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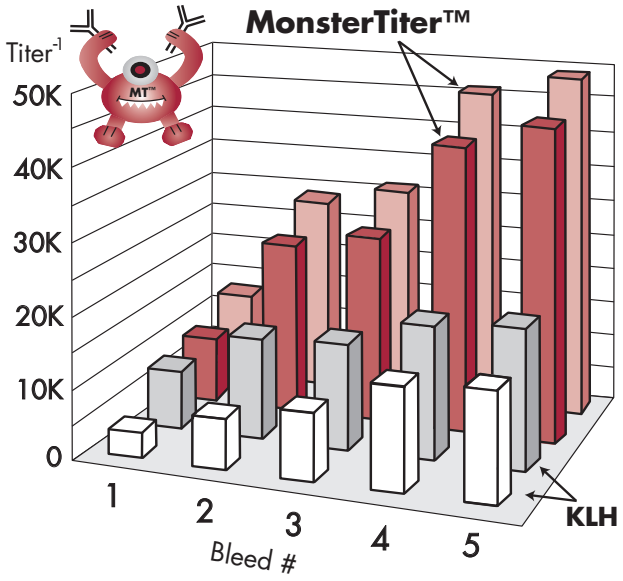

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ASBMB Today

AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

APRIL 2005,
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features

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ASBMB 100 YEARS Chemistry of Life

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Promoting Science For Everyone

ASBMB is an organization dedicated to promoting understanding of the molecular nature of life. In order to guarantee the intellectual, financial and interdisciplinary resources necessary to continue our work, we must train and educate future scientists. In addition, we must educate the general population that supports our work, and forge alliances with social scientists and engineers whose work overlaps ours.

It should be obvious by now that we cannot ignore large segments of the population when recruiting scientists and educating the general public. But we are not yet doing well in our efforts. Although we are training record numbers of women, and more minorities, we are not successfully hiring and promoting these valuable individuals. Recent remarks and debate about the ability of women to succeed in science are indeed depressing and demoralizing, as Judith Bond discussed in the March *ASBMB Today*.

As we ponder changes, we must be aware that science education matters for everyone, not just those who plan to work in research universities. In all the debate about why there aren't more high-level women scientists, we are forgetting that every citizen needs an understanding of science and technology, and that careers in science span a wide range of jobs.

What can be done? *Teaching style and mentoring matter.* If scientists are born and not made, it shouldn't make a difference how they are taught, but it does. Liberal arts colleges in general, and women's colleges in particular send proportionately more women on to graduate school in the sciences than large research universities. What accounts for these differences? Mentoring and close relationships with faculty, including opportunities for undergraduate research, are more common at small colleges than at big universities. Similarly, hands-on learning and collaboration, approaches that work well for girls in elementary and middle school, are mostly absent in high school and many colleges.

> ***"Having a life" matters for both men and women. There are many scientists who work 80-plus hours a week, and some will argue that that is the only way to succeed. But as long as this is the norm, science will be seen as forbidding and inaccessible to anyone who wants to have a family or other interests.***

We also need to recognize aspects of our system that are discouraging to those entering the field. *"Having a life" matters for both men and women.* There are many scientists who work 80-plus hours a week, and those who will argue that that is the only way to succeed. But as long as this is the norm, science will

Continued on page 19

Dr. Judith Bond

ASBMB Gears Up for the Celebration of the Century:

A Foundation for the Future

The ASBMB will be celebrating the 100th anniversary of the Journal of Biological Chemistry and the Society at its annual meeting the first week of April 2006 in San Francisco. The 2006 ASBMB Program Planning Committee at its meeting in San Diego this January developed a dynamic and diverse scientific program. Co-Chairs George Carman and Laurie Kaguni together with theme organizers (pictured below) developed plans to engage ASBMB members and to attract participation by allied societies.

Two themes on signaling in development and disease and a theme on glycobiology have been added to the familiar themes of nucleic acid, lipid and protein biochemistry and metabolism in order to bring biochemists and cell biologists together. Two new themes that will be launched by the Society at the 2006 Centennial Meeting are "Macromolecular Complexes & Dynamics" and "Chemical Genetics & Drug Discovery." These themes have broad appeal to biophysical scientists, chemists, computer biologists, and those in applied science.

Related themes will be scheduled in complementary time slots to maximize participation and cross-fertilization, with receptions following numerous symposia planned to foster discussion. Individuals will be selected from submitted abstracts for oral presentations that will bridge the research of new and established investigators, and to broaden the scope of the research highlighted by the planned platform sessions.

Special programs are also being developed in conjunction with the Minority Affairs and Education & Professional Development themes to promote interactions among junior scientists at the undergraduate, graduate and postdoctoral levels, including poster sessions and hands-on workshops. There will be special exhibits and events, in addition to scientific programs, highlighting achievements of the 100 years of the ASBMB and the JBC, a new book commemorating our history, as well as informal conversations with, and videos of, scientists who have had extraordinary impact on biochemistry and molecular biology.

Plans are in the works to have representatives from several of our sister societies and government officials join us, and to organize numerous informal sessions where young or new scientists can mingle and share ideas with experienced scientists. We have engaged the San Francisco orchestra for one evening, and are planning a big birthday party that will feature the music and tastes of San Francisco for members of the Society and friends. The meeting will provide an opportunity for cutting-edge science tempered by the perspective of the past and challenged by new ideas, for old colleagues and friends to hold reunions, and for new and aspiring scientists to come to know personally the established members of our discipline.

Mark your calendars for the first week in April 2006 for a special treat!

Laurie Kaguni, George Carman,
Co-Chairs of the 2006 Program Committee

Judith Bond, President of the ASBMB

At 2006 Program Planning Committee meeting in San Francisco were (left to right) Gail Pinder, Barbara Gordon, William Merrick, Sharon Dent, Michael Yaffee, Alan Fraenkel, Juliette Bell, Michael Snyder, Judith Bond, Darryl Granner, Co-chairs Laurie Kaguni and George Carman, William Dowhan, Dennis Voelker, Joan Geiling, Carlos Hirschberg, and Bettie Sue Masters.

by Peter Farnham, CAE, ASBMB Public Affairs Officer

Stem Cells Generating News Early This Year

Both sides in the stem cell debate are generating news early in 2005, with a spate of legislation and other actions occurring since the new year. A brief summary appears below of some of the more significant ones.

On February 16, Reps. Diane DeGette (D-CO) and Michael Castle (R-DE) introduced the "Stem Cell Research Enhancement Act of 2005." The bill would change the current federal guidelines by allowing federal funding for stem cell research using new lines created from embryos to be used in fertility clinics, but that were not used by the donors and that currently languish in cold storage. It also permits individuals who have had fertility treatments to donate unused embryos through written consent. So far the bill has garnered 171 cosponsors. Senators Arlen Specter (R-PA) and Tom Harkin (D-IA) have introduced companion legislation in the Senate.

According to recent reports, freshman Rep. Charles Bass (R-NH) will attempt to include similar provisions in an expected NIH reauthorization bill, likely to be considered by the House Energy & Commerce Committee this congress. No reauthorization bill has been introduced yet, however. The White House has indicated that President Bush's position on embryonic stem cell research is unchanged from his 2001 policy statement, which declared that only those stem cell lines existing before August 9, 2001 are eligible for federal funding.

It is very interesting that so far this Congress, no anti-stem cell legislation has surfaced. In previous congresses, both Rep. Dave Weldon (R-FL) and Senator Sam Brownback (R-KS) had introduced legislation banning embryonic stem cell research.

Other States move to Copy California

California passed Proposition 71 last November, a measure that authorized billions of dollars in state money to conduct stem cell research over the next decade. New Jersey also adopted a law allowing such research, and now a host of other states are considering similar steps. States with pro-stem cell legislation introduced include Illinois, Massachusetts (although Governor Mitt Romney has indicated he opposes such research), New York, Connecticut, and Maryland. Even Florida is considering pro-stem cell legislation.

Of course, there is no guarantee that any of this legislation will be passed—nor on the notion that a plethora of differing state policies is a good idea. However, absent a single federal policy, states are moving ahead with their own plans and this will undoubtedly have an impact at the federal level.

Of course, not all legislation introduced on stem cells supports the research. Texas legislator Phil King has reintroduced legislation in the Texas legislature that would criminalize this research in Texas, and Texas' governor has indicated his opposition to the research. We will continue to monitor these developments and keep you informed.

UN Passes Anti-Cloning Resolution

A UN committee passed an anti-cloning resolution in late February that is non-binding, and although 71 delegates voted in favor of it, those opposing and those abstaining outnumbered the supporters. The resolution prohibits all types of human cloning that are incompatible with "human dignity" and the protection of "human life." It is unclear what these terms mean or encompass, however; the prohibition does not differentiate between reproductive cloning—that is, to try to produce children—and therapeutic cloning, that is cloning to help research that will lead to cures for various human diseases. Other opponents of the bill said that the issue of what constituted "human life" was a cultural construct that varied in different cultures.

Mixed Signal from White House on Cloning?

The *National Journal* reported in its February 26 issue that "Bush Gives Award to Stem-Cell Patent-Holder."

Given President Bush's opposition to an expansion of embryonic stem cell research lines that are eligible for federal funding, the *National Journal* noted that "observers were surprised by this month's announcement that on March 14, [President] Bush will award a National Medal of Technology to the research center that has the critical patent for extracting stem cells from embryos, and which champions the use of the controversial cell technology. The center is the Wisconsin Alumni Research Foundation, and it is located at the University of Wisconsin (Madison), in the home state of Tommy Thompson, who touted the embryo-cell work while serving as governor of the Badger State and then as Bush's secretary of Health and Human Services from 2001 to December 2004."

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ARC-1073	N-Octanoyl-D-erythro-sphingosine [octanoyl 1-^{14}C]	50 µCi	$1049
ART-599	N-Octanoyl-D-erythro-sphingosine [octanoyl 8-^{3}H]	50 µCi	$1049
ARC-1649	N-Octanoyl-D-erythro-phytosphingosine, [octanoyl-1-^{14}C]	50 µCi	$1099
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ARC-818	N-Oleoyl-D-erythro-sphingosine [oleoyl 1-^{14}C]	50 µCi	$1649
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ART-899	N-Palmitoyl, [9,10-^{3}H] D-erythrosphingosine	50 µCi	$1199
ARC-772	Sphingomyelin (bovine) [choline methyl-^{14}C]	10 µCi	$519
ART-481	Sphingomyelin (bovine) [choline methyl-^{3}H]	50 µCi	$719
ART-490	Sphingosine D-erythro [3-^{3}H]	50 µCi	$679
ART-859	Sphingosine D-threo [3-^{3}H]	50 µCi	$849
ART-778	Sphingosine, D-erythro-[3-^{3}H]-1-phosphate	10 µCi	$1349
ART-1283	Sphingosine D-threo-[3-^{3}H]-1-phosphate	10 µCi	$1349
ARC-1612	Sphingosine D-erythro-1-phosphate, [^{14}C]		Inquire
ARP-144	Sphingosine D-erythro-1-phosphate, [^{33}P]	10 µCi	$1049
ARC-1815	N-Stearoyl-D-erythro-sphingosine [stearoyl-1-^{14}C]	50 µCi	$1599
ART-1408	N-Stearoyl-D-erythro-sphingosine [stearoyl-9,10-^{3}H]	50 µCi	$999
ARC-1048	Sulphatide [stearoyl 1-^{14}C]	50 µCi	$1499
ARC-1492	N,N,N-Trimethyl-D-erythro-sphingosine, [N-methyl-^{14}C]	10 µCi	$699
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Misunderstandings, Conflicting Advice to Grantees Follow

By Peter Farnham, CAE, ASBMB Public Affairs Officer

NIH officials are apparently misinterpreting the NIH's recently-announced policy on public access to NIH-funded research results, and pressure is being exerted on grantees to comply sooner rather than later with the submission terms of the policy, recent NIH correspondence and announcements sent to the extramural community make clear. The final policy was published in the *NIH Guide to Grants and Contracts* on February 3, 2005. The policy, with a discussion of comments received on the draft policy (published in September 2004) appeared in the *Federal Register* on February 9 (70 FR 6891).

NIH Director Elias Zerhouni summarized the final NIH policy in a February 3 letter to NIH-funded investigators and their institutions. The final policy "requests" that, beginning on May 2, 2005, NIH-funded investigators submit to the National Library of Medicine's PubMed Central (PMC) an electronic version of the author's "final manuscript," upon acceptance for publication, that resulted from research supported with direct costs from NIH.

The term "final manuscript" is defined as the final version accepted for journal publication, and includes all modifications from the publishing peer review process. The policy allows authors to designate the time of public release of the manuscript, ranging from immediately upon submission to PMC to 12 months after final publication in a journal. This is a change from the original proposal, which indicated that the manuscripts would be made publicly available six months after final publication.

A number of questions have been raised about this proposal by publishers, scientific societies, and scientists in the extramural community. There also appears to be at least some confusion among NIH staff regarding what the proposal requires. For example, on February 10, a senior official at the National Eye Institute notified NEI-funded scientists that under the terms of the new NIH public access policy, NEI was asking grantees to submit to PMC an electronic version of any NEI-supported *article* within twelve months of its publication. As Dr. Zerhouni's February 3 letter cited above makes clear, the policy in fact calls for *manuscripts* to be submitted, not "articles" (a term usually used for final publications). This is a critical issue, as manuscripts—even those that have been through final peer review and have been accepted for publication—often differ from published articles in subtle ways.

Another error in the NEI memo is related to when the document is to be submitted and when it will be made public. The NIH policy requests that the manuscript be submitted to PMC upon its acceptance *for publication;* PMC will then withhold it from public availability for up to 12 months following the date of publication. The policy does not ask for submission within "twelve months of its publication," as stated in the NEI memo.

One could chalk these up to careless use of language by a specific individual, except that on February 14, another misunderstanding was transmitted to another segment of the extramural community. An official at the National Institute on Aging (NIA) sent to his program's grantees an announcement from Dr. Zerhouni outlining the new policy, but his cover note stated that the policy will *"require"* investigators to submit manuscripts to PMC. In fact, the policy *requests* that grantees do so; the policy does not require submission. The NIA announcement has since been corrected. Still, these two notes make it clear that senior NIH officials apparently are having difficulty transmitting accurate synopses of such an important policy statement.

When Does "Request" Become "Require?"

There is widespread concern in the scientific community that while the NIH policy is framed in the form of a "request," that is also comes from investigators' primary funding agency and thus declining to comply would not be a wise idea. In fact, NIH is already making clear that it "expects" authors to designate public availability for their manuscripts as soon as possible. Again, quoting from Dr. Zerhouni's February 3 memo to the extramural community:

"The Policy requests that authors designate public release as soon as possible. NIH strongly encourages authors and institutions to exercise their right

NIH Public Access Announcement

A number of questions have been raised by publishers, scientific societies, and scientists in the extramural community. There also appears to be some confusion among NIH staff regarding what the proposal requires.

to inform publishers, and if necessary specify in any copyright transfer agreement, that the author or institution retains the right to provide their manuscripts to PMC for public accessibility as soon as possible after journal publication. NIH expects that only in limited cases will authors deem it necessary to select the longest delay period."

The issue of encouraging authors to renegotiate possible copyright agreements with their publishing journals is reinforced in NIH's "Public Access FAQ" document, available on its website (www.nih.gov/about/publicaccess/index.htm). The NIH offers suggested language for authors to use stipulating their right to submit manuscripts to PMC:

"Journal acknowledges that Author retains the right to provide a copy of the final manuscript to NIH upon acceptance for Journal publication or thereafter, for public archiving in PubMed Central as soon as possible after publication by Journal."

So it seems that the stated policy—that authors can freely choose to delay public access to their manuscripts in PMC up to 12 months after final publication—is not the final word; NIH "expects" authors to authorize public access to the manuscript before then, and preferably "as soon as possible." Furthermore, NIH seems to be encouraging authors to renegotiate copyright agreements, at the least creating a source of additional friction between authors and publishers—an often difficult relationship under the best of circumstances.

The final NIH policy states that "Once the system is operational, modifications and enhancements will be made as needed." NIH is establishing a Public Access Advisory Working Group to advise the agency on implementation and assess progress in meeting the policy's goals. Perhaps a first step would be to make sure that all NIH officials, especially those working closely with the extramural community, transmit accurate information about the policy to their grantees. It might also be appropriate to clear up the ambiguity about the 12-month time limit. If authors can designate the time for public release of their manuscripts as 12 months after publication—as the policy clearly states—it only confuses the issue to send around guidance indicating that NIH "expects" authors to choose shorter time periods.

FASEB President's Statement on NIH and NSF Funding

(The following statement by FASEB President Paul W. Kincade is a call to action in response to the serious consequences for scientific research of the President's FY 2005 and 2006 budgets.)

If you are not already alarmed by the state of federal science funding, you should be. The NIH is experiencing sub-inflationary budget increases for the first time in more than twenty years. To some observers, the organization appears wealthy when compared to other federal agencies. In that context, pressured legislators have a difficult time understanding why biomedical scientists are not satisfied with the doubling of the NIH budget that occurred from FY98 to FY03. However, we are already beginning to see clear signs of disastrous times ahead.

It is considered unhealthy when significantly less than one third of grant applications are funded. At the tail end of the doubling, FY01-03, success rates for competing grants at NIH ranged from 29.9 to 32.5%. But the post-doubling era of flatlined or sub-inflationary increases is already taking a toll: success rates have plunged to 24.5% in FY 04, and based on the President's FY05 budget will decrease to 21.6%. By FY06, grim projections show the success rate to be closer to 21% NIH-wide. The institutes have a variety of means at their disposal to try to correct this problem short term, including cutting award size or scope and adjusting funding cycles, but ultimately these measure translate into investigators having to submit more grants. The resulting increase in applications only further diminishes the success rate.

Because NIH can use these various approaches to manage their grant portfolio, it is difficult to forecast how numbers of grants will be affected by Congressional appropriations. However, it is clear that gains realized during the doubling years will be erased by 2007 if present trends continue (see Korn *et al.*, *Science*, 2002, 296:1401). Success rates will continue to fall, peer review will become arbitrary, frustrations will rise, and tomorrow's precious talent is discouraged from research careers.

The situation at the National Science Foundation (NSF) and other funding agencies is even worse. NSF suffered a major cut in its budget this fiscal year, and despite a nominal proposed increase in the FY06 budget, it is still not back to before reduction levels. The Department of Energy and Veterans Affairs' research programs are facing cuts for next year as well. It is a gloomy scenario for science and scientists.

We cannot sit back and watch as pessimistic forecasts become realities. It is time to mobilize ourselves, our colleagues and our partners. FASEB has begun to take up the challenge. Our FY06 funding recommendations were bold, and we refused to accept the conventional wisdom that the situation is hopeless. As a result of this leadership, other groups joined with us in endorsing a 6% increase for NIH.

In addition, we have announced our disappointment with the President's FY06 budget, and are taking our message to Congress. Public affairs staff from the FASEB Office of Public Affairs and the FASEB Societies are meeting with new members of Congress, budget committee members and appropriators. This is just the beginning. We need to continue to press our case. Recognizing that the battle will be a long and hard one, we need to enlist new messengers and broaden our efforts.

IT IS TIME FOR ALL SCIENTISTS TO TAKE ACTION AND LET OUR VOICES BE HEARD IN WASHINGTON.

These past couple of months, several FASEB Board members and accomplished scientists have joined me in visiting Capitol Hill. We are working with the Campaign for Medical Research, supported by both FASEB and ASBMB, to meet with key members of the Budget committees. You can help our ongoing public call for action. We will be asking all scientists to write to Congress and their local newspapers, to make them aware of the looming funding crisis. It is time for all scientists to take action and let our voices be heard in Washington. I hope that when the time comes, you will respond.

Paul W. Kincade, Ph.D.
FASEB President

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Historical Papers Highlighted on the Journal of Biological Chemistry Website

by Nicole Kresge, Staff Science Writer

As part of its centennial celebration, the *Journal of Biological Chemistry* (JBC) is highlighting some of the seminal papers that have appeared in the Journal in the past 100 years. The Classic papers, which are only available online, are accompanied by a biographical introduction which includes a brief summary of the paper and the events surrounding its publication.

By late 2005, over 250 of these JBC Classics will be available, including papers by many of the legends in biological chemistry such as Leonor Michaelis, Mildred Cohn, and Arthur Kornberg. The papers cover a huge array of topics, including the beginnings of immunochemistry; the elucidation of the metabolic pathway; the discovery of numerous amino acids, vitamins, and proteins; and the development of several instruments and techniques now in common use today.

Some titles of Classics that have already been published include: The Fruits of Collaboration: Chromatography, Amino Acid Analyzers, and the Chemical Structure of Ribonuclease by William H. Stein and Stanford Moore; The Discovery of the Amino Acid Threonine: the Work of William C. Rose; Hans Neurath: the Difference between Proteins That Digest and Proteins That Are Digested; and Britton Chance: Olympian and Developer of Stop-Flow Methods.

The following excerpt is from a Classic on Karl Paul Link (1901–1978) that was published in the February 25 issue of JBC online (280: e5-6). The introduction is titled Hemorrhagic Sweet Clover Disease, Dicumarol, and Warfarin: the Work of Karl Paul Link:

"Initially when he set up his laboratory, Link concentrated on plant carbohydrates and soon established himself as one of the outstanding carbohydrate chemists of his day. Using the microchemical techniques he learned with Pregl, he and his students were able to characterize carbohydrate derivatives that they had isolated and synthesized.

However, the direction of Link's research changed drastically when he became involved in the isolation and characterization of the hemorrhagic factor produced in spoiled sweet clover hay. These experiments are the subject of the three *Journal of Biological Chemistry* Classics reprinted here. Sweet clover was widely used as hay in the 1920s when a series of wet summers had led to an epidemic of "bleeding disease" in cattle. The cause of the disease was traced to sweet clover hay that had been improperly cured and infected with molds. There was also evidence that the defective coagulation in the cows was due to a deficiency in prothrombin.

Link became interested in the sweet clover problem in 1933 when a farmer came to his laboratory with about 100 lbs of spoiled sweet clover and blood from a cow that had died from hemorrhaging after eating the spoiled hay. Realizing that the farmer's dying cattle represented a huge loss in the depths of the great depression, Link and his students set out to isolate and characterize the hemorrhagic agent from the spoiled hay. It ended up taking 5 years for Link's student Harold A. Campbell to recover 6 mg of crystalline anticoagulant. In the first JBC Classic reprinted here Campbell presents his isolation and crystallization of the hemorrhagic agent. To follow the progression of the fractionation he developed an assay in which he fed his concentrates to rabbits and tested their blood for changes in prothrombin levels. From his experiments, Campbell concluded that the hemorrhagic agent had the formula $C_{19}H_{12}O_6$ and that it represented a product that had never before been found in nature."

To read the rest of this introduction or any of the other *JBC* Classics, go to the journal's website at www.jbc.org and click on the link to the Classic Articles. All of the Classics as well as thousands of other historical JBC papers are available free to the public on the website.

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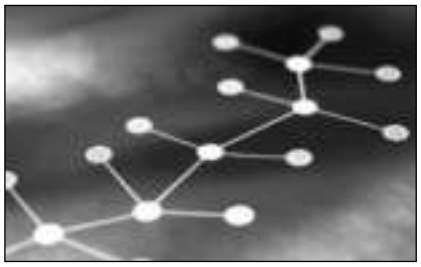

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National Medal

Three ASBMB Members Receive

Three ASBMB Members were among eight recipients of the 2003 National Medal of Science, the nation's highest honor for science. They are J. Michael Bishop, Chancellor of the University of California, San Francisco, Solomon H. Snyder, Johns Hopkins University School of Medicine, Baltimore, and Charles (who prefers to be called Charley) Yanofsky, Stanford University.

The awards were scheduled to be presented March 14 at the White House. The National Medal of Science program is administered by the National Science Foundation, an independent federal agency that provides $5.5 billion annually in grants for basic research and education. The medal honors individuals in a variety of fields for pioneering scientific research that has led to a better understanding of the world around us, as well as to innovations and technologies that give the United States its global economic edge.

J. Michael Bishop

Dr. Bishop is a microbiologist who has served as UCSF chancellor since 1998. He continues to teach medical students and supervises a research team studying the molecular mechanisms of cancer. In 1989, Bishop and his former UCSF colleague Dr. Harold Varmus won the Nobel Prize in Medicine for their pioneering work in the discovery of oncogenes—ordinary genes that can promote cancer when they are damaged.

He shared the 1988 Nobel Prize for Medicine with Dr. Harold E. Varmus, in recognition of their landmark work that led to an understanding of the genetic basis of cancer and had major implications for diagnosis and treatment. The two discovered that genes carried in normal cells could mutate and cause cancer, a finding that was a major contribution to the current understanding of the disease.

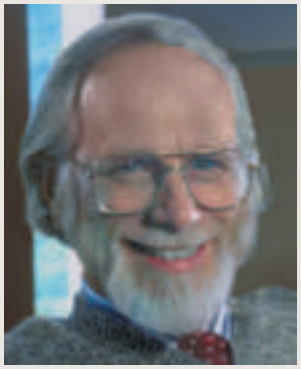
"Their work on oncogenes is landmark in our progress against cancer," Dr. Kurt J. Isselbacher, Director of the Cancer Center at Massachusetts General Hospital, told the Boston Globe. "They were really among the first to show that there were specific genes" for cancer.

Speaking of his current work, Dr. Bishop said, "My current research is devoted to the creation and use of mouse models for the study of cancer. The models are designed to be both genotypic and phenotypic replicas of various human malignancies. We use the models to explore genotypic progression during tumorigenesis, molecular mechanisms of tumorigenesis, and preclinical efficacy of new therapeutics."

Asked about challenges, he replied, "The principle challenge facing UCSF at the moment is to maintain excellence and momentum in the face of fiscal constraints arising from the current plight of the California state budget. We are managing, but still, all else pales in the face of this."

"The principle challenge facing UCSF at the moment is to maintain excellence and momentum in the face of fiscal constraints arising from the current plight of the California state budget."

—Dr. J. Michael Bishop



of Science

National Medal of Science

Solomon H. Snyder

The application of Dr. Snyder's techniques has enhanced the development of new agents in the pharmaceutical industry by enabling rapid screening of large numbers of candidate drugs.

Born in Washington, DC, Dr. Snyder received his undergraduate and medical training at Georgetown University and his psychiatric training at The Johns Hopkins University. In 1966 he joined the staff of the Department of Pharmacology at The Johns Hopkins University School of Medicine. Presently he is Director of the Department of Neuroscience and Distinguished Service Professor of Neuroscience, Pharmacology and Psychiatry at the Johns Hopkins University.

Many advances in molecular neuroscience have stemmed from Dr. Snyder's identification of receptors for neurotransmitters and drugs and elucidation of the actions of psychotropic agents. He pioneered the labeling of receptors by reversible ligand binding in the identification of opiate receptors and extended this technique to all the major neurotransmitter receptors in the brain. In characterizing each new group of receptors, he also elucidated actions of major neuroactive drugs. The isolation and subsequent cloning of receptor proteins stems from the ability to label, and thus monitor, receptors by these ligand binding techniques.

The application of Dr. Snyder's techniques has enhanced the development of new agents in the pharmaceutical industry by enabling rapid screening of large numbers of candidate drugs. Dr. Snyder applied receptor techniques to elucidate intracellular messenger systems including isolation of inositol 1,4,5,-trisphosphate receptors and establishing neurotrophic and neuroprotective roles for immunophilins. He has made contributions to the molecular basis of olfaction including identification, isolation and cloning of the odorant binding protein and delineation of odorant regulation of second messengers. He has established gases as a new class of neurotransmitters, beginning with his demonstrating the role of nitric oxide in mediating glutamate synaptic transmission and neurotoxicity. His isolation and molecular cloning of nitric oxide synthase led to major insights into the neurotransmitter functions of nitric oxide throughout the body. Subsequently, he established carbon monoxide as another gaseous transmitter and D-serine as a glial derived endogenous ligand of glutamate-NMDA receptors.

National Medal of Science

Charley Yanofsky

Dr. Yanofsky, an Emeritus Professor of Biology at Stanford, conducted seminal research in the 1960s in the genetic control of enzyme production by bacteria, setting the stage for the biotechnology revolution that followed. He served on the scientific advisory board of DNAX Ltd., a Palo Alto genetic engineering firm that was eventually sold to Schering-Plough Corp.

A former ASBMB President, he was the 1997 recipient of the Society's William C. Rose Award in Biochemistry. Dr. Yanofsky, or "Charley" as he is to virtually everyone knows him, has been a major figure in biochemistry and molecular biology for over 45 years by virtue of his studies on the relationship between gene structure and protein structure. A colleague has said of Dr. Yanofsky, "His contributions to the area of amino acids and their metabolism stand equal to those of Professor Rose," for whom the Rose Award was named.

"Our research is addressing two regulatory problems. Each project is focused on an understanding of the mechanisms in regulating expression of specific genes of bacteria." —*Dr. Charley Yanofsky*

Asked about his current research, Dr. Yanofsky provided the following:

Our current research, being performed by two postdocs, is addressing two regulatory problems. Each project is focused on obtaining an understanding of the mechanisms used in regulating expression of specific genes of bacteria responsible for tryptophan metabolism. In both projects we have discovered that features of a messenger RNA play a major regulatory role. One project is concerned with the mechanisms regulating expression of the genes of tryptophan biosynthesis of *Bacillus subtilis*, while the second deals with the regulatory mechanisms controlling expression of an operon of *Escherichia coli* responsible for tryptophan degradation. During our investigations we have repeatedly encountered basic processes that previously were poorly understood; we now believe these processes are common in regulating gene expression.

In our most recent findings with *B. subtilis* we have identified a group of genes, the at operon, an operon of previously unknown function, which participates in regulating expression of the genes of tryptophan biosynthesis. Expression of this operon is subject to tandem transcriptional and translational sensing of uncharged tRNATrp. When uncharged tRNATrp accumulates, it serves as a regulatory signal to the bacterium that it has insufficient tryptophan-charged tRNATrp to maintain general protein synthesis. A regulatory protein, Anti-TRAP, is then synthesized, which binds to and inactivates the TRAP regulatory protein, thereby permitting transcription of the 6 gene trp operon and translation of the seventh trp gene, which resides in the folate operon. Increased expression of these genes increases the rate of synthesis of tryptophan. The use of tandem tRNATrp sensing mechanisms in regulating at operon expression adds an event comparable to feedback inhibition in regulation of the rate of tryptophan synthesis.

Our second project is focused on explaining the mechanism of regulation of transcription of the tna degradative operon of *E. coli*. Transcription of this operon is regulated by free tryptophan and synthesis of a leader peptide. We have discovered that the amino acid sequence of this leader peptide can direct a translating ribosome to discontinue synthesis, thereby stalling the translating ribosome. The stalled ribosome blocks Rho factor's access to the tna operon transcript, thereby permitting transcription to proceed into the operon. Our findings have shown that several key amino acid residues in the leader peptide, including a single crucial tryptophan residue, direct the translating ribosome to bind free L-tryptophan in a manner that inhibits ribosomal peptidyl transferase activity. Our continuing studies are revealing features of 23S rRNA and of the proteins of the 50S ribosomal subunit that are essential for this inhibition.

Regarding the challenges I have faced as an emeritus professor, I am continually wondering whether I should continue performing basic research. Obviously I am occupying laboratory space which could be assigned to a younger investigator and, I am also competing with younger scientists for limited federal support. The fact that I love performing creative research, that I believe I am having an impact on the research directions taken by my former and current co-workers, and that we are making significant contributions, are competing considerations. Should I simply ignore the wealth of understanding I have acquired over the years, and abandon my research for the benefit of others? Or, should I continue. Ideally a younger investigator might be invited to join my department and share and grow into my space, and I could continue to be productive by sharing my knowledge with all the members of this group.

Maxine Singer Receives Abelson Prize

The American Association for the Advancement Science presented Maxine Frank Singer, President Emeritus of the Carnegie Institution of Washington, with the 2004 Philip Hauge Abelson Prize on February 19 at the AAAS Annual Meeting in Washington, DC. Dr. Singer is an ASBMB member who has served on the Society's Council.

Established in 1985, the Abelson Prize is awarded annually to a public servant, in recognition of sustained, exceptional contributions to advancing science, or to a scientist whose career has been distinguished by scientific achievements as well as other notable services to the scientific community. The prize was inspired by Philip Hauge Abelson who served as long-time senior adviser to AAAS and editor of the association's journal, *Science*.

Dr. Singer, who in 1992 received the National Medal of Science, earned her undergraduate degree with high honors from Swarthmore in 1952, then received her Ph.D. in biochemistry from Yale University in 1957. Her professional career began in 1956 with a postdoctoral fellowship at the National Institutes of Health, where she received a staff appointment two years later. From 1980 until 1987, Singer served as chief of the Laboratory of Biochemistry for the National Cancer Institute. She continues to serve the NCI as Scientist Emeritus.

Dr. Singer's own scientific investigations have ranged from chromatin structure, to the structure and evolution of defective viruses, to enzymes that work on DNA and its complementary molecule, RNA. In the early 1960s, she investigated the genetic code with her NIH colleague, Marshall Nirenberg. More recently, she has studied a large family of repeated DNA sequences called LINES, which are interspersed many times throughout mammalian DNA. With her co-workers, she has focused in particular on the LINE-1 sequence that is repeated thousands of times in human DNA, concluding that LINE-1 is a jumping gene capable of insertion to new places on chromosomal DNA. Elsewhere, scientists later found that LINE-1 insertions into a gene related to blood clotting are associated with hemophilia. Singer and her colleagues have continued to concentrate on explaining the precise mechanism of LINE-1 transposition, which may have broad significance for understanding genetic diseases.

In 1973, Dr. Singer co-chaired a Gordon conference, where she focused on helping to address early concerns about potential risks of recombinant DNA technology. She was then an organizer of the famous 1975 Asilomar conference, and was among five signers of the summary statement of the Asilomar report, which set forth guidelines for recombinant DNA research. By recommending resumption of recombinant DNA research, but under very cautious safeguards, the Asilomar report established a framework for the responsible conduct of research and ensured the gradual removal of restrictions as understanding of the technology grew in subsequent years.

Dr. Maxine Singer

Nominations for ASBMB 2006 Awards

Nominations for the Society's 2006 Awards are now being solicited. The deadline for the receipt of nominations is May 2, 2005. Nomination for all awards should consist of a letter of recommendation, curriculum vitae minus list of publications, a list of not more than 10 of the nominee's most significant publications, and summary, not to exceed two pages, of the nominee's achievements. The Awards for which nominations are sought are:

ASBMB-AMGEN AWARD • ASBMB-MERCK AWARD • SCHERING-PLOUGH RESEARCH INSTITUTE AWARD • WILLIAM C. ROSE AWARD • AVANTI AWARD IN LIPIDS • HERBERT A. SOBER LECTURESHIP •

ASBMB AWARD FOR EXEMPLARY CONTRIBUTIONS TO EDUCATION

- The Society has created this new award, which will be administered by the ASBMB Education & Professional Development Committee.
- The Award will be given annually to a scientist who encourages effective teaching and learning of biochemistry and molecular biology through his/her own teaching, leadership in education, writing, educational research, mentoring, or public enlightenment.
- The Award will consist of a cash prize of $3,000, and the winner will present a plenary symposium lecture at the 2006 Society Meeting.

For more information about the awards check the ASBMB website, www.asbmb.org. And please make sure to get your nominations to us by May 2, 2005.

Eating Curry to Fight Alzheimer's Disease

By Nicole Kresge, Staff Science Writer

A report recently published in *The Journal of Biological Chemistry (JBC)* reveals that the yellow curry pigment curcumin could be a potential weapon in the fight against Alzheimer's disease. The paper, "Curcumin inhibits formation of amyloid–β peptide oligomers and fibrils and binds plaques and reduces amyloid in vivo," was published in the February 18, 2005, issue of the *JBC* (280: 5892-5901, 2005).

Alzheimer's disease is an irreversible, progressive brain disorder that occurs gradually and results in memory loss, unusual behavior, personality changes, and a decline in thinking abilities. It is the most common form of dementing illness among middle and older adults, affecting more than 4 million Americans and many millions worldwide. The prevalence of Alzheimer's among adults ages 70-79 in India, where curry has been used as a major dietary staple for thousands of years, is 4.4 times lower than the rate in the United States.

"Curcumin has been used for thousands of years as a safe anti-inflammatory in a variety of ailments as part of Indian traditional medicine. Recent successful studies in animal models support a growing interest in its possible use for diseases of aging involving oxidative damage and inflammation like Alzheimer's, cancer and heart disease," says Dr. Gregory Cole, Associate Director for Geriatric Research at the Greater Los Angeles VA Center and Professor of Medicine and Neurology at the David Geffen School of Medicine at UCLA. He and Dr. Sally Frautschy are the study's principal investigators.

The initiation of Alzheimer's disease is widely believed to be caused by the progressive accumulation of amyloid–β peptide aggregates. Amyloid–β peptide is derived from the larger amyloid precursor protein through a series of cleavage events. Under normal conditions, the precursor protein is cleaved into predominantly non-amyloidogenic species with a small percentage of amyloid-forming species. However, in early onset familial Alzheimer's, mutations in the precursor protein or the cleaving enzymes increase the percentage of plaque-forming amyloid–β peptide created. The common causes of late onset Alzheimer's disease are less certain, but lead to virtually identical amyloid peptide deposits. As such, many therapeutic efforts are aimed at blocking amyloid–β peptide production and aggregation.

Drs. Cole and Frautschy and their colleagues at the University of California Los Angeles and the University of California Irvine, focused their studies on curcumin not only because of its presence in the Indian diet, but also because of its structural similarity to Congo Red, a toxic dye that is used to stain amyloid–β peptide. Unlike Congo Red however, curcumin is non-toxic and because of its polar nature it can potentially cross the blood-brain barrier to bind to amyloid and related aggregates.

Dr. Gregory Cole

The researchers found that when aged mice with amyloid deposits were fed a diet including curcumin they experienced significant reductions in their amyloid levels. Not only did curcumin prevent accumulation of additional plaques, but it appeared to break up existing beta amyloid present in animals' brains. In addition, curcumin was better at inhibiting amyloid–β peptide aggregation than ibuprofen and naproxen.

"Our results show that curcumin is an amyloid binding compound capable of binding the amyloid plaques in samples from Alzheimer brain or aged mice carrying a human transgene known to cause Alzheimer's in people," explains Dr. Cole. "Curcumin gets into the brain and binds plaques in the brains of living animals. In test tube experiments, curcumin dose-dependently inhibits the aggregation of pure synthetic human amyloid–β and prevents its further aggregation

into amyloid oligomers or the type of filaments found in plaques in Alzheimer patients. It also disaggregates pre-formed amyloid."

Currently, curcumin's protective and therapeutic effects in Alzheimer's disease patients are being evaluated in an ongoing pilot clinical trial at the UCLA Alzheimer Research Center. "Because amyloid is believed to initiate a cascade, most researchers believe that early treatment for prevention will work best for anti-amyloid therapies," notes Dr. Cole. "We have shown in our *JBC* paper that curcumin will directly target the amyloid endpoint, but we have also shown that it suppresses oxidative damage and inflammation in the same model. Based on curcumin's ability to suppress both oxidative damage and inflammation, it may be more widely protective in neurodegenerative diseases like Alzheimer's. Our finding that it effectively directly blocks amyloid–β aggregation should give a further push to its potential for Alzheimer's."

However, curcumin may encounter some financial stumbling blocks on its way to becoming an Alzheimer's drug, Dr. Cole warns. "Because curcumin is not a patent medicine, there is no drug company behind curcumin that can pay for trials. The general public, government and philanthropists need to know about it and hopefully get behind it or nothing will happen. Ultimately, collectively, we would hope to obtain promising results in patients with Alzheimer's and perhaps other diseases and learn enough about safety, dosing and efficacy to go to general prevention trials which are always very expensive, risky and time-consuming. But prevention is where we need to go as the baby boom ages and we get millions of new cases of what may be a preventable disease."

Re-engineering Nuclear Receptors

Researchers have learned how to commandeer the nuclear receptors that cells use to recognize and respond to molecules such as steroid hormones, thyroid hormones and vitamin D. The development could provide a foundation for a new family of biologically-based mechanisms able to detect common drugs, chemical weapons and other small molecules, as well as lead to new methods for producing enzymes and pharmaceutical compounds.

"We are hijacking these nuclear receptors for a new set of purposes," explained Donald Doyle,* Assistant Professor in the Georgia Institute of Technology School of Chemistry and Biochemistry. "We want to change the nuclear receptors themselves so they don't recognize what they normally recognize, and instead recognize the small molecules we want to detect. That would allow us to develop a new type of sensing mechanism."

A paper published in the October 12, 2004, issue of the *Proceedings of the National Academy of Sciences* describes how Doyle's research team modified one type of nuclear receptor to bind a drug compound to which it previously did not respond. Based on this success, the researchers hope to demonstrate broader application with other small molecules.

For their study, Dr. Doyle's team chose the nuclear receptor retinoid x receptor (RXR) whose molecular structure has been well documented. Using a technique known as structure-based codon randomization, the Georgia Tech researchers used their knowledge of RXR's structure to modify the 20 different amino acids that make up the receptor pocket. The goal was to create a library containing 32,768 different variations in the hope of creating—and then finding—a few re-engineered receptors that would have the ability to bind to a molecule known as LG335. (LG335 is structurally similar to Targretin®, a pharmaceutical developed to bind RXR. However, LG335 does not effectively bind unmodified RXR.)

Georgia Tech Professor Donald Doyle and graduate student Lauren Schwimmer examine yeast colonies growing on a petri plate.

Though the goal was 32,768 variants, the method actually produced approximately 380,000 independent samples to screen, which would have been impossible to test using conventional methods. However, Dr. Doyle and colleagues used a protein engineering technique known as chemical complementation that allowed the variants to be tested in parallel.

Using that technique, they placed each variant, which had been inserted into yeast cells, onto petri plates containing LG335. A small number of yeast cells (less than 0.1 percent of the total) grew into visible colonies, suggesting they might contain nuclear receptors for the LG335.

To verify that the colonies were growing in response to LG335 and not some other compound contained in the yeast, samples were then smeared onto another petri plate that did not contain LG335. Any colonies that grew there were discarded. From the initial 380,000 candidates, the researchers ended up with about a dozen nuclear receptors whose recognition pockets had been re-engineered to respond to the LG335.

The receptors found by the researchers varied in their responsiveness, with some significantly more sensitive than others. Some performed the function of on-off switches, while others were more like dimmer switches, responding in proportion to the amount of LG335 bound to them.

The Doyle team also studied their re-engineered receptors in mammalian cells, and found they behaved much the same as in yeast.

Continued from previous page

The re-engineered receptors may eventually be used in gene therapy against cancer, or as research tools to investigate gene function. More important, the new receptors serve as proof of principle for the protein engineering technique used to produce them. Dr. Doyle envisions using the technique to produce other nuclear receptors that could be the basis for sensing arrays in which a variety of receptors, each sensitive to a different compound, could be used to quickly analyze an unknown agent. A sensor array might also be used in a hospital emergency room to rapidly test for chemical agents in the blood of an unconscious patient.

"If we could take the receptors, express them and put them into a device where there is a color change or another signal produced, we could potentially detect small molecules in a robust way that could complement or replace other detection technologies," he explained.

The same technology could also be used to produce enzymes with new properties, and to regulate metabolism in cells, he added.

Having demonstrated the ability to re-engineer one nuclear receptor to respond to a small molecule to which it previously did not bind, the research team next wants to demonstrate that the technique could apply to other small molecules.

"Now we have to see how far we can push this and how many small molecules we can accommodate with this technique," said Dr. Doyle. "We are trying to generalize this approach to genetic selection. There is a lot of diversity we can work with in terms of different binding pockets and shapes, so this is only the first step."

**ASBMB Member*

Promoting Science continued

Continued from page 2

be seen as forbidding and inaccessible to anyone, male or female, who wants to have a family or other interests. We need to move away from the idea of science as a priesthood, to one of science as a career that is compatible with normal life.

If the problem is the system, then we must consider changing the old model. But institutional change will come slowly, and in the meantime, there are methods we can use to combat our losses and make science a career option for all. Female scientists are often confronted by bewildered colleagues who do not understand the problem, or do not perceive their role in perpetuating the problem, but do want to improve the situation. We can all use new ideas and guidance.

What can you do? At our Annual meetings, a number of sessions will focus on methods to improve education and professional development. This year's Women's Mentoring session on Tuesday, April 5, was planned as a showcase of programs that have been proven successful in retaining and promoting women from graduate school through the faculty ranks. We invite you to join us at these programs and take away lessons from them for your own institutions.

Adele J. Wolfson
Professor of Chemistry
Associate Dean of the College
Wellesley College

Marilee Benore-Parsons
Associate Professor of Biochemistry and Biology
Department of Natural Sciences
University of Michigan at Dearborn

Putting the Brakes on Blood Stem Cells

Howard Hughes Medical Institute researchers have discovered the first regulatory molecule that puts the brakes on the proliferation of blood stem cells. The molecule also preserves the integrity of those stem cells and enables them to produce functional blood cells over a long period of time.

Blood stem cells are immature cells that sustain blood production throughout life. The researchers are hopeful that their discovery will improve knowledge about how blood-cell production is regulated.

"Because this protein is in a number of different types of cells, and may perform different functions in different cells, it is a wake-up call that the stem cell is very versatile."

Ironically, the same molecule, called growth factor independent 1 (Gfi-1), acts as an accelerator of growth in immune cells, emphasizing the important role that cellular context plays in the regulation of stem cells.

This discovery offers valuable lessons for researchers seeking to produce stem cells for use in therapy, said the study's senior author, Stuart Orkin* of the Howard Hughes Medical Institute. Scientists are working toward using an array of stem cells to grow mature specialized cells that could regenerate damaged or diseased skin, brain, heart or other organs.

"Investigators who are searching for important genes in stem cells very often think that such genes have to be specific to stem cells alone, which isn't necessarily true," he said. "Because this protein is in a number of different types of cells, and may perform different functions in different cells, it is a wake-up call that the stem cell is very versatile," Orkin said.

The researchers published their findings in the October 21, 2004, issue of the journal *Nature*. Lead author of the paper was Hanno Hock in Dr. Orkin's laboratory at the Dana-Farber Cancer Institute, Children's Hospital, Boston, and Harvard Medical School.

Prior to embarking on their experiments, Orkin's group was aware of the existence of regulatory proteins that switched on the proliferation of hematopoietic, or blood-forming, stem cells. Previous studies had revealed that Gfi-1 functioned as a growth-promoter in immune-system T cells.

"In that setting, Gfi-1 was known to promote cycling of T cells that become malignant," said Dr. Orkin. "But our experiments showed the reverse in hematopoietic stem cells — that it puts the brakes on."

In their studies, Dr. Hock, Dr. Orkin and their colleagues produced mice that lacked a functioning gene for Gfi-1 and studied how the loss of that gene affected blood production. Their studies showed that knocking out Gfi-1 produced a complex set of effects.

"When these mice were young, they had normal or elevated proliferation of blood cells," Dr. Orkin said. "But as they aged, they began to lose them because the whole integrity of the stem-cell system appeared to depend on the expression of this protein. Our evidence suggests that if you remove this brake, and the cells cycle too much, they can exhaust themselves."

The researchers also transplanted stem cells from the Gfi-1-negative mice into animals in which the blood stem cells had been eliminated by irradiation. This experiment sought to reveal the properties of the Gfi-1-negative cells in a neutral setting with no other blood-forming cells. The researchers also did competi-

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.

Junaid Abdulghani
Meharry Medical College

Jeffrey F. Breit
University of South Alabama
College of Medicine

Linda E. Hammond*
University of North Carolina,
Chapel Hill

Cheng Li
San Diego State University

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

tion experiments in which they introduced both Gfi-1-negative and normal stem cells into the irradiated recipient mice. Both of these kinds of experiments confirmed Gfi-1's role as a brake.

"We saw that if you transplant the Gfi-1-negative cells alone, you can get blood formation in the recipient, which is similar to what we see in the mutant mice. But if you put almost any number of competitor cells in there, meaning normal cells, they just can't compete. They probably don't have the right brake, and they probably exhaust themselves," Dr. Orkin explained. Similarly, when the researchers produced chimeric mice containing cells from both Gfi-1-negative and normal mice, the negative cells tended to disappear from the blood-forming system.

The researchers next studied the activity of the Gfi-1-negative cells, confirming that without the brake, the cells overproliferate, "so the system is just running at top speed, but yet they can't make effective cells," said Dr. Orkin. When the scientists measured the activity of some of the other components of the cell proliferation machinery, they found evidence of accelerated proliferation.

"So, our conclusion is that this is an important brake on the system that we previously didn't know of," he reported. "And it also highlights the fact that a protein may have quite different roles in terms of control of the cell cycle, depending on the cell context. In T-lymphoid cells, Gfi-1 seems to drive proliferation, but in the setting of stem cell it seems to do the opposite."

While the findings do not have direct clinical relevance, Dr.Orkin concluded, "Anything we can learn about how to regulate stem cells is very important in developing approaches to amplifying stem cells in vitro, which is key to their therapeutic use."

The latest finding identifies Gfi-1 only in isolation as an important regulatory brake on blood stem cells, but does not reveal the control pathway by which it functions. The Orkin group is planning additional studies that they hope will uncover the control pathway.

**ASBMB member*

Team Solves Mystery of Centromeres

Researchers at the Ludwig Institute for Cancer Research at the University of California, San Diego (UCSD) School of Medicine have solved one of genetics' mysteries – how a segment of protein on each of the body's DNA-carrying chromosomes is able to form a rigid structure, a centromere, leading to proper cell division and the faithful inheritance of genes.

Published in the July 29, 2004, issue of the journal *Nature*, the study utilized a sophisticated form of mass spectrometry developed at the UCSD School of Medicine to determine how a protein called CENP-A, turns the normally flexible center section of a rod-shaped chromosome into a rigid structure called a centromere.

A crucial player in the complicated process of cell division, the centromere is responsible for moving the correct number of chromosomes into the opposite poles of the dividing cell. When either too many or too few chromosomes end up in newly formed cells, the catastrophic result is often birth defects, spontaneous abortion, or cancer. For example, Down syndrome is a disorder caused by one too many copies of chromosome 21.

During cell division, each cell makes a duplicate copy of its chromosomes. Each pair of identical chromosomes forms a centromere that holds them together in the center, like a cinched waist in an "X." From opposite poles of the cell, microtubules called spindle fibers, extend down to the centromeres and act as ropes to pull the centromere and paired chromosome apart, so that half the centromere/chromosome moves to one side of the cell, while the other half goes to the opposite pole. Cell division follows, resulting in two identical daughter cells.

"Ever since Mendel's original genetic studies, we've wondered how it is that centromeres function to assure that chromosomes are faithfully inherited," said the study's senior author, Don Cleveland,* UCSD Professor of Medicine, Neurosciences and Cellular and Molecular Medicine, and a member of the Ludwig Institute for Cancer Research.

While many genes have similar DNA sequences in all organisms, researchers have determined that the DNA in centromeres varies markedly from species to species.

"It has been perplexing," Dr. Cleveland said. "Although the DNA sequence doesn't matter, we've been able to show that a particular protein, CENP-A, determines where the centromere is located and copies this same location to a newly synthesized chromosome. The presence of CENP-A turns the centromere into a stiff DNA and protein complex, and ensures that the centromere is maintained every time a cell duplicates. This is a critical component of the cellular machinery that operates during cell division."

In the UCSD investigation, researchers made purified, synthetic copies of human CENP-A protein, which they studied in the laboratory. CENP-A, which binds only to centromeres, is a variation of the more common histone 3 (H3), a protein located throughout all regions of chromosomes.

> ***"Ever since Mendel's original genetic studies, we've wondered how it is that centromeres function to assure that chromosomes are faithfully inherited,"***
>
> **—Don Cleveland, UCSD Professor of Medicine, Neurosciences and Cellular and Molecular Medicine**

The study's first author, Dr. Ben E. Black, a post-doctoral fellow in Cleveland's laboratory, was able to characterize the function of CENP-A with a UCSD School of Medicine invention called enhanced amide hydrogen/deuterium-exchange mass spectrometry, or DXMS.** This methodology, developed by Virgil L. Woods, Jr., Associate Professor of Medicine and one of the paper's corresponding authors, enables rapid analysis of protein structure and motion (dynamics) at the molecular level.

Dr. Black performed DXMS analysis of CENP-A in the Woods' lab and identified a region of the protein that was much more rigid than similar regions of H3. He then genetically "transplanted" this small, stiff region of CENP-A into H3, and found that the "stiffened-up" H3 acted just like CENP-A, binding to centromeres.

"With DXMS, we were able to find the small region within CENP-A responsible for its ability to locate and then rigidify the centromere," he said.

Dr. Cleveland added that "biologists have been able to take what are, in essence, snapshots of the structure of proteins for many years, but you couldn't see whether regions of the protein were rigid or flexible. Now, with DXMS, we're able to see something more like a movie that shows how flexible the regions of a protein are."

Dr. Woods noted that "this work demonstrates the ability of DXMS to precisely localize protein features responsible for function, even when the function is a very complex one – in this case, the initiation of centromere formation."

** ASBMB member.*

***see health.ucsd.edu/news/2004/01_15_Woods.html*

ASBMB Support for Special Symposia in 2005 and 2006

Mark your Calendars!

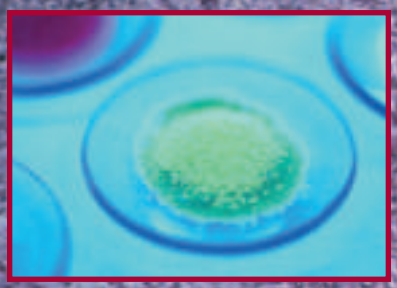
The American Society for Biochemistry and Molecular Biology is pleased to announce its support of two special symposia in 2005 and 2006.

Watch for more details in *ASBMB Today* and on our website:

www.asbmb.org/meetings

Fe-S Proteins: Biogenesis, Structure and Function

May 19-22, 2005 • University of Wisconsin, Madison
Organizers: Elizabeth A. Craig, Helmut Beinert,
Patricia Kiley, and Richard Eisenstein, University of Wisconsin, Madison



14th International Conference on Cytochromes P450: Biochemistry, Biophysics, and Bioinformatics

May 31-June 5, 2005 • Hyatt Regency Hotel, Dallas
Organizers: Julian A.Peterson, and Sandra E. Graham,
U.T. Southwestern Medical Center, Dallas, Texas

Transcriptional Regulation by Chromatin and RNA Polymerase II

November 2-6, 2006 • Kiawah Island, SC
Organizer: Ali Shilatifard, Saint Louis University School of Medicine

DNA Structure, Genomic Rearrangements, and Human Disease

Meeting in 2006
Organizers: James R. Lupski, Baylor College of Medicine, and
Robert D. Wells, Texas A&M University System Health Science Center

Have an idea for a small meeting?

2007 Special Symposia proposals are being accepted through May 2005.
For more details, visit our website:

www.asbmb.org/meetings

ASBMB American Society for Biochemistry and Molecular Biology

Experts Predict a Nanotech Revolution in Medicine

A panel of top nanotechnology researchers convened by EurekAlert! in late February predicted that nanotechnology could have a dramatic impact on medical care in the next 20 years, and they urged their colleagues to help educate the public about the novel treatments to come.

At an online forum, the researchers said that manufactured molecules could have an array of medical uses, from cancer treatments to helping restore lost vision to genetic therapy. And in the long term, they could teach us more about the natural workings of biology.

"It is clear even now in the very early stage of the development of nanoscience and nanotechnology that tremendous positive impacts on medicine and health care will result from nanotechnology in the future," said Richard Siegel, Director of the Rensselaer Nanotechnology Center at Rensselaer Polytechnic Institute.

While it remains difficult to know exactly how large the impact will be, Siegel added, "even today we see a number of examples of potential benefits that may result. Given sustained and increased funding by the federal and state governments and by industry, these developments will go forward and greatly increase the future benefits to society."

Siegel was joined in the online chat by Dr. James R. Baker Jr., who established the Center for Biologic Nanotechnology at the University of Michigan, and by Jeffery Schloss, who coordinates the development of nanotechnology strategy for the NIH and serves as program director for technology development with the National Human Genome Research Institute.

Nanotechnology is the process of building industrial or medical products in the scale of nanometers, or billionths of a meter. Nanotech has drawn enormous interest from industry and the medical fields—and generated copious news coverage—because of its many promising applications. It already is used to make sunscreen and stain-resistant cloth, and could someday be used in sensors to detect the presence of chemical or biological agents and to construct more effective bullet-proof vests.

"It is clear that tremendous positive impacts on medicine and health care will result from nanotechnology in the future,"

—Richard Siegel, Director of the Rensselaer Nanotechnology Center at Rensselaer Polytechnic Institute

Siegel, Baker and Schloss were unanimous in their optimism that developments in nanotechnology could bring great improvements in medical care.

For example, Dr. Baker said, artificial vision systems under development at the University of Southern California offer the potential to replace the retina with artificial photo receptors. The process uses nano-scale electrodes linked to different cells in the brain to produce visual images. In fact, "it's been tried in a few people," Dr. Schloss added. "It's very early work with a reasonable amount of success—in other words, it's not just a lab device."

Or nanotechnology could be used in the treatment of tumors. Dr. Baker said a fluorescent nanoparticle conceivably could be injected into the body and used to identify tumors at a much earlier stage, leading to earlier medical intervention. And, he said, manufactured molecules "might offer the potential for the induction of anti-tumor therapeutics in and of themselves through selective release of drugs or physical disruption of tumor cells."

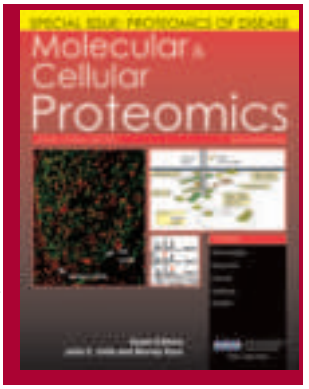
In turn, such treatments could lower the cost of medical care, Dr. Baker said. To diagnose a tumor, he explained, "we often have to use many different, expensive imaging studies, followed up by surgical procedures. If we can replace this with a nanomaterial that could give a real-time diagnosis and allow earlier treatment of the disease before it becomes critical, we can save money in both the diagnostic and the therapeutic arena."

Dr. Schloss said research is underway in the use of nanotechnology to sequence DNA. "This is an exciting area because it would be a completely revolutionary technology approach while at the same time, requiring substantive advances in physics and chemistry. The results could ultimately change the way we do experimental biology as well as changing the way we deliver healthcare. If we could really sequence the DNA of individuals or extract the majority of relevant genomic information from individuals, our understanding of disease and health would be advanced and our ability to tune therapies to the individual would be enabled."

Siegel suggested that public attention to nanotechnology, even when it is skeptical, can provide an opportunity for science. "It's important for the scientific community to use this heightened awareness of nanotechnology to help educate the public about the potential positive aspects of this field," Siegel said, "as well as some of the potential negative aspects which, of course, every new technology, from the advent of mechanical engines to the automobile to television, have engendered."

April Issue of *Molecular & Cellular Proteomics* to Focus on Proteomics of Disease

By Nicole Kresge, Staff Science Writer



Over the past several years, the ASBMB journal *Molecular & Cellular Proteomics* has devoted several issues to the use of proteomics in clinical applications. The April 2004 issue looked at cancer proteomics and the June 2003 issue covered clinical proteomics. The third instalment in this series occurs in the April 2005 issue of the journal, which focuses on how proteomics is being used to analyze, detect and follow disease.

Guest Editors Dr. Julio E. Celis and Dr. Murray Korc have assembled invited reviews and articles on the proteomics of disease, as well as manuscripts selected from direct submissions to the journal. In total, eight different disease states and/or medical conditions are addressed in this special issue, and future articles in the journal will build on these applications.

"Proteomic technologies are expected to play a key role in the study and treatment of human disorders, as they provide invaluable resources to define and characterize regulatory and functional protein networks both within and outside cells," explains Dr. Celis. "Moreover, proteomics provides the tools to investigate, both in tissues and fluids, the precise molecular defect associated with a given disease or condition and may expedite the development of specific reagents to detect different pathological stages of a disease. Even though still at an early stage, some of the articles describe the first steps towards a systematic analysis of diseases using a plethora of technologies."

From the perspective of the clinician and translational researcher, the advances reported in this issue serve to highlight the tremendous potential of proteomic technologies in devising novel diagnostic tests, establishing new prognostic markers that will guide the timing for initiating therapy, optimizing individualized targeted and combinatorial therapies, delineating markers of disease susceptibility and disease progression, and designing strategies for disease chemoprevention.

The Proteomics of Disease issue of *Molecular & Cellular Proteomics* also highlights technologies that are emerging as the tools of the future and presents some applications to diseases such as cancer, diabetes, and malaria. Some of these technologies include gel and non-gel based proteomics, quantitative proteomics technologies, tissue profiling by mass spectrometry, novel approaches to study membrane proteins, and various types of arrays and microarrays.

As with most new technologies, proteomics is not without its limitations. A few of the problems and challenges associated with working with complex tissues and bio-fluids are presented in the special issue, as well as the advantages and limitations of currently available technologies. Several articles also hint at areas were new technology may be needed.

Some examples of papers appearing in this issue include: Unraveling the Pathogenesis of Type 1 Diabetes with Proteomics, Proteomic Mapping of Membrane Proteins, Antibody-based Proteomics for Human Disease Profiling, and TIMP-1 in the Prognostic Evaluation of Breast Cancer Patients.

"By dedicating a whole issue to proteomics of disease, a rapidly developing area of biomedical research, we send a clear signal of the commitment of the journal to the promising and far-reaching discipline of clinical proteomics," concludes Dr. Celis.

The current and upcoming issues of *Molecular & Cellular Proteomics* can be found on the journal's website at www.mcponline.org.

by John D. Thompson, Editor

Is the Life Sciences Industry Joining the Outsourcing Trend?

Bala S. Manian, who left India to attend graduate school in the U.S. has since 1979 started a series of medical technology firms in Silicon Valley. Now, however, *The New York Times* reports that he is rediscovering his native country. His latest medical venture, ReaMetrix, which makes test kits for pharmaceutical research, may still be based in Silicon Valley, but 20 of its 28 employees are in India, where costs for everything from labor to rent are lower.

Can ReaMetrix's story be a sign that the outsourcing of manufacturing, clerical, and computer programming jobs to countries such as India and China is now spreading to medical and pharmaceutical companies in the U.S.?

"What I see in India is the same kind of opportunity I saw in the Valley in 1979," Dr. Manian told *The Times*. "In the United States a million dollars doesn't go more than three months. In India, I can run a group of 20 people for a whole year on half a million dollars."

While life science jobs may be less vulnerable to outsourcing than jobs in information technology, industry officials say many companies are looking at that option as pressures mount to control drug prices and cut development costs.

"First toys, clothes, those kind of things, then electronics and computers and now, finally, pharmaceuticals and biotech," said Jimmy Wei, a venture capitalist in San Francisco who helped start Bridge Pharmaceuticals, a company that is doing drug screening in Asia for American pharmaceutical companies.

The outsourcing of life sciences jobs can be seen as evidence that American biotechnology companies, like their counterparts in other industries, are doing nothing more than building global connections that help make them more competitive around the world.

So far, the job movement has been small. According to the latest data from the Commerce Department, less than 6% of American biotech companies employed contract workers abroad in 2002, but industry specialists say that percentage has since been growing.

"It's a trend that's becoming more pronounced as people's budgets get tight," said Riccardo Pigliucci, CEO of Discovery Partners International, a San Diego company that does chemistry work for drug companies. He said a chemist in India makes $20,000 to $40,000 a year compared to $80,000 to $100,000 in the United States. His company started a small operation in India to offer lower-cost services, and consolidated its San Diego and South San Francisco operations, while closing a Tucson facility and laying off 28 employees.

Clinical trials of new drugs are also moving to countries where the costs of conducting trials are lower and human subjects more readily available, and drug manufacturing is also on the move. India already has a thriving generic drug manufacturing sector and is moving into biotechnology. One company, Biocon, had revenues of more than $100 million in 2004 and is a leading producer of generic cholesterol-lowering drugs.

Fueling this trend are Indian and Chinese scientists who obtained graduate degrees and work experience in the U.S. and Europe, and are now returning to their homelands. As an example, the *Times* cited Ge Li, the founder of WuXi Pharmatech in Shanghai, who earned a doctorate in organic chemistry at Columbia University and then co-founded Pharmacopeia, a New Jersey drug company, before moving back to China.

Pharmaceutical Sector No Longer in Intensive Care

Pharmaceuticals were long considered to be a core portfolio holding. Sector shares rewarded its fans throughout the 1990s by rising steadily on the strength of increasing sales, earnings and dividends. However, the sector disappointed investors in the last four years, according to a London Stock Exchange newsletter. Prices turned down suddenly and savagely in November 2000 in lockstep with the rest of the stock market, but the new stock market advance that began in March 2003 brought little relief to pharmaceutical shares. The sector advanced by just 20% since then, while the Financial Times All Shares index advanced 55% in the same period.

Some analysts believe Pharmaceuticals remain a sector to avoid, not embrace. Others believe all the bad news is out in the open and the next big move is up, not down. Still, according to the current Stock Exchange newsletter, analysts who closely follow the sector do not consider an earnings collapse to be a likely event. There is healthy debate about the potential for earnings increases, but widespread belief that earnings will not get worse on a sector-wide basis.

Applied Biosystems, Stanford, University of Miami Expand Lymphoma Research Collaboration

Applied Biosystems, an Applera Corporation business, has expanded its collaboration with Stanford University and the University of Miami to continue the study of genetic biomarkers associated with treatment in diffuse large B cell lymphoma (DLBCL), the most common form of non-Hodgkin's lymphoma.

The collaborators published their initial findings in an April 29, 2004 *New England Journal of Medicine* article entitled "Prediction of survival in diffuse large B-cell lymphoma based on the expression of six genes." While that study was based on samples from patients receiving standard chemotherapy, a retrospective study will seek to further validate the predictive value of the six genes in a larger study using samples from patients who were treated with a combination of standard chemotherapy and Rituxan® therapy, and whose outcomes are already known.

The researchers also will begin a prospective study to follow patients from diagnosis in order to evaluate if the six genes can predict whether or not patients respond to the combination of chemotherapy and Rituxan, and whether the biomarkers correctly identify those less likely to survive.

While Rituxan is not currently indicated for DLBCL, it is being investigated for the treatment of DLBCL due to its success in treating follicular lymphoma and recent results that it may prolong survival in elderly patients .

"By expanding our knowledge about the genetic biomarkers associated with diffuse large B cell lymphoma, we ultimately hope to provide clinicians with better tools to make treatment decisions," said Ronald Levy, Professor of Medicine and lead author, Stanford University Medical Center.

Children's Hospitals in Renovation Boom

The University of Chicago's new Comer Children's Hospital is the latest in a nationwide construction boom at children's hospitals and a gleaming example of the push for kid- and family-friendly facilities that are also medically state-of-the-art.

With 42-inch flat-screen TVs in the rooms, pullout couches for overnight guests and a no-parents-allowed rec room with a juke box, pinball machine and video games, youngsters could almost forget this is a hospital. Even the medical equipment at the University of Chicago's new Comer Children's Hospital is hidden, stored in wall vaults with sliding doors camouflaged by colorful artwork.

A 2003 survey by the National Association of Children's Hospitals found that at least 41 of the nation's 250 children's hospitals had construction projects under way or recently completed. Among them: a newly opened $172 million children's hospital at Vanderbilt University in Nashville, a $250 million children's hospital in Denver slated to open in 2007, a $500 million expansion at Children's Hospital Los Angeles to open in 2008, and a $1.1 billion expansion at Children's Hospital of Philadelphia to open in 2010.

The boom stems from changes in healthcare that have given children's hospitals a larger share of a shrinking market, according to Lawrence McAndrews, President of the National Association of Children's Hospitals. With managed care's emphasis on hospitalizing only the sickest patients, most children needing hospital care are now sent to children's hospitals.

Alliance to Link Research in U.S., Ireland

The Irish government has welcomed an alliance with the U.S. that it says will boost R&D in both Northern Ireland and the Republic of Ireland.

According to Michael Martin, the Republic's Minister for Enterprise Trade and Employment, "A new key U.S.-Ireland R&D Partnership, with proposals for collaboration and co-operation in the fields of Information and Communications Technology, Biotechnology and Nanotechnology has now emerged which will be of major benefit to researchers on both sides of the Atlantic and in both parts of the island of Ireland."

This development got under way in 2002 at a U.S.-Ireland business summit in Washington, DC, which set up a task force to explore collaboration between centers of excellence in the U.S., the Irish Republic, and Northern Ireland.

Calendar of Scientific Meetings

MAY 2005

Bone Quality: What Is It and Can We Measure It?

May 2–3 • Hyatt Regency Bethesda, Maryland
A Scientific Meeting Sponsored by the National Institute of Arthritis and Musculoskeletal Skin Diseases (NIAMS) and the American Society for Bone and Mineral Research (ASBMR)
Ph: 202-367-1161; Email: asbmr@smithbucklin.com
Website: www.asbmr.org/bonequality.cfm

EuroMedLab 2005—16th IFCC-FESCC European Congress of Clinical Chemistry and Laboratory Medicine

May 8–12 • EuroMedLab, Glasgow, UK
Contact: Jordanhill Campus Southbrae Drive Glasgow 2, UK
Email: euromedlab2005@meetingmakers.co.uk
URL http://www.glasgow2005.org

From Gene to Genome: Heredity and Society

May 26–28 • Palais de Congrès, La Grande Motte, France
Contact: Christophe Schwob; Ph: +33 4 95 09 38 00
Fx : +33 4 95 09 38 01; Email: c.schwob@mcocongres.com
Website: www.genetogenome.org

14th International Conference on Cytochromes P450: Biochemistry, Biophysics, and Biochemistry

May 31-June 5 • The Hyatt Regency Hotel, Dallas, Texas
Focusing on such topics as Structure, Regulation, Protein-Protein Interaction, Bioinformatics, Functional Genomics, and Biophysical Investigations of Cytochromes P450 and their associated enzymes. Includes a CME course on Drug-Drug Interactions and P450 Polymorphisms and hands-on computer workshops.
Regular Registration by April 1, Late posters by April 1.
Contact: Sandra Graham; Ph: (001) 214 648-7628
Fx: (001) 214 648-8855; Email: Sandy@P450Dallas2005.US
Website: www.P450Dallas2005.US

JUNE 2005

7th Annual Plant Sciences Institute Symposium; Meristems 2005

June 2–5 • Iowa State University, Ames, Iowa
Abstracts due April 1, 2005; Registration Deadline May 2, 2005
Student Travel Grants: Applications due April 1, 2005
Contact: Plant Sciences Institute Symposia, Symposium Office, 3208 Molecular Biology Building, Iowa State University, Ames, Iowa 50011-3260; Ph: 515-294-7978; Fax: 515-294-2244
Email: pbmb@iastate.edu
Website: www.bb.iastate.edu/~gfst/phomepg.html

International Society For Stem Cell Research 3rd Annual Meeting

June 23–25 • San Francisco Marriott
Abstract Submission closes February 25.
Submission for oral and poster presentations will be via the ISSCR website. Ph: 847/509-1944; Fax: 847/480-9282
Email: isscr@isscr.org; Website: www.isscr.org

Glycoproteomics—Protein Modifications for Versatile Functions

June 28–30 • Dubrovnik,Croatia
For information: Email: glauc@pharma.hr; Ph: 385 1 4818 757
Website: bmb.pharma.hr/glyco2005/

JULY 2005

30th FEBS Congress—9th IUBMB Conference, 2005 The Protein World; Proteins and Peptides: Structure, Function and Organization; Science is Fun: A Conference for Your Creativity

July 2–5 • Budapest, Hungary
Contact: Ms. Franciska Morlin, Chemol Travel Congress Dept. H-1366 Budapest, P.O.Box 28, Hungary
Ph:+36-1-266-7032, Fx: +36-1-266-7033
Email: incoming@chemoltravel.hu; www.febs-iubmb-2005.com

7th International Symposium on Biocatalysis and Biotransformations

July 3–8 • Delft, Netherlands
Contact: Biotrans 2005 Secretariat, Department of Biotechnology, Julianalaan 67 2628 BC, Delft, The Netherlands
Email: biotrans2005@tnw.tudelft.nl
Website: www.biotrans2005.bt.tudelft.nl/

FASEB Summer Research Conference on Transport ATPases: Genomics, Mechanisms, and Relevance to Disease

July 16–21 • Saxtons River, Vermont
Poster Sessions, Discussions, Young Investigator Forum
Organizers: Alan Senior & Kathleen Sweadner.
Applications will be available in March; Website: src.faseb.org.

Pathobiology of Cancer

July 17–24 • Snowmass Village Resort, Colorado
For information: Email: meetings@aacr.org
Website: www.aacr.org; Ph.: 215-440-9300

BioScience2005—From Genes to Systems

July 17–21 • Glasgow, UK
Poster abstract deadline: April 15, 2005, Early registration deadline: May 23, 2005, For more information: BioScience2005, Biochemical Society, c/o Commerce Way, Colchester, Essex CO2 8HP
Ph: +44 (0)1206 796351; Fx : +44 (0)1206 798650
Email: info@BioScience2005.org; www.BioScience2005.org

Gordon Research Conference on Molecular & Cellular Biology of Lipids

July 24–29 • Kimball Union Academy, New Hampshire
Email: www.grc.uri.edu/05sched.htm#GRC

AUGUST 2005

Ninth International Congress on Amino Acids and Proteins

August 8–12 • Vienna, Austria
For Information: Prof.Dr.Gert Lubec, FRSC (UK)
Medical University of Vienna, Dept. of Pediatrics, Div. of Basic Science, Währinger Gürtel 18, A 1090 Vienna, Austria
Email: gert.lubec@meduniwien.ac.at
Ph: 0043.1.40400 3215; Fax: 0043.1.40400 3194
Website: fens.mdc-berlin.de/calendar/?id=485&action=read

2005 International Gap Junction Conference

August 13-18 • Westin Resort and Spa, Whistler, BC, Canada
Website: www.gapjunctionconference.org
Abstract And Registration Deadline: April 1
Contact: Dale W. Laird, University of Western Ontario, London, Ontario, Canada, N6A-5C1; Ph: 519 661-2111 x86827
Fax: 519 850-2562; Email: dale.laird@fmd.uwo.ca

7th International Symposium on Mass Spectrometry in the Health and Life Sciences: Molecular and Cellular Proteomics

August 21-25 • Fairmont Hotel, San Francisco
This symposium will integrate mass spectrometry perspectives with the needs of the biomedical sciences, including: Sub-cellular separation strategies and sample handling • Analysis and automation technologies • Protein identification and quantitation • Studies of covalent modifications • Modulation of biological function • Protein machines and assemblages and organelles • Deciphering protein networks and systems • Mining genome and proteome databases • Bioinformatics.
For further information contact the symposium office:
Phone: (415) 476-4893; Fax: (415) 502-1655
Email: sfms@itsa.ucsf.edu
Website : http://ms-facility.ucsf.edu/symposium

SEPTEMBER 2005

Second World Congress on Synthetic Receptors

September 7–9 • Salzburg Congress Centre, Salzburg, Austria
Abstract Deadlines: 25 March 2005 (oral and poster papers)
For information: Conference Secretariat, Elsevier, The Boulevard, Langford Lane, Kidlington, OxfordOX5 1GB, UK
Tel: +44 (0) 1865 843691; Fax: +44 (0) 1865 843958
Email: jm.seabrook@elsevier.com
Website: www.syntheticreceptors.elsevier.com

Strategies for Engineered Negligible Senescence (SENS), 2nd Conference

September 7–11 • Queens' College, Cambridge, England
Conference organizer: Aubrey de Grey
Email: ag24@gen.cam.ac.uk)
Website: www.gen.cam.ac.uk/sens2/CSBMCB

14th Annual Growth Factor and Signal Transduction Symposium: Integration of Structual and Functional Genomics

September 22 – 25 • Iowa State University, Ames Iowa
Ph: 515-294-7978; Email: gfst@iastate.edu
Website: www.bb.iastate.edu/~gfst/homepg.html

International Conference on Enzyme Technology RELATENZ 2005

September 20–23 • Varadero, Matanzas, Cuba
Contact: Autopista a Varadero km 3 ?
Matanzas, C.P.44740, Cuba
Email relatenz.umcc@umcc.cu
Website: www.umcc.cu/EnzymeTechnology/relatenz.htm

American Society for Bone and Mineral Research (ASBMR) 27th Annual Meeting

September 23–27 • Gaylord Opryland Resort and Convention Center, Nashville, Tennessee
Abstract Submission Deadline: April 27, 2005
For more information call (202) 367-1161
Email: asbmr@smithbucklin.com; Website: www.asbmr.org

OCTOBER 2005

North Carolina RNA Society's Symposium on RNA Biology VI: RNA, Target and Tool Theme: Small RNAs and RNPs.

October 21-22 • North Carolina Biotechnology Center, Research Triangle Park, NC. 2005
Deadline for registration and abstract submission: July 1
Email: stu_maxwell@ncsu.edu.
Website: http://www.med.unc.edu/pmbb/nc-rna-soc.html

NOVEMBER 2005

International Workshop on Biosensors for Food Safety and Environmental Monitoring

November 10-12 • Agadir, Morocco
Contact: Université Hassan II-Mohammedia, Faculté des Sciences et Techniques, B.P. 146, Mohammedia, Morocco
Email a.amine@univh2m.ac.ma
Website: www.univh2m.ac.ma/biosensors

ASBMB/JBC Centennial Celebration

Honoring 100 Years of Achievements and Contributions to Science

Join us for the ASBMB/JBC Centennial Celebration to honor a century of achievements and contributions of The American Society for Biochemistry and Molecular Biology (ASBMB) and *The Journal of Biological Chemistry (JBC)*. This grand event will be held next year at the ASBMB 2006 Annual Meeting (April 1-5, 2006, San Francisco, CA, in conjunction with Experimental Biology 2006).

- Special publications which tell the history of ASBMB and *The JBC*. A collection of Classics, Reflections, scientific landmarks, and the many contributions to science that have been made by ASBMB members.
- Lectures and commentary by scientific luminaries.
- Displays and demonstrations of both historic instruments and current state-of-the-art instrumentation.

Join us in 2006 for this special ASBMB/JBC centennial celebration!

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