

DECEMBER 2004

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# ASBMB *Today*

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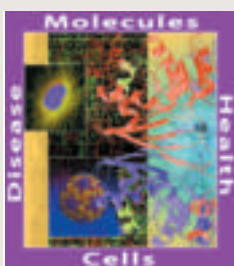
AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

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# ASBMB *Today*

AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

DECEMBER 2004,  
Volume 3, Issue 9

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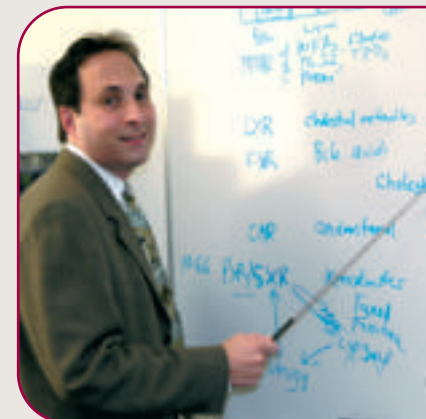
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BRONZE AWARD WINNER 2003

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Please direct any comments or questions  
concerning *ASBMB Today* to:

#### John D. Thompson

Editor, *ASBMB Today*  
9650 Rockville Pike  
Bethesda, MD 20814-3996  
Phone: 301-634-7145; Fax: 301-634-7126  
E-mail: jthompson@asbmb.org

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# School Districts Struggling With Shortage of Science Teachers

According to a survey by the National Science Teachers Association (NSTA), the world's largest organization of science educators, schools nationwide are struggling again this fall to fill science teacher vacancies. Of the 600 science educators who responded to an NSTA informal survey, 70% indicated that their school or school district is experiencing difficulty finding and hiring qualified science teachers. When asked if the problem has decreased or increased in recent years, 48% said that the problem has increased. The survey was conducted through NSTA Express, NSTA's weekly e-newsletter.

"There are many reasons why we continue to experience a shortage of science educators, but the most disturbing is a high turnover rate among teachers," said NSTA President Anne Tweed. "From a lack of ongoing professional development to classroom management issues, and from too few resources to a lack of support from administrators, there are too many reasons not to teach. We must find ways to make the teaching profession more attractive so that prospective educators will choose to be science teachers—and more importantly—we must mentor and coach beginning teachers so that they will remain in the classroom once they arrive."

The survey also asked science teachers if their school district was seeking teachers certified through the alternative certification process. About 53% said their district was seeking these teachers. When asked about recruiting measures, just over 72% indicated that their district was not offering incen-


tives or using other aggressive recruiting measures to attract qualified science teachers.

The results are released at a time when many news reports indicate a continued—and heightened—need for science educators in many states, including Florida, Maryland, North Carolina, and Virginia.

"There has always been a high demand for science teachers, but in light of the No Child Left Behind Act, which requires all teachers to be highly qualified by 2005, the situation will

*Of the 600 science educators who responded, 70% indicated that their school or school district is experiencing difficulty finding and hiring qualified science teachers.*

only worsen," said NSTA Executive Director Gerry Wheeler.

Representing more than 55,000 science educators worldwide, the Arlington, Virginia-based National Science Teachers Association is the largest professional organization in the world promoting excellence and innovation in science teaching and learning for all. NSTA's current membership includes more than 55,000 science teachers, science supervisors, administrators, scientists, business and industry representatives, and others involved in science education. 

# Graduation Survey Results

**T**his year's survey was sent to 572 departments known to offer degrees in biochemistry, molecular biology, chemistry with a biochemical emphasis, or biotechnology. The later category was added in response to comments from last year's survey. While the number of departments contacted increased by 11%, the number of responses (223) decreased by 9%. Despite this decrease in the absolute number of schools responding, the total number of undergraduates, total Masters degrees and number of Ph.D.s awarded to men increased. The only category showing a decrease was the number of Ph.D.s reported for women. Because of the laws in Canada, this year Canadian schools received separate forms that did not include the request for ethnic information. These responses, and a few from schools in the United States that could not, or would not, indicate ethnicity are listed as unspecified.

One encouraging note was that minority graduations were up in most categories below the Ph.D. level. Bachelor degrees reported for Blacks went from 97 to 136 (40% increase) and Masters degrees for Blacks went from 6 last year to 28 this year. Small increases were also seen at both the Masters and Ph.D. level for Hispanics and Pacific Islanders. Of interest was that the total numbers of degrees awarded to White, not of Hispanic origin, was down at all levels. As has been the case for several years now, the number of degrees awarded to women at both the Bachelors and Masters degree levels exceeds the degrees awarded to men. This trend is not true at the Ph.D. level.

This year no information was requested concerning faculty size and composition, nor was there a question about school size. This was because the information has not changed over the years. If one wishes to see the data

from the 2002-2003 survey it can be found as supplemental information on the ASBMB website, [www.asbmb.org](http://www.asbmb.org), under Education.

A list of schools reporting the highest number of graduates in each ethnic and degree category can be found as supplemental information on the website given in the previous paragraph.

These graduation surveys are only as representative as the responses from the departments. Please check our list of schools which can be found at <http://www.asbmb.org/asbmb/site.nsf/Sub/ListofSchools?Opendocument> to see if your department responded to the survey. The information is available in both PDF and Excel format. If you know of any schools that offer a degree in biochemistry, molecular biology, chemistry with a biochemistry emphasis, and especially biotechnology, and are not listed, *please* contact us via email at [education@asbmb.org](mailto:education@asbmb.org). ☞

## Students, Graduated, July 1, 2003 to June 30, 2004

	BS/BA				MS/MA			PhD		
	Male	Female	Unspec.	Total	Male	Female	Total	Male	Female	Total
American Indian or Alaskan Native	5	5		10	0	2	2	1	1	2
Asian	191	220		411	31	37	68	37	28	65
Black, not of Hispanic origin	49	87		136	10	18	28	11	11	22
Hispanic	49	55		104	9	12	21	19	14	33
Pacific Islander	8	8		16	2	3	5	9	1	10
White, not of Hispanic Origin	735	770		1505	104	96	200	197	122	319
International Students	41	77		118	44	46	90	87	71	158
Unspecified	47	53	173	273	22	20	42	25	8	33
<b>Total</b>	<b>1125</b>	<b>1275</b>	<b>173</b>	<b>2573</b>	<b>222</b>	<b>234</b>	<b>456</b>	<b>386</b>	<b>256</b>	<b>642</b>



by Peter Farnham, CAE, ASBMB Public Affairs Officer

# First ASBMB Student Hill Day

**A**tiring but exciting day came to a close the evening of October 14 as 11 students from ASBMB member labs around the country finished their participation in the first ever ASBMB Student Hill Day. The event brought students from around the country to Washington DC for an intensive day of congressional visits with the staff of key Members of Congress and Senators.

The event had its genesis last spring, when the Council approved a special allocation to fund the event. ASBMB decided to focus mostly on key Republican members of the House Appropriations Subcommittee on Labor/HHS, which funds the NIH. Almost without exception, the

ASBMB members approached about the event reacted with tremendous enthusiasm and were pleased to provide us with students to invite.

The students arrived in Washington on October 13, and attended a brief training session that evening. Former Rep. John Porter (R-IL) discussed the next day's events with the students, giving them "insider" pointers on how to act and what to say. We then discussed the message we wanted to deliver—please support NIH in the upcoming negotiations over the 2005 budget, still unresolved as of this writing (a "lame duck" session of Congress was scheduled for mid-November during which a budget for NIH and the rest of the federal government is to be approved).

The next day was spent in over a dozen meetings with congressional staff in both the House and Senate. In addition to NIH and NSF appropriations for Fiscal 2005, the meetings focused on stem cell research, and other issues such as enhanced public access to NIH research (the so-called "open access" issue).

While the students were received politely in all cases, some meetings were more difficult than others. Senator Rick Santorum's staff made it plain that while he was a supporter of NIH in most other areas, he was strongly opposed to embryonic stem cell research (a long-standing position). Likewise, Rep. Dave Weldon's staffer discussed his concerns about how NIH was spending its doubled budget, citing recent examples of "wasteful" research, such as an NIH-funded study on college student dorm room wall hangings.

However, other news indicated that there is a strong likelihood that the House will settle on an increase for NIH somewhere above 3%, which would be better than the House-approved increase of 2.6%. We also learned that Rep. Joe Barton (R-TX), chair of the House Energy and Commerce Committee, plans to try to move an NIH reauthorization bill next year, and is considering ways to strengthen the NIH directorship as well as whether there should be limits on the creation of new institutes.

The students returned home October 15 with a new appreciation of how Congress works. Morehouse College student Ade Adamson noted that "physically sitting in the offices of various congress-

*Continued on next page*



*From left, students Mitch Day, Ade Adamson, Kim Steinman, and Shemedia Johnson talk biomedical research funding and policy with, in foreground, Aarthi Shah, a legislative aide to Rep. Joe Barton (R-TX), during ASBMB's Student Hill Day*

Students who participated in ASBMB's first Student Hill Day were: Ade Adamson, Morehouse College; Dan Aruscavage, Ohio State University, Wooster; Kathleen Bishop, Bucknell University; Mitch Day, Idaho State University; Dan Dries, University of California, San Diego; Shemedia Johnson, University of North Texas; LeAnn Godderz, University of Oklahoma Health Sciences Center,

Oklahoma City; Jordan Irvin, Pennsylvania State University; Sandra Melkonian, Florida Institute of Technology; Jessica Swanson, University of California, San Diego; and Kimberly Steinman, Mississippi State University.

# Bush Reelection Means Few Changes Likely in Science Policy, Funding

**"M**ore of the same." That is how one knowledgeable observer summed up the likely impact on science of President Bush's reelection. While this may be an overly simplistic analysis, it nevertheless has the virtue of brevity as well as probably—some might say "unfortunately"—being true.

First, the realities of our country's fiscal situation cannot be ignored. A large budget deficit means that money is going to be extremely tight in the coming years. We are hearing rumors,

*Continued from previous page*

men made me realize just how human the process really is. From this experience I now understand how special interest groups can be so effective at lobbying on the Hill. In the future I hope more undergraduate students get a chance to do what I did through this program. I feel as though it is important for students to see beyond the beakers and pipettes and become more familiar with how decisions about science funding are made."

Likewise, Penn State student Jordan Irvin said that "it was a pleasure and an honor to meet with congressional staffers and push for biomedical funding ... I can't say how grateful I am that I was able to participate. It was an eye opening experience to see the inner work of the government and the potential for a career in scientific policy."

Students who attended the Hill Day were given a one-year membership in the Society as a "thank you." ❧

for example, that the Administration may propose an actual cut next year in the range of 2% at the National Institutes of Health (NIH).

If such cuts are proposed, the good news is that they are unlikely to pass muster in Congress. There remains a considerable reservoir of good will toward NIH in Congress and we can expect continued support. But the bad news is that Congress also sees the sea of red ink confronting us all. That, coupled with the fact that NIH funding was doubled between 1999 and 2003, means that an increase in the range of 1-2% is probably the best we can expect at NIH next year.

Stem cell policy is an area where we can probably expect some changes—but not to biomedical research's benefit. Some analysts have predicted that President Bush, no longer having to worry about reelection, will revisit his policy on embryonic stem cell research and allow broader federal funding. However, the President does not seem to be one to change his mind easily once he has made a decision. He also received millions of votes from evangelical Christians who are opposed to embryonic stem cell research. Thus, we do not expect administration policy to change.

Congress, however, is another story. The Senate is more conservative now, with four new Republican members. Thus, it will be harder for Senate supporters of stem cell research to block an embryonic stem cell ban that has passed the House in both of the last two Congresses. If a ban passes Con-

gress, the President will likely sign it, and this could put an end to private sector research in this field—including the \$3 billion research referendum that California voters approved on November 2.

In the Senate, several leadership changes are in the works. Senator Judd Gregg (R-NH) has announced that he is stepping down as chairman of the Senate Committee on Health, Education, Labor, and Pensions (which oversees NIH). Next in line is Michael Enzi (R-WY), who up to now has been far more interested in labor issues than health. In addition, Senator Ted Stevens (R-AK) is stepping down as chair of the Appropriations Committee, to be replaced by Thad Cochran (R-MS), a courtly southerner who is a powerful "behind-the-scenes" player. Stevens has been a strong supporter of NIH and Cochran has been a supporter of biomedical research as well, so it is likely that we will not lose anything with this switch.

Finally, it is not clear if Senator Arlen Specter (R-PA) will remain chairman of the Appropriations Subcommittee on Labor/HHS; he is known to want to chair the Judiciary Committee. While chairing one does not preclude chairing the other, the Republican caucus may decide to spread the wealth around a bit. Also, Specter may have seriously hurt his chances of getting the Judiciary Committee chairmanship by implying immediately after his reelection that the President shouldn't send the Committee judiciary nominees who oppose abortion. ❧

# ASBMB-AMGEN Award

**B**arry Forman, Principal Investigator and Assistant Professor, the Beckman Research Institute of the City of Hope National Medical Center and the Gonda Diabetes Center, has been selected to receive the 2005 ASBMB-AMGEN Award. The Award is made to a new investigator (defined as an individual with no more than 15 years experience since receipt of a doctorate) for significant achievements in the application of biochemistry and molecular biology to the understanding of disease, the implications for human disease should be evident. Nominations must be originated by Society members, but the nominees need not be ASBMB members.

The Award consists of a silver and crystal commemorative sculpture, a stipend, an unrestricted research grant, and transportation, and expenses to present a lecture at the 2005 ASBMB Annual Meeting, April 2-6, 2005 in San Diego. Recent recipients of this award were Steven C. Almo in 2004, Wesley Sundquist in 2003, Joseph Heitman in 2002, and Thomas Ried in 2001.

In expressing his support for Dr. Forman's nomination for to receive the award, Ronald Evans, HHMI Investigator and Professor at the Salk Institute for Biological Studies, wrote, "Barry is a spectacular scientist and colleague who, as a young and independent investigator, has made important discoveries to the molecular biology of nuclear receptors, metabolic regulation and disease."

Bert W. O'Malley, Tom Thompson Professor and Chair, Department of Molecular and Cellular Biology at Baylor College of Medicine, described Dr. Forman as "a young M.D./Ph.D. inves-

tigator whose contributions at the interface of molecular biology and human disease are deserving of international recognition."

Dr. Forman began his scientific career as an M.D./Ph.D student in the laboratory of Dr. Herbert Samuels in New York. In 1986 research in this field had become stagnant due to the lack of fundamental molecular reagents. Just as Dr. Forman joined the lab a cDNA clone was identified in the laboratories of Ron Evans and Bjorn Vennstrom and he immediately went to work and made important contributions in this highly competitive area.

Dr. Forman was the first to identify a novel dimerization interface in this subfamily of receptors and showed that this motif could promote heterodimeric interactions with other receptors. This was a critical contribution to the field as it was previously assumed that these receptors functioned as monomeric proteins. Perhaps more importantly from a clinical perspective, he also demonstrated that this dimerization interface facilitated non-productive "dominant-negative" interactions between wild-type and mutant receptors. Based on these findings Dr. Forman postulated that such interactions would explain the molecular mechanisms underlying the genetic disorder known as thyroid hormone resistance syndrome. This stimulated activity in several groups and indeed it was soon demonstrated that the pathology in these patients arises via point mutations that promote dominant negative activity. Thus, even as a graduate student his work was internationally recognized and contributed significantly to our understanding of human disease.

After finishing his MD/PhD training in 1991-1992, Dr. Forman joined the laboratory of Dr. Ronald Evans at the Salk Institute, where he continued to produce insights stemming from his initial work on receptor dimerization. Another member of the Evans lab had just shown that the insect ecdysone receptor formed heterodimers with the insect protein USP. While these interactions were required for DNA binding, Dr. Forman demonstrated that this interaction was also required for high affinity binding of the ecdysone ligand. This was perhaps the first demonstration of an allosteric interaction that promoted ligand binding. This fundamental molecular observation provided the rationale for the creation of the popular "ecdysone-inducible" gene-expression system. This system is currently used in labs throughout the world and has potential clinical applications in the gene-therapy arena.

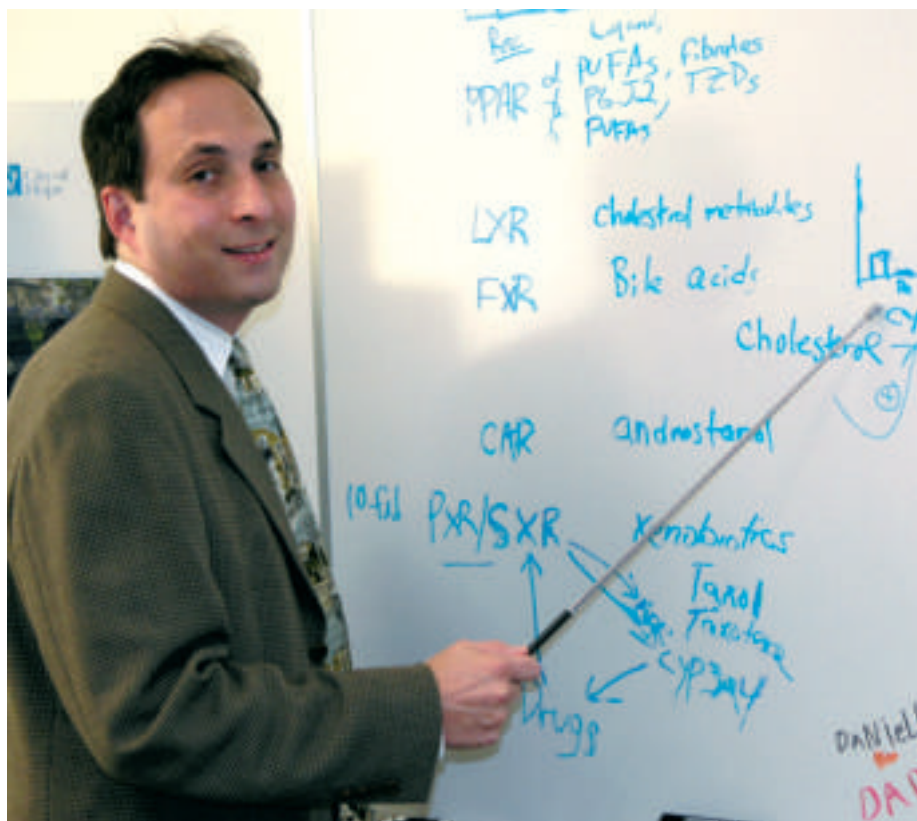
He continued his efforts in this area and demonstrated that allosteric interactions were also used to restrict ligand responsiveness within subunits of a nuclear receptor heterodimer (*Cell*, 1995). Again, this work had important clinical implications as several drug companies continue to use these unique molecular properties to identify novel receptor-selective drugs.

"Barry has recently developed a story that will no doubt attract as much attention as some of his earlier work," noted Robert Roeder, Professor and Head of the Biochemistry and Molecular Biology Lab at Rockefeller University. This work was presented at a closed conference sponsored by the Nobel Foundation in Stockholm.

"One of the intriguing observations about atherosclerosis," said Dr. Roeder,



# Going to Barry Forman



*Dr. Barry Forman*

“is that the lesions do not occur with equal propensity at all sites in the vasculature—they occur more frequently in areas that are exposed to turbulent flow. The mechanism that underlies this phenomenon is not known. An understanding of these events is critical as it implies that certain areas of the vasculature are relatively resistant to developing atherosclerosis. If this natural process were understood one might be able to exploit it for the treatment of atherosclerosis. Barry’s new findings demonstrate that endothelial cells exposed to nonlaminar flow produce an endogenous PPAR ligand that inhibits the earliest stage of atherosclerosis—namely, monocyte recruitment. These same inhibitory ligands are not produced when cells are exposed to

turbulent flow, thus explaining why these areas of the vasculature are prone to developing lesions.

“These studies are quite novel. They demonstrate how a mechanical force can control gene transcription and provide an explanation for a clinical observation that had remained unexplained for over a century. Perhaps even more importantly, these results suggest that high affinity PPAR ligands could be used to prevent atherosclerosis and Dr. Forman’s lab has recently synthesized a novel ligand mimetic that is the highest affinity ligand yet reported.

“A quick review of the nuclear receptor field indicates that orphan receptors have drastically reshaped our thoughts about endocrine signaling pathways.

## About Dr. Forman’s Lab

The lab uses orphan, nuclear receptors to elucidate novel hormonal signaling pathways that participate in normal physiological processes and in disease states. Orphan receptors are structurally related to classical nuclear hormone receptors that mediate the action of steroid, thyroid and retinoid hormones. However, unlike these classical receptors, the ligands for orphan receptors have yet to be identified. Thus, orphan receptors represent unique molecular tools that can be exploited in the search for novel hormonal signals.

The lab’s work has led to the discovery of previously unanticipated regulatory molecules including bile acids, sterols, androstans, eicosanoids and xenobiotics. Most notably, the Forman lab has identified exciting new compounds that regulate fat cell formation, insulin sensitivity and cholesterol homeostasis. Other orphan nuclear receptors have been linked to Parkinson’s disease, cancer and other diseases. These receptors are defining exciting new areas of research which have significant implications for both basic research and for the design of new drug therapies.

Although many excellent labs have contributed to this emerging field, Barry’s relatively young lab has become an established leader in the field.”

# Scientists Discover Enzyme Crucial to HIV Replication

**S**cientists have discovered that a cellular enzyme helps ferry HIV genetic instructions out of the cell nucleus where they can then be translated into proteins to begin their most destructive work. The cellular enzyme represents a potential new target for developing improved HIV drugs, say the researchers from the National Institute of Allergy and Infectious Diseases (NIAID).

Kuan-Teh Jeang,\* M.D., Ph.D., of NIAID led the research team reporting their discovery in the October 29 issue of *Cell*.

"This finding provides new insights into a crucial step in HIV replication," says Anthony S. Fauci, NIAID Director. "The discovery also provides an attractive target for drug development which, if successful, might in time give us a completely new type of HIV drug that circumvents the problem of drug resistance."

Dr. Jeang's team found evidence that the virus co-opts an enzyme produced by human cells to transport HIV's genetic material out of the cell nucleus. Once out of the nucleus, these messenger RNAs begin directing the cell to create and assemble new virus particles.

The process of how HIV genetic material exits the cell nucleus has long been a puzzle. Human cells cut, edit and splice RNA before it can leave the nucleus, but somehow HIV subverts that process and exports from the nucleus the long version of RNA that

encodes instructions for making new viral particles.

Scientists knew that HIV makes a protein called Rev to help skirt the prohibition on transporting the lengthy, unedited version of RNA from the nucleus. They also knew that HIV commandeers a human protein known as

CRM1 to aid in this process. Rev and CRM1 together, however, are insufficient to explain how HIV flouts the molecular machinery that cuts and splices RNA before it leaves the nucleus.

"Unspliced RNA is like an unwieldy ball of yarn," explains Dr. Jeang. "We found that the virus also uses a human

## NIH Awards 1,400 New Student Loan Repayment Contracts

The National Institutes of Health (NIH) awarded student loan repayment contracts to more than 1,400 health researchers across the nation in Fiscal Year 2004.

This brings the total number of awards to over 3,200 since Fiscal Year 2002, the first year NIH implemented the loan repayment programs nationwide. The 1,407 new contracts for Fiscal Year 2004 totaled nearly \$68 million, averaging \$48,300 each. Loan repayment is competitively awarded to health professionals who commit to engage in research careers.

Over half of the awards were to researchers who completed their doctoral degrees within the past five years. In addition, more than 40% of the awardees hold M.D. degrees, 34%, Ph.D. degrees, 9% M.D./Ph.D. degrees, and 7%, other doctoral degrees.

The NIH Loan Repayment Programs can repay up to \$35,000 of qualified educational debt for health profes-

sionals pursuing careers in clinical, pediatric, contraception and infertility, or health disparities research. The programs also provide coverage for Federal and state tax liabilities.


Applications are currently being accepted online at [www.lrp.nih.gov](http://www.lrp.nih.gov). Eligible applicants must possess a doctoral-level degree, devote 50% or more of their time to research funded by a non-profit organization or government entity (federal, state, or local), and have educational loan debt equal to or exceeding 20% of their institutional base salary. U.S. citizens, permanent residents, or U.S. nationals may apply. The online application closes on December 15, 2004 at 8 PM EST.

The five NIH Loan Repayment Programs are the Clinical Research LRP, Clinical Research for Individuals from Disadvantaged Backgrounds LRP, Contraception and Infertility Research LRP, Health Disparities LRP, and Pediatric Research LRP.

enzyme known as DDX3 to straighten its RNA before threading it through a small pore in the nucleus." The team's experiments offer the first evidence that HIV uses DDX3 in the complex process that moves its RNA out of the nucleus. They also demonstrated that DDX3, an RNA helicase enzyme, is essential to this process.

The researchers now plan to look for inhibitors, small molecules that could either lock or gum up DDX3's ability to straighten a twisted strand of RNA. Although it would take many years to develop, an inhibitor for DDX3 could effectively block HIV replication. Researchers would need to find a balance between a potential inhibitor's action in shutting down viral replication and any detriment it might cause to human cells.

In the past decade, two classes of HIV inhibitor drugs, protease inhibitors and reverse transcriptase inhibitors, have greatly extended the lives of HIV-positive individuals. While these drugs target HIV enzymes, a DDX3 inhibitor would target a cellular enzyme. The researchers see a great therapeutic advantage to blocking a cellular enzyme rather than a viral enzyme.

"Unlike viral enzymes, cellular enzymes can not mutate to escape from drugs," says Dr. Jeang. The problem of drug resistance that occurs with protease and reverse transcriptase inhibitors might thus be eliminated with a successful DDX3 inhibitor. 

\* ASBMB Member

## Computer Models to Simulate Hypothetical Outbreak of Avian Flu

**A** group of scientists who are developing computer models to combat infectious diseases have focused their attention on the H5N1 strain of the bird influenza virus. By simulating the outbreak of this potentially deadly avian flu in a hypothetical human community, the researchers hope to answer key questions about how best to contain the virus. The work is funded by the National Institute of General Medical Sciences (NIGMS), part of the National Institutes of Health. Preliminary results from the models could be available by early January 2005.

The flu project is part of a national effort, called the Models of Infectious Disease Agent Study (MIDAS), to develop computational models of the interactions between infectious agents and their hosts, disease spread, prediction systems and response strategies. The participating research teams are led by scientists at Johns Hopkins Bloomberg School of Public Health in Baltimore, MD; Los Alamos National Laboratory in Los Alamos, NM; Emory University in Atlanta, GA; and Research Triangle Institute International in Research Triangle Park, NC.


To simulate the spread of a possible avian flu outbreak that would become infectious between humans, the researchers are developing models of a hypothetical Southeast Asian commu-

nity of about 500,000 people living in neighboring small towns. The computer simulations will incorporate data on population density and age structure, distribution of schools, locations of hospitals and clinics, travel and the infectiousness of the virus.

These simulation models will allow researchers to test different intervention strategies that may reduce the rate of transmission between people. The objective is to evaluate methods to locally contain the spread of disease.

"We can see what would happen if we take certain actions, like vaccinating specific groups, using antiviral medications, restricting travel or implementing other public health measures," said Irene Eckstrand, Ph.D., MIDAS Program Officer at NIGMS. "Computer models let us envisage the impact of these decisions in a variety of scenarios."

The ultimate goal of the project is to identify disease prevention and control strategies that not only contain the virus, but also quickly drop the number of people infected to zero — basically eradicating H5N1 from the human community.

For more information about MIDAS and other NIGMS-supported efforts to model infectious diseases, visit <http://www.nigms.nih.gov/research/midas.html>. 



# Latin America Shows Rapid Rise in Published Science and Engineering Articles

**T**he number of science and engineering articles credited to Latin American authors almost tripled in the 13-year period from 1988-2001, significantly outpacing authors of other developing regions in the world. The output of Latin American authors grew by about 200 percent, by far the highest rate of increase during the period (see figure).

A new National Science Foundation report, *Latin America Shows Rapid Rise in S&E Articles*, reveals that the Latin American increase in scientific articles was concentrated in four countries—Argentina, Brazil, Chile, and Mexico—which generated close to 90 percent of the region's published articles in 2001 alone.

"This growth in Latin American science and engineering articles is important, not only for the Americas, but for the growing community of nations recognizing the engine of progress through science and technology. It indicates that the long-sought goal of more geographic diversity in science and engineering is finally coming to fruition," NSF Acting Director Arden Bement said.

From 1988-2001, Brazil's output of articles quadrupled, while Mexico's more than tripled. The four leading countries, plus Costa Rica, Colombia, and Venezuela accounted for 95 percent of the Latin American contribution.

On a per capita basis, Argentina and Chile produced more scientific articles than any other Latin American country from 1999-2001. Those two nations averaged more than 70 articles published per million inhabitants during the period. Brazil, producer of the largest total number of articles, averaged only 39 articles per million.

The largest numbers of articles, and the largest shares, were in engineering

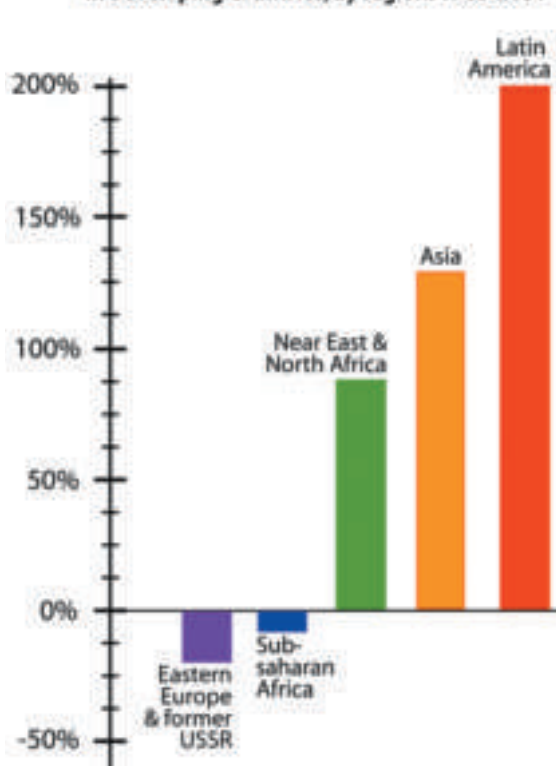
and technology, along with biology and many of the physical sciences. In contrast, the social and behavioral sciences, clinical medicine, and biomedical research showed a slower-than-average growth rate. However, the life sciences still accounted for nearly half of all Latin American articles in 2001.

The number of citations referencing Latin American authors provides another measure of the rising influence of the region's scientists and engineers. Between 1988 and 2001, the number of citations to Latin American science and engineering literature nearly tripled, pushing Latin America's share from 14 to 20 percent among all emerging and developing countries during the period.

"This increase in citations could reflect a well-documented tendency for authors to cite articles from their own countries," says Derek Hill, who pro-

duced the NSF report for NSF's Division of Science Resources Statistics. "Yet the data suggest that most of the increase was from authors outside of Latin America citing Latin American authors." ❧

Percentage Increase of Scientific Articles by Researchers in Developing Countries, by region: 1988-2001



## ASBMB ANNUAL MEETING 2005

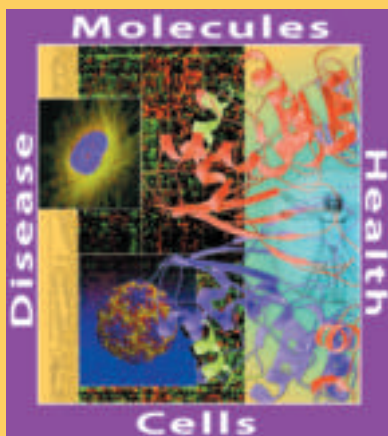
### *Call for Late-Breaking Abstracts*

**Deadline for Submission: Wednesday, February 9, 2005**

Abstracts must be submitted electronically with payment of \$90 and received on or before Wednesday, February 9, 2005.

Late-breaking abstracts will be accepted for special poster sessions to be scheduled on Tuesday, April 5, 2005.

Save Money! Register online by February 4 and make your housing reservations by February 21, 2005.



**2005 ASBMB Annual Meeting**  
Held in conjunction with EB 2005  
April 2-6, 2005, San Diego, CA

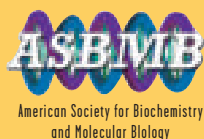
Additional Speakers will be chosen from the abstracts submitted.

**Abstract Deadline:**  
**February 9, 2005**

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

#### More Information:

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# Education in the Biomolecular Sciences: The Next Generation

Organizers: Marion O'Leary, California State Univ.—Sacramento  
Judith Voet, Swarthmore College  
Donald Voet, Univ. of Pennsylvania

## Meetings:

Assessment: What Do Our Students Take With Them When They Leave?

**Chairs, Marion O'Leary**, California State Univ.—Sacramento, and **Hal White**, Univ. of Delaware

Integrating Proteomics into Biochemical Education  
**Chair, Paul Craig**, Rochester Inst. of Technology

Case Studies in Biomedical Education: From the Bedside to the Bench and Back  
**Chair, Kathleen Cornely**, Providence College

Service Learning: Including the Community in the Education Process  
**Chair, Neena Grover**, Colorado College

The Protein Data Bank in the Classroom and Beyond  
**Chair, Judith Flippen-Anderson**, Rutgers Univ.

Posters: Education in the Biomolecular Sciences—The Next Generation  
**Chair, Judith Voet**, Swarthmore College

## Workshops and Panel Discussions:

Using the protein-folder model building kit  
**Richard Garratt**, Univ. of Sao Paulo, Brazil

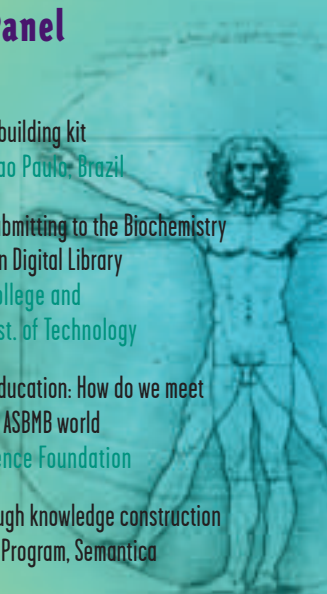
BioMoleculesAlive: Using and submitting to the Biochemistry and Molecular Biology Education Digital Library  
**Judith Voet**, Swarthmore College and **Paul Craig**, Rochester Inst. of Technology

Panel: Graduate-Postdoctoral Education: How do we meet the challenges of the changing ASBMB world  
**Terry Woodin**, National Science Foundation

Enhancing active learning through knowledge construction using the Semantic Networking Program, Semantica Education 3.0.3.  
**Kathleen M. Fisher**, San Diego State Univ.

Careers in Industry: A Panel Discussion  
**Marilee Benore-Parsons**, Univ. of Michigan-Dearborn

Women's Networking and Mentoring Session  
**Adele Wolfson**, Wellesley College, and **Marilee Benore-Parsons**, Univ. of Michigan — Dearborn



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# San Diego 2005

## Education in the Biomolecular Sciences:

Organizers, Marion O'Leary, California State University-Sacramento, Judith Voet, Swarthmore College, and Donald Voet, University of Pennsylvania.

**W**e have put together an exciting series of sessions, posters, workshops and panel discussions concerning many aspects of education and professional development in the molecular life sciences, as discussed below.

### Symposia

**Assessment: What do our students take with them when they leave?** chairs, Marion O'Leary, *California State University-Sacramento* and Hal White, *University of Delaware*



Dr. Marion O'Leary

Assessment is difficult and often done poorly. This session will feature three speakers presenting different examples of assessment done well. George Bodner will describe an assessment of the extent and causes of academic dishonesty in undergraduate teaching laboratories. John Wright will describe a rather unusual assessment approach to document the effectiveness of active learning in the classroom. Finally, Kathleen Fisher will discuss the value of assessment using diagnostic tests.

**Integrating Proteomics into Biochemical Education**, chair, Paul Craig, *Rochester Institute of Technology*

This session aims to facilitate the introduction of proteomics into the biochemistry curriculum. Haleem Issaq will discuss "The State of the Art in Proteomics Today." Eric Eberhardt will talk about "Integrating a Proteomics

Laboratory Experiment into the Biochemistry Curriculum." Thomas Kim will present "Fungal Proteomics: A Platform for Collaborative, Interdisciplinary Research at a Primarily Undergraduate Institution." Finally, Paul Craig will share his experience with Bioinformatics at RIT and discuss "A Proteomics Course in the Context of the Curriculum."

**Case Studies in Biomedical Education: from the bedside to the bench and back**, chair, Kathleen Cornely, *Providence College*

Case studies can be very effective teaching and learning tools. In this session, Linda Hodges will discuss "From the max to the min: adapting case study teaching to different class formats" and Ann Taylor will talk about "Linking Lecture, Literature, and Lab with Case Studies."

**Service learning: Including the community in the education process**, chair, Neena Grover, *Colorado College*

Outreach activities have become increasingly integrated into teaching sciences as discussed in the article by Neena Grover and Marilee Benore-Parsons in the October issue of *ASBMB Today*. This approach is called Service-Learning (SL) and will be discussed in this session. David Parfitt will present his neuroscience course and Henrik Kibak will present his infectious disease course to demonstrate how they have used SL in their courses. Ira Harkavy, will introduce the larger idea of "community schools" at this conference.

**The Protein Data Bank in the classroom and beyond**, chair, Judith Flippen-Anderson, *Rutgers University*

This session will introduce you to the enhanced capabilities of the newly re-engineered RCSB PDB query site and will show how the rich resources stored in the PDB can help in teaching structural biology at both the high school and university level. Visualization is an integral part of studying macromolecular structure. This session will also include presentations showing how physical models and protein folding kits can compliment existing molecular visualization tools.



Dr. Judith Voet

### Posters

**Education in the Biomolecular Sciences: The Next Generation**, chair, Judith Voet, *Swarthmore College*

Posters on all aspects of biomolecular science education are encouraged.

### Noontime Workshops and Panels

**Using the Protein-Folder Model Building Kit**, Richard Garratt, *University of Sao Paulo, Brazil*

The experience of many, even in the age of advanced computer graphics, is that there is still a place for physical models in the teaching of protein structure. This hands-on workshop will involve the use of *Protein folder*, a kit for building Richardson style cartoons of protein structures in 3D. These models are easy and quick to build and have the advantage that the user is



# ASBMB Annual Meeting

## The Next Generation

required to build the structure him/herself rather than passively observing it.

**BioMoleculesAlive: Using and submitting to the Biochemistry and Molecular Biology Education Digital Library**, Judith Voet *Swarthmore College* and Paul Craig, *Rochester Institute of Technology*

BioMoleculesAlive.org is a collection of digital resources sponsored by the American Society for Biochemistry and Molecular Biology. It is part of a larger effort called the BioSciEdNet (BEN) initiative ([www.bioscienednet.org](http://www.bioscienednet.org)). The workshop will focus on how to use and submit software, visual resources, and curriculum resources to the library.

**Panel: Graduate-Postdoctoral Education: How do we Meet the Challenges of the Changing ASBMB World**, Terry Woodin, *National Science Foundation* and J. David Pruet, *University of Georgia*, current president of the *Biochemistry Department*

This noontime meeting will explore the changing face of graduate education in biochemistry. There will be a panel of four stakeholders, a recent postdoc, a representative from NIH/NSF, a representative from industry, and a representative from an institution that is approaching change and feels it is making progress.

**Enhancing Active Learning through Knowledge Construction using the Semantic Networking Program, Semantica Education 3.0.3**, Kathleen M. Fisher, *San Diego State University*

Understanding requires individual knowledge construction, not simply rote learning. Students' knowledge-building and learning skills can be significantly improved as students create their own knowledge structures and reflect on their knowledge by viewing it from multiple perspectives. Semantica supports and scaffolds their thinking, combining visual and verbal elements.



Dr. Donald Voet

Workshop participants will practice using Semantica under expert guidance and will receive a complimentary CD. BRING A LAPTOP.

**Late Afternoon or Evening Sessions Women's Networking and Mentoring session**, Adele Wolfson, *Wellesley College* and Marilee Benore-Parsons, *University of Michigan-Dearborn*

**Careers in Industry: A Panel Discussion**, Marilee Benore-Parsons, *University of Michigan-Dearborn*. 

## 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.

**Jean Buteau**  
Columbia University

**Veronica Contreras-Shannon\***  
University of Texas Health Sciences  
Center San Antonio

**Michelle K. Gumz\***  
University of Florida

**Catherine L. Higgins**  
Tulane University

**Gustavo A. Nader**  
University of Illinois at Chicago

**Jennifer Palenchas**  
University of Delaware

**Peter R. Panizzi**  
Vanderbilt University School of  
Medicine

**Terrence S. Pinkerton**  
Texas A&M University

**Elizabeth B. Rex**  
University of Toledo

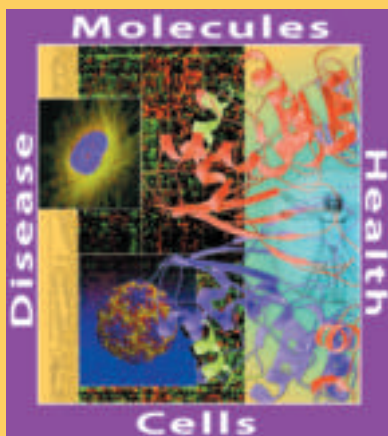
**Anna Seibert**  
State University of New York  
Buffalo

**Richard J. Suderman**  
Kansas State University

**Ekaterina I. Zagriadskaja**  
University of Montreal

**Zarixia Zavala-Ruiz**  
Massachusetts Institute of  
Technology

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



# Interactions and Functions of Glycoconjugates

Organizer: Mark A. Lehrman, UT Southwestern Medical Center

2005 ASBMB Annual Meeting

Held in conjunction with EB 2005

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Additional Speakers will be chosen from the abstracts submitted.

**Abstract Deadline:**  
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Travel Awards Available for Undergraduates, Graduates, Postdoctoral Fellows, and Undergraduate Faculty.

**More Information:**

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## Biosynthetic Basis of Glycoconjugate Function

Glycan-dependent control of leukocyte biology  
**Chair, John Lowe, Univ. of Michigan**

A yeast under cover: polysaccharide capsule synthesis in the pathogenic fungus *Cryptococcus neoformans*  
**Tamara Doering, Univ. of Washington in St. Louis**

Regulation of the glycoprotein ERAD (GERAD) substrate selection checkpoint  
**Richard Sifers, Baylor College of Medicine**

## Chemo-Enzymatic Investigations of Glycoconjugate Function

Exploring and inhibiting galactofuranose residue incorporation  
**Chair, Laura L. Kiessling, Univ. of Wisconsin — Madison**

Automated synthesis of glycoconjugates as basis for biological and medical research  
**Peter Seeberger, ETH-Zurich**

Applications of natural product glycorandomization and neoglycorandomization  
**Jon S. Thorsen, Univ. of Wisconsin, School of Pharmacy**

## Glycans as Signals

Perception of the oligosaccharide signal that initiates the rhizobium-legume symbiosis  
**Chair, Marilyn Etzler, Univ. of California, Davis**

Proteoglycans: Molecular partners for morphogen signaling and gradient formation  
**Scott B. Selleck, Univ. of Minnesota**

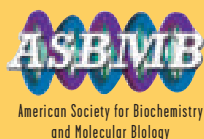
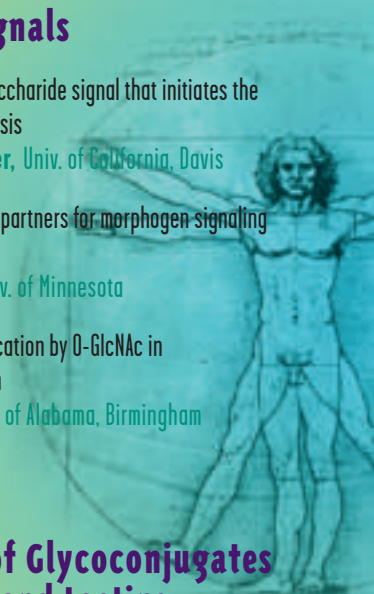
Post-translational modification by O-GlcNAc in transcriptional regulation  
**Jeffrey Kudlow, Univ. of Alabama, Birmingham**

## Recognition of Glycoconjugates by Receptors and Lectins

Molecular regulation of protein O-glycosylation and functions in development and disease  
**Chair, Richard D. Cummings, Univ. of Oklahoma Health Sciences Center**

Glycolipids: endogenous ligands in lectin-mediated cell-cell recognition  
**Ronald L. Schnaar, The Johns Hopkins School of Medicine**

Biology and evolution of the Siglecs  
**Ajit P. Varki, Univ. of California, San Diego**



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## Interactions and Functions of Glycoconjugates Meeting

Organizer: Mark A. Lehrman, Professor of Pharmacology,  
UT-Southwestern Medical Center, Dallas, Texas

**A**SBMB members who attend sessions in the 2005 Interactions and Functions of Glycoconjugates Meeting can expect to hear talks about glycoproteins, proteoglycans, and glycolipids that will be very different from talks they may have heard at the Society's annual meetings of as little as five years ago. This is due in large part to an explosive increase in information about functions of glycoconjugates (typically, glycans attached to proteins or lipids) and the many types of proteins with which they interact. As in many other areas, "glycobiology" has been transformed by advances in gene manipulation and genomic sequence analysis, allowing earlier work on glycan structure, enzymology, and potential binding proteins to be placed in their proper biological contexts. The recent identification of numerous human genetic disorders that affect the biosynthesis of glycoconjugates has provided additional information about their functions. Consequently, ASBMB members who attend these sessions will come away with an appreciation for the variety of biological process in which glycoconjugates have important roles.

### Biosynthetic Basis of Glycoconjugate Function

Chair, John Lowe, *University of Michigan*



Dr. Mark Lehrman

Glycans often consist of elaborate arrangements of sugars coupled together, with one linked to as many as four others, involving various stereochemistries.

Further, there can be striking similarities as well as extensive differences among the glycoconjugates of different species. This session will address the ways in which the complexities of synthesis and structure can be decoded to reveal novel functions. Dr. Doering will present her findings on the role of the polysaccharide capsule of *Cryptococcus neoformans* in virulence of the organism. Turning to mammals, session chair Dr. Lowe will present his approaches for defining the roles of L-fucose on glycoconjugates in cellular interactions. Dr. Sifers will discuss his studies elucidating how trimming of glycans on endoplasmic reticulum glycoproteins orchestrates the processes of export and degradation.

**A yeast under cover: polysaccharide capsule synthesis in the pathogenic fungus *Cryptococcus neoformans***, Tamara Doering, *University of Washington in St. Louis*

**Glycan-dependent control of leukocyte biology**, John Lowe, *University of Michigan*

**Regulation of the glycoprotein ERAD (GERAD) substrate selection**

**checkpoint**, Richard Sifers, *Baylor College of Medicine*

### Chemo-Enzymatic Investigations of Glycoconjugate Function

Chair, Laura L. Kiessling, *University of Wisconsin - Madison*

Chemical biologists have brought tremendous creativity to the study of glycoconjugate function. Society members attending this session will hear about current approaches for chemical manipulation of glycoconjugate biosynthesis, as well as for synthesis of medically important glycans. Dr. Kiessling, who will chair the session, will present strategies for altering glycoconjugate biosynthetic pathways, focusing on galactofuranose. Dr. Seeberger's presentation will deal with experiments taking advantage of highly effective automated synthesis systems he has developed. Dr. Thorson will discuss his novel approaches for creating diverse, randomized collections of useful glycoconjugates.

**Exploring and inhibiting galactofuranose residue incorporation**, Laura L. Kiessling, *University of Wisconsin - Madison*

**Automated synthesis of glycoconjugates as basis for biological and medical research**, Peter Seeberger, *ETH-Zurich*

*Continued on next page*



Continued from previous page

**Applications of natural product glycorandomization and neoglycorandomization**, Jon S. Thorson, *University of Wisconsin, School of Pharmacy*

### **Glycans as Signals**

Chair, Marilyn Etzler, *University of California, Davis*

Glycans have great structural diversity, giving them the potential to carry large amounts of biological information. This session, which is devoted to the signaling functions of glycans, will draw upon different classes of glycans. Dr. Selleck will describe his work revealing how proteoglycans mediate signaling events during development. Dr. Kudlow will discuss how the cytoplasmic modification “O-GlcNAc” controls specific aspects of protein degradation. Dr. Etzler, the session chair, will present her novel work on the role of a glycan in the signaling process that occurs between *rhizobia* and legumes.

**Proteoglycans: Molecular partners for morphogen signaling and gradient formation**, Scott B. Selleck, *University of Minnesota*

**Post-translational modification by O-GlcNAc in transcriptional regulation**, Jeffrey Kudlow, *University of Alabama, Birmingham*

**Perception of the oligosaccharide signal that initiates the rhizobium-legume symbiosis**, Marilyn Etzler, *University of California, Davis*

### **Recognition of Glycoconjugates by Receptors and Lectins**

Chair, Richard D. Cummings, *University of Oklahoma Health Sciences Center*

As the number of glycoconjugate functions has grown, so have the number of proteins, or “lectins” which are known to recognize the glycoconjugates. It has become increasingly clear that these proteins are not merely docking sites, but are actively involved

in mediating the function of the glycoconjugate, and thus act like receptors. The identification of classes of lectins, such as “selectins”, “siglecs”, and “galectins”, has aided elucidation of glycan function. In the presentation by Dr. Schnaar, the role of lectin-glycolipid recognition in the nervous system will be discussed. Dr. Varki will present his work on the biological roles of siglecs, all of which recognize sialic acid. The session chair, Dr. Cummings, will cover his studies on lectin systems that mediate the functions of O-linked glycans.

**Glycolipids: endogenous ligands in lectin-mediated cell-cell recognition**, Ronald L. Schnaar, *The Johns Hopkins School of Medicine*

**Biology and evolution of the Siglecs**, Ajit P. Varki, *University of California, San Diego*

**Molecular regulation of protein O-glycosylation and functions in development and disease**, Richard D. Cummings, *University of Oklahoma Health Sciences Center*. ☞

## **Labs Vandalized at University of Iowa, University of Minnesota-Duluth**

An undetermined number of laboratory mice, rats and pigeons were released, more than 30 computers were damaged, and hazardous materials were dumped sometime during the weekend of November 13 in research laboratories and faculty and graduate student offices at the University of Iowa (UI). There were no reports of injuries to faculty, staff or students in connection with the incident.

In an email sent to media, the Animal Liberation Front (ALF) claimed responsibility for the break-in at Seashore Hall and Spence Laboratories at the University of Iowa.

In part, the email reads, “The Animal Liberation Front is claiming responsibility for the liberation of 401 animals from the University of Iowa in the

early hours of November 14th, 2004. All animals on the third floor of the UI psychology department—88 mice and 313 rats—were removed, examined and treated by a sympathetic veterinarian, and placed in loving homes.”

The motivation for the raid was described as, “a methodical effort to cripple the UI psychology department’s animal research.”

Most of the damage was done to laboratories on a locked floor where animal research is conducted primarily by the behavioral and cognitive neuroscience division of the psychology department. University officials estimate the damage to be in the tens of thousands of dollars. Because of uncertainty about the extent of the damage, including the deliberate dumping of hazardous

chemicals, UI Police decided to evacuate the laboratories.

A nearly completed science building under construction at the University of Minnesota-Duluth (UMD) was also vandalized sometime over the same weekend. Damage estimates for that building were over \$1 million.

Vandals entered the \$33 million James I. Swenson Science building, broke windows, discharged fire extinguishers, and used construction tools left on the work site to destroy mechanical equipment.

The worst damage, however, was caused by the vandals plugging the drains on the third floor of the building and leaving the water running. When workers discovered the damage, there was standing water on the building’s first, second and third floors.

# CUMC Researchers Find New Reason Why Dietary Fat Increases Alzheimer's Risk

**A** new report has uncovered another way dietary fat may increase the risk of getting Alzheimer's, making too much fat a double whammy for the brain's cells.

"It's a new way of looking at Alzheimer's disease and it opens up a whole new way to approach the disease therapeutically," says the study's senior author, Dr. Neil Shachter, associate professor of medicine at Columbia University College of Physicians and Surgeons.

Though the connection between fats and Alzheimer's disease initially took researchers by surprise, it's now so

accepted that clinical trials are testing whether statins, cholesterol-lowering drugs, can prevent the disease.


The rationale behind the trials comes from studies that show that cholesterol increases the amount of beta-amyloid, the molecule most researchers believe is the primary culprit in the disease.

In the new research, Dr. Shachter found that another component of dietary fat, triglycerides, also increases the amount of beta-amyloid inside cells, but in a different way than cholesterol.

Using cultured hamster cells, Dr. Shachter found that triglycerides

increase the amount of a molecule called presenilin, which assists in beta-amyloid production. The increase in presenilin level then increases the amount of beta-amyloid in the cell.

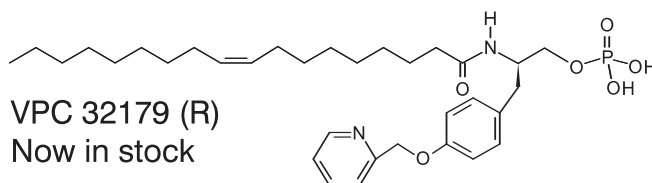
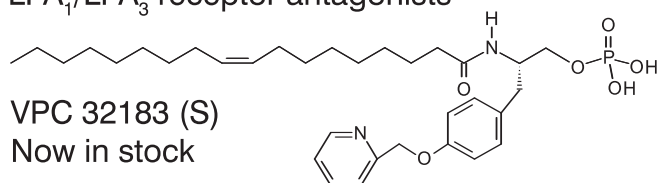
A worldwide effort to find drugs that limit the activity of presenilin is already underway, Dr. Shachter says. He suggests his new findings may lead to more effective treatments that rid the cell of excess presenilin all together, by decreasing fat delivery.

The research was published in the *Journal of Lipid Research*, September 16, 2004. 

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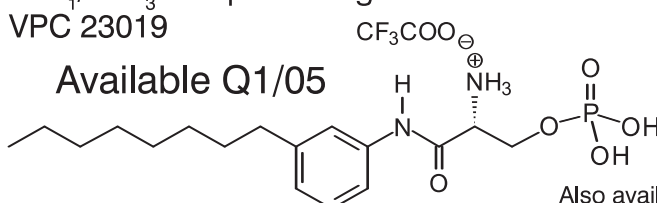
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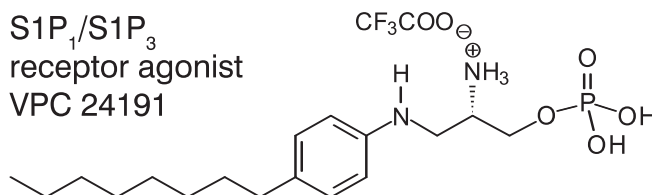
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# Unusual DNA Conformations Linked to Human Diseases

By Nicole Kresge, Science Writer

**I**n 1953, the structure of DNA was reported, revealing that the molecule forms a right-handed double helix held together by adenine-thymine and guanine-cytosine base pairs. Since then, it has been found that most of the time DNA adopts this right-handed B conformation, but occasionally it forms non-B DNA structures such as hairpin loops or triplexes. These unusual DNA conformations have profound biological effects that have recently been linked directly to a large number of human diseases.

Research on the relationship between unusual DNA conformations and genetic disease dates back to the mid-1960s. The early studies used DNA with defined repeating nucleotide sequences to demonstrate that sequence effects DNA conformation and properties. Since then, a great number of non-B DNA structures have been discovered, including triplexes, left-handed DNA, bent DNA, cruciforms, nodule DNA, flexible and writhed DNA, G4 tetrad (tetraplexes), slipped structures, and sticky DNA. The structures form at specific sequence motifs as a result of negative supercoil density, generated in part by transcription, protein binding, and other factors.

Although some of the biological functions of non-B DNA structures had been elucidated, it was not until a few months ago that dramatic advances in genomics, human genetics, medicine, and DNA structural biology revealed the extensive roles that unusual DNA conformations play in human genetic diseases. The ability to analyze chro-

mosomes and search for sequences frequently involved in non-B conformations has allowed researchers to link the conformations to at least 46 human genetic diseases.

Robert D. Wells, Director, Center for Genome Research, Institute of Biosciences and Technology, Texas A&M University System Health Science Center, and Past President of both ASBMB and FASEB, is one of the early pioneers of non-B DNA research. "I have focused on characterizing non-B DNA structures since 1966," says Dr. Wells. "But over all these years, while we have tried to evaluate their biological function, it has not been until extremely recently that we had solid evidence about what these structures do. These discoveries represent major advances in understanding the biological and medical roles of non-B DNA structures and etiology of the target diseases."

Since 1991, approximately 15 human hereditary neurological diseases have been associated with the non-Mendelian expansion of simple triplet repeat sequences such as CTG-CAG, CGG-CCG, and GAA-TTC. The triplet repeats cause DNA to assume hairpin, triplex, quadruplex, and slipped-strand DNA structures, which, in turn, influence replication and transcription by blocking replication forks and promoting repair. The onset and severity of the triplet repeat diseases directly correlates with an increase in the length of the triplet repeat sequences.

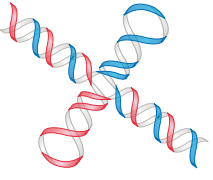
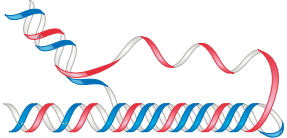
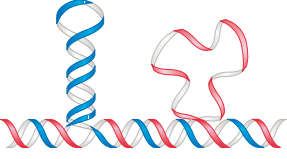
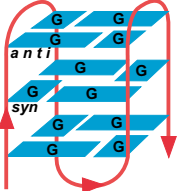

One of the triplet repeat diseases, Friedreich's ataxia (FRDA), is caused by a GAA-TTC triplet repeat expansion in

intron 1 of the FRDA gene. The repeats adopt both triplex and sticky DNA conformations which inhibit transcription of the FRDA gene. Dr. Wells and his colleagues found that GAA-TTC repeating sequences have recombination frequencies as much as 15 times higher than non-repeating control sequences. The recombination products were expansions and deletions of the GAA-TTC repeats, indicating that triplet repeat sequences may be recombinational hot spots. These findings suggest that specific pharmacological agents, capable of interfering with the formation of non-B DNA structures, may up-regulate the expression of the FRDA gene, thereby providing an effective therapeutic approach.

Myotonic dystrophy is a rare genetic disease characterized by progressive loss of muscle cells. Type 1 myotonic dystrophy is caused by an expanded triplet repeat of CTG-CAG on chromosome 19, and type 2 is caused by an expanded quadruplet repeat of CCTG-CAGG on chromosome 3. Dr. Wells and his colleagues found that, similar to the triplet repeats in Friedreich's ataxia, the myotonic dystrophy type 1 repeats are more prone to recombination, contributing to their expansion. In a paper published in the October 1 issue of the *Journal of Biological Chemistry (JBC)*, the investigators also show that the type 2 CCTG-CAGG tetranucleotide repeats form hairpin structures which contribute to the expansion of those repeats.

The Wells laboratory also published a paper the September 28 issue of the *Proceedings of the National Academy of*



Name	Conformation	General Seq. Requirements	Sequence
Cruciform		Inverted Repeats	<pre> TCGGTACCGA AGCCATGGCT </pre>
Triplex		$(R \cdot Y)_n$ Mirror Repeats	<pre> AAGAGGGGAGAA TTCTCC CCTCTT </pre>
Slipped (Hairpin) Structure		Direct Repeats	<pre> TCGGTTCGGT AGCCAAGCCA </pre>
Tetraplex		Oligo $(G)_n$ Tracts	$AG_3(T_2AG_3)_3$ single strand
Left-handed Z-DNA		$(YR \cdot YR)_n$	<pre> CGCGTGCGTGTG GCGCACGCACAC </pre>

Non-B DNA conformations involved in rearrangements.

Sciences in which they reported an association between the breakpoints of gross deletions and non-B DNA conformations. The researchers analyzed a 2.5 kbp poly(purine-pyrimidine) sequence from the human polycystic kidney disease 1 gene and found that breakpoints in the DNA generally occur near or in motifs capable of adopting non-B conformations. A search of 222 rearrangement breakpoints involved in human diseases revealed that tracts of DNA that adopt unusual conformations generally occur close to breakpoint junctions.

Most recently, Dr. Wells and his associates determined that the myotonic dystrophy triplet repeat sequence (CAG•CTG) can replace the polycystic kidney disease intron 21 sequence. "Thus, other simple repeating sequences

which can adopt other types of non-B DNA structures also have the capability of serving as a mutagen," explains Dr. Wells. "Hence the structures, not the sequences per se, are mutagenic." This research was published in *JBC Papers in Press* on October 15.

Other researchers have also found that large blocks of chromosome-specific repetitive sequences (LCRs) are fertile ground for recurrent DNA rearrangements associated with more than 40 human genomic diseases. For example, sequence analysis of constitutional translocation breakpoints between chromosome 22 and chromosomes 1, 4, 11, or 17 show the hallmarks of cruciform DNA. These LCRs have been associated with DiGeorge, velocardiofacial, conotruncal anomaly face and cat-eye syndromes.

Isochromosomes, abnormal chromosomes containing a duplication in a single chromosome arm, also contain LCRs and hence have a propensity to form cruciform DNA. Isochromosome 17 has been implicated in human neoplasia. Furthermore, the LCRs responsible for isochromosome 17 have also been implicated in deletions and duplications leading to, among other disorders, Smith-Magenis syndrome, and the Charcot-Marie-Tooth type 1 disease.

Male infertility due to interstitial deletions in the Y chromosome has also been linked to non-B DNA conformations. Most of the regions of the Y chromosome that are commonly deleted are located within an ~8 Mb interval that contains five large inverted repeats—sequences of identical composition on complementary strands. Cruciform DNA generally occurs at the inverted repeats. Breakpoints in this 8 Mb interval are strongly clustered around the inverted repeat spacers, suggesting a cruciform DNA-mediated mechanism for the deletions.

These biochemical studies and their profound medical consequences are reviewed in a minireview by Dr. Albino Bacolla and Dr. Wells, published in the November 12 issue of *JBC* (279: 47411-47414, 2004).

Although recent advances in scientific technology have contributed to the understanding of non-B DNA conformations in mutagenesis involved in genetic diseases, there is still much research that needs to be done. "This field is just in its infancy," says Dr. Wells. "The future directions will be to characterize a number of other diseases which are caused by recombination-repair at non-B DNA conformations. The current number of approximately 40 diseases will be greatly increased in the future. In addition, I predict that a number of new non-B DNA conformations will be discovered. In fact, approximately one new non-B DNA structure has been characterized every third year for the past 35 years." ❧



**LINCOLN'S INN  
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# Lincoln's Inn Fields Laboratories; At the Heart of Cancer Research UK

**C**ancer Research UK invested a record £213 million (\$389.5 million U.S.) in 2003 on research investigating the causes and improving the prevention and treatment of cancer. The charity's annual spending is up £20 million from 2003 and it aims to increase its funding by 7.5% in the current financial year. Cancer Research UK is Europe's leading cancer charity, dedicated to research into the causes, prevention and treatment of cancer. It supports the work of more than 3,000 scientists, doctors and nurses across the United Kingdom.

At the heart of this program is the Cancer Research UK London Research Institute, comprising the Lincoln's Inn Fields Laboratories in London and the Clare Hall Laboratories, just north of London in Hertfordshire. The Lincoln's Inn Fields Laboratories are located in a 10-storey research facility just north of the Thames at the western edge of the old City of London and neighbors include the London School of Economics, the Royal College of Surgeons and the Law Courts.

More than 30 research groups are based at the Lincoln's Inn Fields Laboratories, with a further 12 at Clare Hall.

## Nobel Laureates

In 1975 Renato Dulbecco, then Deputy Research Director of the Laboratories, shared the Nobel Prize for Physiology or Medicine for his work on the interactions between DNA tumor viruses and cells. In 2001 the Nobel Committee again honored the LRI with the award of a share of the Prize to Sir Paul Nurse, then Chief Executive of Cancer Research UK and a group leader at Lincoln's Inn Fields, and Tim Hunt, a group leader at the Clare Hall site, for their work on the cell cycle.

Research focuses on a number of different model systems and processes, with signal transduction and genome stability as two of the major underlying themes. The Laboratories also house a number of specialist support services including FACS, bioinformatics, mass spectrometry and proteomics, electron and light microscopy, peptide synthesis and DNA sequence analysis.

## LRI-flavored research

Peter Parker's Protein Phosphorylation Laboratory has been located at

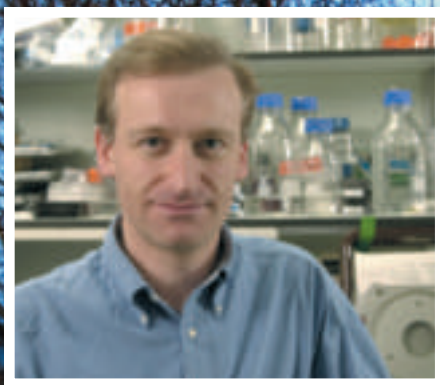
## Another top prize goes to British research

In 2002 Richard Treisman, the present Director of the London Research Institute, received Europe's most prestigious award for medical research, the Louis-Jeantet prize, for his work on how gene regulatory proteins are controlled by extracellular signals.



*Richard Treisman, Director of the London Research Institute.*





*Lincoln's Inn Fields Laboratories and Clare Hall. Insets: Julian Downward, Head of LRI's Signal Transduction Laboratory (left) and Dr. Peter Parker.*

Lincoln's Inn Fields for 14 years and has as its goal an understanding of cellular signaling networks in relation to the altered properties of transformed cells, using the PKC family as a paradigm.

The lab seeks, explains Peter, "To establish the means of assessing how these processes are altered in tumors and whether this is informative for prognosis or, more directly, whether intervention in a positive or

negative sense represents a rational approach to treatment. The critical feature of cancer is the deregulated behavior of cancerous cells, involving inappropriate responses to both external and internal cues. This reflects a series of cellular changes that allow cells to escape the limitations normally imposed by growth factor availability, cell-cell, cell-matrix contacts and cell cycle checkpoint controls.

"Physiologically, the decoding of this information is effected within cells through complex arrays of signaling proteins and there is abundant evidence that key elements within these signaling networks are dysfunctional in cancer. Such altered properties include both gain and loss of function, reflecting the diverse checks and balances normally operating to control and monitor cell division, cell survival and cell integrity."

Much of Dr. Parker's work has centered upon the way in which these controlling proteins are 'wired up,' in particular how the protein kinase C superfamily operates to control cell behavior and under what circumstances this is misappropriated in cancer. These studies have included definition of signaling networks in which PKCs reside, demonstrating that PKCa confers

### **Lincoln's Inn, Whence Came the Name?**

Execution site, sports-ground, fashionable abode and public garden, there is a grisly yet distinguished past to this London square. The leafy park is inseparable from Lincoln's Inn itself, with its ancient legal traditions, and modern pursuits.

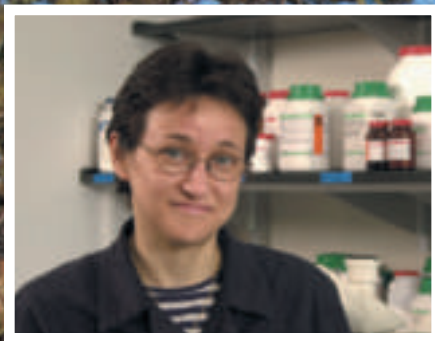
Lincoln's Inn's records go back to 1422, and there is some ground for saying that an ordinance of Edward I made in 1292 was in some part responsible for the founding of the Inns. That Ordinance placed both branches of the legal profession (barristers and solicitors, as they would be called today) under the control of the judges, and hastened the end of the clergy as lawyers in the King's courts.

It was probably early during the 14th century that the Inns first took shape. "Inn" (or "hospitium") then meant a town house or mansion, particularly a mansion used as a hostel for

students. Lincoln's Inn probably takes its name from Henry de Lacy, third Earl of Lincoln who died in 1311; and whose own great house lay a mere 400 or 500 yards away in Shoe Lane.

Whatever their origins, the Inns, when established, came to provide all that was needed for practice at the Bar. There were chambers to live and work in, a hall to eat and drink in, a chapel to pray in, and a library to consult books in. In 1565 the Benchers of Lincoln's Inn sought to preserve morals in the Inn by decreeing the exclusion of all laundresses and other female servants except those under 14 or over 40 years of age. These days, attitudes are no longer hidebound – in fact the largest employer in the square Cancer Research UK prides itself in being an entirely non-discriminatory employer, with staff originating from all over the globe, a far cry from the 16th century.





*Lincoln Inn Manor House. Inset: Dr. Dominique Bonnet joined the LRI three years ago.*

migratory properties through physical and functional interactions with b1-integrins and ERM proteins, and that PKCe confers signal-coupling efficiency to certain receptor classes. More recently the work has provided insights into how cell-matrix engagement profoundly influences function with consequences to those receptor pathways.

Julian Downward, who received his Ph. D. in 1986 from London University and did his postdoctoral work at the Whitehead Institute at the Massachusetts Institute of Technology, has been head of LRI's Signal Transduction Laboratory since 1989. Of his work, Julian says, "Cancer Research UK's London Research Institute provides an excellent interactive setting to work on fundamental aspects of the biology of cancer, with the support to start translating these findings towards the clinic. My laboratory has focused on the mechanisms by which proliferation and survival signals are transmitted into the cell and how they are inappropriately activated in cancers, especially the large number of human tumors that have mutations in the Ras oncogen."

Julian's laboratory has recently benefited from the ability of Cancer Research UK to rapidly invest in technological developments in functional genomics, such as RNA interference libraries. "These have enabled us to identify new genes involved in the formation and maintenance of tumors involving Ras, some of which may make good future therapeutic targets," Julian commented.

Understanding the processes that regulate the developmental program of normal stem cells and those that

initiate proliferative diseases such as leukemia remains one of the major challenges in cancer biology.

### **Translating research efforts**

Peter Parker is currently Vice-Chair of Cancer Research UK's Clinical and Translational Research Committee, which has a strategic role in developing this aspect of work across the whole charity. He also chairs the Translational Research in Clinical Trials Committee, which does what it says on the bottle – supports translational research in clinical trials. "This is a very important element of our work. It is clear that we need to extract every piece of information we can from our trials activities, to inform on those patients who are going to benefit from new treatment regimes. This affects the delivery of care, the quality of life of patients and, of course, the cost of care. The possibilities here are enormous and with the development of new analytical technologies there is the expectation that this will profoundly and increasingly influence cancer care," explained Dr. Parker.

The Institute (<http://intranet.cancer-researchuk.org/sites/lri/home/>) has close contact with Cancer Research UK's associated technology transfer company, Cancer Research Technology ([www.cancertechnology.co.uk/](http://www.cancertechnology.co.uk/)), which supports all elements of the charity's activities. Unusually for such technology transfer activities this includes an expanding Development Laboratory with, amongst other capabilities, a

small molecule screening facility and medicinal chemistry. "This proactive strategy recognizes the increasing need of the academic sector to bring novel therapeutics into clinical trials in order to attract pharmaceutical and biotech industry partners for their successful development and so fulfill the objective of delivering improved patient care," says Parker.

One such initiative that has grown out of a long-standing collaboration between Peter Parker's laboratory and that of Professor Mike Waterfield (a former London Research Institute Laboratory head who has directed the Ludwig Institute for Cancer Research in London for the last 18 years) led to the establishment of the biotech company PIRamed last year. The company is part-owned by the Institutes and is poised to test new agents in the clinic. "The long-standing effort on what is colloquially referred to as the PI3Kinase pathway has been a great example of co-operation between different cancer researchers, their respective institutes and the pharmaceutical industry," Parker commented. "The prospect of testing new and selective drugs targeting this pathway is very exciting. This is one of a number of new developments emerging from the Institute that promise much for the future."

# EXPERIMENTAL BIOLOGY 2005

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Dominique Bonnet, who joined the LRI three years ago, has a long-standing interest in haematopoietic stem cell biology. Dominique has a joint appointment at Bart's Hospital with close links to the Medical Oncology Group there.

Emerging evidence from stem cell biology studies support the notion that cancers contain a rare population of cancer stem cells that have maintained or re-acquired the capacity for indefinite proliferation through accumulated mutations and/or epigenetic changes. "Despite the clear importance of the leukemic stem cell (LSC) in the genesis and perpetuation of leukemic disease, little is currently known about the biological and molecular properties that make LSCs distinct from normal hematopoietic stem cells," Dominique explains. "We and others have shown that for most acute myeloid leukemia (AML) subtypes, the only cells capable of transplanting the disease in experimental models share a similar phenotype to that of normal hematopoietic stem cells, whereas more mature leukemic blast cells cannot transfer AML."

Further understanding of the differences between normal and leukemic stem cells should not only help in better understanding the process of leukemogenesis in AML, but at the same time pave the way for the development of new therapeutics more specifically directed against LSC. Therapies that are more directed against cancer stem cells might result in much more durable responses and even cures for patients suffering from this disease. ☞

## CALL FOR LATE-BREAKING ABSTRACTS

**Deadline for Submission:**

**Wednesday, February 9, 2005**

Late-breaking abstracts will be accepted for special poster sessions to be scheduled on Tuesday, April 5, 2005. Late-breaking abstracts will be published in an addendum to the meeting program. The addendum will be distributed at the meeting. Late-breaking abstracts will NOT be published in *The FASEB Journal* and are not citable.

Abstracts must be submitted at [www.faseb.org/meetings/eb2005](http://www.faseb.org/meetings/eb2005) with payment of \$90. Payment and abstracts must be submitted on or before Wednesday, February 9, 2005. The submission site will open on Monday, December 6, 2004.

**Abstract submission site: [www.faseb.org/meetings/eb2005](http://www.faseb.org/meetings/eb2005)**

**Abstract Submission Fee: \$90**

**Questions contact:**

Experimental Biology/IUPS 2005 Meeting Office

Phone: (301) 634-7010

Fax: (301) 634-7014

Email: [eb@faseb.org](mailto:eb@faseb.org)

For information about the meeting, including each Society's preliminary program, housing, and registration forms, please visit our official Web Site at

[www.faseb.org/meetings/eb2005](http://www.faseb.org/meetings/eb2005)

**Save Money! Register online by February 4 and make your housing reservations by February 21.**

by John D. Thompson, Editor

## French Biotech Group Calls for Increased Investment

France Biotech, a group that represents the nation's biotech firms, is expected to press for increased investment in its case for change in a series of discussions and debates as the French government prepares to draft legislation for a major overhaul of the country's national science strategy next spring. The industry's recommendations, made jointly with the pharmaceutical industry group Les Entreprises du Medicament, complement 24 proposals for reforming research that were put forward by French scientists in Grenoble month.

Philippe Pouletty, President of France Biotech, said that the scientific community in France had begun to

organize itself to lobby the government more effectively. "Scientists and entrepreneurs realize that they must take the initiative in their own hands," Pouletty told *The Scientist*. He said that the French government, media, and public had also come to understand the importance of science for the country's future.

The first recommendation from the biotech and pharmaceutical groups is that 60% of all the funds at the disposal of the new National Research Agency (Agence Nationale de la Recherche) should be allocated to the life sciences. The funds at the disposal of the agency could be as high as 1 billion (USD \$1.3 billion) each year,

although it will only be 550 million (USD \$710 million) in the first year.

Pouletty said that the National Research Agency had to use international criteria of scientific excellence to select projects, and channel funds to the best project, regardless of the establishment that the researchers belong to—the French Institute of Health and Medical Research, the National Center for Scientific Research, or universities.

The second recommendation is for the government to support moves to concentrate biotech clusters to two or three centers of excellence. "Only by stronger linkages between academic centers of excellence, startups, bigger companies, and investors, as in the U.S., can we reach the critical mass and excellence in key areas," said Pouletty. The result, he predicted, would make France very competitive with the best in other nations, in terms of human and financial resources.

The group also urged the government to support one or two large-scale French-European life science research projects because these would "prove exciting for researchers and public alike and promote breakthrough discoveries."

Michel Pucoat, from the French National Research Center's Macromolecular Biochemical Research Center in Montpellier, expressed his support for the proposals, saying, "I think that concentrating on two or three biotech clusters would have a beneficial effect on research."

France's biotech sector is currently ranked third in Europe behind Germany and the United Kingdom, which leads Europe with a biotech sector four times larger than France's.

### Vioxx Recall Hurt's Merck's Third Quarter Earnings

Its voluntary recall of Vioxx had a strong impact on Merck & Co. Inc.'s third-quarter earnings. The company reported net income of \$1.3 billion for that period, down had a billion from the period last year. For the quarter ending September 30, Merck had earnings per share of \$0.60, with a \$0.25 unfavorable effect from the recall in the third quarter. In the same period last year, the drug maker reported earnings per share of \$0.83. Sales still topped \$5.5 billion for this year's third quarter, but that was down from \$5.76 billion in the third quarter of last year.

Vioxx, used to treat arthritis and acute pain, was removed from the market after a clinical trial found its use increased the risk of heart attack

and stroke in patients, starting after 18 months of regularly taking the drug. From May 1999 to August 2004, Merck estimated that there were 105 million prescriptions for Vioxx written in the U.S., with some 20 million people taking the drug. Withdrawing Vioxx from the market affected quarterly net income by \$552.6 million and had a negative effect of \$491.6 million on sales, said Merck.

The Vioxx recall came on top of a reorganization plan instituted by Merck last fall, in the wake of a poor third-quarter. The company then aimed at trimming 4,400 jobs worldwide, in part due to the loss of patent exclusivity on products including Zocor, its popular cholesterol-lowering drug.



## Indiana Universities Urged to Put Research Before Undergraduates

Indiana and Purdue universities should enroll fewer undergrads and concentrate instead on becoming research hotbeds that could spur the state's economic growth, a new study suggests. That is the gist of a proposal currently being drafted by an independent panel appointed by the Indiana Legislature. If adopted this would mark a significant change in the state's higher education system.

The proposal calls for IU and Purdue to decrease undergraduate enrollment by becoming more selective, while boosting the number of graduate students on the main campuses. The panel also wants to beef up research capabilities at the two campuses and Indiana University-Purdue University Indianapolis. The panel, a six-member

group of business and education leaders, was also expected to call for improvements in the quality of the state's community college system, by putting more money into buildings and faculty pay. After nearly a year of study and work by a consulting firm, the full higher education report was expected to be made public November 11.

Thomas Reilly, Chairman of the Higher Education Panel of the Government Efficiency Task Force and also Chairman of Reilly Industries and a member of the College Affordability Task Force appointed by the state's General Assembly, told the *Indianapolis Star*, that it needs to award more bachelor's degrees at the state's other four-

year institutions — Ball State, Indiana State and the University of Southern Indiana. Those changes, he said, would not require additional state money for higher education, but a gradual shift in funding. IU and Purdue need to generate even more of their own funding through research, he said, and "almost become more privatized."

Indiana educates a higher percentage of its students at the two main research campuses than many other states, according to Stan Jones, Commissioner of the Indiana Commission for Higher Education. That, he said, creates higher costs, whereas other states rely on bigger two-year college systems to educate more students for less money.

## Bayer CropScience Opens Biotech Center in Belgium

Bayer CropScience recently inaugurated a new plant biotechnology innovation center in Gent, Belgium. The new facility is the BioScience business group's largest research facility dedicated to the development of plant biotechnology and seed products. Together with the firm's other research sites in France, the Netherlands, Germany and around the world it develops plant-based solutions for agriculture, nutrition, health, and biomaterials.

According to Friedrich Berschauer, Chairman of the Bayer CropScience Board of Management, the center marks an important milestone in Bayer's strategy. "Through the use of plant biotechnology and modern breeding," he stated, "plants will be enhanced to increase the quantity and quality.

## UNC, RTI Team Up to Woo Military

The University of North Carolina system and RTI International are pursuing a partnership with the Pentagon, defense contractors, and others to create a potentially vast industry for the state: biotechnology-related military products.

Research Triangle Institute, a non-profit Research Triangle Park company experienced with government contracts, is scouting sites in the Triangle for what will be known as the North Carolina DoD Initiative, said Robert Helms, who leads RTI's role in the initiative. Helms plans to present business plan to Pentagon officials this month.

The initiative's planned campus would be home to unusual research and development teams that would include members of the military, academia, major defense contractors, pharmaceutical companies and others. These teams would operate

"skunkworks" fashion in an intense atmosphere with few rules to bring products into production at a pace matching the rapid advances in biotechnology. The best-known skunkworks, that at Lockheed, gave birth to the F-117 Nighthawk stealth fighter and other unusual aircraft.

The military is expected to require some of the extraordinary products that biotech promises, such as drugs developed quickly to fight exotic new diseases and combat uniforms that diagnose illness, close wounds, or change color to match surroundings. However the Pentagon's purchasing system can't respond fast enough to take advantage of advances in the field, according to Helms said.

North Carolina has the nation's third-largest biotech industry, with 180 companies and a workforce of 21,000, according to RTI.

# Nanotechnology: The Next Medical Revolution?

By John D. Thompson, Editor

**T**hat was the question raised at an American Chemical Society briefing in late September by the Science and the Congress Project. The session looked at a wide range of emerging technologies in the areas of both biotechnology and nanotechnology, coining the word nanobiotechnology to describe the fusion of the two.

Under Secretary of Commerce for Technology Phillip J. Bond moderated the panel which featured speakers Theodore Poehler, Vice Provost for Research at Johns Hopkins University, and Karl Sanford, Vice President of Technology at Genencor International. The speakers made presentations on the worldwide market for nanotechnology-derived goods which is expected to reach \$1 trillion by 2015, with up to one third of the new technologies developed from advances in both the nano and bio-revolutions.

Bond started by defining nanotechnology as the science of the very small, able to manipulate individual atoms and molecules that enable the creation of material and structures from the bottom up, building machines on the scale of human cells. He said the administration was committed to the development of nanotechnology, noting that 21 federal agencies with a current combined budget of approximately \$1 billion had, in the past four years, committed \$3 billion to nanotech research.

An important driver that is moving the field to real applications is the federal National Nanotechnology Initiative (NNI). Officially set up in 2000, the initiative provides a long-term R&D focus

for nanotechnology and coordinates federal government efforts in this area. NNI funds research on fundamental science and engineering, on targeted R&D on a set of nine "grand challenges," and on the societal impacts of nanotechnology. The initiative also supports 17 centers of excellence that conduct broad multidisciplinary research within a host institution and seven user centers for the development of infrastructure, instrumentation, standards, and computational capabilities that can be used by the research community.


"Nanotechnology," Bond predicted, "may well become a second Industrial Revolution—a revolution built literally from the atomic level up. Almost every industry in the global economy will be impacted by this smallest of all technologies."

"Perhaps most striking to me," said Bond, "is the news that nanomanufacturing is coming to Danville, in rural southwest Virginia," where Luna Innovations is investing \$6.4 million to establish a facility there for the production of cost-effective, carbonaceous nanomaterials such as buckyballs and carbon nanotubes for R&D in both the military and commercial areas. His premise is that if nanotechnology has made it to Danville, nanotechnology and nanotechnology-related jobs and economic growth is not science fiction but economic reality.

Bond predicted that the worldwide market for nanotechnology-related products, now \$300 billion, will reach \$1 trillion by 2015 and play a key role in the next generation of medical advances. These will include new diagnostics that will conduct cancer at the

atomic level and result in targeted pharmaceuticals.

Johns Hopkins' Ted Poehler told the audience that nanomaterials and devices are expected to revolutionize the medical, plastics, energy, electronics and aerospace industries, and that nanobiotechnology holds promise for biomimetic nanostructures, biological nanostructures, devices for the early detection of disease and well as tissue engineering. In the future, drug production, discovery and delivery might be made through nanoparticle materials, directing site-specific medicine and sensors.

Genencor International's Karl Sanford's look at nanotechnology includes a commercial point of view. Billed as "a different kind of biotechnology company," Genecor started in 1982 and as a catalyst for the bio-based economy with biochemicals, bioenergy and biomaterials, and an emerging leader in nanobiotechnology. The company is currently developing a biosensor product line designed to deliver precise and accurate sensing products for consumers that can be used in the prevention, detection, diagnosis, and treatment of disease. 

**What will be the role of biochemists and molecular biologists in Nanotechnology: The Next Medical Revolution?**

**That question was not addressed in this meeting, so we are asking ASBMB members for their thoughts on this topic. Just email your comments to [jthompson@asbmb.org](mailto:jthompson@asbmb.org)**

# Career Opportunities

## BIOCHEMIST

The Department of Biology of the University of New Brunswick seeks applicants for a tenure track position in Biochemistry. The successful candidate will be expected to develop a strong research program examining biochemical processes in any biological system.

Since this position is central to the Biology-Chemistry degree program, the candidate will be expected to teach a core biochemistry course and to develop other courses in support of this program. A PhD is required and post-doctoral experience is strongly preferred.

Information about the Biology Department can be obtained at [www.unb.ca/fredericton/science/biology](http://www.unb.ca/fredericton/science/biology). All qualified applicants are encouraged to apply, however, Canadian and permanent residents will be given priority. The University is committed to the principle of employment equity.

The closing date is 1 February 2005, or whenever a suitable candidate is found. To apply, send a letter describing your research and teaching interests, a curriculum vitae with the names and addresses of three referees, three representative publications, and a statement of teaching philosophy to:

S. Heard, Chair, Dept. of Biology,  
University of New Brunswick, Mail  
Bag Service #45111, Fredericton, N.B.  
Canada, E3B 6E1.

Applications may also be submitted electronically to [biochair@unb.ca](mailto:biochair@unb.ca).

## Place your Career Ads in *ASBMB Today*

Recruitment advertising is available in *ASBMB Today* for \$12 per line, 10 line minimum. Copy is due by the first of the month prior to the issue month. For recruitment advertising information call Veronica at FASEB AdNet, 800-433-2732 ext. 7791 or 301-634-7791, email: [adnet@faseb.org](mailto:adnet@faseb.org)

Display space is also available for those desiring greater visibility.

## FACULTY POSITION

### Kansas State University

The Department of Anatomy and Physiology in the College of Veterinary Medicine invites applications for a 12-month, tenure-track **Assistant or Associate Professor** position beginning July 1, 2005. We seek an individual who will contribute to a team-taught pharmacology course in the D.V.M. curriculum. Areas of teaching expertise should include pharmacokinetics, and antimicrobial therapy. In addition, this individual will be expected to lead an initiative in curriculum development in veterinary pharmacology. This position also requires the development of an active research program that will compliment the research strengths within the department and college. Active research programs in the department are focused on cell and molecular physiology, neuroscience, cardiovascular and respiratory physiology, molecular pharmacology, and immunophysiology (**website:** <http://www.vet.k-state.edu/depts/ap/index.htm>).

Collaborative teaching and research opportunities exist between college departments, including the Veterinary Medical Teaching Hospital which is a full service veterinary hospital providing routine, specialty and emergency care. Applicants for an **Associate Professor** rank must have an outstanding record of teaching expertise and research productivity. D.V.M. and/or Ph.D. or equivalent are required. Applicants should submit curriculum vitae, selected reprints, statement of research and instructional interests, and three letters of reference to

**Dr. Mike Kenney, c/o BJ Thompson, Department of Anatomy and Physiology, Kansas State University, 228 Coles Hall, Manhattan, KS 66506-5602.**

Electronic submission of application is encouraged and should be sent to Dr. Mike Kenney at [bthomps@vet.k-state.edu](mailto:bthomps@vet.k-state.edu). Review of applications will begin on February 1, 2005 and

continue until the position is filled.

*KSU is an Equal Opportunity Employer and actively seeks diversity among its employees.*

## WEST VIRGINIA SCHOOL OF OSTEOPATHIC MEDICINE

### Biochemistry Position Available Assistant/Associate Professor

The Division of Functional Biology of the West Virginia School of Osteopathic Medicine invites applications for a tenure-track position. The successful applicant must have a Ph.D. in Biochemistry/Molecular Biology expertise (or willingness to develop expertise) in Nutrition preferred. Experience with development of Web-based teaching material is a plus.

The successful applicant will team teach first and second year medical students in the traditional curriculum's biochemistry course, will serve as a facilitator in the problem-based curriculum, and will perform other academic administrative duties (for example, course/system coordinator) as assigned. Mode of professional development is flexible; some research opportunities are available.

Salary and rank commensurate with experience and includes excellent fringe benefit package.

For a unique opportunity to really make a difference, qualified applicants may apply by submitting a current resume, including statements of teaching experience and research interests, and three letters of professional references to: Chairperson, Biochemistry Search Committee, C/O Personnel Office, Box S, WVSOM, 400 North Lee Street, Lewisburg, WV 24901. Applications accepted until position is filled.

*The West Virginia School of Osteopathic Medicine is an Affirmative Action/Equal Opportunity Employer and encourages applications from all protected classes.*



# Calendar of Scientific Meetings

## DECEMBER 2004

### American Society for Cell Biology, 44th Annual Meeting

December 4–8 • Washington, DC  
Ph: 301-347-9300; Fx: 301-347-9310  
Website: <http://www.ascb.org/>

## MARCH 2005

### CSBMCB Sponsored Meeting on Cellular Dynamics

March 16–20 • Banff Centre, Banff, Alberta, Canada  
This Canadian Society of Biochemistry, Molecular and Cellular Biology sponsored meeting will feature cutting-edge sessions on Nuclear structure, Organelle Inheritance, Imaging Technologies, Protein Folding, mRNA Localization, Organelles of the Secretory Pathway and Systems Approaches to Cell Biology. Keynote Speaker will be Günter Blobel.  
Meeting organizer: Email: [rick.wozniak@ualberta.ca](mailto:rick.wozniak@ualberta.ca)  
Website: [www.csbmcb.ca/2004Meeting/index.html](http://www.csbmcb.ca/2004Meeting/index.html)

### Horizons in Molecular Biology Decoding Nature: Hierarchy of Interactions

March 17–19 • Max-Planck Institute for Biophysical Chemistry in Göttingen, Germany  
Email [gpmolbio@gwdg.de](mailto:gpmolbio@gwdg.de)  
Website: [www.horizons.uni-goettingen.de](http://www.horizons.uni-goettingen.de)

## APRIL 2005

### American Society for Biochemistry and Molecular Biology Annual Meeting in Conjunction with EB2005

April 2–6 • San Diego  
Nobel Laureates Michael S. Brown and Joseph L. Goldstein will open the ASBMB Annual Meeting with the Herbert Tabor/Journal of Biological Chemistry Lecture.  
Contact: ASBMB 2005, 9650 Rockville Pike, Bethesda, MD 20814-3008; Ph: 301-634-7145; Email: [meetings@asbmb.org](mailto:meetings@asbmb.org)  
Website: [www.asbmb.org/meetings](http://www.asbmb.org/meetings)

### The 46th ENC Experimental Nuclear Magnetic Resonance

April 10–15 • Rhode Island Convention Center, Providence, Rhode Island  
Contact: ENC, 2019 Galisteo Street, Building I Santa Fe, New Mexico 87505 (USA); Ph: 505-989-4573  
Fx: (505-989-1073; E-mail: [enc@enc-conference.org](mailto:enc@enc-conference.org)  
Website: [www.enc-conference.org](http://www.enc-conference.org)

## MAY 2005

### 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](mailto: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  
The half-century long success story of genetics and genomics has had and will continue to have a profound impact on society. It is time to recall how the science of genetics has evolved, and modified several fields of society such as medicine, law, ethics, behaviour. Taking advantage of the 40th anniversary of the Nobel prize awarded to a team from the Pasteur Institute, the French Society for Genetics has invited prominent geneticists, historians and philosophers to address these issues. Contact: Christophe Schwob  
Ph: +33 4 95 09 38 00; Fx : +33 4 95 09 38 01  
Email : [c.schwob@mcocongres.com](mailto:c.schwob@mcocongres.com)  
Website: [www.genetogenome.org](http://www.genetogenome.org)

## 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](mailto:pbmb@iastate.edu)  
Website: [www.bb.iastate.edu/~gfst/phomepg.html](http://www.bb.iastate.edu/~gfst/phomepg.html)

### Glycoproteomics—Protein Modifications for Versatile Functions

June 28–30 • Dubrovnik, Croatia  
For information: Email: [glauc@pharma.hr](mailto:glauc@pharma.hr); Ph: 385 1 4818 757  
Website: <http://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](mailto:incoming@chemoltravel.hu); [www.febs-iubmb-2005.com](http://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](mailto:biotrans2005@tnw.tudelft.nl)  
Website: [www.biotrans2005.bt.tudelft.nl/](http://www.biotrans2005.bt.tudelft.nl/)

### BioScience2005 - From Genes to Systems

July 17–21 • Glasgow, UK

Focus topics for the meeting: Cell architecture: from structure to function; The nucleus: chromatin, recombination and repair; Cellular information processing; Proteins in disease; Stem cells and development. Plenary speakers include: Robert J. Lefkowitz, Wolfgang Baumeister, P. Leslie Dutton, Walter Kolch, and David Stuart. 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](mailto:info@BioScience2005.org); [www.BioScience2005.org](http://www.BioScience2005.org)

## 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](mailto:gert.lubec@meduniwien.ac.at)  
Ph: 0043.1.40400 3215; Fax: 0043.1.40400 3194  
Website: <http://fens.mdc-berlin.de/calendar/?id=485&action=read>

## SEPTEMBER 2005

### 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](mailto:ag24@gen.cam.ac.uk)  
Website: <http://www.gen.cam.ac.uk/sens2/CSBMCB>

### 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](mailto:relatenz.umcc@umcc.cu)  
Website: [www.umcc.cu/EnzymeTechnology/relatenz.htm](http://www.umcc.cu/EnzymeTechnology/relatenz.htm)

## Department Heads Take Note:

# ASBMB Offers Free Membership to New Ph.D.s

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

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

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

Membership at ASBMB  
American Society for Biochemistry  
& Molecular Biology  
9650 Rockville Pike  
Bethesda, MD 20814  
Email: [membership@asbmb.org](mailto:membership@asbmb.org)

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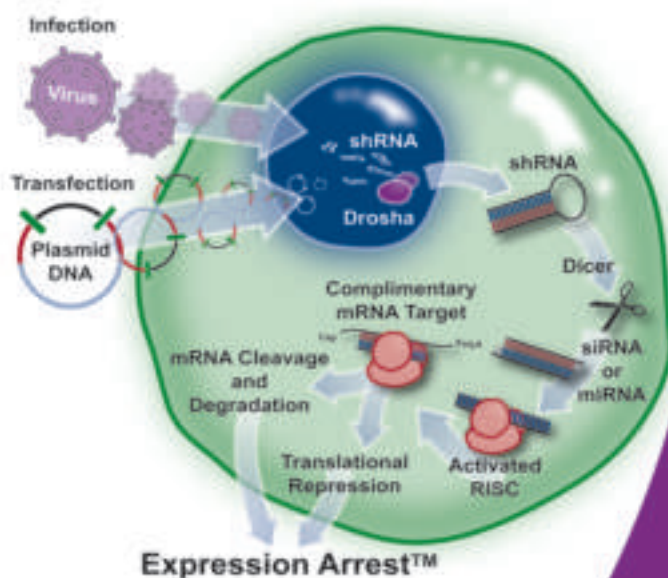
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