DECEMBER 2003

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ASBMB Today

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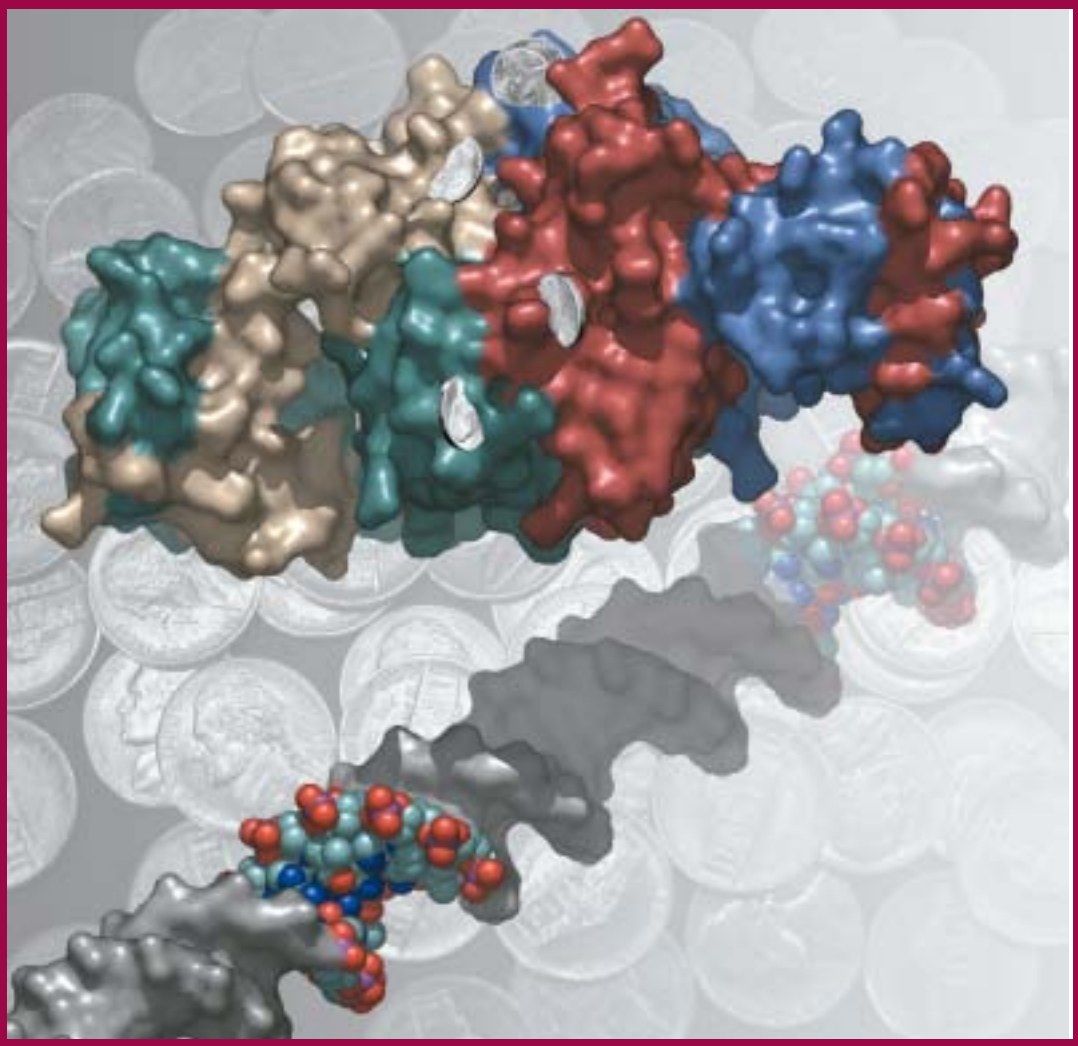
AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

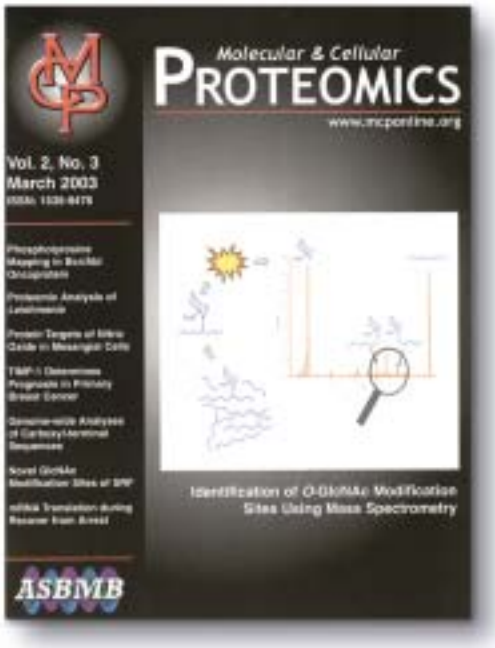
How Cells Regulate the Uptake of Nickel



ALSO IN THIS ISSUE

Q: WHAT IS BLACK, WHITE, AND READ ALL OVER?

A:



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ASBMB Today

AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

DECEMBER 2003,
Volume 2, Issue 9

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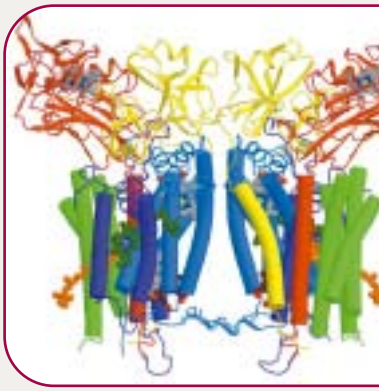

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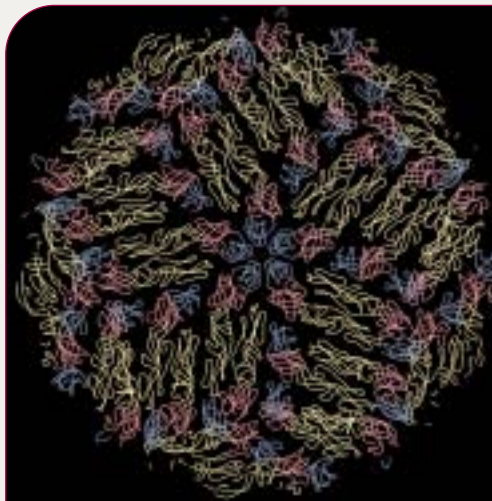

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Comments

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Bad for Biomedical Research

One deleterious effect of the Patriot Act and allied executive edicts has not been mentioned in recent accounts. It involves their chilling influence on biomedical research.

Some investigators are abandoning research with organisms that have appeared on a "sensitive" list because of egregiously cumbersome requirements recently instituted for permission to acquire and work with such agents. The American. Type Culture Collection, a major repository for many cell types, is refusing to fill orders for certain bacterial cultures because of similar arduous restrictions, and a number of scientists are destroying "suspect" biological samples.

These actions, ironically, are counterproductive to developing immunological defenses against presumptive biological terrorist attacks.

In addition, some scientists are being induced to go overseas to pursue their research in less draconian environments.

While scientific exchange between nations is to be encouraged, this activity should not have a negative driver. The intrusiveness of federal antiterrorist activities in these areas undermines creative efforts to the detriment of the nation as well as civil liberties.

Dr. Elliot Schiffmann
Chevy Chase, Maryland
301-496-1465

This letter from an ASBMB member appeared in the Washington Post, *September 13, 2003.*

Could Glitazones Be Effective Anti-Cancer Drugs?

Researchers at Georgetown University's Lombardi Comprehensive Cancer Center have decoded the step-by-step process by which a class of popular anti-diabetes drugs inhibits cancerous tumor growth. With the discovery of this molecular chain of events, as reported in the September 2003 issue of *Molecular and Cellular Biology*, the Georgetown researchers are now studying whether these anti-diabetes drugs, called glitazones, could one day be effective anti-cancer drugs.

Glitazones are taken by more than two million people with Type 2 diabetes, and are marketed under the names Avandia and Actos. Glitazones bind to a particular target on a cell, and in diabetics, they work by reducing insulin resistance at the sites of insulin action in the muscle and liver. Previous studies have also shown that glitazones also have the ability to inhibit tumor growth. However, until this study no one understood how this process worked.

"This study shows for the first time a direct link between a gene causing breast and other cancers and a gene linked to diabetes and the production of fat cells," said ASBMB member Richard Pestell, Director of the Lombardi Comprehensive Cancer Center. "The link between these cellular components may be a lynchpin in some cancers—linking some cancers and metabolism directly. Potentially, we could be on the way to finding new therapeutic leads that would improve both diseases."

Dr. Pestell and his colleagues describe a complex relationship between a cancer causing gene, Cyclin D1, and a cancer-blocking receptor called PPAR gamma, which is involved in fat cell development. They are respectively found in breast cancer tissue and normal breast tissue. When PPAR is "turned on" by glitazones, tumor growth is inhibited. Conversely, when Cyclin D1 is activated in cells, it causes cancer cells to divide uncontrollably and excessively.

The new study reports that the anti-tumor effects of the PPAR gamma receptor are actually controlled by the cancer-causing Cyclin D1. In short, too much Cyclin D1 trumps the PPAR gamma receptor, turning off its ability to inhibit tumor growth.

Based on these findings, the Georgetown researchers believe that reduction in PPAR expression coupled with the increase in Cyclin D1 may represent a key genetic alteration underlying the transition from normal breast tissue to breast cancer. These findings suggest that drugs that block the effects of Cyclin D1 may be useful in stopping the conversion of normal tissue to malignant tissue.

Dr. Richard Pestell

The discoverer of the human Cyclin D1 gene, Dr. Andrew Arnold, Professor and Director of the Center for Molecular Medicine at the University of Connecticut School of Medicine, agrees with the Georgetown researchers.

"This link between Cyclin D1 and PPAR gamma biochemical pathways is fascinating and clearly worthy of further exploration, including the potential for yielding new treatment modalities for cancer," said Dr. Arnold.

George L. Kenyon Elected President of IUBMB

George L. Kenyon, Dean and Tom D. Rowe Collegiate Professor of Pharmaceutical Chemistry at the University of Michigan, Ann Arbor, was elected the 15th president of the International Union of Biochemistry and Molecular Biology (IUBMB) at the IUBMB's 18th General Assembly on October 12 in Montreal.

Dr. Kenyon, an ASBMB member, will serve as IUBMB President-Elect from 2003 to 2006 and as President from 2006 to 2009. For the past three years, he has been Chair of the U.S. National Committee for IUBMB, one of several field-specific national committees run by the National Research Council of the National Academies.

The IUBMB has members from 71 nations, representing approximately 100,000 biochemists and molecular biologists in the various societies of member-nations. The mission of the IUBMB is "to foster and support the growth and development of biochemistry and molecular biology as the foundation from which the biomolecular sciences derive their basic ideas and techniques in the service of mankind."

Dr. George L. Kenyon

In addition to organizing and sponsoring various scientific conferences and congresses around the world, the IUBMB supports the publication of several prominent scientific journals including *Trends in Biochemical Sciences, IUBMB Life, Biochemistry and Molecular Biology Education,* and *Molecular Aspects of Medicine*.

William Smith to Receive 2004

The 2004 ASBMB-Avanti Award in Lipids will be presented to William L. Smith, Minor J. Coon Professor and Chair of the Department of Biological Chemistry, University of Michigan Medical School, at the ASBMB Annual Meeting.

The Award recognizes outstanding research contributions in the area of lipids, and consists of a plaque, a stipend, and transportation and expenses to present a lecture at the ASBMB Annual Meeting. Dr. Smith's lecture, is tentatively entitled "Structure, Function and Regulation of Cyclooxygenases."

Dr. Smith is known as an outstanding experimentalist whose prolific career has yielded seminal work in the areas of eicosanoid biosynthesis, the physiology of polyunsaturated fatty acids, and the action of prostaglandins. He is one of the acknowledged experts in the world on the molecular biology, biochemistry, and enzymology of the prostaglandin synthases, the key enzymes in prostaglandin biosynthesis, and the target for non-steroidal anti-inflammatory drugs (NSAIDs). He has made contributions to the broad field of eicosanoid biochemistry and physiology in the past, he continues to move the field forward, contributing pioneering research, by bringing together researchers to apply cutting-edge approaches to the study of the biochemistry and enzymology of prostaglandin biosynthesis.

After receiving his Bachelor's in Chemistry at the University of Colorado in 1967, Dr. Smith began his graduate studies with Professor William E.M. Lands at the University of Michigan. It is there that he was introduced to the emerging field of eicosanoids, and first established in 1972 that the target of aspirin was the newly discovered enzyme prostaglandin synthase. Only a year earlier had Sir John Vane proposed that aspirin worked by directly blocking prostaglandin biosynthesis, and only a few years earlier had Bengt Samuelsson established the existence of prostaglandin H2 and its biosynthesis from arachidonic acid. Through the work of Dr. Smith and Dr. Lands, researchers now had the target of all NSAIDs, which ushered in a new stage of pharmacological research.

After receiving his Ph.D. in 1971, Dr. Smith pursued postdoctoral research in carbohydrate chemistry with Dr. Clinton E. Ballou, an ASBMB member, at the University of California, Berkeley. By 1974, he had become a senior scientist at the Mead Johnson Company in Indiana. However, he wanted to return to academic research, and in 1975 he was appointed as Assistant Professor in the Department of Biochemistry at Michigan State University, where he conducted his research until moving to the University of Michigan this year. It was at Michigan State that Dr. Smith tbegan in earnest his research on prostaglandin biosynthesis and, in particular, on the enzymology of prostaglandin synthase. Not only was his laboratory one of the first to isolate, purify, and characterize this new enzyme, but he also studied the distribution of prostaglandin synthase in different tissues, and its broader role in the physiology of prostaglandins, from the release of arachidonic acid from the phospholipid pool to the recognition of prostaglandins by receptors.

This research led the ASBMB-Avanti Award recipient into studying the molecular biology and gene regulation of this enzyme. In 1988, he and Dr. David L. DeWitt, an ASBMB member, published the sequence of prostaglandin synthase, derived from its cDNA, in *PNAS*. This achievement not only allowed the subsequent isolation and characterization of the prostaglandin synthase gene, but also the detailed characterization of the enzyme by site-directed mutagenesis.

ASBMB Member Receives AAMC Award for Research

At its annual meeting last month, the Association of American Medical Colleges presented its Award for Distinguished Research in Biomedical Sciences to Aaron Shatkin, Director of the Center for Advanced Biotechnology and Medicine, a joint project of Rutgers University and the University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School,

Dr. Shatkin, an ASBMB member, demonstrated how viruses spread within cells and is considered one of the pioneer scientists to bring molecular biology and biochemistry to the field of animal virology. He has studied the genome of the reovirus and gained insight into the base life processes of life-threatening diseases, such as AIDS and cancer.

Dr. Shatkin, an ASBMB member, whose work demonstrates how viruses spread within cells, is considered one of the pioneer scientists to bring molecular biology and biochemistry to the field of animal virology. While at the National Institutes of Health, he studied the genome of the reovirus and gained insight into the base life processes of life-threatening diseases, such as AIDS and cancer.

ASBMB-Avanti Award

Dr. William L. Smith

This laid the foundation for new groundbreaking studies by Dr. Smith's laboratory, as well as numerous laboratories around the world. His work and the molecular biological reagents that his laboratory created aided in the discovery of prostaglandin synthase-2, a second isoform of the enzyme, in 1991. With this discovery, the entire face of prostaglandin physiology and NSAID pharmacology changed. Most recently, he has collaborated with Dr. Michael Garavito and Dr. Michael Malkowski to determine the crystal structures of prostaglandin synthase with fatty acid substrates bound within the active site.

The importance of Dr. Smith's research and the regard in which it is held by others is evidenced in the number of invited reviews he has published over the last 20 years on eicosanoid biosynthesis. His contributions in the area of lipids, and more specifically prostaglandins, cyclooxygenases, and lipid mediators, have been called outstanding. His work has been seminal and he uses a variety of approaches from molecular and cell biology to structural biology. He has a record of publications over the last 30 years, including in the last five years, 15 peer-reviewed papers in such journals as the *Journal of Biological Chemistry, Journal of Clinical Investigation,* and *Science*. In addition , he has served as an Associate Editor of the *JBC* and of *Prostaglandins and other Lipid Mediators*.

He has been a recipient of an American Heart Association Established Investigator Award, two NIH MERIT grants, the Treadwell Award, and the Abraham White Distinguished Scientific Achievement Award (1996) from George Washington University, and the Senior Aspirin Award from the Bayer Corporation. He has also served extensively as a consultant to granting agencies such as NIH and the American Heart Association, and to numerous pharmaceutical and biotech companies.

James Darnell Receives National Medal of Science

President Bush announced eight winners of the 2002 National Medals of Science, the nation's highest honor for lifelong achievements in science and engineering. The honorees included ASBMB member James E. Darnell Jr., Vincent Astor Professor at Rockefeller University.

Dr. Darnell, who heads the university's Laboratory of Molecular Cell Biology, was honored for four decades of work on gene regulation. His achievements include discovering pathways by which cell receptors signal genes. Rockefeller University President Paul Nurse, speaking for Dr. Darnell who was abroad, told The Scientist, "These signals are sent in reaction to changes in the cell's external environment in the body. As a result, the genes may express a message for a specific hormone or other protein, or halt gene expression or activation,"

In particularly far-reaching findings, Dr. Darnell in the mid-1990s identified a cell-signaling route, the JAK-STAT pathway, that helped to clarify the biology of human cancers including multiple myeloma and head and neck tumors, Dr. Nurse said. This "promoted a flurry of research into the ways cells receive signals to become and remain specialized, to respond to growth factors and to deal with infection."

The National Medal of Science was established by Congress in 1959 as a Presidential Award to be given to individuals "deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, or engineering sciences." A committee of 12 scientists and engineers is appointed by the President to evaluate nominees for this Award.

ASBMB Welcomes New Ph.D.s

ASBMB extends its congratulations to these individuals who recently received their Ph.D. degrees. In recognition of their achievement, ASBMB is presenting them with a free one-year membership in the Society. The new Ph.D.s are listed below with the institution from which they received their degree.

Bret B. Beyer
University of Florida, Gainesville

Eileen M. Burkart
Washington University School of Medicine

Bojie Dai
Chinese Academy of Sciences

Marisela DeLeon
Virginia Commonwealth University

Jonathan T. Goldstein
University of Wisconsin—Madison

Richard D. Kensinger
Penn State University College of Medicine

Shr-Jeng Leu*
University of Illinois at Chicago

Jeremy S. Myers*
Louisiana State University

** Candidates with an asterisk were previous Associate members who met the requirements for a free one-year membership.*

It's the Neighborhood that Matters in ALS

A multi-center effort led by researchers at the University of California, San Diego (UCSD) School of Medicine, has determined in mouse models of amyotrophic lateral sclerosis (ALS) that the nerve cells, or neurons, involved in ALS can be either damaged or saved from degeneration by neighboring non-neuronal cells. When non-neuronal cells harbor a genetic mutation associated with ALS they can cause damage in normal "motor neurons."

Degeneration of motor neurons in ALS leads to progressive loss of muscle control, paralysis and ultimately death. However, when the neighboring non-neuronal cells are normal, they can protect or rescue motor neurons from degeneration when the neurons themselves carry the ALS mutation. Published in the October 3, 2003 issue of the journal *Science*, the findings implicate non-neuronal cells in the disease, suggesting the potential of stem cell replacement therapy targeting non-neuronal cells as a treatment for ALS.

"In place of the Herculean task of replacing the huge, as much as a meter-long motor neurons damaged by ALS, it would be easier to replace some of the surrounding cells with normal cells. Based on our findings, this could potentially prevent the degeneration and death of motor neurons that would otherwise be targeted for premature death," said ASBMB member and senior author Don Cleveland, UCSD Professor of Medicine, Neurosciences and Cellular and Molecular Medicine and member of the Ludwig Institute for Cancer Research.

Co-senior author Lawrence S. B. Goldstein, UCSD Professor of Cellular and Molecular Medicine and an HHMI investigator, added, "We still need to do more research, but our hope is that stem cell therapy might be a candidate to rescue support cells and treat ALS patients."

Estimated to affect some 30,000 Americans, most people are diagnosed with ALS between the ages of 40 and 70, with 55 being the average age of diagnosis. Half of those diagnosed live only three to five years after diagnosis, while fewer than ten percent survive more than ten years.

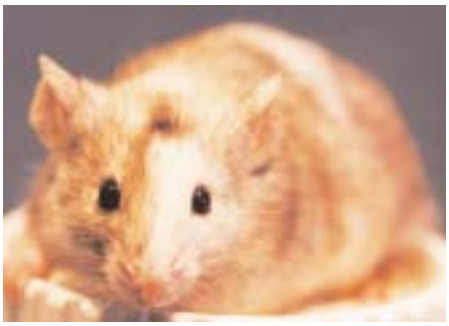
To determine if ALS was caused directly by defects in the motor neurons themselves, or if other cells were inducing motor neurons to die, the researchers studied mouse models of ALS with a mutation in the gene superoxide dismutase (SOD1). A fraction of the inherited form of ALS is caused by the SOD1 mutation.

The researchers developed 65 mice that were mixtures (chimeras) of normal cells and cells with the ALS-causing mutant SOD1 gene. Past studies have shown that mice consisting of 100 percent mutant SOD1 cells develop ALS. Those transgenic mice expressing human SOD1 do not get the disease, while those expressing the FALS-associated SOD1 do. In the new study, many of the chimeric, or mixed-version, mice were completely disease free and most others developed ALS only at a later point in time (with extensions of average lifespan of between one and six months). Even in mice carrying the ALS mutation in all their motor neurons, those with a higher proportion of normal, or wild-type, non-neuronal cells had reduced motor neuron death.

> ***"Our hope is that stem cell therapy might be a candidate to rescue support cells and treat ALS patients."***
>
> Dr. Lawrence Goldstein

The research team noted that the longer survival of mutant motor neurons surrounded by normal cells indicate that these healthy neighbor cells have a protective effect on the damaged neurons, slowing the progression of ALS even when the nerve cells carry the mutant gene. Conversely, the findings that mice with mutant non-neuronal cells develop symptoms of the disease even when the neuronal cells do not carry mutant SOD1 "supports the view that damage to adjacent non-neuronal cells by mutant SOD1 is a major contributor to disease."

While the cause-and-effect of this relationship is not known, the researchers speculate that the non-neuronal cells play a vital role in nourishing the motor neurons, and scavenging toxins from the cellular environment of the motor neurons. When damaged with mutant SOD1, it appears that they fail in this role, contributing to the degeneration of the motor neurons.



Elizabeth A. Roberts, UCSD.

A genetic mosaic mouse in which part of its cells (neurons and non-neurons) are normal and part express an ALS-causing mutation in superoxide dismutase. The black/brown fur represent some of the cells that express the SOD1 mutant; the white fur comes from normal cells.

Biologists' Spotlight
Solves Mysteries of Photosynthesis

Completion of the molecular-scale picture of how oxygen-evolving bacteria convert sunlight to chemical energy offers potential new insights into plant, as well as animal, metabolism.

Using high resolution x-ray crystallography of integral membrane proteins, a team of Purdue biologists has determined the structure of the membrane-bound cytochrome b_6f complex, one of three protein complexes that govern photosynthesis. There is an extraordinary degree of similarity between cyanobacterial and plant photosynthesis. While their work does not immediately suggest any industrial applications, it does reveal a wealth of information not only about a chemical process crucial to all life on the planet, but also about how cells handle and distribute energy. According to team member Dr. William Cramer, an ASBMB member, the study is a great leap forward in the understanding of photosynthesis.

"Where we once could see merely the tip of the iceberg, we can now perceive the entire mechanism of photosynthesis," said Cramer, Henry Koffler Distinguished Professor of Biological Sciences in Purdue's School of Science. "Before we found a way to crystallize the cytochrome, we had a general picture of the photosynthetic process, but possessed only a fraction of a percent of the information we now have. Now that we can examine these proteins closely with x-ray crystallography, it could lead to knowledge about how all cells exchange energy with their environment."

Dr. Cramer also said that the study is an important contribution to the young field of proteomics research because there is little data on the important family of membrane-embedded proteins in the total protein database.

"Membrane proteins are involved in a cell's interactions with its environment, making them an essential component of metabolism," he said. "However, they are difficult to crystallize for study. This research could clarify our understanding of energy flow in human cells as well, giving us better insight into respiration and the absorption of antioxidants in animal cells."

The report appeared in the journal *Science's* online edition, *Science Express*. The first two authors on the manuscript are Genji Kurisu, visiting scholar from Osaka University, Japan, and Huamin Zhang, associate research scientist in the Department of Biological Sciences at Purdue, who made major contributions to the crystallographic and biochemical part of the analysis.

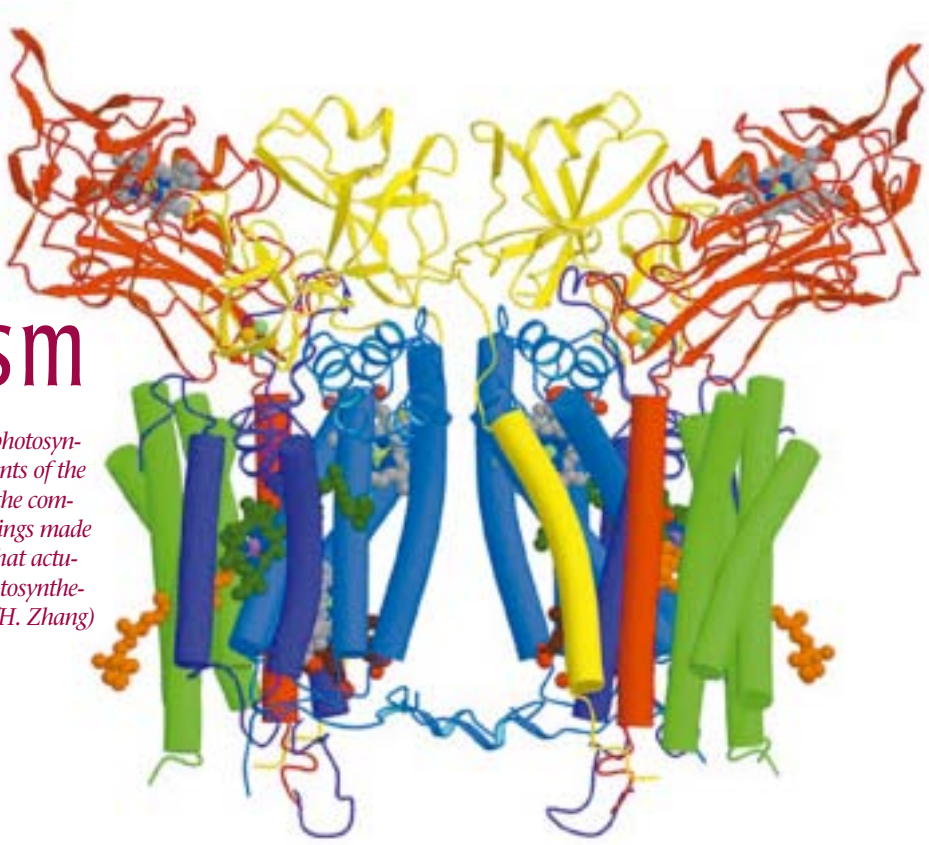
Examining the membrane proteins has been the challenge for the research team.

The report paints a picture of the complex motion of electrons and protons across the bacterium's cell membrane, the boundary between the cell and its surroundings.

"Plant cell membranes are like the two ends of a battery," said ASBMB member Janet Smith, Professor of Biological Sciences and the team member responsible for much of the structure analysis. "They are positive on the inside and negative on the outside, and they are charged up when solar energy excites electrons from water within the cell. The electrons travel into the cell membrane via proteins that conduct them just like wires. Of course, because of their high energy level, the electrons want to 'fall back' like water over a dam, releasing the energy a plant harnesses to stay alive."

The cell that provided the proteins for the team's work was a cyanobac-

and Metabolism



The cytochrome b6f protein complex, which is critical for photosynthesis. The eight colors represent the eight protein components of the cytochrome complex; the cylinders are the 26 segments of the complex that cross the photosynthetic membrane; the colored rings made of little balls that are embedded in protein are the groups that actually carry the electrons stimulated by light absorbed in photosynthesis. (Purdue Department of Biological Sciences illustration/H. Zhang)

terium, a filamentous thermophilic bacterium commonly found in hot springs such as those in Yosemite. While animals do not employ photosynthesis, their cells do make use of similar proteins for respiratory energy transduction. The similarities could lead to a better understanding of our own metabolic processes.

"What we see when we examine these proteins is the nature of their partial similarity," said Dr. Cramer. "The differences can now be explored more easily."

Examining the membrane proteins has itself been the challenge for the research team, which is reaping the benefits of its breakthrough work with protein crystallization. While proteomics specialists have been crystallizing protein molecules for years to obtain their structure, membrane proteins have proven difficult because they do not dissolve in water, a crucial step in the crystallization process.

"This has left a gap in our knowledge of membrane proteins, which total about 30 percent of the proteins in living things," Dr. Cramer said. "After a decade of trying, involving about 100,000 person-hr, we found a way to crystallize this multi-subunit integral membrane protein last year. Because of access to high intensity synchrotron radiation at the Advanced Photon Source (Argonne National Lab), it then took less than a year until we were able to look at its structure in detail."

The team is hopeful that their method can be applied to other integral membrane proteins, which they consider a variety of vast untapped potential.

"If cells were countries, membrane proteins would control all the international commerce," Dr. Cramer said. "They are the border guards that regulate all the energy transfer and material exchange across the boundary between the cell and its environment. If you want to get a drug into a cell where it can be of use, you have to deal with the membrane proteins—that's why they're so important a subject to study."

Purdue Department of Biological Sciences photo/T. Geders

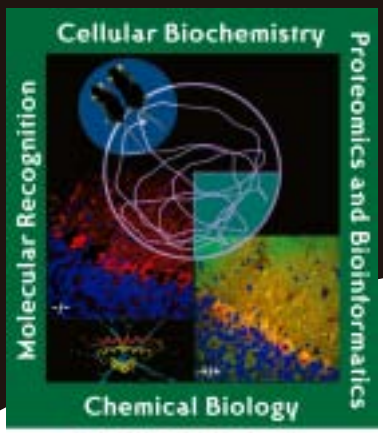
The Purdue University biologists who determined the structure of the cytochrome protein complex are, from left, Professor Janet Smith, Associate Research Scientist Huamin Zhang, visiting scholar Genji Kurisu, and Professor William Cramer.

Molecular Recognition and Catalysis

Organizer: Jack Dixon, Dean for Scientific Affairs and Professor of Pharmacology,
Cellular & Molecular Medicine, Chemistry & Biochemistry,
University of California, San Diego

The overall session will focus on Molecular Recognition and Catalysis. Specific sessions will focus on various aspects of Molecular Recognition that takes place between mammalian signal transduction pathways and bacterial and viral pathogens. Other sessions will address the issues of cellular signaling pathways involved in cell growth as well as cell motility. Another area which will be covered includes the use of mass spectrometry as applied to biological systems to examine post-translational modification of proteins as well as to examine macromolecular complexes involved in cell biology.

The cytochrome P450's have also played a key role in molecular recognition. Presentations will focus on the chemistry, recognition and catalytic properties of "nature's versatile blowtorch." Catalysis in Health and Disease will examine the role of proteases in anti-angiogenesis, their roles in metabolic control and their function in complex biological systems. A session on molecular recognition and protein targeting will provide novel insights into how protein interactions contribute to epithelial cell polarity in both Drosophila and mammalian systems. Finally, a session on the biophysical tools used in molecular interactions will focus on new methods and instrumentation involved in following protein-protein interactions.



"A Molecular Exploration of the Cell"

ASBMB Annual Meeting
and 8th IUBMB Conference
June 12 - 16, 2004
Boston, Massachusetts

Molecular Recognition and Catalysis Meeting

Organized by **Jack E. Dixon**, *UCSD*

Cytochrome P450's

Cytochrome P450, nature's versatile blowtorch
Chair, Minor J. Coon, *Univ. of Michigan*

Heme-oxygen enzymology: recognition and catalysis across a rich functional landscape
Stephen G. Sligar, *Univ. of Illinois*

Pharmacogenomics of P450: evolutionary, functional, and clinical aspects
Magnus Ingelman-Sundberg, *Karolinska Inst., Stockholm*

Catalysis in Health and Disease

Methionine aminopeptidase: target for anti-angiogenesis
Chair, Ralph A. Bradshaw, *UC, Irvine*

Defining the role of proteolytic enzymes in complex biological systems
Charles S. Craik, *UCSF*

Role of dipeptidyl peptidase IV in metabolic control
Nancy Thornberry, *Merck Res. Labs., Rahway, NJ*

Molecular Recognition and Protein Targeting

Protein Interaction domains and epithelial cell polarity
Chair, Benjamin Margolis, *Univ. of Michigan*

Determinants of planar polarity in Drosophila
Michael Simon, *Stanford Univ.*

Asymmetric cell division in the Drosophila nervous system
Juergen Knoblich, *Res. Inst. of Molecular Pathology, Vienna, Austria*

ARBF/ASBMB Symposium - Role of Biophysical Technologies in Molecular Interaction Analysis

Chair, Michael Doyle, *Bristol-Myers Squibb Pharmaceutical Res. Inst.*

Quantitating the Time Component of Protein Interactions
David G. Myszka, *Univ. of Utah Sch. of Med.*

Practical ITC and its applications in protein-ligand and protein-protein interactions
Alan Cooper, *Univ. of Glasgow, Scotland*

Characterization of p38-MAPKAPK2 interaction by SPR and ITC
Mark Labadia, *Boehringer Ingelheim Pharmaceuticals, Ridgefield, CT*

Pathogens Which Intercept Mammalian Signal Transduction Pathways

The biochemical interactions between bacterial pathogens and signal transduction systems
Chair, Jack E. Dixon, *UCSD*

Molecular recognition in host-pathogen interactions
Partho Ghosh, *UCSD*

Control of innate immunity by hepatitis C virus
Michael J. Gale, *Univ. of Texas Southwestern*

Cellular Signaling Mechanisms

Protein phosphorylation in regulation of protein synthesis and cell growth
Chair, Kun-Liang Guan, *Univ. of Michigan*

Map kinase signaling
Natalie G. Ahn, *Univ. of Colorado, Boulder*

Cross talk between heterodimeric G proteins and Rho GTPases
Silvio Gutkind, *NIDCR, NIH*

Mass Spectrometry Meets Cell Biology

Analysis of protein modifications by mass spectrometry
Chair, Huilin Zhou, *UCSD*

Proteomic tools for dissecting cellular function
Brian T. Chait, *Rockefeller Univ*.

The study of macromolecular complexes by quantitative proteomics
Jeff Ranish, *Inst. for Systems Biology, Seattle, WA*

Additional Speakers will be chosen from the abstracts submitted to the ASBMB Molecular Recognition and Catalysis topic categories.

Travel Awards Available for Undergraduates, Graduates, Postdoctoral Fellows and Undergraduate Faculty

More Information:
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Abstract Deadline: February 4, 2004

The Future of Education and Professional Development in the Molecular Life Sciences

Organizer: J. Ellis Bell, University of Richmond

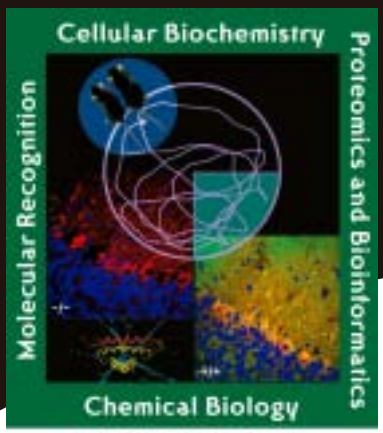
This meeting, organized by the Education and Professional Development Committee of the ASBMB continues the recent trend at the annual meeting of including a full program of activities aimed more at Educators: faculty at undergraduate institutions and at medical schools. In keeping with the recently launched Undergraduate Affiliates Network (UAN), designed to create communities among undergraduates and undergraduate institution faculty a significant component of the meeting will focus on undergraduate education and activities with an opening Undergraduate Orientation and Mixer for both faculty and students. With an anticipated increase in undergraduate participation in the Meeting in general, and the Undergraduate Research Poster Competition, this session will bring students and faculty together at the start of the meeting and will feature the revelation of the six regional winners in the UAN Tee Shirt Design Competition- meeting attendees will have a chance to vote on the six regional finalists to select the ASBMB UAN Inaugural TeeShirt. Details of the regional competitions are to be found on the various regional UAN Websites.

A central theme behind the organization of the sessions will be community building and mentoring, both of students and faculty, and the critical role that outreach activities play in these activities. A symposium Outreach activities in the Education of Undergraduates, Graduates and Postdocs will focus on the practical ways that outreach activities can be, and must be, incorporated into all levels of our educational system and reflects the Education and Professional Development Committees goal of seeing education at all levels incorporate a strong component of outreach activity in every students education. Community building and mentoring motivated the formation of the UAN and will continue to be a motivating force for the activities of the committee in the future. At this meeting it is reflected in both the encouragement of informal interactions with the speakers after the sessions and in several sessions aimed at mentoring young faculty in teaching institutions or graduate students and post docs interested in developing careers in teaching institutions. On the Tuesday of the meeting there will be a lunchtime workshop on writing research grants for faculty in primarily undergraduate institutions with a focus on NIH-AREA and NSF-RUI and CAREER grant writing where a goal of the session will be to help identify mentors for young faculty to assist in research grant writing. This will be followed on Tuesday evening with the Women Scientists Networking Session and Reception.

Although in previous years there has been more of a focus on how to teach, many of the sessions this year will focus on what to teach, both skills and content, in keeping with the recently revised undergraduate curriculum in biochemistry and molecular biology. The symposium sponsored by the Minority Affairs Committee will focus on content issues as well with a symposium titled Obesity and Minority Populationsthat should be of particular interest to Medical School educators. The symposium The Role of Biophysical Technologies in Molecular Interactionsponsored in conjunction with ARBF will highlight a variety of biophysical techniques and their uses and bring an important quantitative aspect to the overall discussions. A double symposium co-chaired by Judy Voet and Jessica Bell will focus on Emerging Areas in the Molecular Life Sciences- first on uses of the internet to address issues in proteomics, genomics and structural biology and second on computational approaches, with a focus on bioinformatics, molecular visualization and computational chemistry and dynamics. After both sessions there will be opportunities for informal lunchtime discussions with the speakers from the sessions. These sessions will be complemented by the session on the new Undergraduate Affiliates Network where issues of content in introductory courses and assessment of student learning will be addressed together with a presentation on the resources that are available through the new UAN. Of particular interest to educators in the area of biochemistry and molecular biology will be physical chemist and renowned author, Peter Atkins from Oxford University focusing on how to bring quantitative science back into introductory courses.

How to teach is not being ignored at the meeting. Sessions on Getting Started with PBL, a workshop chaired by renowned PBL expert Hal White from the University of Delaware, and on Training Medical Students, chaired by Susan Frost from the University of Florida College of Medicine.

Finally, recognizing that not all of the graduate and post doctoral students that we train are going to end up in careers in academia or industry, Carl Rhodes, from HHMI has put together a fascinating session on Preparing for Diverse Career Futures involving presentations from a *Science* writer, a patent lawyer, and a government research administrator, which will illustrate the various pathways to careers in these areas.



"A Molecular Exploration of the Cell"

ASBMB Annual Meeting
and 8th IUBMB Conference
June 12 - 16, 2004
Boston, Massachusetts

The Future of Education and Professional Development in the Molecular Life Sciences Meeting

Organizer: **J. Ellis Bell**, *University of Richmond*

Emerging Areas in the Molecular Life Sciences I: Using the Internet

Co-chairs, Judith Voet, *Swarthmore Col.* and
Jessica Bell, *NIDDK, NIH*
J. Ellis Bell, *Univ. of Richmond*
Kathy Takayama, *Univ. of New South Wales, Australia*
Judith Voet, *Swarthmore Col.*
Paul A. Craig, *RIT*

Outreach Activities in the Education of Undergraduates, Graduates and PostDocs

Chair, Stephen L. Hadjuk, *Marine Biological Lab., Woods Hole, MA*
Neena Grover, *Colorado Col.*
Nancy P. Moreno, *Baylor College of Medicine*
Mary Williams, *Univ. of Alabama at Birmingham*

Emerging Areas in the Molecular Life Sciences II: Computational Approaches in the Future

Co-chairs, Judith Voet, *Swarthmore Col.* and
Jessica Bell, *NIDDK, NIH*
Minoru Kanahisa, *BioInformatics Center, Kyoto Univ., Japan*
Jane S. Richardson, *Duke Univ. Med. Sch.*
Raelene Lawrence, *Chemical Computing Group, Canada*

Obesity and Minority Populations

Chair, Phillip A. Ortiz, *Empire State Col.*
Felix Ortiz, *New York State Assemblyman, 51st District*
Desmond G. Hunt, *NIDDK/NIH*
Betty Monroe Kennedy, *Pennington Biomed. Res. Ctr., Baton Rouge, LA*
Kristie J. Lancaster, *New York Univ.*

BioMolecules Alive: The ASBMB Digital Library

Chair, Paul A. Craig, *RIT*
Duane W. Sears, *UC, Santa Barbara*
Frank R. Gorga, *Bridgewater State Col.*

ARBF/ASBMB Symposium - Role of Biophysical Technologies in Molecular Interaction Analysis

Chair, Michael Doyle, *Bristol-Myers Squibb Pharmaceutical Res. Inst.*
David G. Myszka, *Univ. of Utah Sch. of Med.*
Alan Cooper, *Univ. of Glasgow, Scotland*
Mark Labadia, *Boehringer Ingelheim Pharmaceuticals, Ridgefield, CT*

Undergraduate Education and the ASBMB Undergraduate Affiliate Network

Co-chairs, Neena Grover, *Colorado Col.* and
J. Martyn Gunn, *Texas A&M Univ.*
Trevor Anderson, *Univ. of Natal, South Africa*
Peter Atkins, *Oxford Univ., UK*
J. Martyn Gunn, *Texas A&M Univ.*
Marilee Benore-Parsons, *Univ. of Michigan, Dearborn*

Undergraduate faculty grant writing workshop and networking

Co-Chairs, Terry S. Woodin, *NSF* and **J. Ellis Bell**, *Univ. of Richmond*

Training Medical Students

Chair, Susan C. Frost, *Univ. of Florida Col. of Med.*
Roger W. Koment, *Association of Medical Science Educators*
MaryJo Koroly, *Univ. of Florida Col. of Med.*
Wojciech Pawlina, *Mayo Clinic*

Getting Started with PBL Workshop

Chair, Harold B. White, II, *Univ. of Delaware*

Preparing for Diverse Career Futures

Chair, Carl Rhodes, *HHMI*
Kevin Davis, *Editor,* Bio-IT World
Adriane Antler, *Pennie & Edmonds, LLP*
Tony Demsey, *Research Administratior, NIH*

Also:

Undergraduate Orientation and Mixer

8th Annual Undergraduate Student Research Achievement Award Poster Competition

ASBMB Graduate/Postdoctoral Travel Award Symposium

Minority Scientists' Mixer

Women Scientists' Networking Session/Reception

Travel Awards Available for Undergraduates, Graduates, Postdoctoral Fellows and Undergraduate Faculty

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Abstract Deadline: February 4, 2004

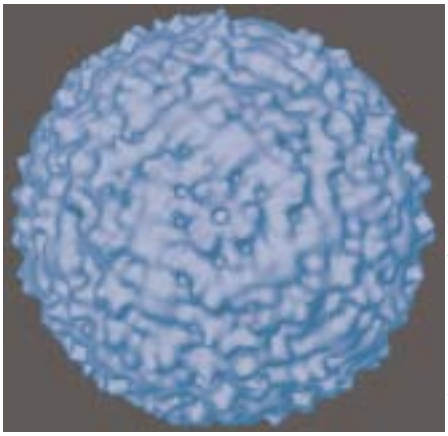
Purdue Team Solves Structure Of West Nile Virus

Using cryoelectron microscopy and advanced imaging techniques, a Purdue University team has determined the orientation of the major surface proteins in a West Nile viral particle. Because these proteins are instrumental in allowing the virus to bind to and invade a host cell, the research could be a step forward in combating the deadly mosquito-borne disease. The team's work appeared in the October 10, 2003, edition of *Science*.

"We can now clearly understand how these proteins interact with one another," said Richard J. Kuhn, Professor of Biological Sciences in Purdue's School of Science and an ASBMB member. "We can't cure West Nile yet, but we can now start thinking about how to interfere with these interactions, which could be a key to stopping the infection's progress."

As West Nile develops inside a host cell, several layers of protein molecules assemble themselves around the genetic material, forming a protective shell. The outer layer of proteins is often arranged in an intricate pattern of interlocked molecules that can give the particle's surface the appearance of a lattice. When the mature West Nile virus particle emerges, it is these surface proteins that interact with another cell's surface so the next invasion cycle can begin.

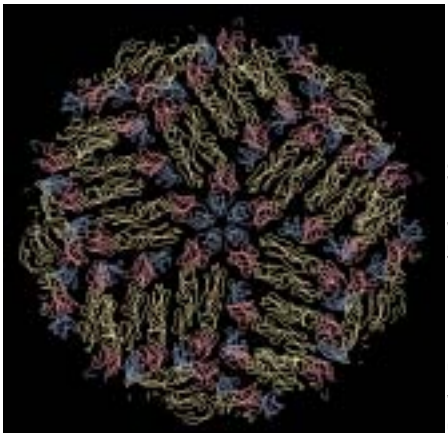
"The West Nile virus is formed from three protein types," Dr. Kuhn said. "After the virus assembles in its host cell, these protein molecules fit together like a jigsaw puzzle and form a well-ordered symmetrical particle. From the structure, we now know, essentially, how the major sets of protein molecules interlock with each other chemically. Armed with this knowledge, scientists might now conceive of ways to interrupt the viral assembly process."



Purdue Department of Biological Sciences image

This figure shows a surface-shaded image of the West Nile virus particle produced by Purdue University biologists using cryoelectron microscopy. The surface is composed of proteins that enable the virus to bind with and invade a host cell. The particle is approximately 50 nanometers in diameter, or about 1/1000th of the width of a human hair.

Adding to the knowledge base is the previous work the group has done with flaviviruses, the viral family that causes diseases including West Nile, dengue and yellow fever. The group, which is composed of researchers from Kuhn's lab, as well as the labs of Dr. Michael Rossmann, an ASBMB member, and Dr. Timothy Baker, has described the structure of other flaviviruses before. While this is the first time West Nile's structure has been described, Dr. Kuhn said the group's past work could assist with science's understanding of this particular viral family.



Purdue Department of Biological Sciences image

This image shows the orientation of the envelope protein molecules that compose the surface of a West Nile virus particle. The major surface protein is composed of three domains color-coded pink, yellow and blue. The proteins self-assemble in a host cell, forming a well-organized geometric shape. Knowledge of the proteins' structure could help scientists in the effort to develop antiviral agents.

"What we already know from studying other flaviviruses could give us a leg up understanding West Nile's behavior," he said. "Dengue, for example, has a very similar structure to West Nile's, but its surface features are sufficiently different that comparisons could help shed light on how West Nile operates."

While Dr. Kuhn is hopeful that the group's work will add to the effort to contain the disease, he said much additional work will be required to understand the virus' life cycle on the molecular level.

"Our structural map now shows only the general orientation of the proteins," he said. "What we need now is to include what you might think of as an 'inset map' - an even smaller-scale picture that details the structure of each of the three protein varieties that make up the virus particle. Then researchers will have more insight into how the proteins bond with cells and each other."

This closer look represents the next step for Purdue's structural virology group, which has recently received new support from the NIH in the form of grants totaling nearly $18 million. These grants support basic research on viral infectious diseases, including West Nile.

"We currently have a 17-angstrom resolution structure," Dr. Kuhn said. "We hope to use our NIH support to get down to the 9-angstrom scale or better, as this would give us details on the individual protein molecules as well as other proteins in the virus."

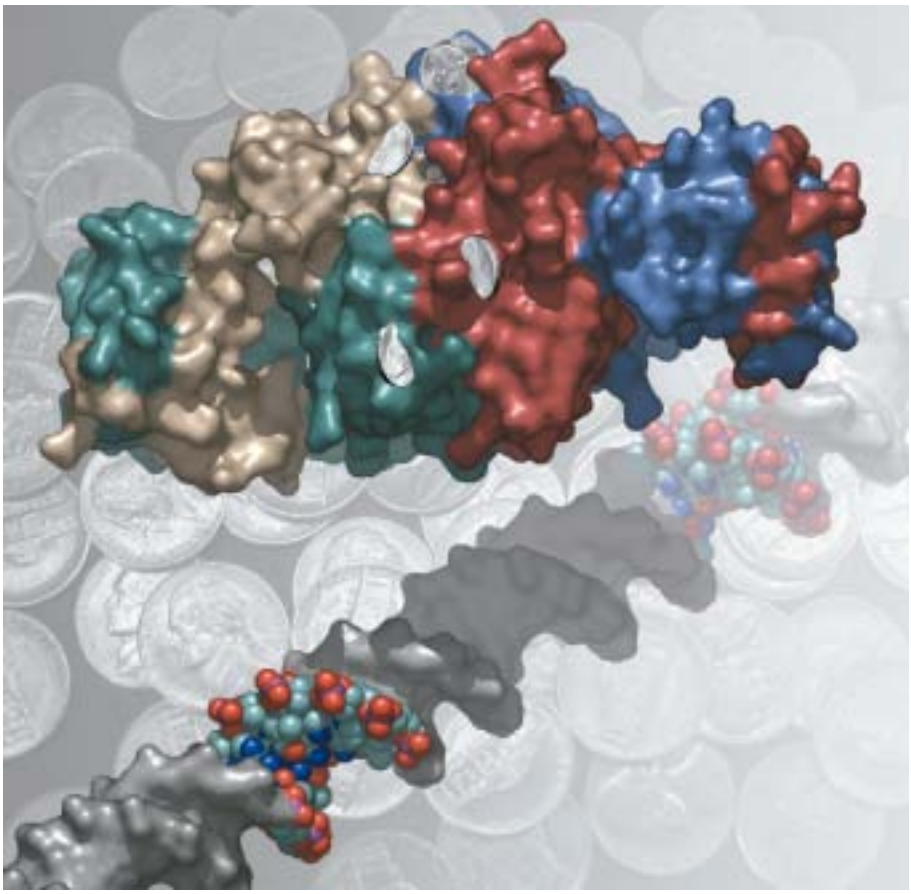
How Cells Regulate the Uptake of Nickel

Pathogenic bacteria such as *Helicobacter pylori* and certain *Eschericia coli* strains require substantial amounts of nickel ions to proliferate in the mostly anaerobic environment of the gastrointestinal tissues they colonize. For example, for *H. pylori* to colonize the stomach lining and form peptic ulcers, it must first make the low-pH environment of the stomach habitable. It does this by producing large amounts of a nickel-containing enzyme called urease.

Although there is a significant requirement for nickel in these organisms, excess nickel can be toxic to cells by binding non-specifically to biomolecules and catalyzing unwanted chemical reactions. It is clear, therefore, that the quantity of nickel taken up into a cell must be tightly regulated.

It has recently been demonstrated that one protein, NikR, is important in several different organisms for regulating various aspects of nickel uptake and utilization. NikR has been studied most extensively in *E. coli*, where it has been shown to repress transcription of a specific nickel import complex in the presence of excess nickel ions, thereby shutting down nickel uptake when sufficient amounts are already present in the cell.

In order to understand how this protein converts the signal of excess nickel into regulation of gene expression, the Drennan laboratory at the Massachusetts Institute of Technology has determined the first structures of *E. coli* NikR by x-ray crystallography. These structures, which appear in the October 2003 issue of *Nature Structural Biology*, differ from all other metal-dependent transcriptional repressors in the motif used to bind DNA. The nickel site in NikR displays an unprecedented Ni-binding mode, as well as the highest reported affinity for Ni in biology.



Transcriptional repressor NikR responds to levels of nickel in the cell. On the cover of the magazine is a surface representation of NikR with "nickels" bound. Photo by Eric Schreiter.

"Understanding how the levels of trace metals are regulated by cells is an important, emerging area," says Dr. Drennan. Recent work in other laboratories has yielded structures of other metal-dependent transcriptional regulators, and "it will be interesting to compare and contrast these different structures to look for themes of metal regulation in biology."

Too much metal is not a good thing as metal accumulation can lead to disease states. A molecular understanding of metal uptake and transport is important for the treatment of these conditions. In the case of *H. pylori* and urease, blocking nickel uptake could be a strategy for the prevention or treatment of ulcers.

The material for this article was provided by Catherine L. Drennan, Assistant Professor, Department of Chemistry, Massachussetts Institue of Technology. Dr. Drennan was the recipient of the 2003 ASBMB-Schering-Plough Young Investigator Award which recognizes outstanding research contributions to biochemistry and molecular biology by researchers recipient who have no more than 10 years post-doctoral experience.

ASBMB Members Elected to Institute of Medicine

Seven ASBMB members were among 65 new members elected in October to the The Institute of Medicine of the National Academies, which now has a total active membership to 1,382.

Established in 1970 by the National Academy of Sciences, the Institute OF Medicine has become recognized as a national resource for independent, scientifically informed analysis and recommendations on issues related to human health. With their election, members make a commitment to devote a significant amount of volunteer time as members of IOM committees, which engage in a broad range of studies on health policy issues.

ASBMB members newly elected to the Institute are:

Henry R. Bourne, Professor of Pharmacology and Medicine, Department of Cellular and Molecular Pharmacology, University of California, San Francisco.

Michael M. Gottesman, Deputy Director for Intramural Research, National Institutes of Health.

Leroy E. Hood, President and Director, Institute for Systems Biology.

Timothy J. Ley, Alan and Edith Wolff Professor of Medicine, Division of Oncology, School of Medicine, Washington University, St. Louis.

Paul L. Modrich, Howard Hughes Medical Institute Investigator and James B. Duke Professor of Biochemistry, Department of Biochemistry, Duke University Medical Center.

Leona D. Samson, Ellison American Cancer Society Research Professor, Professor of Biological Engineering and Toxicology, and Director, Center for Environmental Health Sciences, Massachusetts Institute of Technology.

Keith R. Yamamoto, Professor and Chair, Department of Cellular and Molecular Pharmacology, and Vice Dean for Research, School of Medicine, University of California, San Francisco.

Pehr Harbury to Receive Schering-Plough Research Institute Award

Pehr A.B. Harbury, Assistant Professor of Biochemistry, Stanford University School of Medicine will receive the 2004 Schering-Plough Research Institute Award. The Award recognizes outstanding research contributions to biochemistry and molecular biology. The recipient must have no more than 10 years postdoctoral experience, and need not be an ASBMB member. The Award consists of a plaque, stipend, and transportation and expenses to present a lecture at the ASBMB Annual Meeting. In addition, up to $1,000 will be awarded for travel to attend a meeting of the recipient's choice. Recent recipients of the Award were Catherine Drennan in 2003, John D. York in 2002, Stephen P. Bell 2001, Xiadong Wang 2000, and in 1999 Kun-Liang Guan.

Dr. Harbury has developed new methods for characterizing the folding determinants and folding behavior especially of larger proteins and has used them to characterize the folding of yeast triosephosphate isomerase (TIM), a large dimeric protein each of whose identical monomers contains more than 250 residues. These methods are expected to be widely used and speed the development of proteomics. They are:

Mutational characterization of the folding roles of individual residues, based on combinatorial mutagenesis of gene fragments and reshuffling them with wild type fragments.

A footprinting method which circumvents the previous difficulties of footprinting proteins, and which has been applied to unfolding intermediates in equilibrium with the native TIM structure.

Further development of a theoretical approach for predicting protein stability given the backbone fold and amino acid sequence. An earlier version has been tested with coiled-coils.

Dr. Harbury's Ph.D. research with Peter Kim set the stage for his current work. In a remarkable paper, they and coworkers first predicted by a theoretical approach and then demonstrated experimentally that peptide helices can form a right-handed coiled-coil structure that has an 11-residue hydrophobic repeat (Harbury et al., *Science*, 1998).

To analyze mutationally the folding roles of residues essential for forming the TIM barrel, Silverman, Balakrishnan, and Harbury (*PNAS*, 2001) developed a novel method of combinatorial mutagenesis. The method is based on mutagenizing gene fragments and then diversifying the gene library by reshuffling the mutagenized fragments with wild type fragments at varying ratios. They first identified the conserved residues in a phylogenetic alignment of 43 unique TIM sequences, and chose 182 sites for mutational analysis. They found that 97 sites are freely mutable. Then they characterized the ease of mutational replacement of the other residues, most of which form specific interactions, such as helix capping. They found that any mutation in the central hydrophobic core of the ?-barrel gives reduced TIM function, in agreement with the jigsaw model of folding according to which specific packing of the core determines the backbone fold. On the other hand, their results give poor agreement with the HP, or oil droplet, model of folding. (H = hydrophobic, P = polar, and the HP sequence determines the backbone fold in this model.) Less than 1 in 10^{10} gene sequences with the HP sequence of wild type TIM gives TIM function. A *PNAS* commentary on this study termed it a landmark work.

A practical method of footprinting proteins (the MP AX method) was developed by Dr. Silverman and Dr. Harbury (*JBC,* 2000). The MP AX method uses chemical reaction (alkylation) with a cysteine side chain to measure the accessibility to solvent of the Cys side chain. Alkylation prevents later cleavage of the polypeptide backbone in the unfolded protein by the cysteine-cutting reagent NTCB. Peptide cleavage is determined by mass spectrometry. In a valid footprinting method, it is essential that no more than one site should react per protein molecule because chemical reaction can cause local unfolding and protein folding is cooperative. A misincorporation method is used to ensure that no more than one Cys residue is introduced per protein molecule. Misincorporation is achieved with a chemically synthesized misincorporator tRNA for a specific amino acid such as valine, and they made a few dif-

Continued on page 22

by Peter Farnham, CAE, ASBMB Public Affairs Officer

Omnibus Bill Likely As Most '04 Appropriations Stall

More than five weeks into the fiscal year, with most appropriations bills still not signed into law, a gigantic omnibus appropriations bill is becoming more and more likely. The bill would include all appropriations bills not signed into law by mid-November. It is very likely that this will include the Labor/HHS bill (which funds the National Institutes of Health) and the VA/HUD bill (which funds the National Science Foundation).

Regarding the NIH, both the House and Senate approved their versions of the Labor/HHS bill last summer. In the House bill, NIH would receive a $681 million increase, about 2.5 percent over Fiscal Year 2003. The Senate bill is slightly more generous. Approved September 10, this bill would provide NIH with an additional $1 billion over last year's total, or about a 3.7 percent increase.

However, the bill has been stalled in a conference committee since September, and there is little indication that it will be approved as a "stand-alone" bill, thus likely consigning it to inclusion in the omnibus bill. Several problems have developed in conference.

When the House approved the bill last July, not one democrat voted in favor of it. The party's position was that the bill did not adequately fund health and education programs. In response to the lack of support from House democrats, Labor/HHS subcommittee chairman Ralph Regula (R-OH) deleted funding for all "special projects" in the bill that had been requested by members who voted against the bill last July. This decision has provoked a testy exchange of letters between Regula and ranking minority member David Obey (D-WI), but so far Regula is holding fast to his position.

A dispute in the conference committee has also developed over proposed Labor Department changes in decades-old rules governing overtime compensation. Senator Arlen Specter (R-PA) is working to prevent the changes, but the White House has vowed to veto the bill over this issue. It is believed that inclusion of the Labor/HHS bill in an omnibus would make the bill harder to veto.

NIH Peer Review Under Attack

Somewhat overshadowing the more fundamental conference committee disagreement over the Labor/HHS bill as a whole is a dispute that erupted in October when a list of almost 200 NIH grants having to do mostly with HIV and AIDS, sexuality, and gender-related issues was made public. An organization called the Traditional Values Coalition had put the list together earlier this year. However, due to a misunderstanding, the list got sent to the NIH by a congressional staffer, creating the impression that Congress was concerned about all 200 grants. In fact, Congress had intended NIH to review a list of only 10 grants.

Nevertheless, the mistake generated an enormous amount of concern in the biomedical research community, and in a statement released on November 5, FASEB President Robert Wells strongly defended the NIH merit review system. He said that "FASEB fervently hopes that the Federal government, from the Administration to HHS to Congress, will continue to thwart any attempt to compromise the integrity of scientific research funded by NIH." Other scientific groups issued similar statements, and by early November, most in Congress appeared to be distancing themselves from the list.

Nevertheless, the flap highlights the need for continued vigilance over NIH and the merit review system, and it is very likely that NIH will continue to receive criticism and public pressure not to fund research in certain sensitive areas, mostly those related to sexuality and gender issues.

NSF Appropriations

The VA/HUD bill, the parent bill for the NSF, is even less farther along than the Labor/HHS bill. The House passed the bill in late July, but the Senate was still debating the bill as of early November. In the House, NSF is funded at $5.64 billion for FY 2004, a 6.2 percent increase. In the Senate bill, the agency receives $5.59 billion, a 5.2 percent increase. Although Senate Appropriations Chair Ted Stevens (R-AK) wanted to complete work on this bill before Veterans Day, he has apparently been unable to do so; thus, this will also likely end up in an omnibus bill.

The VA/HUD and Labor/HHS bills are usually the most contentious of the appropriations bills, and can thus be expected to be among the last bills signed into law each year. There has been repeated failure in recent years to get them signed into law by the beginning of the fiscal year (October 1).

UN Delays Vote on U.S.-Backed Cloning Ban

The United Nations on November 6 voted to put off for two years a vote on a ban on human cloning offered by Costa Rica with the strong backing of the United States.

The UN General Assembly was prepared to approve with near unanimity a ban on human cloning to produce a child. However, a sticking point in getting such an agreement was the United States' position that cloning for research be included in the ban. The U.S. was the sole industrialized nation supporting an all-inclusive ban.

One proposal, sponsored by Costa Rica and strongly backed by the United States and at least 63 other cosponsors, mostly developing nations, called for a ban on all types of human embryo cloning. An alternate proposal, introduced by Belgium and supported by France, Germany, and more than 20 other nations, called for a reproductive cloning ban only.

However, during the November 6 debate, a coalition of Islamic nations led by Iran offered a proposal that put off a vote on such a ban for two years, which won by a single vote. Iran's Royan Institute, a government-funded fertility center in Tehran, recently announced that it had created embryonic stem cells from an embryo, making Iran the first Middle Eastern country to do so.

According to a professor of religion quoted by the *Washington Post* in a story about the UN vote, Islam does not view an embryo as a human being and thus Islamic states tend to support somatic cell nuclear transfer (SCNT). Some politically powerful Christian groups in the United States and abroad have been pursuing a UN ban on cloning for several years.

According to the *Wall Street Journal*, a survey by the Oakland, California-based Center for Genetics and Society shows that 77 percent of countries do not yet ban reproductive cloning, including the United States, which is which is currently seen as unlikely to approve human cloning. The survey found that only 16 percent of nations have banned cloning for medical research.

The UN ban, had it been approved, would not have the force of law; but would have led to a treaty committing all signatory nations to legislation that would conform to the treaty terms. A ban would make it much more difficult to conduct somatic cell nuclear transfer (SCNT) research, thus making it harder to find cures for various intractable genetic illnesses that SCNT might address.

Biomedical science groups around the world expressed relief at the two-year delay.

NIH Establishes Rare Diseases Clinical Research Network

To address the challenges inherent in diagnosing and treating rare diseases, NIH has established the Rare Diseases Clinical Research Network. With $51 million in grant funding over five years, the network will consist of seven Rare Diseases Clinical Research Centers and a Data and Technology Coordinating Center.

Approximately 25 million people in the United States are affected by an estimated 6,000 rare diseases or conditions. Diseases to be studied in the centers include: urea cycle disorders; Angelman's syndrome; Prader-Willi syndrome; Rett syndrome; periodic paralysis; non-dystrophic myotonic disorders; episodic ataxia; aplastic anemia; paroxysmal nocturnal hemoglobinuria; single lineage cytopenias, including granular lymphocyte leukemia, pure red cell aplasia, and myelodysplastic syndromes; vasculitis disorders; inborn defects in steroid hormone pathways; alpha-1 antitrypsin deficiency; lymphangioleiomyomatosis; pulmonary alveolar proteinosis; and hereditary idiopathic pulmonary fibrosis.

Rare Diseases Clinical Research Centers:

Baylor College of Medicine, Houston, Rare Disease Clinical Research Center for New Therapies and New Diagnostics.

Boston University School of Medicine, Boston, Vasculitis Clinical Research Network.

Children's Hospital Medical Center, Cincinnati, Rare Lung Diseases Clinical Research Network.

Children's National Medical Center, Washington, DC, Rare Diseases Clinical Research Center for Urea Cycle Disorders.

The Cleveland Clinic Foundation, Cleveland, Bone Marrow Failure Clinical Research Center.

University of Rochester, Rochester, New York, Nervous System Channelopathies Pathogenesis and Treatment.

Weill Medical College of Cornell University, New York City, The Natural History of Rare Genetic Steroid Disorders.

H. Lee Moffitt Cancer Center and Research Institute, University of South Florida, Tampa, The Data and Technology Coordinating Center.

by John D. Thompson, Editor

Germany Pumps Extra Funding into Biotech Firms

Researchers and biotechnology firms have given a qualified cheer in response to the recent announcement by the German research ministry that it is committed to

At last month's Biotechnology Days in Leipzig, Federal Minister of Education and Research Edelgard Bulmahn announced a commitment to spending an extra 100 million ($117 million)on the sector in the next four years, with the money being directed to small- and medium-sized biotech companies. She said that the government would also extend its cooperation with financiers in a bid to secure an extra 1.7 billion, almost $2 billion) in venture capital for technology companies over the next five years.

Germany, with some 360 biotech companies, is the biotechnology leader in Europe and the increased public investment is intended to consolidate the country's competitive advantage in a sector expected to grow substantially in the coming decades. The boost in funding comes at a time when many outfits founded in Germany during the recent boom are to struggling to find venture capital to fund their drug research and development programs.

"It is very good news," said Rüdiger Marquardt, director of biotechnology at the German Society for Chemical Engineering and Biotechnology, an association that represents German biotechnological companies and researchers. "The injection of funds will help promising companies which have not yet reached the critical mass need to attract venture capital or which do not have products on the market yet, " he told *The Scientist*.

Even companies that have been successful in raising capital said that they welcome the government's initiative.

"Extra funding will allow us speed up our drug development capabilities," Giulio Superti-Furga, vice president of research at Cellzome, a Heidelberg-based biotech company employing a hundred people, told The Scientist.

During the Leipzig meeting, Minister Bulmahn also announced 43 biotechnology prizewinners, who will receive a total of 5.5 million ($6.5 million) for research and company startups. Noting that 10 young German researchers who had left the country were among the winners, she said that the award was helping to tackle the growing problem of recruiting and maintaining domestic biotechnology researchers.

The German government has allocated 480 million $5.6 million to biotechnology in 2003.

Genentech, Xoma Get OK for New Psoriasis Drug

South San Francisco biotechnology giant Genentech Inc. and its Berkeley partner Xoma Ltd. have won Food and Drug Administration approval for their drug Raptiva as a remedy for the debilitating skin disorder psoriasis.

Raptiva is one of a new class of biotech-era drugs called biologics that aim to make treatment safer and more effective for patients who suffer from the painful skin scaling and irritation. Current treatments such as methotrexate and cyclosporine can someimes damage the liver or kidneys. Raptiva was cleared for marketing to adults with moderate to severe psoriasis, a market Genenetch estimates at about 500,000 people.

Analysts estimate that Raptiva could eventually bring in $500 million per year for Genentech and Xoma. Genentech set a wholesale price that translates to a per-patient cost of about $14,000 per year.

Scripps to Open Florida Branch

La Jolla, California-based Scripps Research Institute has announced plans to open an East Coast facility in Florida's Palm Beach. The new research center, a 364,000–square-foot facility is scheduled to open in 2006 at an expected cost of $140 million.

According to Scripps spokesman Keith McKeown, the expansion to the East Coast came in response to a "very attractive proposal" from Florida Governor Jeb Bush, who has asked the state legislature for $310 million jump start the new facility. The interim labs as well as the permanent facility with 100 acres or more of land will all be provided by Palm Beach County.

Regarding plans for research at the new site, McKeown told *The Scientist*, "If there's anything that would be different about what we do, it's that there might be a bit more emphasis on drug development, because that is what Governor Bush is interested in doing in Florida—jumpstarting the biomedical, biotechnology, and pharmaceutical industries."

Science Survey Ranks Top Biopharma Employers

Genentech, Inc. and Johnson & Johnson earned top honors in a ranking of biopharmaceutical employers in a survey commissioned by the journal *Science*. Survey responses were analyzed by Hughes Research Worldwide, which used a mathematical process to assign a unique score to rate the employer reputation of some 323 companies, taking into account 42 specific characteristics or attributes.

Genentech Inc. and Johnson & Johnson earned the Number One and Number Two spots on the list, respectively, meaning that they were in the "first tier" of companies, with rankings of 98 to 100. Genentech Inc. was described as offering a research-driven environment and quality management, while treating employees with respect. Johnson & Johnson also was described as research-driven, with a clear vision of where the firm is heading and a culture of respect for employees.

Ranked in the top 20 slots in the survey were:

1. Genentech, Inc., South San Francisco, CA
2. Johnson & Johnson, New Brunswick, NJ
3. Amgen, Inc., Thousand Oaks, CA
4. Pfizer, Inc., New York, NY
5. Merck & Co., Inc., Whitehouse Station, NJ
6. AstraZeneca PLC, London, United Kingdom
7. Eli Lilly and Company, Indianapolis, IN
8. Novartis AG, Basel, Switzerland
9. Millennium Pharmaceuticals, Inc., Cambridge, MA
10. Genzyme Corporation, Cambridge, MA
11. Biogen, Inc., Cambridge, MA
12. Abbott Laboratories, Abbott Park, IL
13. Aventis, Strasbourg, France
14. GlaxoSmithKline, London, United Kingdom
15. Chiron Corp., Emeryville, CA
16. Roche, Basel, Switzerland
17. Wyeth Pharmaceuticals, Collegeville, PA
18. Schering-Plough Corp., Kenilworth, NJ
19. Bayer Healthcare, Bayer AG, Leverkusen, Germany
20. Bristol-Myers Squibb, New York, NY

Feds Need to "Get on Top" of R&D Enterprise Changes

The Office of Science and Technology Policy (OSTP) and the Officie of Management and Budget (OMB) need to "get on top of" the changing nature of research, according to Arthur Bienenstock, a former White House Office of Science and Technology associate director for science, who spoke last month at a forum on Research Business Models hosted by the Lawrence Berkeley National Laboratory.

OSTP and the White House Office of Management and Budget need to take responsibility for seeing trans-agency regulations are implemented evenly, common business practices are adopted and the administrative burden abated, he said. Moreover, the federal government should be paying for such necessities as institutional review boards and shared instrumentation, he charged.

Dr. Bienenstock, an OSTP official during the Clinton Administration and now Vice Provost and Dean of Research and Graduate Policy at Stanford University, called on OMB to allow administrative costs as direct funding on grants, and stop shifting more and more of the cost of doing federally-funded research to the universities.

Cyrospace, University of Houston Sign Commercialization Agreement

Cyrospace Inc. and the University of Houston have signed an agreement in which the company will license and commercialize inventions and technologies created by the faculty, staff and students of the university. According to the agreement, Cyrospace will assist UH in realizing the commercial potential of its advanced technologies in the marketplace.

Arthur Vailas, the University's Vice President for Research and Intellectual Property Management, said "Our principal goal is to foster research and scholarship. The effective transfer of university-wide technology to industry contributes to that goal. Cyrospace has developed strong commercial alliances with world-renowned innovators, as well as educational and research institutions. University of Houston joins a select group of organizations benefiting from experience and expertise that Cyrospace contributes to such relationships."

UCLA Receives $500,000 Bristol-Myers Squibb Unrestricted Cardiovascular Research Grant

Bristol-Myers Squibb has awarded a five-year $500,000 Unrestricted Cardiovascular Research Grant to the University of California, Los Angeles (UCLA). ASBMB member Aldons J. Lusis, Professor in the Departments of Medicine; Microbiology and Molecular Genetics; Microbiology and Immunology, and Human Genetics at UCLA, will supervise and serve as principal investigator of the grant.

Simeon Taylor, Vice President of Cardiovascular and Metabolics Drug Discovery at the Bristol-Myers Squibb Pharmaceutical Research Institute in Hopewell, New Jersey, said, "Dr. Lusis is an international leader in the use of the mouse model to identify and characterize individual genetic factors for cardiovascular and related diseases. Using mouse models developed for particular genetic backgrounds, he and his colleagues have developed strains that exhibit such traits as diabetes, obesity, hypertension and susceptibility to atherosclerosis. They are now also studying the genetic basis of atherosclerosis in human families. We are very pleased to support this important work, which should greatly enhance our understanding of the biology of the processes involved in the development of the disease and guide the development of new genomics-based therapies."

"This unrestricted funding will greatly help support our studies on the genetics of atherosclerosis," said Dr. Lusis. "Atherosclerosis is a disease of the large arteries that is the cause of heart disease and stroke and is responsible for more than half of all death and disability in the Western world. Common forms of the disease have a polygenic basis, with mixed contributions from major genes, modifier genes, and gene-gene and gene-environment interactions. As yet, this complex architecture is poorly understood. Our strategy is to simultaneously study both human subjects and mouse animal models. A better understanding of the genetic and environmental factors contributing to this disease will have considerable implications for individualized therapy and risk assessment."

Dr. Lusis said a major area of his research interest has been to characterize genetic factors acting at the level of the vessel wall, particularly factors that affect oxidation and inflammation. "Thus far, all of the risk factors that have been identified for coronary artery disease, such as hypercholesterolemia and hypertension, are systemic. But our recent studies emphasize that a major genetic component in disease susceptibility involves cellular interactions of the vessel wall. We have recently mapped two genes influencing cellular functions that can almost completely block atherosclerosis in a hyperlipidemic mouse model. Knowledge of these genes may allow the development of new therapies that compliment those that target high cholesterol and blood pressure."

Schering-Plough ... continued

Continued from page 17

ferent misincorporator tRNAs in order to achieve Cys introduction at many sites. In addition to controls testing the validity of the method, this paper contains proof that MP AX correctly maps the site of complex formation between TIM and an antibody, when an antigenic determinant is introduced into the TIM sequence.

In a following paper, the two (*JMB,* 2002) apply the MP AX method to determining the unfolding pathway of TIM. The principle is the same as that of native-state hydrogen-exchange: rare folding intermediates in equilibrium with the native form can be detected by the high reactivity of groups in the folding intermediate. A Cys side chain that is buried in the native form of TIM but solvent-exposed in a folding intermediate becomes highly reactive in the folding intermediate. They identified and characterized three cooperatively unfolding subdomains of TIM and proposed a plausible unfolding pathway. One of the three subdomains is of the same type found earlier in folding studies of 4 other TIM-barrel type proteins. The native-state hydrogen exchange method cannot be used with TIM because of its large size and the requirement for NMR analysis.

Dr. Harbury is developing a theoretical framework that will be used to predict amino acid sequences that can form stable TIM-barrel structures. His algorithm incorporates both polar and nonpolar interactions. This paper introduces negative design for preventing the formation of unwanted products, in addition to positive design for forming the desired product. Havranek and Harbury (*NSB,* 2003) test the ability of the algorithm to predict specific interaction when helix-forming peptides that should form a specific coiled-coil heterodimer must compete against a background of forming homodimeric coiled-coils. In this work their algorithm does an excellent job of predicting specific interaction and is quite successful in predicting the actual stabilities of the coiled-coil products. They identify three new specificity motifs not seen previously in coiled-coil studies. They test the algorithm with the well-studied coiled-coil system before applying it to the design of new TIM barrels.

Career Opportunities

OREGON UNIVERSITY

Graduate Study in Environmental & Biomolecular Systems

The Department of Environmental and Biomolecular Systems at the OGI School of Science & Engineering, Oregon Health & Science University, seeks qualified students for its M.S. and Ph.D. programs. The departmental focus on research and teaching addresses environmental systems through approaches on all relevant scales; leverages exciting advances in biomolecular science and information technology; and recognizes the close connections between human and ecosystem health. All M.S. and Ph.D. students are eligible for financial assistance. Candidates applying to the Ph.D. program will automatically be considered for fellowships that provide an annual stipend, fully-paid tuition, and fully-paid health insurance. For more information, visit the departmental Web site at www.ebs.ogi.edu or contact Therese Young at tyoung@ebs.ogi.edu or 503-748-1247.

The OGI School of Science & Engineering is one of the four schools of Oregon Health & Science University, an equal opportunity, affirmative action institution.

BIOCHEMIST

Moravian College

Moravian College, a 260 year old, highly selective, liberal arts college with an ACS approved chemistry program, and 1400 undergraduates, seeks applications for a tenure-track assistant professorship in biochemistry beginning September 2004. The successful candidate will hold a Ph.D. in chemistry or biochemistry and have the ability to teach a variety of chemistry courses. The position requires a commitment to teaching and research in an undergraduate environment that emphasizes close student-faculty interaction. The primary teaching responsibility is the creation of an upper-level biochemistry course, including the laboratory, for our newly developed biochemistry major. Other courses may include an upper-level course in the area of expertise, a course for non-science majors, an interdisciplinary social impact of science course, or involvement in the general chemistry course. Moravian College is located in the historic Lehigh Valley of Eastern Pennsylvania near Philadelphia and New York City. Send a curriculum vita, graduate and undergraduate transcripts, statements of teaching philosophy and research plans including equipment and facility needs, and three letters of recommendation to Professor R. Daniel Libby, Chair, Department of Chemistry, Moravian College, 1200 Main St., Bethlehem, PA 18018. Thorough consideration will be assured to applications completed by January 12, 2004. Moravian College, an equal opportunity employer, especially encourages applications from women and minority candidates.

POST-DOCTORAL RESEARCH FELLOW (Job $4096)

A position is available at the Puget Sound Blood Center in Seattle, WA to study megkaryocyte development and thrombopoiesis. Project will focus on signal transduction in hematopoietic cells and genetic studies of inherited platelet disorders. Candidates must have a Ph.D. or M.D. degree, a background in hematopoiesis, genetics, or signal transduction, and a valid Visa permitting work in the United States. Experience with tissue culture, molecular biology techniques, and protein analysis is desirable. Salary is in accordance with NIH post-doctoral pay scale. Qualified applicants should send their curriculum vitae and the names of three references to: Human Resources, Puget Sound Blood Center, 921 Terry Avenue, Seattle, WA 98104-1256, or email to HumanResources@psbc.org.

JOHN W. HEIN POSTDOCTORAL RESEARCH FELLOWSHIP AWARD

The Forsyth Institute

The Forsyth Institute is a private, Harvard affiliate, world-renowned for scientific excellence in oral disease and developmental biology. We invite applicants for the John W. Hein Research Fellowship. The fellowship provides generous salary compensation, benefits, and infrastructure to develop a research program mentored by a Forsyth researcher. Support will be for 2 years with the possibility of an additional year. Applicants should have a Ph.D., MD, or DDS degree, and be US citizens, permanent residents, or holders of J1 or H1 visas with the view to obtaining US residency. Candidates who develop innovative and productive research programs have the potential to become Forsyth faculty members. Applicants should visit the Forsyth web site (http://www.forsyth.org) for information regarding research activities, and to identify a potential mentor(s). A cover letter indicating research interest and mentor, together with a CV that includes contact information for 3 referees should be sent to Dr. Margaret Duncan, Chairman, JWH Committee, The Forsyth Institute, 140 Fenway, Boston, MA 02115. Affirmative Action/Equal Opportunity Employer.

Calendar of Scientific Meetings

DECEMBER 2003

American Society for Cell Biology 43rd Annual Meeting

December 13–17 • San Francisco, California
Late Abstract Submission/Revision Deadline: October 14, 2003
Ph: 301-347-9300; Fx: 301-347-9310
Website: http://www.ascb.org/meetings/am2003/main03mtg.htm

Selenium Biochemistry 2003: Celebrating 30 Years of Selenoprotein Research

December 17-19 • Bethesda, Marland
Ph: 407-823-4262;Email: selfw@nhlbi.nih.gov
Website: http://www.nhlbi.nih.gov/meetings/se2003.htm

FEBRUARY 2004

Second International Conference on Ubiquitin, Ubiquitin-Like Proteins, and Cancer

February 5-7 • University of Texas M. D. Anderson Cancer Center, Houston
To allow for the optimal exchange of ideas, the conference will be limited to 175 attendees, who will be selected based on past contributions and/or newly developed interests in this field. In addition to the invited speakers, all attendees are encouraged to present posters and some will be invited to present them at the podium. Due to the limited number of attendees, you are encouraged submit online applications prior to the November 15, 2003 deadline.
Contact: Amy Heaton; Ph: 713-745-6826
email: aheaton@mdanderson.org; website: http://www.sentrin.org

Biophysical Society 48th Annual Meeting

February 14–18 • Baltimore, Maryland
Abstract Deadline: October 5, 2003
Early Registration Deadline: December 12, 2003
Ph: 301-634-7114; Fx: 301-634-7133
Website: http://www.biophysics.org/annmtg/site-index.htm

50th Anniversary Gordon Conference on Isotopes in Biological and Chemical Sciences

February 15–20 • Ventura, California
Chair: David N. Silverman, Vice Chair: Charles L. Perrin
Email: silvrmn@ufl.edu
Website: http://www.grc.org/programs/2004/isotopes.htm

The 1st Gordon Research Conference on The Biology of 14-3-3 Proteins

February 22–27 • Ventura, California
Chairs: Haian Fu & David Klein, Vice-Chair: Alastair Aitken
Email: hfu@emory.edu
Website: http://www.grc.org/programs/2004/14-3-3.htm

MARCH 2004

Association for Biomolecular Resource Facilities 2004 Annual Meeting

February 28-March 2 • Portland, Oregon
Abstract Deadline: November 21, 2003
Early Registration Deadline: January 16, 2004
Ph: 301-634-7010; Fx: 301-634-7014; Email: marcella@faseb.org
Website: www.faseb.org/meetings/abrf2004

APRIL 2004

Experimental Biology 2004

April 17–21 • Washington, DC
Deadline for Submission of Abstracts: November 12, 2003
Website: http://www.faseb.org/meetings/eb2004/

Xth International Symposium on Amyloid and Amyloidosis

April 18-22 • Tours, France
A transdisciplinary meeting that will address basic as well as clinical aspects of this field
Deadline for Receipt of Abstracts: December 15th, 2003
Abstracts must be submitted in English and only via the web via http://www.colloquium.fr/isaa2004 where you will find all the necessary information for submission.
COLLOQUIUM-ISAA2004, 12 rue de la Croix-Faubin 75557 PARIS cedex 11 (France); Ph: +33 (0)1 44 64 15 15
Fx: +33 (0)1 44 64 15 16; email: isaa@colloquium.fr

JUNE 2004

American Society for Biochemistry and Molecular Biology Annual Meeting and 8th IUBMB Conference

June 12–16 • Boston, Massachusetts
Contact: Kelly Gull; Ph: 301-634-7145; Fx: 301-634-7126
Email: kgull@asbmb.faseb.org; Website: www.asbmb.org/meetings

JULY 2004

4th ANNUAL CONFERENCE OF FOCIS (Federation of Clinical Immunology Societies)

July 18-23 • Montréal, Canada
Deadlines
Abstract submission: January 23, 2004
Travel Award applications (CSI and ICI: November 15, 2003
Travel Award applications (FOCIS): January 23, 2004
Early Registration: April 30, 2004; Website: www.immuno2004.org

AUGUST 2004

12th International Conference on Second Messengers and Phospoproteins

August 3–7 • Montreal, Canada
Contact: smp2004@eventsintl.com
Website: http://www.secondmessengers2004.ca

SEPTEMBER 2004

Stem Cell Biology: Development and Plasticity

September 16-19 • Scheman Continuing Education Building Iowa State UniversityAmes, Iowa.
Deadlines: Abstracts due July 16, 2004; registration deadline: August 16, 2004
Travel Grants: Students may apply for travel grants (applications due July 16, 2004).
Contact: Growth Factor and Signal Transduction Conferences Symposium Office, 3208 Molecular Biology Building, Iowa State University,Ames, Iowa 50011-3260
Ph: 515-294-7978; Fx: 515-294-2244; Email: gfst@iastate.edu
Website: http://www.bb.iastate.edu/-gfstlhomepg.htmi

NOVEMBER 2004

4th International Congress on Autoimmunity

November 3–7 • Budapest, Hungary
Deadline for Receipt of Abstracts: June 20, 2004
Contact: 4th International Congress on Autoimmunity Kenes International—Global Congress Organisers and Association Management Services,17 Rue du Cendrier, PO Box 1726, CH-1211 Geneva 1, SWITZERLAND
Ph: +41 22 908 0488; Fx: +41 22 732 2850
Email: autoim04@kenes.com
Website: www.kenes.com/autoim2004

American Association of Pharmaceutical Scientists

AAPS Annual Meeting and Exposition

November 7-11 • Baltimore, Maryland
Ph: 703 243 2800; Fx: 703 243 9650
Website: www.aapspharmaceutica.com/meetings/futuremeetings/

DECEMBER 2004

American Society for Cell Biology

44th Annual Meeting
December 4-8 • Washington, DC
Ph: 301-347-9300; Fx: 301-347-9310
Website: http://www.ascb.org/

Department Heads Take Note:

ASBMB Offers Free Membership to New Ph.D.s

ASBMB is now offering a free one-year Associate membership to all students who have, within the past year, earned a Ph.D. degree in the molecular life sciences or related areas.

ASBMB implemented this program as a way to recognize the significant accomplishment of earning the Ph.D., and to provide new Ph.D.s with something tangible and of economic value. Membership in ASBMB brings with it a free subscription to the online versions of the *Journal of Biological Chemistry* and *Molecular and Cellular Proteomics,* as well as subscriptions to *The Scientist* and the Society's magazine, *ASBMB Today*, discounts on other publications, and a host of other benefits.

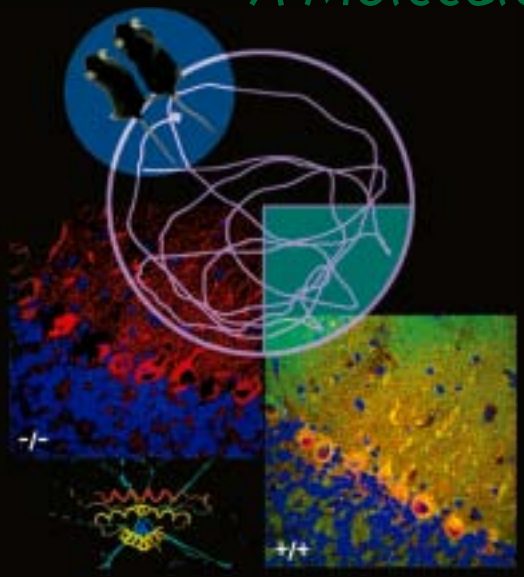
The Society is asking department chairs to provide ASBMB with the names and addresses of each new Ph.D. recipient from their institutions. Upon receipt of this information, we will write the new Ph.D.s to congratulate them on their accomplishment and offer the free one-year membership in ASBMB. Names and addresses of the new Ph.D.s should be sent to:

Kathie Cullins
Membership and Subscriptions Manager
American Society for Biochemistry
& Molecular Biology
9650 Rockville Pike
Bethesda, MD 20814
Email: asbmb@asbmb.faseb.org

This is an ongoing project; please advise us whenever a student in your department earns the Ph.D., so that we can make this free membership offer to him or her.

IUBMB/ASBMB 2004

"A Molecular Exploration of the Cell"



June 12 – 16

Boston, MA

American Society for Biochemistry and Molecular Biology Annual Meeting and 8th IUBMB Conference

Proteomics and Bioinformatics ■ Chemical Biology ■ Molecular Recognition ■ Cellular Biochemistry

Opening Lecture

First Annual Herbert Tabor/Journal of Biological Chemistry *Lectureship*

Robert J. Lefkowitz, *HHMI, Duke University Medical Center*

Organized by:

John D. Scott, HHMI, *Vollum Institute;* Alexandra C. Newton, *UCSD;* Julio Celis, *Danish Cancer Society*, and the 2004 ASBMB Program Planning Committee

Cellular Organization and Dynamics
Organizer: Harald A. Stenmark, *Norwegian Rad. Hosp.*

Genomics, Proteomics and Bioinformatics
Organizers: Charlie Boone, *Univ. of Toronto* and Michael Snyder, *Yale Univ.*

Integration of Signaling Mechanisms
Organizer: Kjetil Tasken, *Univ. of Oslo, Norway*

Molecular and Cellular Biology of Lipids
Organizer: Dennis Vance, *Univ. of Alberta*

Molecular Recognition and Catalysis
Organizer: Jack E. Dixon, *UCSD*

Protein Modifications and Turnover
Organizer: William J. Lennarz, *SUNY at Stony Brook*

Protein Structure, Catalysis and Dynamics
Organizer: Susan Taylor, *UCSD*

Regulation of Gene Expression and Chromosome Transactions
Organizer: Joan W. Conaway, *Stowers Inst. for Med. Res.*

Signaling Pathways in Disease
Organizers: Alexandra Newton, *UCSD* and John D. Scott, *HHMI, Vollum Inst.*

The Future of Education and Professional Development in the Molecular Life Sciences
Organizer: J. Ellis Bell, *Univ. of Richmond*

For further information:

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Bethesda, MD 20814
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Fax: 301-634-7126
Email: asbmb@asbmb.faseb.org
http://www.asbmb.org/meetings

www.asbmb.org/meetings

Abstract Deadline: February 4, 2004