *JBC* paper, Taylor (then Susan Serota) was an undergraduate chemistry major at the University of Wisconsin, excelling in her classes and creating art in her downtime, all the while chasing her childhood ambition of going to medical school.

Then, during her junior year, she met pharmacology graduate student Palmer Taylor. The two began a whirlwind romance and would get engaged a year later, which would create a bit of a timing conundrum. "I had applied to several medical schools," Taylor says, "but Palmer already had post-graduate work lined up at the NIH, and none of my options were near that region." She considered Johns Hopkins University, but unfortunately she had missed the application deadline. "I could still apply to Hopkins' graduate program, though, so I decided to first complete a Ph.D., because I did enjoy scientific research, and then go and get my M.D. afterwards."

Circumstances would intervene yet again, however. In 1968, as Taylor was finishing up her doctoral studies with Edward Heath in physiological chemistry, Palmer (now her husband) received a fellowship at the newly formed Medical Research Council Molecular Pharmacology Research Unit in Cambridge, United Kingdom. Facing another crossroads, Taylor decided to accompany her



Representation of the reversible activation and inhibition of the PKA catalytic subunit by the RIa regulatory subunit.

husband to England and found a post-doctoral position at the prestigious (Medical Research Council) Laboratory of Molecular Biology with Brian Hartley in the division of protein and nucleic acid chemistry. That decision may have meant the end of her medical aspirations, although looking back, Taylor has no regrets. "It wasn't how I would have planned it," she says, "but it worked out great."

Indeed, once Hartley introduced her to the world of protein science (her graduate studies had focused primarily on bacterial lipopolysaccharides), she never looked back. And the fun wasn't just at her lab, as MRC provided a stimulating and collaborative environment that many of the world's top scientists called home. In due time, Taylor was learning about molecular biology from Francis Crick, nematodes from Sydney Brenner, DNA and RNA sequencing from Fred Sanger, and crystallography from Max Perutz.

After a two-year stint in Cambridge, it was time to move again; Taylor's husband had received a faculty offer from UCSD and she began the search for nearby positions. Fortune then played its hand, as structural biologist Michael Rossman visited MRC to give a talk. In his lecture, he mentioned that Nathan Kaplan at UCSD was trying to sequence the lactate dehydrogenase protein, the crystal structure of which Rossman had just solved. Later, he spoke with Taylor and in hearing about her job search, mentioned that Kaplan could use someone with her protein chemistry skills.

Thus, another phase of her career was launched. Taylor accepted a position with Kaplan (where she met fellow post-doctoral candidate Jack Dixon; the two would continue their careers at UCSD and become lifelong friends, not to mention both serve as ASBMB president) and soon was working along with him and Rossman on LDH, purifying the enzyme and deducing the amino acid sequence—an impressive feat back in the early 1970s. With that, she and her collaborators were finally able to look at the structure-function relationship of LDH. And while Taylor would phase out this aspect of her research a few years after reading Lipman's and Krebs' seminal PKA articles, she doesn't overlook it. "PKA may define my career, but it was the success of my LDH studies that got me tenure at UCSD," she says. "Without it, who knows where I'd be."

Crystal Visions

Taylor began her work with PKA much like she had done with LDH, using her knowledge of protein chemistry to carry out sequencing, affinity labeling, and chromatography studies on the enzyme to get an idea of the substrates, activity, and functional domains of all its components (PKA in its full form is a holoenzyme of regulatory and catalytic subunits). However, while she made several important observations—such as providing evidence of a close-knit kinase family by demonstrating that PKA and tyrosine kinases had homologous ATP binding sites—Taylor realized that a real understanding of PKA would require a structure.

"I think I was pretty much alone at sea in that regard," Taylor says. "Kinases were becoming well-studied, but the signaling people looking at them were trained in pharmacology or biochemistry and not crystallography, so crystallizing their proteins was not high on their list of priorities; after all, crystallography wasn't routine back then. In my training at the MRC, though, I had learned structural biology side by side with protein chemistry, which gave me a different perspective."

In 1991, Taylor's group succeeded in solving the crystal structure of PKA's catalytic subunit, providing the first structure of any kinase and a template for the entire 500+ member kinase family, as this subunit is extremely conserved. "In many ways it's still the best model for kinase studies, even though we have about 70 or 80 kinase structures currently solved," Taylor notes. Part of PKA's enduring charm stems from its easy-going nature, being one of the few eukaryotic kinases that can be purified in an active form from *E. coli*. "Many pharmaceutical companies still work regularly with PKA because it's an enzyme you can easily crystallize with inhibitors to test general binding of kinase inhibitors."

Other structures followed, each one revealing a little more of the hidden picture. In 1995 Taylor determined the structure of the first regulatory subunit, and the second subunit followed six years later. A true turning point, however, came about in 2005, and then 2007, when Taylor's lab solved the structure of the catalytic and regulatory subunits in complex. "With that, we finally could see how the whole enzyme was activated by cAMP and inhibited without it."

The multi-subunit structure also provides a glimpse into PKA enzyme cooperativity, something that can't be gleaned from individual subunits. Taylor notes that PKA binds to many different substrates and regulators, which can affect the conformation of the entire enzyme, and the challenge now is to understand the extent of that allostery.

Another challenge arrived when Taylor began performing some yeast two-hybrid assays with one of the PKA regulatory subunits. "We pulled out two novel peptides that turned out to be scaffold proteins that bring together PKA with its substrates at the site of phosphorylation. Although protein scaffolding had been shown for PKA and a few other kinases, these scaffolds, DAKAP 1 & 2, can bind to both isoforms of the regulatory subunit, which was at the time unusual." Using a technique known as low angle x-ray scattering, which provides a way of looking at shapes and dynamics in solution (though not high-resolution), Taylor and collaborator Don Blumenthal at the University of Utah have defined surprising isoform differences and hope to piece together exactly how the PKA tetramer and its modulators come together on the scaffold to create a molecular machine.

Localizing the Problem

Nearly 40 years after her first foray into the mysteries of PKA, Taylor is still fascinated by this ubiquitous and amazingly complex enzyme. "I'm certainly not bored with it; it keeps teaching me new things about science."

One example of that new science occurred a little over a decade ago, when Taylor was looking at PKA inhibition with UCSD colleague Roger Tsien. PKA and cAMP had helped lure Tsien, the 2008 Nobel Prize laureate in chemistry, down to UCSD from Berkeley in 1989 and Taylor and Tsien developed fluorescent tools to detect cAMP molecules in living cells. The pair then began collaborating to track PKA subcellular localization, and during one of their experiments, they observed that one particular PKA inhibitory subunit, the heat-stable PKI, could apparently remove PKA from the nucleus in addi-

Out of Focus: The Best of Both Worlds

While PKA may be Taylor's scientific "baby," she often states that her best experiments have always been her three children. Today, they do indeed reflect the perfect balance of nature and nurture. Taylor's oldest, daughter Tasha, takes after her parents with a preference for science and medicine and works as a pediatrician, while son Ashton, a graphic designer, expresses Taylor's artistic side. As for youngest child Palmer Andrew, well, he took a little from each column, splitting his time between physics and music. "In fact, he just completed working on a documentary on steelhead and salmon fishing in northern California, so we'll see where that takes him. We'll also see how our two new grandchildren, Elian and Natalia, launch the new generation of the Taylor family."

tion to blocking kinase activity.

"We found that PKI had a small motif coding for a nuclear export signal, which was something we hadn't anticipated, mainly because most scientists didn't believe such sequences existed. Now, the NES (Nuclear Export Signal) is a well-known mechanism for protein transport along with peptide signals for nuclear import and localization."

And speaking of localization, Taylor has recently identified another protein, A-kinase-interacting protein (AKIP), which escorts and localizes PKA to the nucleus. While not too surprising—considering PKA's ubiquitous nature, there likely should be many proteins helping to control when and where it operates—AKIP has turned out to be an intriguing molecule in its own right. "It contains several different motifs and binds many interesting proteins besides PKA," Taylor says. Not to worry, though, this doesn't represent a change in Taylor's research focus—she knows PKA still has plenty of fascinating secrets to tell.

Nick Zagorski is a science writer for ASBMB. He can be reached at nzagorski@asbmb.org.

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scientific meeting calendar

NOVEMBER 2008

2nd Latin American Protein Society Meeting
NOVEMBER 4–8, 2008
ACAPULCO, GRO. MEXICO
www.laproteinsociety.org

2008 Fall Workshop on Protein-Protein and Protein-Ligand Interactions
NOVEMBER 6–7, 2008
SAN FRANCISCO, CA
www.asms.org/Default.aspx?tabid=58

2008 Annual Meeting of the Society for Glycobiology
NOVEMBER 12–15, 2008
FORT WORTH, TX
www.glycobiology.org

Oils + Fats 2008
NOVEMBER 18–20, 2008
MUNICH, GERMANY
www.oils-and-fats.com
E-mail: info@oils-and-fats.com

DECEMBER 2008

Exploring Modular Protein Architecture
DECEMBER 3–5, 2008
HEIDELBERG, GERMANY
www-db.embl.de/jss/EmblGroupsOrg/conf_110

The Annual Meeting of the American Society for Matrix Biology (ASMB)
DECEMBER 7–11, 2008
SAN DIEGO, CA
www.asmb.net/

The 48th American Society for Cell Biology Annual Meeting
DECEMBER 13–17, 2008
SAN FRANCISCO, CA
www.ascb.org/meetings/

The Science of Eliminating Health Disparities
DECEMBER 16–18, 2008
NATIONAL HARBOR, MD
www.blsmeetings.net/2008healthdisparitiessummit/

JANUARY 2009

2009 Glycobiology Gordon Research Conference
JANUARY 18–23, 2009
VENTURA, CA
www.grc.org/programs.aspx?year=2009&program=glycobio

Keystone Symposium–Obesity: Novel Aspects of the Regulation of Body Weight
JANUARY 20–25, 2009
BANFF, ALBERTA, CANADA
www.keystonesymposia.org/Meetings/ViewMeetings.cfm?MeetingID=997

Sanibel Conference on Mass Spectrometry: Lipidomics and Lipids in Mass Spectrometry
JANUARY 23–26, 2009
ST. PETERSBURG BEACH, FL
www.asms.org/Default.aspx?tabid=70

The 22nd Biennial Conference of the Australian & New Zealand Society for Mass Spectrometry
JANUARY 27–30, 2009
SYDNEY, AUSTRALIA
www.mmb.usyd.edu.au/ANZSMS22

FEBRUARY 2009

Gordon Research Conference—Plant Lipids: Structure, Metabolism, & Function
FEBRUARY 1–6, 2009
GALVESTON, TX
www.grc.org/programs.aspx?year=2009&program=plantlipid

Molecular Targets for Cancer Prevention Conference
FEBRUARY 4–5, 2009
BETHESDA, MD
http://web.ncifcrf.gov/events/cancerprevention/2009/default.asp

The 14th Annual Proteomics Symposium
FEBRUARY 6–8, 2009
LORNE, AUSTRALIA
www.australasianproteomics.org

PLA 3rd Annual Scientific Forum
FEBRUARY 20–22, 2009
SALT LAKE CITY, UT
www.lipid.org

US HUPO 5th Annual Conference
FEBRUARY 22–25, 2009
SAN DIEGO, CA
www.ushupo.org
E-mail: ushupo@ushupo.org
Tel.: 505-989-4876

Keystone Symposium–Complications of Diabetes and Obesity
FEBRUARY 24–MARCH 1, 2009
VANCOUVER, BRITISH COLUMBIA
www.keystonesymposia.org/Meetings/ViewMeetings.cfm?MeetingID=998

2nd International Conference on Advanced Technologies & Treatments for Diabetes (ATTD)
FEBRUARY 25–28, 2009
ATHENS, GREECE
www.2.kenes.com/attd/Pages/home.aspx

Biophysical Society 53rd Annual Meeting
FEBRUARY 28–MARCH 4, 2009
BOSTON, MA
www.biophysics.org/2009meeting

MARCH 2009

Gordon Conference on Oxidative Stress & Disease
MARCH 8–13, 2009
TUSCANY, ITALY
www.grc.org/programs.aspx?year=2009&program=oxidat

ACS Spring National Meeting & Exposition
MARCH 22–26, 2009
SALT LAKE CITY, UT
www.acs.org/meetings

APRIL 2009

3rd International Congress on Prediabetes and the Metabolic Syndrome—Epidemiology, Management, and Prevention of Diabetes and Cardiovascular Disease
APRIL 1–4, 2009
NICE, FRANCE
www.kenes.com/prediabetes

ASBMB Annual Meeting
APRIL 18–22, 2009
NEW ORLEANS, LA
www.asbmb.org/meetings.aspx

Keystone Symposium—Complex Lipids in Biology: Signaling, Compartmentalization, and Disease
APRIL 22–27, 2009
OLYMPIC VALLEY, CA
www.keystonesymposia.org/Meetings/ViewMeetings.cfm?MeetingID=961

Arteriosclerosis, Thrombosis, and Vascular Biology Annual Conference
APRIL 29–MAY 1, 2009
WASHINGTON, D.C.
www.americanheart.org/presenter.jhtml?identifier=3057022

2009 NLA Scientific Sessions
APRIL 30–MAY 3, 2009
MIAMI, FL
www.lipid.org

MAY 2009

57th ASMS Conference on Mass Spectrometry
MAY 31–JUNE 4, 2009
PHILADELPHIA, PA
www.asms.org
E-mail: office@asms.org
Tel.: 505-989-4517

JUNE 2009

VIII European Symposium of the Protein Society
JUNE 7–11, 2009
ZURICH, SWITZERLAND
Organizer: Andreas Plückthun (University of Zurich)
www.proteinsociety.org

21st American Peptide Society Symposium
JUNE 7–12, 2009
BLOOMINGTON, IN
www.21staps.org

Cancer Proteomics 2009
JUNE 8–12, 2009
DUBLIN, IRELAND
www.selectbiosciencies.com/conferences/files/Agendas2009/CP2009_Agenda.pdf

3rd EuPA Meeting—Clinical Proteomics
JUNE 14–17, 2009
STOCKHOLM, SWEDEN
www.lakemedelsakademin.se/templates/LMAstandard.aspx?id=2529

VII European Symposium of the Protein Society
JUNE 14–18, 2009
ZURICH, SWITZERLAND
www.proteinsociety.org

XV International Symposium on Atherosclerosis
JUNE 14–18, 2009
BOSTON, MA
www.isa2009.org

SEB at Glasgow 2009
JUNE 28–JULY 1, 2009
GLASGOW, SCOTLAND
www.sebiology.org/meetings/Glasgow/glasgow.html

JULY 2009

23rd Annual Symposium of the Protein Society
JULY 25–29, 2009
BOSTON, MA
www.proteinsociety.org

AUGUST 2009

ACS Fall 2009 National Meeting & Exposition
AUGUST 16–20, 2009
WASHINGTON, D.C.
www.acs.org/meetings

18th International Mass Spectrometry Conference
AUGUST 30–SEPTEMBER 4, 2009
BREMEN, GERMANY
www.imsc-bremen-2009.de

SEPTEMBER 2009

World Congress on Oils and Fats and 28th ISF Congress
SEPTEMBER 27–30, 2009
SYDNEY, AUSTRALIA
www.isfsydney2009.com

OCTOBER 2009

3rd ESF Functional Genomics Conference
OCTOBER 1–4, 2009
INNSBRUCK, AUSTRIA
www.esffg2008.org

Bioactive Lipids in Cancer, Inflammation, and Related Diseases (11th International Conference)
OCTOBER 25–28, 2009
CANCUN, MEXICO
www.bioactivelipidsconf.wayne.edu

APRIL 2010

ASBMB Annual Meeting
APRIL 24–28, 2010
ANAHEIM, CA
www.asbmb.org/meetings.aspx

AUGUST 2010

14th International Congress of Immunology
AUGUST 22–27, 2010
KOBE, JAPAN
www.ici2010.org

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Early Registration Deadline:
February 9, 2009

April 18–22, 2009

www.asbmb.org/annualmeeting.aspx

ASBMB
American Society for Biochemistry and Molecular Biology