AUGUST 2003

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AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

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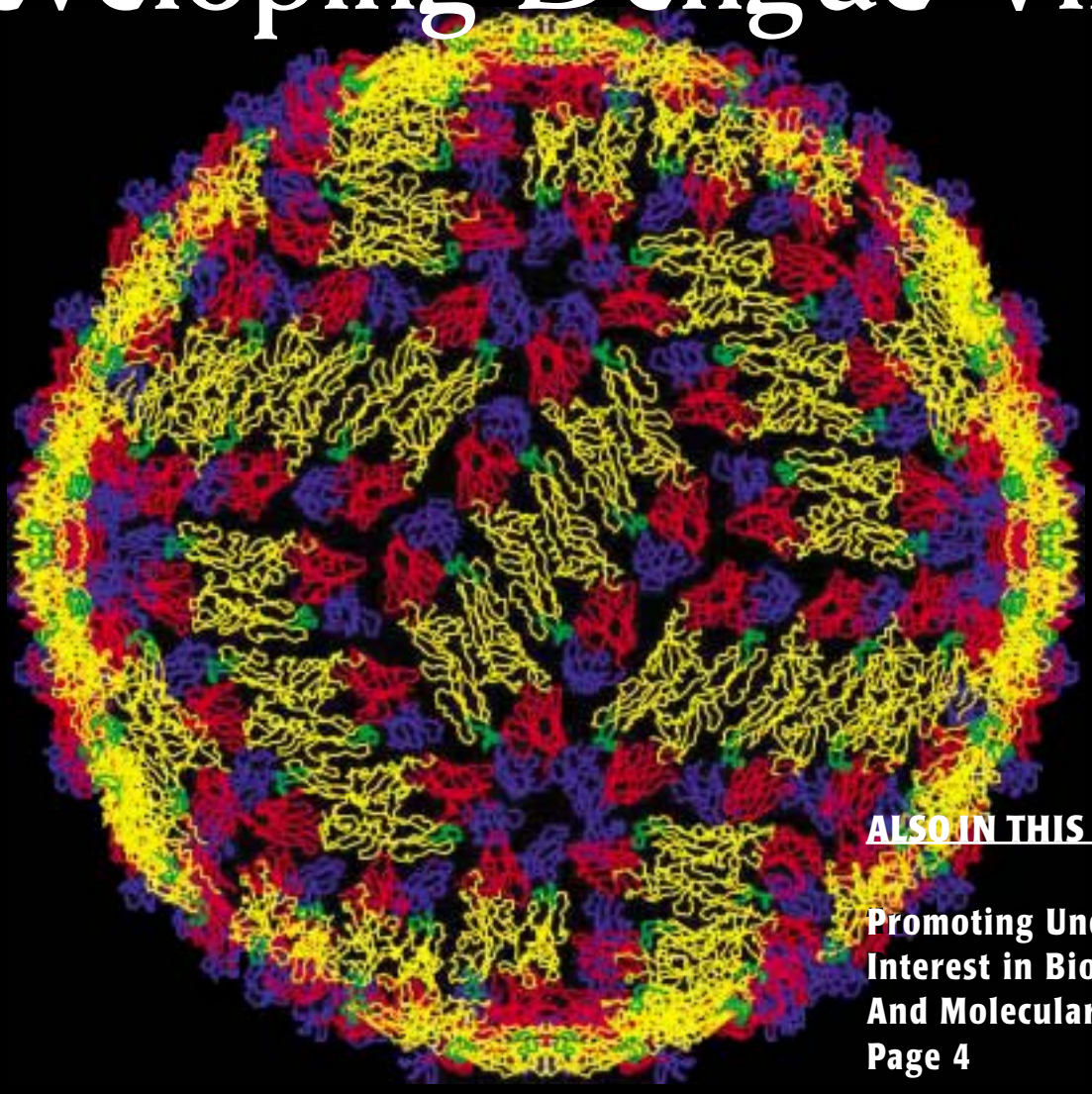

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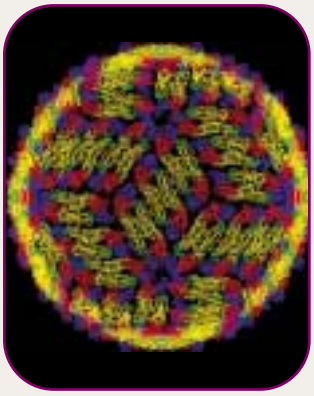
# ASBMB Today

AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

AUGUST 2003,
Volume 2, Issue 5

## features





ON THE COVER:



10

4

## departments



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# When Will the Agencies Learn?

Dear *ASBMB Today*:

The progress being made at the Gladstone Institute on "flushing" out latent HIV, as reported in the June issue of *ASBMB Today*, is exciting. However, both in the USA and Canada, granting agencies were sceptical when the approach was suggested more than a decade ago (1).

When will the agencies learn from Wall Street that the golden rule of productive resource allocation is "hedge your bets?" It seldom pays to place all one's eggs in a few, invariably highly expensive, baskets, however plausible they may initially appear (2).

*Sincerely,*
*Donald R. Forsdyke,*
*Department of Biochemistry,*
*Queen's University, Ontario,*
*Canada, K7L3N6*

(1) Forsdyke, D. R. (1991) Programmed Activation of T-Lymphocytes. A Theoretical Basis for Short Term Treatment of AIDS with Azidothymidine. Medical Hypothesis 34, 24-27.

(2) Forsdyke, D. R. (2000) Tomorrow's Cures Today? How to Reform the Health Reseach System. Harwood Academic, Amsterdam.

# Judith Bond Named President-Elect of ASBMB

Judith S. Bond, Professor and Chair, Department of Biochemistry and Molecular Biology, Pennsylvania State College of Medicine, Hershey, is the new President-Elect of ASBMB. She will assume the office of President in July 2004.

Elected as Councilors were William R. Brinkley, Vice President and Dean, Graduate School of Biomedical Science, Baylor College of Medicine; and William L. Smith, Professor and Chair, Department of Biological Chemistry, University of Michigan Medical School.

Elected to the Nominating Committee was Robert Rhoads, Professor and Head, Department of Biochemistry and Molecular Biology, Louisiana State University Health Science Center, Shreveport.

Elected to the Publications Committee were Karen Browning, Associate Professor, Department of Chemistry and Biochemistry, University of Texas, Austin; and Catherine Drennan, Assistant Professor, Department of Chemistry, Massachusetts Institute of Technology.

Peter A. Rubenstein, Professor, Department of Biochemistry, University of Iowa, is Chair of the Publications Committee for 2003-2004.

## About Dr. Bond

Judith S. Bond received her Ph.D. in biochemistry and physiology from Rutgers University in 1966. After postdoctoral training at Vanderbilt University, she joined the faculty of the Medical College of Virginia, Virginia Commonwealth University in 1968, becoming Professor of Biochemistry in 1985. She served as Chair of Biochemistry and Nutrition at Virginia Tech from 1988-92 before becoming Chair of Biochemistry and Molecular Biology in the College of Medicine at Penn State University in Hershey.

*Dr. Judith Bond*

Dr. Bond has trained 13 Ph.D.s, 4 M.D./Ph.D.s, 4 M.S. students and 18 postdoctoral fellows. She was director of the MD/PhD Program (MSTP) at Penn State and obtained federal funding for this program. She served as

*Continued on page 5*

# Promoting Undergraduate Interest in Biochemistry and Molecular Biology

"Success comes from having a community," says Ellis Bell, Professor of Chemistry at the University of Richmond and co-chair of the ASBMB Education and Professional Development Committee (EPD).

Dr. Bell and the EPD are now creating such a community for undergraduates interested in biochemistry and molecular biology, called the Undergraduate Affiliate Network (UAN). Under the leadership of Marion O'Leary, Dean of the College of Natural Sciences and Mathematics at California State University, Sacramento, the EPD has recently taken a more active role within ASBMB. The committee has focused on developing a new undergraduate curriculum for biochemistry and molecular biology and providing career resources for new graduates as well as established professionals who are interested in changing fields. The new hub of EPD activity is community building, especially for undergraduate programs. The coming Undergraduate Affiliate Network is a centerpiece of this new program.

*Marion O'Leary, Co-Chair of the Education and Professional Development Committee, which has recently taken a more active role within ASBMB*

A major concern of those who teach biochemistry and molecular biology is the nationwide decline in the number of students expressing interest in the biological sciences as researchers. The UAN was designed in response to this shortage. The members of the EPD hope that by increasing the quality of undergraduate curricula and directly connecting students with careers in biochemistry and molecular biology, interest in the field will increase.

"We are trying to form a community. If you connect students who may be interested in science with scientists, they'll be more likely to go into and stay in science," says Dr. Bell.

Scheduled to start accepting applications to become an affiliate at the start of the 2003-2004 school year, the UAN aims to form scientific and educational communities across the country to help schools develop the best possible undergraduate curricula and to provide more research and learning opportunities for students by pooling their resources and working together. The EPD divides the country into six regions, in each of which UAN will have a regional director and a website.

"Within each region, the idea is to foster connections, not only between undergraduate institutions, but with outreach activities as well, and to create a community where people of all ages are talking to each other about biochemistry," says Dr. Bell.

To further conversation about biochemistry, the UAN will serve as a way to inform others about local research symposia, seminars and awards open to students. The program will also provide opportunities for students to participate in outreach programs that teach biology and chemistry to K-12 students and educate the general population. Dr. Bell stresses the importance of making the UAN reach everyone, not just undergraduate students.

"Scientists can do better to reach out to the general population and explain what they are doing," he says. "These are the people who do the voting and influence legislators." Dr. Bell hopes that the UAN will work with the EPD to help increase scientific literacy among laypeople.

One of the most valuable resources available to students joining an affiliate of the UAN is the opportunity to present research at the ASBMB annual meeting. ASBMB will provide travel

*Continued on next page*

*These are not undergraduates, but an example of Dr. Ellis Bell's commitment to bringing the fascination of science to young people of all ages. Here he is seen with kindergarteners at Bon Air Elementary School in Richmond, Virginia.*

# MAC Explores Future of the Profession

At the Annual Meeting in San Diego, the ASBMB Minority Affairs Committee (MAC) held a symposium entitled: *Diversifying the Profession: Who? What? When? Where? and How?*. The session was organized by MAC members Phillip A. Ortiz of Empire State College and Juliette Bell of Fayetteville State University. Dr. Ortiz and Dr. Bell presented the Session Overview, and Dr. Bell also gave a presentation titled "Diversifying the Profession: Perspectives from the Front." MAC member Dr. Thomas A. Landefeld of California State University, Dominguez Hills followed with "Scientists as Administrators: Can They Make a Difference in Diversifying the Professorate?" Dr. Howard Adams of H.G. Adams & Associates, Inc., presented "Mentoring: a Strategy for Developing Minority STEM (Science, Technology, Engineering or Mathematics) Talent for Diversifying the Profession." Dr. Benjamin Dixon of VPI and State University concluded the presentations with "Changing the Paradigm for Faculty Searches." In addition to questions following each presentation, there was a panel discussion involving all five presenters.

*Dr. Phillip A. Ortiz*

*Dr. Juliette Bell*

"The session was well-attended and the presentations were very interesting and informative," commented Dr. Ortiz, also chairperson of the MAC.

Copies of their presentations can be found on the Diversity section of the ASBMB website (http://www.asbmb.org/diversity).

***"The session was well-attended ... interesting and informative,"***

The MAC has begun planning its symposium for the 2004 ASBMB Annual Meeting. Breaking with tradition, the session will not be issues based, rather, it will be scientific. The focus of the session will be on healthcare disparities, obesity in particular. Although the speaker list is not yet finalized, the MAC has identified a number of potential scientists and policy makers.

*Continued from previous page*

funds to one student at each affiliated institution to attend the meeting and to compete in the Annual Undergraduate Research Achievement Poster Competition. In addition, each affiliate can nominate a student for one of 10 Seniors in Science Excellence Awards.

Students will interact with the ASBMB and science through the UAN, not only by participating in research internships and outreach programs, but by providing the means by which a school joins the network. Each school in the UAN must have at least five undergraduate members of ASBMB, as well as one faculty advisor who is a member of the Society. Student affiliate members will enjoy all benefits of ASBMB professional members except voting rights, as well as those that come from the UAN.

Applications are available on the web at www.asbmb.org/education.

## Judith Bond ... continued

*Continued from page 3*

Assistant Dean for Graduate Education from 1996-99, Co-Director of Graduate Education for the Life Sciences Consortium from 1995-2000, and Co-Director of the Chemical Biology Option of the Integrative Biosciences Graduate Program from 1996 to the present.

Dr. Bond was a member of the NIH Biochemistry Study Section 1987-91, which she chaired from 1989-91, and on the NIDDK Advisory Council of NIH 1996-2000. She served on several editorial boards and has been an Associate Editor of the *Journal of Biological Chemistry* since 1999.

Dr. Bond was elected president of the Association of Medical and Graduate Departments of Biochemistry 1996-97, served on the Council of the International Proteolysis Society 1997-2001, the Council of the American Society for Biochemistry and Molecular Biology 1996-99 and 2002-present, and was elected to the Steering Committee of the Graduate Research, Education, and Training (GREAT) Group of the Association of American Medical Colleges (AAMC) this year. She was named YWCA Outstanding Woman in Science and Health in Virginia in 1989, and Virginia's Outstanding Scientist in 1988, and was an NIH MERIT Awardee 1989-99. Her research on proteolysis, particularly meprin metalloproteinases, has been funded continuously by NIH for 28 years.

# Stowers Meeting: 'A Showcase of

On May 2-4, the Stowers Institute for Medical Research in Kansas City, Missouri, hosted over 150 local, national and international partisans of the newly developing proteomic 'arts' in an exciting conference, Proteomic Solutions in Cellular and Developmental Biology and Medicine. The conference, which was co-sponsored by ASBMB, showcased the varied applications and problems in biology and medicine that are proving amenable to these types of analyses. The ultra modern facilities of the Institute, overlooking the scenic Brush Creek Reserve, were an outstanding venue for both the oral and poster presentations and the several informal breaks.

The meeting was opened by Ralph Bradshaw, Editor of *Molecular & Cellular Proteomics*, with an overview of the field entitled "Proteomics Today, Proteomics Tomorrow" and was followed by successive sessions focused on organelle structure, developmental biology and clinical issues. In the first session, Dr. Steve Alexander (University of Missouri), a co-organizer of the meeting, described the application of proteomics to the well-studied model, *D. discoidium*, particularly with respect to the structure of developmentally regulated secretory vesicles, Dr. Michael Rexach (Stanford University) presented his studies on the nuclear pore complex and Dr. John Bergeron (McGill University), who is co-chairing the second HUPO Conference in Montreal in October, gave a summary of his work to define the proteome related to secretory and endocytotic pathways in mammalian cells.

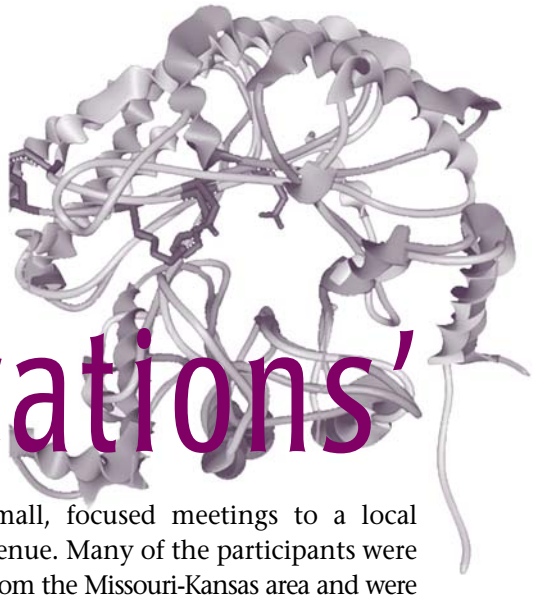
In this and the other sessions, the invited speakers were supplemented with shorter presentations selected from the abstracts. These included talks by Dr. Roy Soberman (Harvard University), who described his work on leukotriene signaling; Dr. Nevan Krogan (University of Toronto), who spoke on yeast non-coding RNA processing; and Dr. Benoit Coulombe (Clinical Research Institute, Montreal), who discussed the human RNA polymerase II transcription machinery.

The second session was on development (including cell signaling) and featured Dr. Marian Walhout (University of Massachusetts Medical School and Dana Farber Institute), who described the mapping of protein interaction net works in *C. elegans*, Dr. Richard Cummings (University of Oklahoma Health Sciences Center), who talked about mining the glycoproteome, and Dr. Michael Washburn (Stowers Institute), who discussed the correlation of mRNA and protein expression in yeast. Short talks in this session were provided by Dr. Tom Vanaman (University of Kentucky), Dr. Mike Harrington (Huntington Medical Research Institute), Dr. Akio Shimizu (Harvard University) and Dr. Joel Pounds (Pacific Northwest National Laboratory). They covered proteomic studies related to epilepsy, headache, EGF and VEGF signaling, and the human serum proteome, respectively.

> ***"Without a doubt many scientific collaborations will emerge from this very successful event."***
>
> **Dr. Benoit Coulombe**
> **Clinical Research Institute**

The final morning was devoted to a program on clinical proteomics and included Dr. Jack Kessler (Northwestern University Medical School), who presented his analyses that have provided great insight into the mechanisms controlling stem cell differentiation in the brain, and Dr. Hubert Hondermarck (University of Lille) and Sam Hanash (University of Michigan), President of HUPO, who described their work on cancer diagnostics primarily in breast and liver, respectively. These exciting presentations were nicely augmented by papers given by Dr. Dan Jay (Tufts University), Dr. Farhad Rezaee (University of Amsterdam) and Dr. Robert Hanzlik (University of Kansas), who talked about identifying proteins involved in cancer cell invasion, atherothrombosis and the use of proteomic approaches in toxicology.

A clear highlight of the meeting was the Keynote Address given by Dr. Rick Young (Whitehead Institute), "Exploring Where the Proteome Meets the Genome," that dealt with the transcriptome and the regulation of transcriptional events. This work elegantly demonstrated how genome-wide analyses, of the interactions of DNA-binding transcriptional activators and chromatin-modifying regulators in living yeast and human cells, can be combined with gene expression data to assemble models for transcriptional regulatory networks, to describe how major cellular processes such as the cell cycle, DNA damage, and environmental responses are controlled at the transcriptional level.



# Proteomic Applications'

Finally, there were a very nice collection of supporting presentations in abstract form and these provided the opportunity for lively interactions between all the participants.

As noted by Dr. Joan Conaway (Stowers Institute), co-organizer of the event, this meeting was intended to promote discussions of how to use proteomic solutions to address biological problems. While the areas selected for this meeting were only three of several possibilities, they did represent important areas of biology that have been characterized in the past as large and intractable and the various presentations elegantly illustrated how proteomics has and will continue to reduce these types of problems to a manageable size.

Dr. Coulombe praised the meeting as a unique opportunity to meet with fellow researchers sharing a common interest in protein characterization. The many and wide-ranging presentations, both the talks and the posters, were of the highest quality in terms of their scientific content and discussions of the latest technological advances in the field of proteomics research.

"Because of its reasonable attendance (about 150 participants), the meeting generated multiple opportunities for interesting discussions and exchanges among the participants," said Dr. Coulombe. "Without a doubt many scientific collaborations will emerge from this very successful event."

The ASBMB/Stowers Proteomics Meeting also underscored the value of small, focused meetings to a local venue. Many of the participants were from the Missouri-Kansas area and were treated to a world-class meeting without having to make extensive travel plans.

Of course, as residents of the area they were probably well prepared for the exit show, a serious of severe tornadoes that swept through the area late on Sunday afternoon, that provided a different kind of whirlwind than the scientific one that had preceded it. Happily, none of the attendees suffered any worse consequences than some travel delays that, in light of the quality of the meeting, were undoubtedly worth it. For those wishing to get more details of what was reported at this meeting, the abstracts can be found on the MCP website, www.mcponline.org.

## Meeting Demonstrated Significant Impact of Proteomics

The main aim of the organizers of the ASBMB/Stowers Proteomics meeting was to explore how well proteomics was doing in solving fundamental problems in cellular and developmental biology and medicine. Several other meetings had explored the technical, mass spectrometric, side of proteomics, and it was hoped that this meeting would clarify if this new experimental strategy was indeed solving biological and medical problems. The meeting was a success in bringing together investigators who are applying proteomics to a wide range of studies. Moreover, it is clear that in quite a few cases the proteomic approach has already paid big dividends.

The session of proteomic solutions to problems in cell biology clearly showed that proteomics is an excellent addition to the arsenal of techniques used in understanding the fundamental processes of cells. Several talks demonstrated the power of proteomics for identifying novel proteins in organelles and pathways, which in turn leads to a fuller understanding of the function of these cellular compartments. Proteomics is also being used to attack major medical problems, including cancer. The presentations at the meeting made it clear that proteomics has already provided new insights into cancer biology. The problems remain challenging, but advances in protein separation and identification technology are helping to advance these studies.

Although mass spectrometry retains a central place in most proteomic studies, it became clear during the meeting that proteomics must be viewed as a much wider variety of techniques used to interrogate the protein composition and interactions in cells. Examples of the technologies and approaches were well represented in the two days of talks and over fifty posters. Overall, the meeting demonstrated the significant impact that proteomics is having on the major issues in biology and medicine.

# Theory of Insulin Resistance Needs to be Refined

Forty years on, the biochemical explanation of insulin resistance proposed by Dr. Philip Randle needs to be refined, according to a leading biochemist.

The "glucose-fatty acid cycle," developed in 1963 by Dr. Randle and his colleagues at the University of Cambridge's Biochemistry Department, described the intimate association between carbohydrate and lipid metabolism.

Fatty acids and glucose compete for oxidation of the same substrates. The cycle therefore explains how the metabolism of carbohydrates and lipids influence each other. But crucially, the cycle also led to speculation that by inhibiting an enzyme involved in glucose metabolism, fatty acids caused the resistance to insulin that is characteristic of obesity.

In a classic series of in vitro studies, Dr. Randle and his colleagues induced insulin resistance in rat heart cells simply by incubating them with fatty acids. They argued that the circulation of fatty acids and ketones released when fats are metabolized inhibited key enzymes in the glucose oxidation pathway, and ultimately decreased the uptake of glucose into cells.

As circulating concentrations of glucose rise, the pancreas works harder to secrete more insulin in an attempt to deal with the problem. Eventually, over a period of 10 to 20 years, the pancreatic beta-cells crack under this strain and give up altogether. At this point, the patient has developed clinical type 2 diabetes.

Dr. Randle's discovery was really important, according to ASBMB member Yannick Le Marchand-Brustel, Director of Molecular Signaling and Obesity Research at the Institut Fédératif de Recherche in Nice, France. "The fact that there is inter-regulation between the different substrates is something that is still completely true," she said.

However, his explanation of insulin resistance "probably needs to be refined," she told *BioMedNet News*. "Randle proposed that the glucose transport decreases as a consequence of fatty acid metabolism in the cell," said Dr. Le Marchand-Brustel. "What has recently been proposed is that the fatty acids could modify the insulin response by interfering with some molecules in the insulin signaling pathway."

One of these molecules is insulin receptor substrate-1 (IRS-1), an intracellular protein that is rapidly phosphorylated by the activated insulin receptor, initiating the insulin signaling cascade.

Normally, IRS-1 is phosphorylated on tyrosine residues, says Dr. Le Marchand-Brustel, but when cells are incubated with fatty acids in vitro or when human volunteers are infused with fatty acids, there is an increase in serine phosphorylation, she says, which prevents the intracellular cascade from working.

This switch from tyrosine to serine phosphorylation seems to be a very generic mechanism, which can also occur when there is too much insulin as is often the case in type 2 diabetes or in obesity, she noted. "It can also be induced by other factors, such as TNF-alpha or with stress of the cell."

It looks like kinases are interfering with the phosphorylation process, she adds, which suggests ways of restoring the normal activity of the insulin signaling pathway. "We could think of perhaps specific inhibitors of some of those kinases to inhibit this serine phosphorylation process of IRS-1, thus allowing a better insulin action," she suggested.

Recent research indicates that mitogen-activated protein (MAP) kinase could play a part. Muscle cells from diabetes patients conserve a defect in insulin signaling even after many passages in culture, says Dr. Le Marchand-Brustel. The abnormal serine phosphorylation of IRS-1 also occurs in these cells, she said, "It seems in that case it was due to an increase in MAP kinase."

However, MAP kinase is involved in so many intracellular reactions that blocking its action is not a straightforward therapeutic option.

Dr. Randle's contribution to metabolism research is being remembered by the Biochemical Society, which together with La Société Française de Biochimie et Biologie Moléculaire has arranged a colloquium in his honor at their forthcoming annual meeting.

"The aim of the conference is to see how the glucose-fatty acid cycle has stood the test of time, and how links between lipid mobilization and carbohydrate utilization and insulin resistance might now go beyond the classic cycle," according to Mike Titheradge, Conference Organizer and Head of Biochemistry at the University of Sussex, UK.

"It's very kind of them to mention my name," said Dr. Randle, who retired several years ago. "I feel rather flattered actually," he confessed.

# Redefined Metastasis Theory Ends Year-long Debate

By Lisa Samols

Joan Massagué, Chairman of the Cell Biology Program at Memorial Sloan-Kettering Cancer Center, HHMI Investigator and ASBMB member, has redefined the theory of metastasis.

In a paper published by Dr. Massagué and Sloan-Kettering colleagues Dr. Yibin Kang and Dr. Peter Siegel in the June 23, 2003 issue of *Cancer Cell*, the new theory brings together two seemingly contrasting theories of metastasis, effectively ending a year-long debate in the cancer field.

The classical theory of metastasis evolved 30 years ago, and described a model in which just a few cells in a primary tumor accumulated several genetic mutations to break free of the tumor and invade other organs. According to this theory, the cells accumulated mutations over time, so the fate of the tumor could not be initially determined. That theory was contested last year when two papers showed that there was a "poor prognosis" signature in the metastatic tumor, a group of 70 genes that, when expressed, meant that the tumor would become metastatic. This theory asserted that it could be determined immediately whether or not a tumor would metastasize.

To resolve the debate, Dr. Massagué took what he termed an "unbiased approach to the study." He cultured cancerous cells that were obtained from a patient who died from a metastasized tumor. The primary tumor had been removed from the patient, so by the classical theory, all of the cancerous cells that were traveling in the blood on their way to another organ should have accumulated mutations. By the newer theory, these cells should all have the poor prognosis signature.

Dr. Massagué and his colleagues discovered that the cells did indeed have poor prognosis signatures, but they had other signatures as well. The cells that metastasized to the bone over-expressed 40 genes that were either off or minimally expressed in non-aggressive cancer cells. However, a different set of genes were expressed in cells that metastasized to the adrenal glands. Comparing the metastasizing cells to cells from the primary tumor as well as healthy cells, they found that all the cells in the primary tumor had a poor prognosis signature, but that none of those 70 genes overlapped with the 40 genes found in the additional signatures of the metastatic cells. This led him to conclude that, as the second theory postulates, cells must have a poor prognosis signature to metastasize, but, in concordance with the classical theory, additional genes must be activated for certain cells to metastasize to certain places.

"The poor prognosis signature, when activated, creates a violent society of cells," explained Dr. Massagué using an analogy. "In and of themselves, these are not all criminals," he said, but the signature somehow provides the conditions for certain cells to go bad.

Additional investigation showed that when the 40 genes for metastasis to the bone were introduced to non-metastasizing cells from the primary tumor, those cells metastasized to the bone as well. This further supported the idea that the newly identified genes cause metastasis.

Though the research was conducted on cells from one patient, with one single genomic signature, Dr. Massagué asserts that the potential for diagnostic tools is promising. Several of the 40 genes identified in cells that metastasize to the bone code for factors that are secreted by the metastasis cells and travel through the blood. This should facilitate their detection by drawing blood. However, the factors could differ from person to person.

*Dr. Joan Massagué*

"By repeating these experiments with metastasis cells from other patients, we will build a menu of possible genes driving metastasis," said Dr. Massagué. He described how metastasis cells are using sets of genes as necessary and complementary tools, each fulfilling a specific function. Metastatic cells from different patients may perform the same function by using different genes of similar function—or different modalities of the same tool. Therefore, it is important to know as many as possible of the genes that can be utilized to achieve metastasis. Based on this knowledge, individuals coming into the clinic with metastasis could be analyzed to determine which combination of genes are driving their metastasis.

Once the menu has been completed and the ability to analyze patients that way is in place, Dr. Massagué projects that the next step will be to use inhibitors to the genes or antagonists of the gene products. Though this may be a long way off, Dr. Massagué is optimistic.

# The Career That Grew

**Long before she became Princeton's 19th president, Dr. Shirley Tilghman, an ASBMB member, was known among her peers as a distinguished molecular geneticist who had expanded the field of knowledge about embryo development in mammals.**

**As director of the Lewis-Sigler Institute for Integrative Genomics at Princeton, Dr. Tilghman spent the last decade studying the different ways that male and female genomes are packaged and the consequences of the differences of the two for regulating embryo growth.**

**Then, in October 2000, she was asked to join a search committee for a new president of Princeton. After several months her colleagues found her educational ideas so compelling that they asked her to resign and present herself as a candidate.**

**Thus, she became the first woman to lead Princeton in its 257 years.**

**Last month, a few days after she conferred degrees on a Princeton graduating class that included her daughter Rebecca, who received her Bachelors in Art and Archaeology, Dr. Tilghman, 56, spoke about three passions of her work life: science, education and the advancements of women.**

***Q.*** *Do you have any sense now of who you were as a young woman?*

***A.*** Thinking back, I was self-confident. One of the things my parents gave me —it was their greatest gift—is self-confidence. I liked myself.

My father, who was a banker, in particular had always rejected the idea that there were "female professions" and "male professions." My mother was a homemaker. She's still alive. I felt confident I was going to do something interesting.

***Q.*** *Early on, you asked a mentor whether it was possible for a woman to be a scientist and a mother. Why?*

***A.*** That happened when I was a postdoc at the National Institutes of Health. And I think by the time I had come to the NIH., I saw clearly the kind of commitment it took to succeed in science.

My mentor was Phil Leder, a very successful scientist. I saw very few women at the NIH. at his level. The one exception was Maxine Singer. But Maxine was so intimidating to me—so daunting, so businesslike—that I couldn't see her as a role model. When I asked Phil this question, he said: "Don't be ridiculous. There's no reason why you can't do both of these things."

***Q.*** *When your daughters were 2 years old and 6 months old, your marriage ended. Did you put blinders on and just forge ahead?*

***A.*** I think that's the answer: I put blinders on. "This is how it is; we'll move forward." I was very organized. It sounds ridiculous, but I think I jettisoned everything except family and work. I had this mindset: I was not going to feel guilty when I was at work, and I was not going to feel guilty when I was with the children.

***Q.*** *You were a part of the laboratory that was the first to clone a mammalian gene. Did you have any sense of the history you were making?*

***A.*** Oh yes. This was 1977, and it was while I was a postdoc fellow in Phil Leder's lab. We knew that this was a major moment in the history of molecular biology. The idea that we were looking at the chemical composition of the first few genes that had ever been studied in biology was just an amazing moment.

What made it truly thrilling was that the genes were organized in a way that was totally unexpected. So nature took us by surprise.

***Q.*** *In the 70's, there were huge debates about the ethics of genetic research. Do you see any parallels between the issues raised then and the debate today on stem cells?*

***A.*** I think this debate is different. The majority of the debate in the 70's was about safety. Were bacterial strains going to be created that unleashed disease and caused havoc? Stem cells, I see it as an ethical debate, which, in my view, devolves down to a single question: whether you invest in an embryonic stem cell sitting in a petri dish the same moral status as you do a living human being. If your answer is yes, then you have to be opposed to the use of human embryonic stem cells. If your answer is no, stem cells are a perfectly legitimate subject for study.

***Q.*** *How do you think the stem cell debate will be resolved?*

***A.*** A compromise. If work progresses in places like the United Kingdom and if stem cells look as promising as the proponents suggest, there will be enor-

# From an Embryo

mous pressure in this country from disease lobbyists to allow American scientists to work on them as well.

**Q.** *A few years ago, scientific women at the Massachusetts Institute of Technology asked their administration to investigate discrimination against women. What came down was a report that showed significant differences in the way men and women were treated. You've ordered a similar look at Princeton. What have you found?*

**A.** You know, when I first heard about M.I.T., my first reaction was, I'm sure glad I'm at Princeton because in all my years on the faculty I've always been treated with great respect. But we have now done a thorough analysis, and the picture is less glowing than my own experiences have been.

I can't really talk about the details right now because we won't release the study until the fall. While women in some departments have thrived, there are others where they have not. There are no systemic problems. Clearly there are places in the university where we're going to have to do some serious work to make things better.

**Q.** *What will it take to make sure women on the math and science faculties are treated equally at Princeton?*

**A.** For me this is a very high priority, obviously. But I'm a big believer in carrots and not sticks. So I think what you can do is provide incentives for good behavior, which I think works better than punishment for bad. I think you can set a tone in the choice of chairs, because leadership isn't just the president and the provost and the dean and the faculty. A lot of the critical work that gets done in a university gets done by the chairs. So getting chairs committed to this, getting the right chairs in those positions: very important.

**Q.** *How would you change the way science is taught at universities?*

**A.** I think we do not teach the introductory courses appropriately. Right now, we just teach all the basic facts of chemistry, physics, biology or mathematics. Then, we teach a few basic principles.

By the third year, we finally tell the students what is interesting about all of this. I think we should break the pyramid. We should begin with the most exciting ideas in chemistry, physics, biology and how you go about studying it. What are the things you need to know? We should only teach what students need to know in order to understand what those are.

**Q.** *Would you teach science by changing science education into a "great ideas of science" course?*

**A.** Absolutely. I'd like to see us teaching more than a canon, a collection of facts, but why this is exciting, why is the exploration of nature one of the most wonderful ways to spend one's life.

**Q.** *When you first took over the Princeton presidency, you declared you'd continue your research for at least one day a week. Was that too difficult to do?*

**A.** It's not sustainable. And I've really come to the conclusion very quickly I was going to have to eventually close my lab.

Science is a very competitive field. And it's just simply not possible to do it one day a week. So I have not accepted anyone new into the lab in two years now. My lab was 20 people when I became president. I've been letting the graduate students finish their

*Dr. Shirley Tilghman with her daughter Rebecca, who had just received her Bachelors in Art and Archaeology at Princeton.*

Ph.D.'s, the postdocs find new positions. We're now down to five people, and when they've completed their work I will close the lab.

**Q.** *Doing science is a lot like doing art, or writing. You need to think about what you're doing all the time. Was that not possible?*

**A.** Exactly. It really does have to be the last thing you think about when you go to sleep at night and the first thing you think about when you get up in the morning.

I haven't got the time to read the way you must to keep up. I can't go to scientific meetings anymore. So I am holding on by my fingernails just to mentor and shepherd the people who are in the lab. To those who can combine a major administrative job with science, I have the greatest admiration. I have not the slightest idea how they accomplish it.

# William A. Catterall to Receive Bristol-Myers Squibb Award

William A. Catterall, Professor and Chair of Pharmacology at the University of Washington School of Medicine in Seattle, is the recipient of the 16th annual Bristol-Myers Squibb Award for Distinguished Achievement in Neuroscience Research. The $50,000 award is in recognition of his pioneering discoveries of the sodium and calcium channel proteins, which are considered crucial advances in defining the molecular basis of electrical signaling and in understanding key functions of the nervous system at the molecular level.

Dr. Catterall, an ASBMB member, discovered the sodium and calcium channel proteins, which were the first two major classes of voltage-gated ion channel proteins. All processing of information and transmission of signals in the nervous system is dependent on electrical signals that are generated by voltage-gated ion channels. These highly specific filters open or close in response to changes in voltage passing down a neuron, allowing or halting the continuation of a nerve impulse through a cell membrane. While the properties of these channels were first defined in the 1950s, it was not until about three decades later that Dr. Catterall's work led to the discovery of the first two major classes of voltage-gated ion channel proteins —the sodium channel protein in 1980 and the calcium channel protein in 1984.

*William A. Catterall*

"Until the discovery and characterization of the molecular structures of these complex proteins by Dr. Catterall and his colleagues, the molecules responsible for electrical excitability and its regulation were obscure," said Frank Yocca, Ph.D., Executive Director, Neuroscience Clinical Design and Evaluation at the Bristol-Myers Squibb Pharmaceutical Research Institute. "Today, thanks in large measure to his pioneering efforts, scientists have now identified over 100 members of this class of proteins. He established the fundamental principles of their structure, function, regulation and molecular pharmacology. These are indeed major advances in neuroscience, in biochemistry and in cell biology."

***Thanks in large measure to Dr. Catterall's pioneering efforts, scientists have now identified over 100 members of this class of proteins.***

Dr. Catterall received his Ph.D. degree in physiological chemistry from Johns Hopkins School of Medicine in 1972 and his post-graduate training as a Muscular Dystrophy Association Postdoctoral Research Fellow at the National Institutes of Health from 1972-1974. He joined the faculty of the University of Washington School of Medicine in 1977 as an associate professor in the department of pharmacology. He became a full professor in 1981 and chair of the department in 1984.

Early in his career he was recognized for his many achievements, beginning with the Passano Foundation Young Scientist Award in 1981, and with two Jacob Javits Neuroscience Investigator Awards — in 1984 and then again, in 1991. Dr. Catterall also was a recipient of the Basic Science Prize of the American Heart Association in 1992, and the National Institutes of Health Mathilde Solowey Award in Neuroscience and the H.B. Van Dyke Award in Pharmacology from Columbia University, both in 1995.

Dr. Catterall was elected to the National Academy of Sciences at the age of 43. He served as editor-in-chief of *Molecular Pharmacology* from 1985-1990 and has been an editorial board member of a number of professional journals since the early 1980s. Dr. Catterall's laboratory has published over 250 refereed papers and 30 reviews on voltage-gated channels.

The Bristol-Myers Squibb Unrestricted Biomedical Research Grants Program, under which the Distinguished Achievement Award is presented, was initiated in 1977. It marked its 25th anniversary in 2002, reaching a milestone of $100 million in no-strings-attached funding in six biomedical research areas: cancer, cardiovascular, infectious disease, metabolic disease, neuroscience and nutrition. The recipient is selected by peer review. The award, a $50,000 cash prize and a silver commemorative medallion, is given annually in each of the six therapeutic areas. Dr. Catterall will officially receive the neuroscience award at the annual Bristol-Myers Squibb Distinguished Achievement Award dinner to be held in New York City on October 16, 2003.

# Former ASBMB Leader Takes Office As FASEB President

Former ASBMB President Robert D. Wells became the 88th President of the Federation of American Societies for Experimental Biology on July 1. Dr. Wells is the Director of the Center for Genome Research at the Institute of Biosciences and Technology, Texas A&M University, Texas Medical Center in Houston. In addition, he is the Robert A. Welch Endowed Professor of Chemistry for that institution and holds an Adjunct Professorship in the Department of Biochemistry at the University of Texas M.D. Anderson Cancer Center.

*FASEB President Robert D. Wells*

Dr. Wells' experience as a society president, along with his connection to the physical sciences, gives him a unique perspective on the Federation and its relations with the broader research community. "In my role as President," he said, "I would like to work closely with the member societies to increase the solidarity within the FASEB community, as well as work closely with organizations within the greater scientific enterprise to help further our common goals of discovery." Dr. Wells believes that these partnerships are critical to the Federation's efforts to increase NIH and NSF funding. "Funding for these two agencies must be our top priority. If we are not successful in the appropriations arena, the rest of our advocacy agenda will be compromised," he stated.

Dr. Wells intends to bring a special focus to the activities of the National Science Foundation. Having been a continuous recipient of NSF grants for over 25 years, he noted; "NSF is the underpinning of science for everything, including health research. Funds for the NSF are very broad range, hitting engineering, chemistry, and mathematics. The research that is performed by NSF-funded scientists is key for the economic health of the country and for the future of the scientific enterprise. We need to fund this agency to its fullest extent to reach these goals."

The new FASEB President believes that a joint, cohesive advocacy of the entire NSF community will be crucial and he would like to take a lead role in the effort of bringing the organizations together. To illustrate his commitment, one of his first acts as President was to meet with NSF Director Rita Colwell.

# First-Ever Images of Developing Dengue

High-quality images of a virus still forming in its cellular host shed light on how viruses reproduce, knowledge that could prove important to the development of antiviral drugs.

A team including Purdue University's Michael Rossmann, Hanley Distinguished Professor of Biological Sciences, and Dr. Richard Kuhn, Professor of Biological Sciences, both ASBMB members, has solved the structure of the immature dengue virus, which is related to West Nile virus and yellow fever. Dengue is a mosquito-borne pathogen that kills more than 24,000 people in the world annually. The pair solved the structure of the mature dengue virus particle last year, and Dr. Rossmann said the new findings were a significant step toward unraveling the behavior of viruses.

"We're beginning to dissect the individual steps in a virus' life cycle," commented Dr. Rossmann. "We hope to learn a great deal more about viral development so that approaches to preventing infection become conceivable."

The study, a collaboration among Dr. Rossmann, Dr. Kuhn, and Dr. Tim Baker at Purdue, and Dr. James Straus at the California Institute of Technology, appeared in the June 2 issue of *EMBO*.

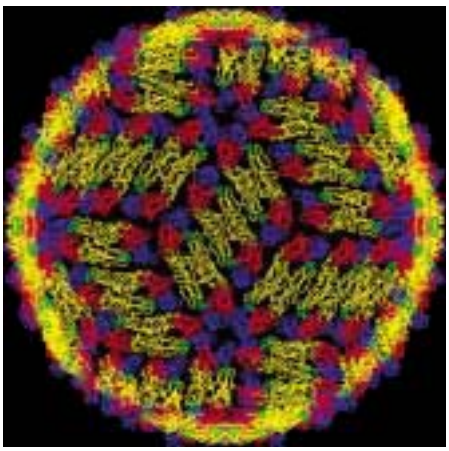
The research group used an advanced imaging technique, known as cryoelectron microscopy, to take 3-D pictures of the dengue particle. While viruses are not considered to be "alive" by the standards we apply to plants and animals, the team's images have revealed that particles go through a complex developmental process.

"We have discovered that an astonishing structural change occurs between the immature and mature dengue shells," said Dr. Kuhn. "We don't yet know how it all happens, but even though we have only seen two points along the viral assembly line so far, we can tell it's quite a dynamic metamorphosis."

Compared to the mature dengue particle, for example, the immature form is 15% greater in diameter.

"The immature particle is covered with 60 three-pronged protein spikes, called trimers, that jut from its surface," Dr. Kuhn explained. "In contrast, the mature particle is a nearly smooth sphere, like a golf ball. Somewhere in the assembly process, these

*Purdue researchers Michael G. Rossmann (left) and Richard Kuhn display computer simulations that show architectural details of the dengue virus. The findings may help scientists understand the processes that lead to viral infection and target those activities to develop new vaccines and antiviral agents. (Purdue News Service Photo by David Umberger)*



Purdue University computer illustration

*The dengue virus—the first flavivirus structure to be determined—reveals an architectural structure that is different from any other virus that has been seen, says Purdue University researcher Richard Kuhn. The virus surface is unusually smooth and its membrane is completely enclosed by a protein shell. This computer illustration shows how the major protein, called "E" for envelope protein, organizes itself to form a protective shell around the virus. The protein is color-coded blue, green and yellow to show the three specific domains of the protein. The protein shell serves as a cage for the genetic material inside.*

# Virus Obtained at Purdue

trimers flatten out, making the surface appear more even."

The proteins are important because each contains a short amino acid sequence called a fusion peptide that the virus needs to attach itself to a potential host. Without this fusion peptide, the virus cannot successfully invade a cell.

"If you compare a virus to a pirate ship, these peptides are the grappling hooks by which they attach themselves to their prey," said Dr. Kuhn. "A particle can only inject its genetic material into a cell after it has bonded with its surface. Fusion peptides allow the virus to prepare for boarding, so to speak."

The peptides need to be protected until the virus is ready to bond with a cell, so in the immature particle, each peptide is covered with a special cap that protects it until the time is right.

"We would like to know more about how a virus changes," Dr. Rossmann said. "Our imaging techniques are now giving us vastly greater perspective on how a particle becomes a successful invader. Now we want to know how it marshals its offenses and defenses."

It is in examining the changes a virus undergoes?for example, in the case of dengue, how it uncaps its fusion peptides to become an infectious agent?that the team hopes to find clues to stopping the developmental process in its tracks.

"Any knowledge of the steps in a virus' assembly process provides a potential target for an antiviral agent," said Dr. Rossmann. "If you are trying to assemble something, introducing a foreign body into the process could gum up the works."

*Ying Zhang, a third-year graduate student in Dr. Rossman's lab, was the lead author of the paper on immature dengue virus that was published in the* European Molecular Biology Journal (EMBO J). *However the work was a collaboration between Dr. Richard Kuhn's, Dr. Tim Baker's and Dr. Chad Boutin's lab at Purdue University, and Dr. Jim Strauss' lab at the California Institute of Technology.*

However, Dr. Kuhn warned that much more work needs to be done before such medicines will appear in the drugstore, as the full picture of viral assembly remains unclear.

"This is only one step in the viral maturation process," he said. "We still need other scenes from its cycle of existence?snapshots of it fusing with a cell, for example, and of it entering?to have complete understanding."

The team's next step will be to confirm its findings, which Dr. Kuhn considers critical. The metamorphosis the dengue particle undergoes is so radical, he said, that there is a possibility the immature form the team has seen is not actually a step in dengue's development. For the moment, however, the results are encouraging enough to pursue the research further.

"Knowledge of how a virus assembles itself can reveal its vulnerabilities," he said. "This is what our research techniques allow us to explore?and perhaps exploit."

This research was funded in part by the Allergy and Infectious Diseases Institute at NIH.

Dr. Rossmann and Dr. Kuhn are associated with Purdue's Markey Center for Structural Biology, which consists of laboratories that use a combination of cryoelectron microscopy, crystallography, and molecular biology to elucidate the processes of viral entry, replication, and pathogenesis.

## 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.

**Delia Susan-Resiga**
University of Notre Dame

**Andrew J. Sutherland-Smith**
Massey University, New Zealand

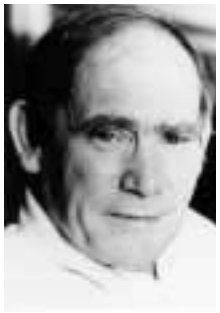
# Sydney Brenner to Keynote Digital Biology Symposium

Sydney Brenner, Distinguished Professor at the Salk Institute and an ASBMB member, will be the biology keynoter at the NIH Biomedical Information Science and Technology Initiative (BISTI) 2003 Symposium Digital Biology: The Emerging Paradigm, November 6-7 at the Natcher Conference Center on the NIH campus in Bethesda.

According to the Lasker Foundation, which twice honored him: "Sydney Brenner likes beginnings. . . . While many scientists are gearing up to explore the new frontiers he has pioneered, Dr. Brenner's brain is already fidgeting and scouting around for a fresh path." Today, Dr. Brenner is moving beyond the genome as an inventory of function, to scout the world of integrated information in a quest to understand function in complex organisms. "We now have unprecedented ability to collect data about nature . . . " he says, "but there is now a crisis developing in biology, in that completely unstructured information does not enhance understanding."

"We need a framework to put all of this knowledge and data into, that is going to be the problem in biology," said Dr. Brenner in an interview with *Salk Signals* magazine. "We've reached the stage where we can't talk to each other, we've all become highly specialized. We need a framework, a framework where people can come back to us and say, 'Yes, I understand.' Driving toward that framework is really the big challenge, and I think that's what I'm going to do."

Acclaimed as one of the fathers of molecular biology, and a Nobel Laureate in Physiology or Medicine, Dr. Brenner is known for his brilliant creativity and trenchant wit.



*Dr. Sydney Brenner*

The technology keynoter at the symposium will be Nathan Myhrvold, Co-Founder and Managing Director, Intellectual Ventures, an entrepreneurial firm. Dr. Myhrvold spent 14 years at Microsoft Corporation and retired in May 2000 as Chief Technology Officer. At Intellectual Ventures, Dr. Myhrvold is focused on a variety of business interests relating to biotechnology, computer science, intellectual property, and invention.

Before joining Microsoft in 1986, Dr. Myhrvold was founder and president of Dynamical Systems. Prior to that he was a postdoctoral fellow in the department of applied mathematics and theoretical physics at Cambridge University and worked with Professor Stephen Hawking on research in cosmology, quantum field theory in curved space time and quantum theories of gravitation.

For information about the program, poster abstract submissions, logistics, and registration go to http://www.capconcorp.com/digitalbiology/

## NIGMS Educational Funding Opportunities

NIGMS has recently announced the following funding opportunities for educational activities:

Summer Research Experiences for Undergraduates RFA-GM-03-010 http://grants1.nih.gov/grants/guide/rfa-files/RFA-GM-03-010.html

This program seeks to encourage the cross-training of undergraduate students in the quantitative and physical sciences by providing them with opportunities to take part in mentored research experiences with NIH-supported biomedical investigators.

Post-Baccalaureate Research Education Program (PREP) PAR-03-140 http://grants1.nih.gov/grants/guide/ pa-files/PAR-03-140.html

This is a reannouncement of an existing program in the NIGMS Minority Access to Research Careers Program Branch. PREP supports institutional grants to encourage underrepresented minorities who hold a recent baccalaureate degree in the biomedically relevant sciences to pursue a research doctorate.

Minority Program Supplements Current grantees of the NIGMS Minority Access to Research Careers and Minority Biomedical Research Support programs are eligible to apply for supplements for program evaluation (http://grants1.nih.gov/grants/ guide/ notice-files/NOT-GM-03-105 .html) and curriculum development/improvement in the quantitative sciences (http://grants1.nih.gov/grants/guide/notice-files/NOT-GM-03-107.html).

# Structure of HIV-Neutralizing Antibody Solved

A team of scientists whose leaders are funded by NIH has solved the structure of an antibody that is able to neutralize HIV, the virus that causes AIDS. Their work was described in the June 27 issue of *Science*.

The antibody, called 2G12, was isolated about a decade ago from one of the rare HIV-positive individuals whose body is able to successfully combat the virus. Scientists at the Scripps Research Institute worked with an international team to determine the 2G12 antibody structure by diffracting X-rays from crystals of 2G12.

The structure reveals an unexpected intertwining of the antibody's two chains, the extensions that grab hold of the AIDS virus. Researchers also discovered how the 2G12 antibody neutralizes HIV by binding to sugars on the surface of the virus. The immune system usually will not attack these sugars because they are made and attached to the AIDS virus by human cells; the immune system accepts them as if they are part of the body.

The structure of the 2G12 antibody could provide scientists with a template to design an antigen that would trigger the body to produce 2G12. Antigens are molecules that the immune system recognizes as foreign; they stimulate the immune system to produce antibodies to combat invading microbes. The scientists believe that it might be possible to design an antigen to entice the body to produce 2G12. Such an antigen could be the basis of a vaccine against HIV.

This research was led by ASBMB member Dr. Ian Wilson and Dr. Dennis Burton, both of the Scripps Research Institute, as well as scientists from Florida State University, the University of Oxford, and the University of Agriculture in Vienna, Austria.

NIH's National Institute of General Medical Sciences supports Dr. Wilson through a program that brings together crystallographers, chemists and biologists to determine the detailed, three-dimensional structures of potential HIV drug targets.

"We are excited about the new structure solved by Ian Wilson's team," said James Cassatt, Director of the NIGMS Division of Cell Biology and Biophysics. "Our program encourages scientists to look for potential HIV drug and vaccine targets using the tools of structural biology. These results show that structural biology can offer new avenues to pursue AIDS treatments and prevention."

# NIH to Explore Alternative Vectors for Gene Therapy

The National Institutes of Health Recombinant DNA Advisory Committee (RAC) will consider a wide-ranging set of issues over the next year, including what gene therapy vectors could replace retroviruses and what is required to win FDA approval of new vectors so they can be used in clinical trials.

Clinical trials using retroviruses have been under close scrutiny since last fall when patients in French studies using retroviruses to insert new genes in blood stem cells to treat X-linked severe combined immunodeficiency syndrome (X-SCID) developed leukemia.

In response, the RAC recommended in February that retroviral gene transfer for X-SCID be limited to cases where stem cell therapies had failed or where stem cell donors could not be found. The committee did not, however, recommend halting clinical trials using retroviruses to treat other diseases, including non–X-linked SCID.

As yet undetermined is what other vector types might be appropriate substitutes for retroviruses, and what would be needed to develop these new vectors in terms of clinical use, animal models, and FDA approval.

The RAC is scheduled to meet again September 17–19, and among topics that may be discussed are:

Risk–benefit analyses of using retroviruses in clinical trials and whether there are types of studies for which these vectors shouldn't be used.

Ways to make more useful the committee's interaction with institutional biosafety committees, institutional review boards, and international oversight committees.

# NIH Doubling Brings Scrutiny, Criticism from Congress

By Peter Farnham, CAE, ASBMB Public Affairs Officer

"Be careful what you wish for—you just might get it." Aesop's saying is perfectly applicable to the situation in which the National Institutes of Health now finds itself. The agency's budget doubled to over $27.2 billion from 1998, a situation devoutly wished and worked for since the early 1990s. But with this increased size comes increased scrutiny; NIH is no longer small enough to escape attention. And, while congressional support remains overwhelming—at least in spirit—there are troubling indications that some members of Congress may be starting to look at NIH with a more critical eye than in the past.

## Lean Budgets

The first warning sign is, of course, the administration's requested increase of just 2% for FY 2004, raising the agency to $27.9 billion (ASBMB is supporting a 10% increase this year). The administration has argued that its proposal actually amounts to about a 7% increase for NIH basic research, as funding for several one-time procurement and construction programs from last year is being kept in the base but will now be spent on grants. However, this math is considered suspect in many quarters. So, while the President can argue accurately that he kept his campaign promise to finish doubling the NIH budget, the bottom line is that 2% is a far cry from the approximately 15% increases NIH received in each of the last five years.

The second problem is that both the House and Senate are considering NIH budgets that so far are not much better than what the President proposed. The House has already acted; in mid-July it approved a budget for NIH that almost precisely mirrors the President's request—$681 million more than 2003, a 2.5% increase. As of this writing, the Senate is considering an NIH budget that is only slightly better than what the House has proposed—NIH would grow by about $1 billion, a 3.7% increase, under the Senate bill. The fact that the Senate went on record this spring (by a 96-1 vote) supporting an 8.5% increase for NIH seems not to be making any difference in its deliberations now that funding decisions are being made for keeps.

A recent paper (Korn, D. et.al., *Science*, Vol.296, pp. 1401-02) in *Science* magazine, of which ASBMB President Bettie Sue Masters was a coauthor, notes that NIH increases have averaged about 9% a year for decades. It also points out that if NIH receives increases in the 2-3% range for the next 4 to 5 years, the effect of the doubling will have disappeared, as NIH will then be no further along than it would have been had increases merely continued at the historical pace. Unfortunately, so far, this logic seems not to be impacting the debate.

## Congressional Scrutiny

There are other problems besides funding shortfalls. NIH seems to have attracted the attention of the House Energy and Commerce Committee, chaired by Rep. Billy Tauzin (R-LA). He and the chairman of the committee's Oversight and Investigations panel, Rep. Jim Greenwood (R-PA), have sent at least four detailed letters to NIH Director Elias Zerhouni since March. The first letter, sent March 13, points out that in light of NIH's significant budgetary growth since 1998, "the Committee is conducting an examination of NIH management and oversight of its federally funded research." Tauzin and Greenwood then requested a veritable treasure-trove of documents, including a detailed description of how NIH oversees grantees' management of funds, a list of all grantees receiving NIH funds for the past two years, a summary of allegations for "all 54 active grant reviews" being conducted by the NIH Office of Management Assessment, and summaries of OMA reports of fraud, waste, abuse or mismanagement.

*There are troubling indications that some members of Congress may be starting to look at NIH with a more critical eye than in the past.*

## No Sex Please

Finally, consider a matter that came up on the House floor during debate

on the Labor/HHS bill during the week ending July 4. A third-term congressman, Patrick Toomey (R-PA), offered an amendment to rescind funding for four specific NIH grants that dealt with sexuality and gender issues. Toomey, after asking, "Who thinks this stuff up?" argued that the Congress has "an affirmative obligation …as the body that controls the purse strings of the federal government to supervise and provide oversight. And when a bureaucracy is making mistakes, we have an obligation to come here and correct that."

The amendment failed, but not by much—213 to 210. This attempt to defund specific, named grants in an appropriations bill, had it been successful, would have set a precedent that would have endangered any future grant a member of Congress decided was inappropriate. As it is, the situation is bad enough, since the attempt came very close to succeeding. This may well encourage others to try again.

All these recent occurrences speak to the fragility of political support for the NIH. While none of the problems is unmanageable by itself, collectively they should be viewed as very serious warning signs. In short, the biomedical research community is now experiencing the downside of having its most devout wish granted. We got more money—but along with that, we got more scrutiny, too.

Aesop would no doubt understand this perfectly.

# Medical Research in Danger of Losing Momentum

*The following is an op-ed piece by ASBMB Public Affairs Advisory Committee Chair William R. Brinkley and FASEB President Robert D. Wells that appeared in the* Houston Chronicle *on July 18.*

In Texas, every football fan understands the value of momentum. Momentum pushes a team across the goal line. Losing momentum means halting the forward rush.

That same metaphor applies to scientific progress. Biomedical research has surged with the recent doubling of the budget of the National Institutes of Health over five years completed in 2003. In 1998, the budget was $14 billion and by 2003, it had reached $27.2 billion. The feat transcended political differences and economic difficulties.

The nation got its money's worth with the pace of medical research dramatically accelerating. Adult leukemia is now treatable with new drugs that target molecules at the center of the disease. Heart disease is being dramatically reduced with statins, new cholesterol-lowering drugs that may also have a significant impact on diseases such as Alzheimer's and multiple sclerosis.

The current plan to increase the 2004 NIH budget by between 2.5 percent (the Bush administration's proposal and House's plan) and 3.7 percent (the Senate's plan) could stop the scientific momentum that promises to result in treatments for some of the world's greatest killers. Currently, it is estimated that the previous investment resulted in new findings that prevented 62,000 deaths from HIV/AIDS, 241,000 deaths from stroke and 815,000 deaths from coronary heart disease by the year 2000.

In June 2002, Health and Human Services Secretary Tommy Thompson hailed the progress, saying, "We are no longer resigned to thinking of cancer as a death sentence. Today, we can successfully treat or increase the life expectancy for more than half of all cancer patients."

The support of the NIH by President Bush and Congress has been helpful, and a small increase is better than none at all. However, putting such a damper on federal support of medical research, even in the face of economic difficulties, threatens the future of millions of Americans who are hoping for new medical breakthroughs to save their lives. These new findings will be important to future generations and result in healthier, more productive American families.

The Federation of American Societies for Experimental Biology and Research!America have determined that increases of 8-10 percent per year will keep the momentum going. The money would not only be a real investment in human health, it also would help the U.S. economy. Every dollar invested into America's biomedical research brings a gain of approximately $20 to the economy. For example, the Texas Medical Center employs approximately 70,000 individuals and is a vital part of the Houston economy.

We must maintain the momentum in scientific research. When we cross the finish line, the gain is measured in more than a few points or yards. It is measured in human lives saved and human suffering avoided.

by John D. Thompson, Editor

# Biotech Fueling Chemical, Energy Innovations

Biotechnology is poised to transform the chemicals and energy industries, according to several Industrial & Environmental track speakers at the recent BIO 2003 Convention in Washington, D.C. Industry demand for technology platforms that are sustainable, that reduce dependence on fossil fuels, and that reduce hazardous waste and greenhouse gases are driving the application of biotechnology to industrial processes.

Some 5 billion kilograms of commodity chemicals are produced annually in the United States using plant biomass such as corn as the primary feedstock. McKinsey & Co. estimates that with the help of recombinantly produced enzymes, biomass waste—stalks, leaves, and other leftovers from agricultural production—could supply the raw material for 40% of bulk chemical production.

"Already 5% of chemical sales are dependent on biotechnology," according to McKinsey partner Rolf Bachman. These chemicals include alcohol, organic acids, amino acids, and fine chemicals that represent about $30 billion a year in sales. With improved conversion technologies, biotechnology might help transform biomass waste into biodegradable plastics and textiles, as well as ethanol, a cleaner-burning alternative fuel.

Biotech refining is an infant industry—the first commercial biorefinery came online just last year. To realize the potential of industrial biotechnology will require a distribution infrastructure, huge capital investments, proof of concept and market development. However, Bachman said each of these obstacles is being overcome, and "biomass is poised to provide a broad set of new low-cost building blocks for next-generation polymers."

Volume is already growing, and Bachman forecasts that biotech will affect 10% to 20% of the chemical market by 2010, depending on feedstock prices, demand, regulatory policy and private investment.

# Study Finds Industrial Biotech Offers Significant Benefits

Although industrial biotechnology, or as it is called in Europe white biotechnology is a newcomer to product manufacturing, it can achieve significant environmental and economic advantages over traditional manufacturing processes, according to a report released at the recent BIO 2003 Conference.

Industrial biotechnology supplants traditional manufacturing processes by using enzymes rather than chemicals, thereby reducing pollution. It is being used to develop new forms of energy production based on agricultural waste derived from corn stalks and rice, rather than oil or coal.

"These new industrial biotech processes will allow us to use enzymes and renewable carbon instead of fossil fuels created by the dinosaurs to fuel our automobiles and our economies, while at the same time helping our environment," said Brent Erickson, vice president for the Biotechnology Industry Organization's industrial and environmental section.

The report, White Biotechnology: Gateway to a More Sustainable Future, examined how certain companies have used industrial biotech to improve manufacturing processes:

BASF: By using a biobased fermentation process, BASF creates Vitamin B2 in a single step rather than the traditionally complex, eight-step chemical process. The report estimates that the biotech approach reduces carbon dioxide emissions by 30%, resource consumption by 60% and waste by 95%.

DSM: The traditional method for creating the antibiotic Cephalexin involved a 10-step chemical synthesis. By replacing that approach with a combination of a fermentation and enzymatic reaction, DSM reduced its material use and energy consumption by 65% and variable costs by 50%.

Novozymes: The scouring process used in the textile industry usually involves harsh chemical solutions. Novozymes supplies enzymes applied to the water-intensive textiles industry, creating a 25% decrease in primary energy demand and a 60% drop in emissions to water. Further, the enzymatic process has been shown to reduce costs by 20%.

Cargill Dow: NatureWorks, a new bio-based polymer, to produce clothing, packaging materials and electronic goods. The product requires 25 to 55% less fossil resources.

DuPont: Sorona, also a bio-based polymer, incorporates the use of dextrose from corn as one of its key feedstocks, reducing the use of fossil inputs by 50%. The Cargill Dow and DuPont products were based on a process developed with Genencor.

## Regulations Not in Harmony Worldwide

While such changes will continue, the report found that in one key aspect there has not been enough happening globally to foster biotech—regulations governing biotech worldwide are not in harmony. Inconsistent patent protection and governance of therapeutically equivalent biologics are two examples of regulatory issues that have affected global access to biotech medicines. "Western companies are reluctant to enter partnerships in India and China for fear of losing intellectual property without compensation," the report says. Meanwhile, India and China are seizing the change to make therapeutically equivalent versions of biologics from Western nations.

Biotech in India is forecast to generate $5 billion in revenue and 1 million jobs over the next five years, while the Chinese government invested $180 million during 1996-2002 to create a biotech industry and is expected to spend three times that amount in the next three years. In Japan, biotech workers are expected to increase from 70,000 to 1 million by 2010. Revenue in Singapore from biomedical manufacturing is expected to hit $7 billion by 2005.

The U.S. continues to dominate biotech, accounting for 70% of revenue and more than 70% of research and development spending. In Europe, biotechs, which outnumber the U.S. industry, are expected to account for 20% of global revenue and 25% of research and development.

While U.S. dominance remains unchanged, the report finds that "in other respects, the global profile is changing significantly" because of cross-border partnerships and mergers and acquisitions.

## Bio-Batteries on the Battlefield?

In response to military needs, the energy industry is exploring new ways to produce hydrogen fuel and bio-based batteries. BIO 2003 speakers Jerry Warner, a retired Colonel now with Defense Life Sciences LLC, and Dr. Michael Ladisch, Distinguished Professor and Director of Purdue University's Laboratory of Renewable Resources Engineering, believe that biotechnology may lead to a process for battlefield fuel production.

Such fuel production, said Dr. Ladisch, "though more expensive than traditional methods, may fill a need in emergency situations, such as military applications."

The process involves using biomass, waste food, cartons, wood and grasses as source materials. "Then, he said, you add enzymes to break down those materials into sugar, add yeast, and you go!"

Although the process is not quite that simple (the fuel must be completely dry), it is becoming "a legitimate candidate," said Col. Warner. "The DoD is becoming very interested."

## Biotech Potential Seen as 'Limitless'

The biotechnology business may be in for some painful change with continued consolidation shrinking the number of players, but the industry's long-term potential appears "limitless" according to the Ernst & Young's recently released annual global biotechnology report.

"The biotech industry is maturing and its character is changing," according to *Beyond Borders, The Global Biotechnology Report 2003*. "The sector is moving toward an alliance network of specialty companies, similar to what has occurred in the computer and software industry." Companies increasingly must focus on specific areas needed to take products to market, the report says, citing analytical instruments, target and compound discovery plus validation, pharmacogenomics and toxicity, regulatory affairs and clinical trial development, or manufacturing.

"By refocusing on what they do best, biotech companies can build networks of alliances through which each player contributes to the end product and shares in the revenues. They can generate profit-making enterprises to support other activities, such as their own drug development," says the report. "Setting up a company that will not report earnings for 10 to 15 years was a business model for the 20th century, not the 21st century."

Many companies continue to fight for survival and the stagnant economy is of paramount concern in the report. "Hundreds of cash-starved companies, whose capital-intensive R&D engines require frequent refueling, have reached or are approaching a crisis."

Industry consolidation, with companies merging, cutting programs and employees, or shuttering business, will continue because of the economy, but also because the industry cannot sustain the more than 4,300 biotech companies globally, particularly given that most of them lose money, the report says.

# The Politics of Science vs. the Science

*The following is excerpted from an address by Carl Feldbaum, President of the Biotechnology Industry Organization (BIO), at that organization's annual meeting, June 21-25.*

Lobbying for science might seem an easy job. After all, who's against science? The federal government invests more than $100 billion in R&D each year; in the last five years, NIH funding has doubled.

But even as elected officials avidly seek the economic benefits of biotechnology, they are passionately debating embryo research, regulations for biotechnology crops, and the uses of genetic information. They may be for "science" in general, but the decisions they make about our industry can have an outsize effect on the work we can do. Earning public support, and the support of those entrusted with the public good, is why scientists must engage in politics.

The early years of recombinant DNA were marked by a fierce public debate over safety and ethics. Twenty-some years ago, when the idea of moving DNA across species became a technical possibility, the leading scientists in the field immediately tapped the brakes and called for a moratorium on such experiments until the hazards could be assessed. A group of leading molecular biologists got together in 1975 at the Asilomar Conference Center in Pacific Grove, California, and produced recommendations that did just that.

Problem solved, right? Unfortunately, once a political issue gains momentum, mere facts may not stop it. In 1976, the *New York Times Magazine* ran an alarmist story called "New Strains of Life?Or Death?" related to recombinant DNA. More than a dozen bills were floated in Congress, and in Cambridge, Massachusetts, supposedly a science Mecca, authorities imposed a temporary moratorium.

Bills to severely restrict recombinant DNA died in the House Science Committee. Because those ill-conceived proposals never became law, today, more than 350 million patients worldwide have been treated with?and many live as a direct result of?the medicines created by recombinant DNA.

Not every legislative story ends well for science. A decade ago, in a demonstration of shortsighted economy and political vindictiveness, Congress killed one of its smallest agencies, the Office of Technology Assessment. This nonpartisan office had a reputation for solid scientific judgment, but when it was under attack scientists were unable to save Congress' best source of scientific analysis.

There is a wide gap between politics and science: only seven of 535 members of the current Congress?1.3%?are scientists. Twenty-one others are health-care professionals, including nine physicians.

In addition, many scientists are uncomfortable with the rough and tumble, the unscientific messiness of the democratic process demeaning. The writer of a letter to *Science*, for example, vehemently disagreed with a call to action urging scientists to learn to play by Washington's rules and speak Washington's language. He wrote, "Many of [Washington's rules] are just plain stupid and its language unintelligible."

One way to influence what happens in Congress is to influence the people who vote. Public opinion needs to be wooed through the media to win the day on many issues.

Scientists often take a different view. At a recent genome celebration conference, a world-renowned evolutionary biologist said during a Q&A with a media panel, "To me, the interesting stories in science are things which have been true for the last hundred million years and will be true for the next hundred million years. And, therefore, I find it regrettable that the interest of science journalists tends to be what is current at the moment."

***Earning public support, and the support of those entrusted with the public good, is why scientists must engage in politics.***

When taking your discoveries to journalists, politicians, and the public, you have to make both the meaning and impact clear. When you look at your achievements from the journalist's perspective?what they mean to ordinary readers?you may find a greater audience than you expected.

In dealing with journalists, you deal with deadline pressure. You may have spent 10 years toiling on a scientific problem; read hundreds of scientific papers on the topic; attended dozens of conferences; given presentations. A journalist may have 20 minutes to interview you, and then just a few hours to write the story.

Here are a few keys to making sure reporters understand us.

Use common analogies and plain language to describe the question your

# of Politics

research posed and the answers you got. Think about the bottom-line impact of your research on ordinary people's lives. Is it going to stop a disease? Fill nutritional needs? Protect the environment?

Return phone calls right away. If you call back two days later, the story you're calling about has been filed.

There are three questions reporters always want to ask. What is the value to my readers and viewers? What's new, what has changed? Where does this lead to in the future?

In politics, passion can triumph over logic and numbers. Just look how well patient groups over the last 25 years have raised awareness and funding. People and families affected by rare diseases joined together in the late 1970s and early 1980s to push for new incentives to develop orphan drugs. In the 1980s, the HIV/AIDS activists took to the streets in their battle for more funding and faster approval of new drugs. The result? Billions in research dollars and new rules allowing fast-track development and approvals for drugs treating life-threatening diseases.

The list goes on: Breast cancer, prostate cancer, Alzheimer's and Parkinson's, juvenile diabetes. There is nothing more powerful than a passionate, articulate scientist, a patient or family member speaking to a member of Congress or testifying at a hearing.

Politics is not a spectator sport, scientists need to be writing letters, participating in meetings when a member of Congress is in town, and going to Washington and the state capital to deliver the message in person. You can't win if you don't play.

## Harvard, MIT, Whitehead Plan New Biomedical Research Institute

Harvard University and the Massachusetts Institute of Technology plan to establish a research institute to apply knowledge of the human genome to the practice of medicine. The institute is to be named for Los Angeles financial executive Eli Broad and his wife, Edythe, who are donating $100 million over 10 years.

The Eli and Edythe L. Broad Institute will be run by Dr. Eric Lander, a leader of the consortium that decoded the human genome and a faculty member at MIT and the Whitehead Institute for Biomedical Research, which is also a founder of the Broad Institute.

In addition to $100 million in seed funds, Harvard and MIT hope to raise an additional $200 million in private support over the next decade. Federal support in the form of research grants is also anticipated.

The Institute will begin operation in the Kendall Square area of Cambridge later this year. Mr. Broad said he selected Cambridge as home of the institute "to leverage the world-class strengths and geographic proximity of its three founding institutions."

The institution will combine expertise in molecular biology, genomics, chemistry and chemical biology, computational science, and engineering, as well as breadth and depth in medicine. Its faculty, drawn from all three founding institutions, will have 12 core members appointed on a long-term basis and some 30 associated members serving on a rotating basis.

## House Approves $5.6 Billion Fund for Bioterror Remedies

The House voted overwhelmingly last month to establish a $5.6 billion fund intended to encourage the development of drugs, vaccines and other defenses against biological, nuclear, radiological or chemical attack. The bill was then awaiting action by the Senate where a similar bill was unanimously approved in committee.

The measure would provide $5.6 billion over 10 years to encourage private companies to work with the National Institutes of Health and other federal agencies to research and develop measures to combat smallpox, ebola virus, plague, anthrax and other feared biological agents. The government would then buy the drugs or vaccines and stockpile them.

The bill also gives the Secretary of Health and Human Services authority to allow the drugs and vaccines to be used without government approval in an emergency.

Supporters of the legislation, including representatives of the biotechnology industry, have termed it necessary as there is no commercial market for such drugs, which leaves private companies with little incentive to invest in research.

# Calendar of Scientific Meetings

## AUGUST 2003

### First Gordon Research Conference on Cellular Osmoregulation: Sensors, Transducers and Regulators

**August 15–20** • Roger Williams University, Bristol, RI
Contacts: Janet M. Wood (jwood@uoguelph.ca) and Karlheinz Altendorf (altendorf@biologie.Uni-Osnabrueck.de)
Website: http://www.grc.uri.edu/programs/2003/cellosmo.htm
Application: http://www.grc.org/scripts/dbml.exe?Template=/Application/apply1.dbm

### Sixth International Symposium on Mass Spectrometry in the Health and Life Sciences: Molecular and Cellular Proteomics

**August 24-28** • Fairmont Hotel, San Francisco
Contact: Marilyn Schwartz; Ph: 415-476-4893
Email: sfms@itsa.ucsf.edu
Website: http://donatello.ucsf.edu/symposium

### Biology of Molecular Chaperones Mechanisms and Regulation of Chaperones

**August 30–September 4** • Tomar, Portugal
Contacts: Dr. Josip Hendekovic or Caroline Walford
Ph: + 33 388 76 71 35; Fx: + 33 388 36 69 87
Website: http://www.esf.org/esf_euresco
Please quote 2003-15 in any correspondence

### 16th International Mass Spectrometry Society Conference

**August 31–September 5** • Edinburgh, Scotland, United Kingdom
Contact: John Monaghan; Email: johnmonaghan@ed.ac.uk
Website: http://www.imsc-edinburgh2003.com

## SEPTEMBER 2003

### NMR in Molecular Biology EuroConference on Structural Genomics: From Gene to Structure as viewed by NMR

**September 5–10** • Obernai (near Strasbourg), France
Contact: Dr. Josip Hendekovic or Anne-Sophie Gablin
Ph: + 33 388 76 71 35; Fx: + 33 388 36 69 87
Website: http://www.esf.org/esf_euresco
Please quote 2003-14 in any correspondence

### Sixth Conference on Protein Expression in Animal Cells

**September 7–11** • Mont-Tremblant, QC, Canada
Contact: Marc Aucoin, Technical Officer
Biotechnology Research Institute; Email: 6thPEACe@nrc.ca
Website: http://www.bri.nrc.ca/6thPEACe

### American Society for Bone and Mineral Research (ASBMR) 25th Annual Meeting and Anniversary Celebration

**September 19-23** • Minneapolis, Minnesota, U.S.A.
Late-Breaking Abstract Submission Deadline is July 15, 2003.
Ph: 202-367-1161; Email: asbmr@dc.sba.com; www.asbmr.org

### Third International Conference on the Pathobiology of Proteoglycans

**September 20 - 25** • Parma, Italy
Contacts: Roberto Perris, Chair and Ariane De Agostini, Co-chair
Clinique de Stérilité de d'Endocrinologie gynécologique,
Hôpital Cantonal Universitaire de Genève
Ph: 41-22 / 382.43.46; Fx: 41-22 / 347.59.79
Email: Ariane.Deagostini@medecine.unige.ch
Website: http://www.assb.biol.unipr.it/PG2003

## OCTOBER 2003

### OARSI's 2003 World Congress on Osteoarthritis

**October 12-15** • Palais am Funkturm, Berlin
Contact: OARSI Headquarters; Ph: 202-367-1177; Fx: 202-367-2177
Email: oarsi@oarsi.org; Website: http://www.oarsi.org

### AAPS Workshop on Method Validation and Measurement of Biomarkers in Nonclinical and Clinical Samples in Drug Development

Cosponsored with Clinical Ligand Assay Society
**October 24-25** • Salt Lake City, Utah
Contact: AAPS Meetings Department
Ph: 703-243-2800; Fx: 703-243-9532; Email: meetings@aaps.org
Website: http://www.aapspharmaceutica.com/meetings

### AAPS Annual Meeting and Exposition

**October 26-30** • Salt Lake City, Utah
Contact: AAPS Meetings Department
Ph: 703-243-2800; Fx: 703-243-9532; Email: meetings@aaps.org
Website: http://www.aapspharmaceutica.com/meetings

### Cytokines, Signalling & Diseases

**Oct. 26-30** • Cairns, Australia
Event Host: International Society for Interferon and Cytokine Research; Website: http://www.cytokines2003.conf.au/

### American Association of Pharmaceutical Scientists Annual Meeting and Exposition

**October 26-30** • Salt Lake City
Ph: 703-243-2800; Fx: 703-243-9650; Email: aaps@aaps.org
Website: http://www.aapspharmaceutica.com/meetings/annualmeet/am03/index.asp

## NOVEMBER 2003

### Biomedical Information Science and Technology Initiative (BISTI) 2003 Symposium
### Digital Biology: The Emerging Paradigm

**November 6-7** • Natcher Conference Center, NIH, Bethesda, MD
Contact: Saundra Bromberg, Capital Consulting Corporation
Ph: 301-468-6004, ext. 406
Email: sbromberg@md.capconcorp.com.

## FEBRUARY 2004

### 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

## 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

## AUGUST 2004

### 12th International Conference on Second Messengers and Phospoproteins

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

## 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

## 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.**

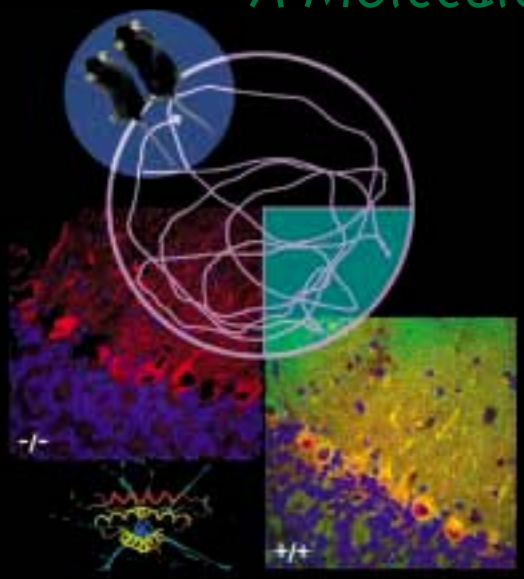
**The Society is asking department chairs to provide ASBMB with the names and addresses of each new Ph.D. recipient from their institutions. Upon receipt of this information, we will write the new Ph.D.s to congratulate them on their accomplishment and offer the free one-year membership in ASBMB. Names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

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

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

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

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

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

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

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

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

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

**Meeting X: 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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*9650 Rockville Pike*
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*Fax: 301-634-7126*
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*http://www.asbmb.org/meetings*

**Abstract Deadline: February 4, 2004**