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ASBMB Today

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features

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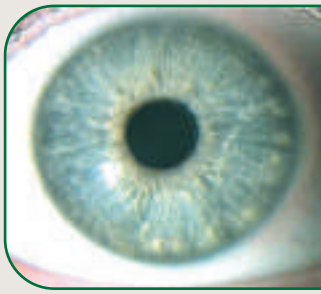

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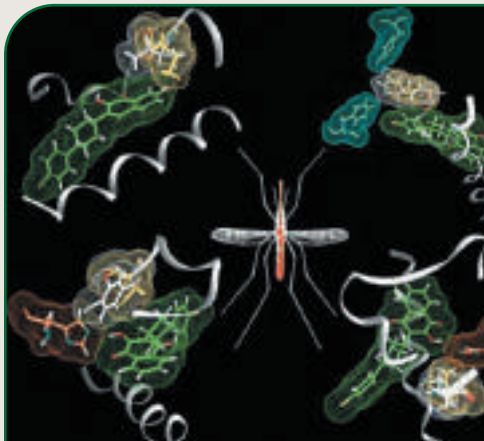

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Comments

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'Intelligent Design' Does Not Belong in the Science Classroom

President George W. Bush commented on August 3, 2005, that he believes that "intelligent design" should be taught in American science classrooms alongside evolution as competing theories. Injecting un-testable beliefs about the origin of species, especially Homo sapiens, into science classrooms confuses the distinction between theology and science, to the detriment of both. Scientists need to define clearly their goals in understanding the "what and how" of natural phenomena, and recognize that science does not address the spiritual or mystical "why" of natural phenomena.

Russel Wallace and Charles Darwin in the 19th century described continuous changes and adaptations of plants and animals to better fit a particular niche or environment. There are numerous examples of changes in the flora and fauna, including extinction of species, after natural disasters and introduction of new species that overwhelm an endogenous species. The "what" of evolution is based upon observed fact. The "how" of evolution has been the focus of continuing study. Darwin proposed 'Natural Selection,' with 'survival of the fittest,' as the process for evolution. Sewell Wright proposed an additional process for evolution within a species, genetic drift, in which the small population that settles in a new location or survives a disaster is not necessarily representative of the parent population. Genetic variation in a population may arise through recombination and reassortment to produce new configurations of genes, or existing genes may be modified by mutation. Moreover, genes can be transferred from one species to another. Not all mutations result in a detectable change in appearance or function of a cell or organism. Moto Kimura argued that these neutral mutations could play a role in evolution. The issue that scientists disagree about is not the "what" of evolution, but the "how" of evolution, that is, the relative importance of various sources of genetic variation and the driving factors.

The scientific process does not address the "why" of evolution or the "why" of any other natural phenome-

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Tell Us What You Think

We appreciate receiving letters that are suitable for publication regarding issues of importance or commenting on articles appearing in *ASBMB Today*. Letters should be sent to the editor, John Thompson, at the address found at left. Letters must be signed and must contain the writer's address and telephone number. The editor reserves the right to edit all letters.

Dr. Judith Bond

'Science is Fun' at the FEBS/IUBMB 2005 meeting in Budapest

The 30th Federation of European Biochemical Societies (FEBS) Congress and the 9th International Union of Biochemistry and Molecular Biology (IUBMB) Conference was held 2 to 7 July in Budapest, Hungary. There was a refreshing spirit that ran through the meeting organized by our Hungarian hosts (Péter Friedrich, President of the Congress, and Peter Csermely, Chair of the Organizing Committee) that emphasized that science is a creative enterprise, and that science is fun.

The meeting, held on the grounds of Eötvös Loránd University, was attended by 2,646 persons from 89 countries. Students made up 34% of the participants, 39% were women, and 13% were from Asia. Although only 11% of the attendees were from America, they made up 24% of the 321 speakers from 32 countries. The National Science Foundation provided funds for ten young U.S. investigators to participate in the meeting. The scientific oral and poster presentations were well attended. The science focused on the 'The Protein World,' and spanned the full range of biochemistry and molecular biology. Plenary lectures included protein misfolding and human disease, ribosome structure, molecular mechanisms of bacterial swimming and tumbling, and complex networks in metabolics and systems biology.

There were a number of unique features at the meeting, including participation by 150 high school student researchers who served as guides, translators and general ambassadors. These students belong to the FEBS-sponsored Network of Youth Excellence program, and were readily recognized by their yellow T-shirts. Another special feature of the meeting was Pub Tours that matched each of 20 speakers with 6 to 12 young scientists.

There was a continuing infusion of the Arts throughout the meeting, with one day focusing on paintings, another on sculpture, and another on building molecular models. Elena Kameneva won the protein painting contest with her work "Angel of Immunology."

The protein sculpture contest was won by the team making the "Dragosome", a proteasome-dragon consuming an unfolded protein-like feature with a poly-ubiquitin chain. Both works remain on display at the Museum of the Faculty of Science. The opening session included an impressive display of sand painting by Ferenc Cakó, a well-known Hungarian artist, in which one representation was replaced by another against a background of rousing music depicting the evolution of life on earth. Local artisans demonstrated contests between armored knights of the Austro-Hungarian Empire along the banks of the Danube River.

The conference banquet was an evening riverboat cruise up and down the Danube, under the many bridges connecting the city of Pest and the city of Buda. Along the banks were the Parliament Building, a twin of the Parliament Building in London, St. Stephen's Cathredral, and much more. There was a colorful display of traditional Hungarian folkdances and music.

Our ASBMB Executive Officer, Barbara Gordon, recruited new members and promoted all the Society's journals, Ralph Bradshaw promoted MCP, and I promoted the centennial and the April 2006 meeting in San Francisco. The IUBMB and the other ASBMB (Australian Society for Biochemistry and Molecular Biology) are celebrating their 50th anniversary, and the Argentine Society for Biochemistry and Molecular Biology (SAIB) is celebrating its 40th anniversary.

The meeting successfully brought colleagues together from all over the world, highlighted exciting new developments, welcomed trainees and other aspiring scientists and brought them together with experienced, accomplished scientists in formal and informal settings. Our Hungarian colleagues were wonderful hosts. The experience brought to mind a poem written by one of our great American poets, Carl Sandburg, who wrote:

Happiness

I asked professors who teach the meaning of life to tell me what is happiness.

And I went to famous executives who boss the work of thousands of men.

They all shook their heads and gave me a smile as though I was trying to fool with them.

And then one Sunday afternoon I wandered out along the Desplaines River

And I saw a crowd of Hungarians under the trees with their women and children and a keg of beer and an accordion.

Judith Bond
President, ASBMB

For Photos of meeting in Budapest, see page 14.

by Peter Farnham, CAE, ASBMB Public Affairs Officer

ASBMB Takes Issue With President's Comments on 'Intelligent Design'

In an August 4 letter to President Bush, ASBMB President Judith Bond took issue with his August 1 comments to a group of reporters visiting Bush's Crawford, Texas, ranch that he supported teaching the idea of "intelligent design" in science classrooms.

"It is disappointing," Dr. Bond stated, "that you would speak favorably of teaching an idea in science classrooms that would only diminish the quality of science teaching in the United States." She added that poor science teaching has helped create a domestic labor market that is so short of technologically competent workers that American business has to rely increasingly on foreign labor.

> *"Intelligent design is not a scientific concept."*
>
> —Dr. John Marburger

Dr. Bond continued that "'intelligent design' is not a theory in the scientific sense, nor is it a scientific alternative to the theory of evolution. The theory of evolution has survived rigorous scientific scrutiny ever since it was promulgated in the mid-19th century, and is now recognized as one of mankind's greatest intellectual achievements."

"The overwhelming majority of scientists, including many who are people of faith, strongly support teaching the theory of evolution as how life developed on earth. Injecting untestable explanations for this highly complex phenomenon into science classrooms

Continued on next page

Senate Stem Cell Vote on Hold until Fall

Congress left Washington for its traditional August recess with one important piece of business unfinished-resolution of the stem cell issue. While delay in its resolution is often a sign that a policy proposal is in trouble, just the opposite is probably the case with stem cells; so the postponement of a vote in the Senate until after Labor Day may actually be a good sign for supporters of stem cell research (of which ASBMB is one).

The House passed the Castle/DeGette bill, H.R.810, on May 24, garnering 50 GOP votes along with almost all of the Democrats. This was a somewhat surprising turn of events, given that the House had voted overwhelmingly inn the previous two congresses to ban human embryonic stem cell research (although similar proposals died in the Senate). The Castle/DeGette bill would allow federal funding for embryonic stem cell research conducted using left-over human embryos at fertility clinics. It is estimated that about 400,000 such embryos currently exist, and very few of these will ever become infants. Most will languish in cold storage for some period of time before being disposed of.

The bill extends President Bush's policy, adopted August 9, 2001, of allowing federal funding of research only on stem cell lines that existed as of that date. It is now widely known that only about 22 such lines exist; at the time, it was thought that over 70 such lines existed.

On to the Senate…

Upon House passage, the Castle/DeGette bill was sent to the Senate for its consideration and a vote was expected soon thereafter. It was widely assumed that the bill would pass handily; some supporters were even predicting that it would pass by a veto-proof margin (that is with at least 60 votes). But Senate opponents of the Castle/DeGette bill began introducing a series of bills that would legalize "alternative" stem cell research techniques that would not harm human embryos. None of the techniques described in these bills has been proven however, leading many observers to conclude that they were being offered in an attempt to peel supporters away from the Castle/DeGette bill to keep it from passing. It was unclear that this strategy would work; however, the strategy delayed a final resolution of the issue until after the August recess.

In spite of this minor roadblock, supporters continue to believe the Castle/DeGette bill will pass the Senate handily when it comes to the floor, probably in September. Its chances for passage were enhanced by Senate Majority Leader Bill Frist's recent conversion to supporting increased embryonic stem cell research (he had supported the President's policy earlier).

Thus, if all goes as expected, a stem cell bill will probably be presented to President Bush for his signature sometime early in the fall. Unfortunately, he is expected to veto it, and while the Senate might override the veto, it is difficult at this time to see where the votes to do the same are going to come from in the House. Nevertheless, this would force the President to cast the first veto of his Presidency, and would likely serve to energize stem cell research and its supporters.

We will keep you informed of progress on this bill upon Congress' return after Labor Day. Keep an eye on the "What's New" section of the ASBMB website in the meantime-if any news breaks before the next issue of this magazine, you will find it there.

'Intelligent Design' continued …

Continued from previous page

only confuses the distinction between theology and science, to the detriment of both."

"The fundamental observation that species evolve through extinction, and replacement by new species, is well documented in both geologic and recorded history," Bond told ASBMB Today. "A belief that some unknown intelligence created life on earth cannot be tested, and therefore is not science." Dr. Bond said that teaching the idea of "intelligent design" in a religion or philosophy class might be appropriate, but that it had no place in a science classroom.

In clarifying comments the day after the President's remarks, his science adviser Dr. John Marburger, said in an interview with the New York Times that "evolution is the cornerstone of modern biology" and "intelligent design is not a scientific concept." He also said that it would be over-interpreting President Bush's remarks to conclude that Bush meant that intelligent design should be placed on an equal footing with evolution.

The full text of Dr. Bond's complete letter to the President is posted on the public affairs page of the ASBMB website.

Molecular Models Advance the Fight Against Malaria

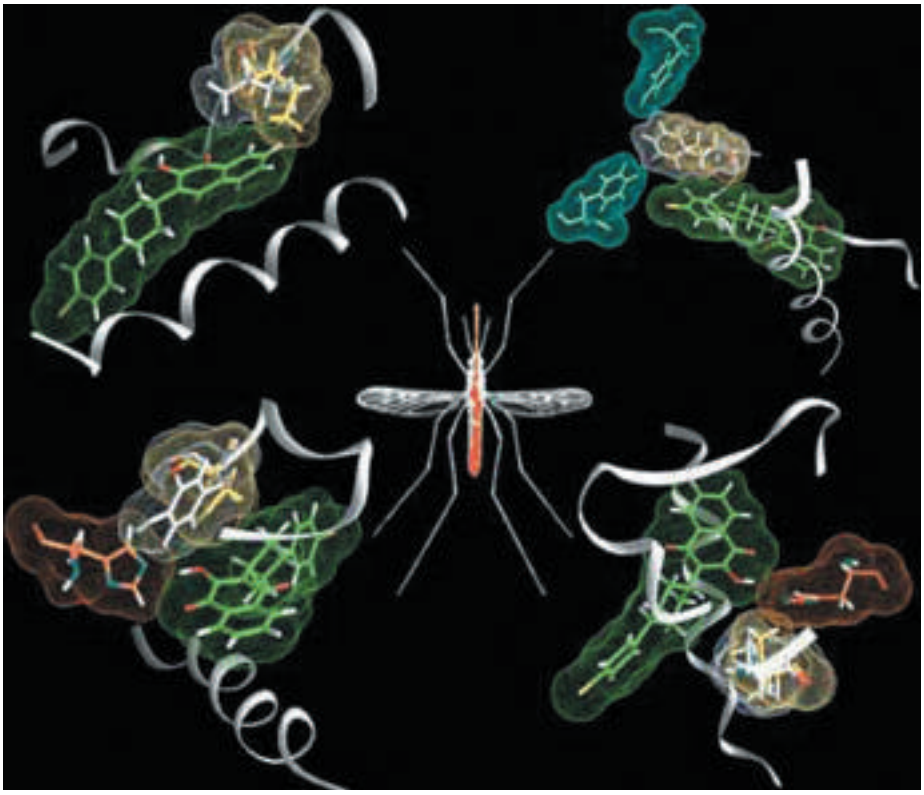
Research from Dartmouth Medical School, demonstrating how malaria parasites mutate to become resistant to drug therapy, may hold the key to a new treatments for a disease that afflicts more than half a billion people worldwide.

The scientists developed disease models by reconstructing a malarial enzyme pathway in yeast and then successfully introduced five mutations that make malaria resistant to the anti-malarial drug, atovaquone. The study, featured as the cover story of the April 29 *Journal of Biological Chemistry*, paves the way for using these models to test new drugs that could suppress malaria's ability to mutate against current therapy.

"This is the first quantitative explanation for malaria's drug resistance," said Dr. Bernard Trumpower,* Professor of Biochemistry at Dartmouth Medical School and head of the study. "In addition to confirming the belief that the resistance was due to these mutations, we have created a practical research tool to design new, improved versions of the drug using these resistant strains."

Malaria, transmitted by *Plasmodium falciparum*, a parasite carried by mosquitoes, has developed resistance to almost every anti-malarial drug introduced in the past 30 years. Although atovaquone is one of the most recent drugs on the market, there is significant evidence that malaria parasites are quickly developing resistance to that drug as well. According to WHO estimates, 40% of the world's population are currently at risk of the disease and approximately 2 million people, mostly children, are killed by malaria annually worldwide.

Dr. Bernard Trumpower



A mosquito, the vector of the malaria parasite, is surrounded by four molecular models that show how the antimalarial drug atovaquone loses potency against emerging resistant strains as binding of atovaquone (green) is modified by mutations in cytochrome.

Investigating ways to counter the mutations and sustain the efficacy of anti-malarial drugs, Trumpower and his colleagues continued their work on previous studies using yeast enzymes to explore atovaquone resistance. It is not possible to grow enough malaria parasites to isolate and study the respiratory enzyme cytochrome bc1 complex, which the parasites need to live and multiply. A protein subunit of the bc1 complex is where the malaria parasite mutates to counter anti-malarial drug therapies. Yeast is an effective resource because it can be safely grown in large quantities and can be easily modified to take on the qualities of more dangerous pathogens, without risking human infection.

When the researchers genetically transferred mutations into the yeast surrogates, the yeast acquired resistance to atovaquone just as the malaria parasites had done. The team was then able to apply computerized modeling techniques to illustrate exactly how the drug interacted with the cytochrome bc1 complex on a molecular level. With this new understanding of how the parasites were able to counter the effects of atovaquone, researchers can now design new anti-malarial drugs with features that just may prevent the appearance of drug resistance more unlikely.

"Within the next three to five years, we hope to develop a new drug that will finally empower us to treat this terrible disease," said Trumpower.

** ASBMB member*

Letter continued ...

Continued from page 2

non. Scientists are prone, when extending the description of "how," to equate erroneously proposed mechanism with "why." By-in-large scientists emphasize the "what and how" of nature, based upon evidence for the synthesis of propositions that allow prediction of future outcomes, whereas fundamental religious adherents have a belief system depending upon spiritual or mystical authority.

Although religious advocates such as Christian creationists and intelligent design proponents are primarily concerned about "why" they also propose to advance their belief as to "how." The dichotomy of evidence based "what and how" of the scientist and the "why" of the religious devote are comfortably accommodated by the same individual because they address different spheres of intellectual and emotional activity. Indeed, many scientists readily accept their traditional belief system while zealously extending our knowledge of "what and how" of natural phenomena. Evolution is an observable fact, one in which naturalists have described the "what" and probed the "how," but cannot and do not offer an explanation of "why." Science is an evidence-based process that continuously extends understanding of natural phenomena, whereas religion is a faith-based system to explain "why." Science has little to offer as to "why" natural phenomena occur, as distinct from the mechanism of "how" they occur. Religion, on the other hand, has little to offer on the "what and how" of natural phenomena. It may be deemed appropriate to teach "intelligent design" in a philosophy class or a class devoted to world cultures and societies, but the science classroom is not the place to offer instruction on the concepts of "why" as interpreted by the doctrines of Buddhism, Christianity, Confucianism, Hinduism, Judaism, Islam, Shintoism, and other belief systems.

Gaylen Bradley, PhD
Penn State University College of Medicine

China Trip Praised

I was very glad to read the paper "ASBMB Goes to China" published in the July issue oif ASBMB Today.

It is a very good summary of the ASBMB Delegation's China trip, and also a very good introduction about biochemistry and molecular biology in China. All the photos are excellent, and made me recall the wonderful time spent with the delegation a few months ago.

One thing that I think is a mistake is the explanation for the photo on page 2. This is a photo of the ASBMB Delegation with Peking University, not with China National Center of Biomedical Analysis.

Prof. Xiaohong Qian
China National Center of Biomedical Analysis, Beijing

'Discussion Draft' of NIH Reauthorization Bill Surfaces, Barton Seeks Comment

by Peter Farnham, CAE, ASBMB Public Affairs Officer

A "discussion draft" of a reauthorization bill for the National Institutes of Health has been circulating since June in the life sciences community as House Energy and Commerce Committee Chairman Joe Barton (R-TX) made clear his intention this spring to pass such a bill in this Congress. The Energy and Commerce Committee is the NIH's authorizing committee in the House, which gives it oversight authority over policy decisions at the NIH.

Authorizations versus Appropriations

An authorization bill, in effect, gives congressional permission for an agency to exist. These bills differ from appropriations bills in that they do not give money to the agency; however, they do specify policy issues (which appropriations bills are not supposed to do) and also indicate the maximum amount of money an agency is allowed to receive. An authorization bill typically covers a period of three to five years.

Since the last NIH reauthorization bill was signed into law in 1993 (and expired in 1996), one might be forgiven for asking how the NIH has been able to exist the last nine years. First, NIH is permanently authorized by the Public Health Service Act. Second, Congress has been reluctant to write a new reauthorization bill addressing other issues besides NIH's legal right to exist because of the likelihood that contentious issues such as abortion and controversial research would have to be dealt with, causing a fight that the congressional leadership did not want to take on. Finally, as in all aspects of congressional business, waivers and exceptions are always possible. Consequently, the appropriations committees have taken over as de facto "authorizers," making policy decisions in appropriations bills over the years as well as supplying the agency with money.

However, Barton has concluded—not without some justification—that the authorizing committees have allowed too much of their power to gravitate to the appropriations committees; so he hopes to reassert his committee's authority over NIH through passage of a new authorization. He also cited the need for improved management at the agency given the large increase in its budget, almost $29 billion from the 1998 to 2003 doubling campaign.

Director Gets New Powers

As a review of the "discussion draft" shows, the changes Barton proposes are dramatic. In general, the draft gives the NIH director considerable more authority, including the ability to reorganize or abolish institutes and to transfer money between them—NIH Director Elias Zerhouni suggested that up to 5% of an institute's budget should be transferable during a hearing on the draft bill—for crosscutting scientific work.

The draft bill also freezes the number of institutes and centers at 24, and removes the current practice of appropriations going specifically to each institute; rather, the Director would be given authority to allocate funds to the institutes from two pots of money, one for "mission specific" institutes and the other for "science enabling" institutes. While a 2003 Institute of Medicine report—the recommendations of which were supported by former NIH Director Harold Varmus—called for a reduction in the number of institutes, the reorganization scheme proposed in the draft is meeting considerable resistance in the broader community. Advocates for specific institutes and the diseases they focus on are concerned that their diseases will attract less interest and thus fewer research dollars if their institutes are eliminated or merged.

The bill also creates a new division within the director's office—the Division of Program Coordination, Planning, and Strategic Initiatives. This division would have the power to finance research, although the bill does not specify the new division's funding level. In fact, many funding levels in the bill are unspecified, with blank spots left in the draft language. Committee staff, however, has assured that these will be filled in before the bill is introduced.

Prospects in Senate

It was thought earlier this summer that a draft bill would be introduced in early July. However, we are now expecting to see a revised draft addressing some of the criticisms the community has had; this has not been circulated as of this writing. In addition, prospects for this legislation in the Senate are less than positive. No

Continued on page 11

Scientists Find Scissor-like Enzyme Matriptase Causes Cancer

Scientists at the National Institute of Dental and Craniofacial Research (NIDCR) and colleagues report in animal studies that a single, scissor-like enzyme called matriptase, when left to its own devices, can cause cancer.

This finding, published in the August 15 issue of the journal *Genes and Development*, marks the first report of a protein-cleaving enzyme, or protease, on the cell surface that can efficiently trigger the formation of tumor cells. The authors also note that matriptase is the first known cell-surface protease that can act as an oncogene, an umbrella term for mutated genes and their proteins that prompt cells to divide too rapidly, a hallmark of tumor cells.

"What makes matriptase potentially such a good molecular target to treat cancer is its accessibility," said NIDCR scientist Dr. Thomas Bugge, who was the senior author on the paper. "We don't have to trick the tumor cell to internalize a drug, then hope it reaches its destination in an appropriate concentration and duration. In this case, the bull's eye is right on the cell surface."

Bugge said the exact function of matriptase in healthy human cells remains a bit of a mystery. Previous studies show that cells comprising the outer lining, or epithelium, of nearly all human organs express the protease. They also suggest that matriptase might play a role in activating other membrane-bound proteins on the cell surface that are involved in signaling basic cellular activities, such as growth and motility, or movement.

Since its discovery nearly 13 years ago, scientists also have suspected that matriptase might have a dark side. It is overly abundant in a variety of epithelial-derived tumors, including breast, prostate, ovarian, colon, and oral carcinomas. Then, in 2002, scientists reported women with breast and ovarian cancer have poor prognoses if their tumors contain high levels of matriptase. In fact, just two months ago, researchers reported for the first time that increased expression of matriptase is associated with more serious forms of cervical cancer.

Still unanswered, however, was the larger question of whether the protease, when over-expressed and deregulated, or uncontrolled within the cell, might actually cause cancer. To find the answer, Bugge and colleagues produced mice that expressed the human version of the matriptase gene in a stable, readily measurable manner. "After our initial round of experiments, we found that the skin of the mice was quite sensitive to fluctuations in the levels of matriptase," said Dr. Roman Szabo, co-lead author on the study and an NIDCR scientist. "So much so, that all 10 of the mice that produced too much matriptase developed distinctive, splotchy skin lesions within a year."

According to Szabo, that's when things took an unexpected turn. He and his colleagues biopsied the lesions and, to their surprise, found that they were tumors that had already advanced in most cases to a type of cancer called squamous cell carcinoma, a strong indication that the excess matriptase was driving the process.

The scientists next wondered whether excess matriptase and sustained exposure to a chemical carcinogen might be a dangerous combination, a scenario with obvious real world implications. They applied various doses of the chemical DMBA, a well-characterized carcinogen present in tobacco products, to a small area of skin on each of 40 newborn matriptase overproducers. Within seven weeks, 95 percent of these mice developed tumors compared to roughly 2 percent of normal, healthy mice. The group also found that the higher the exposure to DMBA in the matriptase overproducers, the greater the chances were that the tumors would turn cancerous.

"What we found is deregulated matriptase sends a strong and versatile pro-growth signal that can travel along more than one route to the cell nucleus," said Dr. Karin List, the other lead author and an NIDCR scientist. "But the key point is, like a classic oncogene, matriptase initiates the erroneous growth signal. As further confirmation of this, when we turned off matriptase, not only the tumors but the precancerous lesions never appeared in the mice."

"What this work really shows is the current list of about 100 known oncogenes remains very much a work in progress," said Bugge. "It's also clear that matriptase and the approximately 200 other distinct cell-surface proteases will have a lot more to tell us about human health and disease in the coming years."

Dennis Vance to Receive

Dennis E. Vance, Canada Research Chair in the Molecular and Cellular Biology of Lipids at the University of Alberta has been selected to receive the Avanti Award in Lipids. The Award recognizes outstanding research contributions in the area of lipids, and consists of a plaque, stipend, and transportation and expenses to present a lecture at the ASBMB Annual Meeting. Past recipients of the Award were in 2004 William L. Smith, Robert Bittman in 2003, Christian R.H. Raetz in 2002, Ronald N. McElhaney in 2001 when the Award was presented by the Biophysical Society, and in 2000 Edward A. Dennis.

Dr. Dennis Vance

"Dennis E. Vance is certainly an outstanding candidate for the Avanti Award in Lipids," said Ronald N. McElhaney, Professor and Associate Chair, University of Alberta. "His Ph.D. research was in glycosphingolipid metabolism under the supervision of Charles Sweeley, a noted sphingolipid biochemist and an expert in mass spectrometry. His postdoctoral work was with Konrad Bloch on fatty acid metabolism. He then began his independent research career in phospholipid metabolism where he has garnered an international reputation for his numerous and high quality publications."

"He elucidated the regulation of the enzyme CDP-choline synthase (discovered by Gene Kennedy in 1955) by fatty acids and other lipids, which leads to the translocation of the enzyme from the cytosol to the endoplasmic reticulum, thereby increasing the rate of phosphatidylcholine biosynthesis. A portion of the cellular CDP-choline synthase also resides in the nucleus and may be required for nuclear phosphatidylcholine biosynthesis," noted Christian H.R. Raetz, Professor and Chair, Department of Biochemistry, Duke University Medical Center.

Dennis Vance's laboratory was the first to make a phosphatidylethanolamine *N*-methyltransferase knockout mouse and demonstrated that such mice die because of liver dysfunction within a week of being subjected to a choline deficient diet. The knockout mouse provides a compelling explanation for the biological importance of two pathways for phosphatidylcholine biosynthesis in liver. Recent data further suggest that the phosphatidylcholine pools made by the CDP-choline pathway versus the methylation pathway have different compositions and functions, and that over-expression of the methylation pathway cannot substitute for the absence of the CDP-choline pathway in mutants lacking the CDP-choline synthase. Thus, the methyltransferase appears to protect the liver from periods of choline deficiency, although it cannot by itself substitute for the CDP-choline pathway. In contrast to the methyltransferase, mouse knockouts in the major form of the CDP-choline synthase are embryonic lethals. CDP-choline synthase mutants of somatic cells must be isolated as temperature-sensitive conditional lethals.

Dr. Vance's laboratory purified to homogeneity and cloned for the first time the liver phosphatidylethanolamine methyl transferase , an interesting membrane enzyme that catalyzes three sequential methylations of phosphatidylethanolamine to make phosphatidylcholine, using S-adenosylmethionine as the methyl donor. This was a technically demanding

Avanti Award in Lipids

task and an important achievement. The biological significance of the methylation pathway in animal cells, which was discovered by Bremer and Greenberg in 1961, remained elusive in relation to the CDP-choline pathway (which is the dominant one in most animal tissues) until Dennis Vance's recent work with transgenic mice.

His research has impacted on our understanding of the regulation of phosphatidylcholine (PC) biosynthesis and its function in mammals. He demonstrated that the rate-limiting and regulated step in PC biosynthesis via the CDP-choline pathway is catalyzed by CTP:phosphocholine cytidylyltransferase. His lab provided much of the evidence that the cytidylyltransferase is activated by translocation of a soluble, inactive form to an active, membrane-associated form. More recently he has done pioneering research on transcriptional regulation of the cytidylyltransferse a gene. Dr. Vance is the world leader in research on mammalian phospholipid methylation. His lab generated the first "knockout" mouse in phospholipid biosynthesis when the gene for phosphatidylethanolamine N-methyltransferase was disrupted. Although much of his research is fundamental and curiosity driven, his research has direct relevance to cardiovascular disease, the most common cause of death in the Western World. His research on the role of PC in lipoprotein secretion has contributed to our understanding of how lipoproteins are assembled and secreted into the blood stream and yield low density lipoproteins, elevated levels of which are a major risk factor for cardiovascular disease. More recent studies from his lab have cast new light on phospholipid methylation as a source of plasma homocysteine, which is also a risk factor for cardiovascular disease. In addition, his collaborative studies on the role of lipids in axonal growth have implications for the regeneration of damaged neurons and the etiology of Niemann-Pick C disease.

In addition to his research achievements, Vance has been possibly the most active lipid biochemist in the world in terms of disseminating and synthesizing information regarding all aspects of lipid chemistry, biochemistry and biology. His recently revised book on lipids and lipoproteins is considered the best in the field, and is aimed at graduate students, post-doctoral fellows and other young scientists. His work fills a niche in the emerging field of chemical biology, as applied to lipids. Lipid structures and biosynthetic pathways are extremely complex and variable, and are not always well covered in introductory textbooks. Vance has taught lipid biochemistry for over 30 years, and has an impressive record as both a lecturer and as a mentor to many undergraduate and graduate students. More than 15 of his former students have developed distinguished careers as independent scientists and educators throughout the world.

A Fellow of the Royal Society of Canada, he is recognized as an international leader in lipid and lipoprotein research as reflected by his service on the editorial boards of leading journals in the field of biochemistry. He has organized the Gordon Conference on Lipid Metabolism and the Deuel Conference on Lipids, and is frequently invited to give major lectures at international meetings in Europe, North America and Japan, and played a significant role in developing the Lipid and Lipoprotein Program of the Heritage Foundation in Alberta into one of the most respected groups within North America.

In sum, as William Dowhan, Professor and John S. Dunn Chair, Department of Biochemistry and Molecular Biology, University of Texas-Houston Medical School, said, "I would like to emphasize that Dennis is not only a scholar but truly a gentleman. He is rigorous but gentle in his evaluation of other research efforts and in his interaction with his colleagues."

NIH News continued ...

Continued from page 8

draft bill has been developed there, and the Senate is very busy this summer and fall with a lot of other matters, including passage of most of the appropriations bills (all of which have cleared the House) and the confirmation hearings and vote on Supreme Court nominee John Roberts.

A summary of the draft bill is available on the ASBMB website, under the "What's New" Section. This will be posted on the homepage throughout the month of September. In addition, please feel free to contact the ASBMB Public Affairs office to receive an electronic copy of the discussion draft.

Macromolecular Structure

Organizer: Andrej Sali, Professor, Departments of Biopharmaceutical Sciences and Pharmaceutical Chemistry, California Institute for Quantitative Biomedical Research, University of California at San Francisco.

The four symposia of this theme will cover the topics of structure, dynamics, function, evolution, control, and design of biological macromolecular assemblies. Each symposium will consist of three invited presentations and three shorter talks highlighting individual posters.

Genome sequencing has provided nearly complete lists of macromolecules present in an organism. However, a list of components reveals comparatively little about the function of the system because the functional units in cells are often complex assemblies of several macromolecules. Complexes vary widely in their activity and size, and play crucial roles in most cellular processes. They are often depicted as molecular machines, a metaphor that accurately captures many of their characteristic features, such as modularity, complexity, cyclic functions, and energy consumption. We need to explain the functionality of the system as a whole in terms of the properties of its components and interactions between them. To do so, a comprehensive structural characterization of proteins and their assemblies is essential. Such a characterization may help us discover the principles that underlie cellular processes, bridging the gaps between genome sequencing, functional genomics, proteomics, and systems biology. The goal seems daunting, but the consensus is that the prize will be commensurate with the effort invested, given the importance of molecular machines and functional networks in biology and medicine. Identification of assemblies and transient complexes combined with their structural and functional characterization will allow us to understand, control, design, and change the functioning of larger biological systems as well as to contribute to drug target discovery, lead discovery, and lead optimization for treatment of human disease.

Structural Characterization of Macromolecular Assemblies

Chair: David Agard, UCSF

The speakers will present the latest methodological improvements in structural characterization of complexes and their applications to several important assemblies. Structural biology is a great unifying discipline of biology. Technical advances on several frontiers have expanded the applicability of existing methods in structural biology and helped close the resolution gaps between them. Compared to structure determination of the individual proteins, structural characterization of macromolecular assemblies is usually more difficult and represents a major challenge in structural biology. The shortcomings of the individual methods, such as x-ray crystallography, NMR spectroscopy, SAXS, FRET spectroscopy, chemical cross-linking, affinity purification, comparative modeling, computational docking, and bioinformatics analysis, are being minimized by simultaneous consideration of all available information about a given assembly. Invited speakers will describe their studies of the centrosome and the mechanism of microtubule nucleation (Dr. Agard), clathrin coated vesicles and the organization of membrane dynamics (Dr. Stephen Harrison, Harvard Univ.), and predicting structural details for protein pathways and complexes (Dr. Rob Russell, EMBL).

Dr. Andrej Sali

Evolution and Physical Principles of Macromolecular Assemblies

Chair: Mike Rout, Rockefeller Univ.

The speakers will address how assemblies and networks of proteins evolved and how assemblies are held together by physical forces. In-depth analyses focused on a single assembly or network can provide a wealth of information about its evolutionary origins, especially when biochemical and sequence characterization is supplemented with structural information, as illustrated by a comprehensive study of the nuclear pore complex (Dr. Rout). On a genomic scale, the reconstruction of evolutionary pathways is enabled by the availability of an increasing number of complete genomic sequences and protein structures as well as large-scale mapping of protein interactions

and Dynamics

(Dr. Peer Bork, EMBL); numerous databases and bioinformatics tools have been developed to store, visualize, and analyze these data. Finally, the increasing number of assembly structures defined by experiment, development of more accurate molecular mechanics force fields and conformational sampling, as well as faster computers are improving our understanding of the role of the different physical forces, entropy, solvent, and environment in the formation of complexes (Dr. Sandor Vajda, Boston Univ.). These physics-based methods may eventually allow us to predict the structure, thermodynamics, and kinetics of systems of interacting molecules.

Dynamics of Macromolecular Assemblies

Chair: Jody Puglisi, Stanford Univ.

The speakers will focus on the dynamic properties of assemblies, including the dynamics involved in the assembly and function of a given complex. Large conformational transitions in proteins are clearly part of many biological processes. One example is the translation on a ribosome (Dr. Puglisi); a combination of techniques, primarily NMR spectroscopy and single molecule fluorescence spectroscopy, allowed detailed characterization of dynamics of translation on a ribosome, including monitoring of multiple steps of the translation cycle and recording of rare events. Another example is the assembly and disassembly of the nuclear pore complex that occurs as part of the mitotic nuclear modeling of intact cells (Dr. Jan Ellenberg, EMBL); the residence times of the individual subunits of the nuclear pore complex were mapped by the optical imaging of live cells using inverse fluorescence recovery after photobleaching (iFRAP). Improved computational methods are needed to address the various types of molecular motions in the large systems consisting of multiple protein subunits (Dr. Jianpeng Ma, Baylor Univ.). There has been considerable progress in the application of normal model analysis to assemblies. These approaches rely on low-resolution representations of assemblies and allow characterization of large and slow motions. They are being applied to describe the dynamics as well as to refine the structures of assemblies based on the data from experimental methods, such as electron cryomicroscopy and small angle x-ray scattering (SAXS).

Modulation and Design of Protein Interactions

Chair: Wendell Lim, UCSF

The speakers in this symposium will move one step further from describing natural complexes to modulating their properties as well as designing new complexes and networks (synthetic biology). They will focus on the principles guiding the functioning of complex systems, rather than drug discovery. Livings cells process vast amounts of environmental information to generate sophisticated responses such as movement, growth, and differentiation. Such decisions are made by complex networks of signal transduction proteins. One of the most challenging problems in modern biology is understanding how these networks of proteins act to carry out these remarkable behaviors (Dr. Lim). Structural principles of protein interaction specificity, elucidated both by computation and experiment, are the key to answering such questions (Dr. Tanja Kortemme, UCSF). Computationally, new simple physical energy functions for the prediction and design of protein-protein interactions, at the atomic level, are being developed. Experimentally, such models are applied to the computational redesign of a protein interface and have created an artificial DNA binding protein with new specificity. More recently, a new computational strategy was used to generate new pairs of interacting proteins. The modulation and design of protein interactions is a special case of modulation and design of protein sequences. Significant advances in protein design have been achieved, based on a multi-prong approach involving analytical statistical mechanical theories of heteropolymers, computer simulations of simple and detailed models of proteins structure and evolution, and bioinformatic analyses of known protein sequences and structures (Dr. Eugene Shakhnovich, Harvard Univ.).

Budapest Wel

Hungary's Neo-Gothic Parliament building in Budapest is reminiscent of the British Parliament.

ASBMB Executive Officer Barbara Gordon with John Scott of the Oregon Health and Science University.

The 'yellowshirt' student helpers at the Congress with Ralph Bradshaw and Judith Bond.

An American group at a boat dinner on the Danube: Judith Bond, Charles Craik, George Kenyon, Ladislau Kovari, Jack Preiss.

Peter Csermely, Chair of the Organizing Committee for the 2005 FEBS/IUBMB Conference, and Judith Bond.

comes ASBMB

Peter Friedrich, President of the FEBS/IUBMB Congress.

Judith Bond and Ralph Bradshaw advertising JBC and MCP.

The Danube with Buda on the left, Pest on the right.

Hungarian Dancers.

Mary Osborn, President of the IUBMB.

RNA: Structure, Function, and Regulation

Organizer: Alan Frankel, Professor of Biochemistry and Biophysics, University of California, San Francisco

The field of RNA biology has exploded over the last decade, as the wide diversity of RNA function has become ever more apparent. From RNA-mediated catalysis to RNA-based gene regulation to alternative splicing to the roles of small RNAs, the RNA world displays the richness of structure, biochemistry, and mechanism that are well appreciated within the protein world. The symposia in this theme represent but a small sampling of RNA biology and emphasize the intimate linkage between RNA structure and its function.

Molecular Recognition of RNA

Chair: Alan Frankel

At the core of RNA function lies the molecular architecture of the RNA molecule and its interactions with proteins and small ligands. Dr. Jennifer Doudna (UC Berkeley) will discuss how mechanisms of RNA-based gene expression, such as IRES (internal ribosome entry site)-mediated translation, are coupled to the underlying RNA structure and conformational rearrangements. Dr. Tom Steitz (Yale University) will discuss how the structure of the large ribosomal subunit, and particularly the RNA, has led to insights into the peptidyl transferase reaction, antibiotic inhibition, and resistance mutations. Dr. Frankel will describe how structural knowledge of RNA-protein complexes can be used to design new binding proteins and suggest possible routes of RNA-to-protein evolution.

RNA-based Gene Regulation

Chair: Ronald Breaker, Yale Univ.

The process of transcription marks the beginning of life of an mRNA and is followed by many subsequent steps that include splicing, capping, polyadenylation, transport, translation, and decay, among others. Regulatory mechanisms abound for each step. Dr. Breaker will describe how ligand-binding riboswitches and ribozymes located within mRNAs are used to control gene expression at multiple levels, often acting as metabolite sensors. Dr. Adrian Krainer (Cold Spring Harbor Laboratory) will discuss the mechanisms by which genomic diversity is amplified through alternative splicing and how it is regulated. Dr. Roy Parker (University of Arizona) will describe how mRNA processing, including decapping and decay, are mechanistically and spatially coupled to translation.

Small RNAs: Structure and Function

Chair: Gisela Storz, National Institutes of Health

The discoveries of RNA interference (RNAi) and micro RNAs (miRNAs) have led to a much wider view of how trans-acting RNAs can influence gene expression. Dr. Storz will describe how some of the small RNAs found in bacterial genomes are used to coordinate metabolic circuitry. Dr. Raul Andino (University of California, San Francisco) will discuss mechanisms of RNAi in vertebrate and viral systems, including mechanisms of double-stranded RNA entry. Dr. Traci Hall (NIH) will address the roles and structures of proteins in post-transcriptional gene regulation mediated by small RNAs.

Dr. Alan Frankel

RNA Structure and Translation

Chair: Peter Sarnow, Stanford Univ.

The recently determined ribosome structures provide fertile ground to understand how the basic translational machinery functions in molecular detail, as well as how it can be regulated. Dr. Rachel Green (Johns Hopkins University) will discuss how the basic steps of ribosome function, including tRNA and mRNA interactions, can be dissected through biochemical and mutational analyses. Dr. Joachim Frank (Wadsworth Center) will provide a structural view of the translocation process using cryo-EM to examine the ribosome in different states and in different complexes. Dr. Sarnow will describe how viruses are able to redirect the functions of ribosomes and miRNAs for their own purposes.

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ARP-144	Sphingosine D-erythro-1-phosphate, [^{33}P]	10 μCi	$1049
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ART-1408	N-Stearoyl-D-erythro-sphingosine [stearoyl-9,10-^{3}H]	50 μCi	$999
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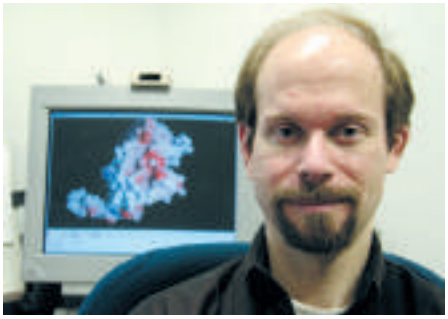
Signaling in Growth

Organizer: Michael B. Yaffe, Center for Cancer Research, Massachusetts Institute of Technology

The formation and maintenance of complex tissue architectures is essential for life, both during the process of organ formation during embryogenesis, and later as part of the normal processes of repair and regeneration throughout the lifetime of an organism. Tissues acquire their distinctive anatomic and physiological features through the precise control of biochemical networks that ultimately control when and where cells grow, divide, migrate, differentiate and die. These biochemical events, and the signal transduction cascades that control them, link signals at the cell membrane to complex changes in gene expression through pathways involving receptors and channels, protein kinases and phosphatases, G-proteins, proteases, cytoskeletal proteins, and chromatin remodeling enzymes. Over the last ten years, there has been significant progress in elucidating components of signaling pathways involved in vertebrate development by genetic means. Our understanding of the key biochemical mechanisms involved many aspects of tissue development, however, as well as the molecular details of the relevant signaling complexes involved, remain somewhat rudimentary. As such, these processes constitute an expanding frontier for detailed biochemical and biophysical analysis. A mechanistic understanding of these processes is particularly important since alterations in tissue structure, or in the signaling mechanisms that control this, are the root cause of diverse human diseases, including cancer, degenerative diseases associated with aging, and congenital birth defects. The programs of these symposia will focus on recent advancements in our biochemical understanding of how cellular signals arise at the cell surface, are modulated and transmitted to the nucleus, and ultimately converge on chromatin structure in order to activate or inactivate distinct patterns of gene expression.

Transcriptional Regulation and Epigenetic Control

This symposium is focused on the molecular mechanisms underlying control of gene expression during development. Dr. Eric N. Olson (UT Southwestern Medical Center at Dallas) will chair this session and will present his work on transcriptional control of heart development and disease through the action of homeodomain proteins, kinases, and chromatin remodeling enzymes. Dr. Raphael Kopan (Washington University, St. Louis) will discuss Notch signaling, a pathway in which ligand-dependent proteolysis is critical for signal propagation. Intriguingly, the Notch pathway shares molecular components implicated in Alzheimer's disease. Dr. Kevin White (Yale University) will describe his combined genomic and bioinformatics approach to elucidate nuclear receptor regulatory networks involved in transcriptional control.



Dr. Michael B. Yaffe

These receptors are among the most common drug targets because of their critical roles in both development and normal physiology.

Signaling Mechanisms that turn Cells into Tissues

Multiple cell signal transduction pathways must ultimately converge to control both the behavior of individual cells and to coordinate diverse cell types to produce a functioning tissue. Jeff Wrana (HHMI and Samuel Lunenfeld Research Institute, Mount Sinai Hospital, Toronto) will chair this symposium and describe a unified high-throughput biochemical and genetic approach to dissecting new components of the TGF-b signaling pathway. Jeff Settleman (Harvard Medical School) will discuss how small G-proteins of the Ras and Rho family control cell shape and morphogenesis that are involved in embryogenesis, and how their dys-regulation contributes to tumorigenesis. Judith Kimble (HHMI and University of Wisconsin-Madison) will present work

and Development

on how several distinct signaling pathways regulate proliferation, cell fate, and organogenesis in the nematode *C.elegans*, a classic model system that has long been a favorite of developmental biologists.

Mechanisms of Cell-Cell Contact and Communication

Events that occur at the cell membrane ultimately control how cells communicate information with their neighbors and sense their environment. Mechanisms of cell-cell communication are particularly important in neurodevelopment and neurophysiology, where the primary function of the cells is to convert electrical signals into chemical ones and vice-versa. This area has seen some recent significant advances in our understanding of the structural and biochemical basis for neuronal function including how these events may control mood and memory formation. Dr. Axel Brunger (HHMI, Stanford University) will chair the session and present structural biology studies that are elucidating the basis for synaptic vesicle fusion at the molecular and atomic level. Dr. Li-Hui Tsai (HHMI, Harvard Medical School) will discuss how abnormalities in signaling by the cyclin-dependent kinase Cdk5 underlie synaptic impairments, neuronal death, and neuropathology reminiscent of Alzheimer's disease. In both neuronal and non-neuronal cells, intercellular channels/gap junctions formed by connexin proteins play critical roles in allowing chemical messengers to pass directly from one cell to another. Dr. Bruce Nicholson (University of Texas Health Sciences Center San Antonio) will discuss how particular interactions between connexins establish communication boundaries in vivo, and how mutations in either connexin genes, or in signaling pathways that regulate connexin function contribute to human neuronal disease, susceptibility to tumors, and cardiac arrhythmias.

Protein Kinase and Phosphatase Signaling Mechanisms in Development

Protein phosphorylation, and its role in controlling protein function, forms a central theme for many aspects of cell signaling relevant to both development and disease. However, the demonstration of specific kinase/phosphatase pathways that are directly involved in tissue formation is still limited to a few well-established examples. In this symposium, we will explore new pathways and new roles of protein phosphorylation, and phosphorylation-regulated events in stem cell biology and organ development. Dr. Michael Yaffe (MIT) will chair this session, and present data on how phosphorylation of a transcriptional regulatory molecule controls the differentiation of mesenchymal stem cells into alternative fates of bone and fat. Dr. Xi He (Harvard Medical School) will discuss how the Wnt signaling pathway, along with kinases and co-receptors, regulates embryonic development at the biochemical and molecular level. Dr. Thomas Benzing (University of Freiburg) will demonstrate how protein kinases, adaptors, and scaffolds function together to control kidney development, and how continual protein kinase signaling during the process of urine formation is required in order to prevent a variety of common kidney diseases.

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.

Peter B. Everett
University of Tennessee Health Sciences Center

Vesa P. Hytonen
University of Jyvaskyla, Finland

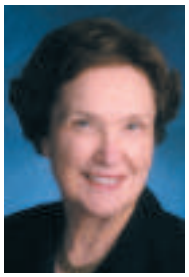
Ryan T. Kendall
University of Tennessee Health Sciences Center

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

ASBMB Members Share FASEB Excellence in Science Award

ASBMB members Marilyn Gist Farquhar and Elaine Fuchs have been awarded the 2006 FASEB Excellence in Science Award.

Due to the extraordinary number of qualified candidates, the committee took the unusual step of recommending two individuals this year. The FASEB Excellence in Science Award is presented each year to a woman scientist whose outstanding career achievements have contributed significantly to furthering understanding of a particular discipline through her excellence in research. The awardees will present lectures at the Annual Meeting of the American Society of Biochemistry and Molecular Biology during the 2006 Experimental Biology Conference in April. The winners will each receive complimentary registration to the conference, travel expenses, hotel, and a $10,000 unrestricted research grant funded by Eli Lilly.



Dr. Marilyn Farquhar

Dr. Elaine Fuchs

Dr. Farquhar is Professor and Chair of the Department of Cellular and Molecular Medicine at the University of California–San Diego School of Medicine. She is a pioneer in the study of cell structure and function, and is well-known for her electron microscopy studies. Her cell biology laboratory focuses on the interplay between cell signaling and protein trafficking. Farquhar is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

Dr. Fuchs is a Howard Hughes Medical Institute Investigator, and Professor and Head of the Laboratory of Mammalian Cell Biology and Development at Rockefeller University. She is a leader in the area of research on understanding the molecular mechanisms underlying development and differentiation of mammalian skin and how these processes go awry in human skin diseases. She is well-known for using reverse genetics in her studies. Fuchs was recently elected to the National Academy of Sciences.

Scott Waldman to Head New Department at Jefferson Medical College

Scott A. Waldman,* Professor of Medicine at Jefferson Medical College in Philadelphia, has been named Chair of Jefferson's new Department of Pharmacology and Experimental Therapeutics.

Dr. Waldman, a member of Jefferson's Kimmel Cancer Center, currently is director of the Division of Clinical Pharmacology in the college's Department of Medicine. Much of his current research is aimed at detecting the recurrence of advanced colorectal cancer, the second leading cause of cancer-related death in the U.S. Armed with a five-year, $5.6 million grant from the National Cancer Institute, he is leading a clinical trial of more than 2,000 patients with colorectal cancer to see if a blood test that he and his co-workers developed and which is based on detecting the protein that causes traveler's diarrhea is a better early detection system than current methods. In a previous NCI-supported trial, he and his colleagues showed that testing for the protein was an effective tool in determining the extent of a patient's colorectal cancer, particularly whether or not it had spread to the lymph nodes.

Dr. Waldman joined the faculty at Jefferson in 1990, and was assistant professor of pharmacology and medicine from 1990 to 1993. He was associate professor of biochemistry and molecular pharmacology and medicine from 1993 to 1998. He has been director of the Division of Clinical Pharmacology since 1997, and was appointed Samuel M.V. Hamilton Professor of Medicine in 1998. He has been professor of biochemistry and molecular pharmacology since 2000.

"Scott Waldman's expertise and experience in pharmacology and research are widely recognized at Jefferson and across the country," said Jefferson Medical College Dean Thomas J. Nasca. "He is uniquely qualified to lead this new department."

Dr. Waldman has lectured and published widely, including in such prestigious journals as the Annals of Internal Medicine, the Proceedings of the National Academy of Sciences and the Journal of Clinical Investigation. Much of his research is supported by the National Cancer Institute.

** ASBMB member*

Could DNA Methylation be the Key to Longevity?

By Nicole Kresge, Staff Science Writer

The addition of a methyl group to the 5'-position on cytosine in the DNA of humans and other mammals plays an important role in determining whether or not genes are expressed. This, in turn, affects many biological processes such as cell growth, genomic imprinting, X chromosome inactivation, and embryogenesis.

Until recently, it was believed that DNA methylation did not occur in *Drosophila melanogaster*, because scientists were unable to detect any methylation or find a cytosine-5 DNA methyltransferase in this invertebrate.

"For a long time, it was known that the DNA methylation program was essential for eukaryotic development and gene regulation," says Dr. Che-Kun James Shen,* former Director of the Institute of Molecular Biology, Academia Sinica, Taipei, Taiwan. "However, until 1999, it was well accepted that such a program did not exist in *Drosophila*. Then, two papers published in 1999, one by us in the *Proceedings of the National Academy of Sciences, USA* (1999: 96, 11940-11945), and one by A. Bird's group, pointed out that a protein (dDnmt2) that is orthologous to one of the vertebrate DNA methyltransferase family members is encoded by the *Drosophila* genome."

This discovery prompted subsequent analysis by other groups who proved that the *Drosophila* genome did indeed contain low amounts of methylated cytosine that were only detectable by very sensitive methods. This left two questions. First, does dDnmt2 methylate the *Drosophila* genome? And second, is dDnmt2 required for specific developmental functions in *Drosophila*? These questions have recently been answered by two papers from Dr. Shen's lab published in the *Journal of Biological Chemistry* (JBC).

In the first paper (2003: 278, 33613-33616), Dr. Shen and his colleagues examined the ability of dDnmt2 to methylate cytosines. They noticed that when they overexpressed dDnmt2 in *Drosophila*, the fly's genome became hypermethylated. They also discovered that when *Drosophila* dDnmt2 or mouse mDnmt2 was transiently expressed in embryonic *Drosophila* cells, the cytosines of a cotransfected plasmid became methylated. These experiments provided solid evidence that fly and mouse Dnmt2 gene products were genuine cytosine-5 DNA methyltransferases. Two other groups (Jetsch and Lyko) made similar observations around the same time.

Dr. Che-Kun James Shen and son.

The effects of dDnmt2 on *Drosophila* became apparent more recently in Dr. Shen's second JBC paper (2005: 280, 861-864). It turns out that dDnmt2 is a longevity gene that controls the life span of *Drosophila* by regulating the expression of small heat shock proteins. These proteins are chaperones for damaged proteins and help maintain the integrity of cellular functions and thus normal life span. Dr. Shen discovered the connection between the DNA methylation program and the small heat shock proteins when he noticed that flies engineered to overexpress dDnmt2 ubiquitously had significant increases in their lifespan as well as the expression levels of these proteins.

Dr. Shen believes that Dnmt2 may play a similar longevity role in humans. "Since the Dnmt2 gene is well conserved in the eukaryotes, I think that the human Dnmt2 protein may also carry out a similar function in maintaining the normal lifespan. However, the longevity/aging processes is probably regulated by an interaction network of different cellular proteins, and Dnmt2 is likely one of several keys in this network. In the future, Dnmt2 could become a target for therapeutics that increase longevity or slow down aging. Before that happens, however, significant research efforts should be focused on investigating the details of the position of Dnmt2 within the interaction network regulating longevity, as well the molecular and cellular mechanisms of its function."

Currently, Dr. Shen is working to understand the role of mammalian Dnmt2 in longevity and aging and how dDnmt2 regulates the expression of the small heat shock protein genes. He is also trying to elucidate the identities of other genes that act downstream of dDnmt2 and determine the interactions between dDnmt2 and other longevity genes.

**ASBMB Member*

Scientists Characterize Proteome of Human Cornea

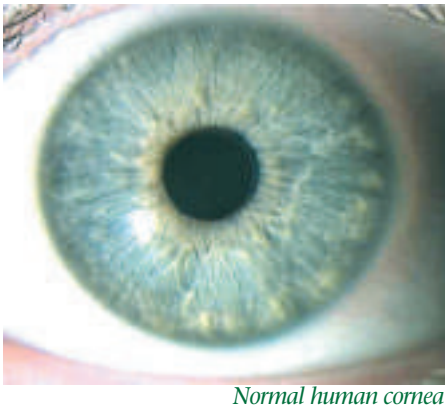
By Nicole Kresge, Staff Science Writer

An international group of researchers has characterized the proteome of the human cornea. In doing so, they have identified 141 distinct proteins, 99 of which had not been previously recognized in mammalian corneas. The details of their findings are scheduled to appear in the August/September issue of *Molecular and Cellular Proteomics*, an American Society for Biochemistry and Molecular Biology journal.

The cornea is the transparent, dome-shaped window that covers the front of the eye. Although it is clear and seems to lack substance, the cornea is actually a highly organized group of cells and proteins. Its functions include shielding the eye from germs, dust, UV light, and other harmful matter and acting as the eye's outermost lens.

Approximately 120 million people in the United States wear eyeglasses or contact lenses to correct nearsightedness, farsightedness, or astigmatism. These vision disorders are often the result of incorrect curvature or irregular shape of the cornea and are the most common vision disorders in this country. Other diseases that affect the cornea range from bacterial, fungal, and viral infections (keratitis) and allergies to various dystrophies including keratoconus.

"Corneal damage and disorders account for several million cases of impaired vision and are second to cataracts as the most important cause of blindness in the world," explains study author Dr. Jan J. Enghild* of the University of Aarhus in Denmark. "Corneal infections by bacteria, fungi, or viruses are common disorders that can lead to corneal opacification. A group of inherited corneal disorders including granular and lattice corneal dystrophies are characterized by deposition of insoluble and opaque macromolecules in the cornea. Other disorders associated with loss of corneal transparency arise from cornea swelling (Fuchs' dystrophy) or thinning and change of curvature of the cornea (keratoconus)."

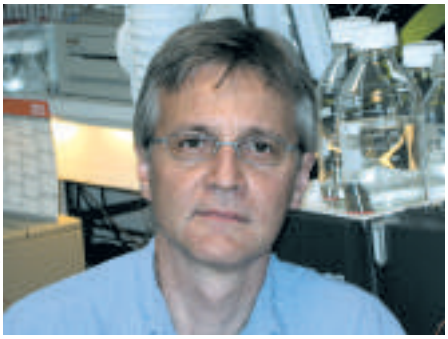


Normal human cornea

In order to learn more about the cornea and corneal disorders, Dr. Enghild and colleagues characterized the most abundant proteins found in the non-diseased human cornea. They identified 141 distinct proteins, 70% of which have not previously been identified in the cornea. This work is the most comprehensive protein study of the cornea to date.

"Surprisingly, about 15% of the identified proteins in the cornea are classical blood proteins, which indicate that they originate from the blood stream around the cornea and are not produced in the cornea," notes Dr. Enghild. "Our results also showed that proteolysis and post-translational modifications of proteins are common events in the normal human cornea."

Dr. Jan J. Enghild



Photos by Dr. Gordon K. Klintworth.

Among the molecules that the scientists identified were proteins involved in antimicrobial defense, heme and iron transport, tissue protection against UV-radiation and oxidative stress. Several other proteins were known antiangiogenic factors, which prevent the formation of blood vessels.

The results from this research may open the door to future therapeutics for a myriad of corneal disorders. "It is essential to know the biochemical composition of normal healthy corneas in the effort to understand the molecular mechanisms behind corneal disorders," emphasizes Dr. Enghild. "By comparative proteomic studies of diseased and normal corneas we can identify differences in the expression profiles that may suggest avenues for therapeutic interventions. Because the cornea is so accessible, the potential for developing effective drugs for the treatment of corneal diseases is good. Furthermore, the work is likely to improve the clinical classifications of corneal diseases. Identification of the protein profile of the normal human cornea may also be very useful in the effort toward generating artificial corneas for transplantation."

To follow up on their initial research, Dr. Enghild and his colleagues have begun proteomic studies of corneas affected by granular and lattice corneal dystrophies, and are also planning on looking at other cornea diseases such as keratoconus and Fuchs' dystrophy.

**ASBMB Member*

Joslin Scientists Find Genes to Help Treat Obesity

Joslin Diabetes Center scientists have discovered a group of genes that govern the genesis of calorie-burning fat cells. This discovery may lead to novel ways to treat obesity in humans.

"With obesity at epidemic levels, finding new ways to treat it is one of medicine's holy grails," said C. Ronald Kahn, President of Joslin Diabetes Center and principal investigator of the study that appeared in the June edition of the journal *Nature Cell Biology*. In laboratory studies of mouse cells, his research team identified genes that govern how precursor cells give rise to mature brown fat cells.

There are two main types of fat cells in the body—white and brown. White fat cells are the "conventional" form of fat that we all recognize. They are designed to store energy for use in times of need. Chock—full of lipid droplets, these big cells accumulate under the skin and around internal organs.

By contrast, the main role of brown fat cells is to burn energy and generate heat. They contain small lipid droplets tucked between tiny energy factories called mitochondria. In mice, brown fat cells are found throughout the body and are present during the entire life cycle. In humans, they are principally found in the neck area of newborns, helping their tiny bodies generate heat. Brown fat cells largely disappear by adulthood, but their precursors still remain in the body, lodged in white-fat depots.

Because brown fat cells burn calories, Joslin scientists theorized that finding ways to encourage the development of brown fat might be good for treating obesity. In previous research, the scientists were among the first to develop cell lines of precursor cells that give rise to brown fat cells. "We used those cell lines to study how insulin affects the conversion of fat cell precursors, or preadipocytes, into mature brown adipocytes," said Dr. Yu-Hua Tseng, who along with Dr. Atul J. Butte, of Boston's Children's Hospital and HMS, served as first author of the study.

The researchers compared cell lines from normal "wild-type" mice to cells lines from mice that genetically lacked key components of the insulin-signaling network which are important to insulin's role in letting food nutrients enter the body's cells. If cells resist insulin, the body cannot get the energy it needs. This "insulin resistance" is the main culprit in the onset of in type 2 diabetes. Being overweight or obese has long been implicated with insulin resistance and type 2 diabetes and also raises the risk for heart disease, stroke and cancer.

The Joslin team studied "knockout" cell lines of brown preadipocytes that lacked insulin receptor substrates (IRS) numbered 1 through 4, which are the first steps in insulin signaling inside the cell. In cell lines lacking IRS1, the precursors failed to develop into mature brown fat cells. Importantly, when they added the gene for IRS1 back into the knockout cells, the precursors recovered most of their ability to differentiate into brown fat cells. Varying effects occurred with the knockout of genes for IRS2, IRS3 and IRS4. Using DNA chips to analyze these cells, a strong genetic pattern emerged that predicted the potential of precursors to differentiate into mature brown fat cells.

Of the 347 genes that were altered in the cells that could not form brown fat, one of the most over-expressed was for a protein called necdin. Until this study, necdin was associated largely with nerve tissue and Prader-Willi syndrome, a neurodevelopmental disorder in children characterized by mental retardation, feeding problems and obesity. The Joslin researchers discovered that reducing the level of necdin is essential for precursor cells to give rise to brown fat cells. They also found that a transcription factor called CREB is involved in this reduction.

"For now, diet, exercise and medication is the best approach for helping the body overcome insulin resistance and controlling type 2 diabetes," said Dr. Kahn. "But for people who are genetically predisposed to obesity, that approach often doesn't work. As we learn more about the genesis of brown fat cells and the genes governing them, we may be able to target those genes with drugs or other agents to create powerful tools to fight obesity."

** ASBMB member.*

3 More Awards for *ASBMB Today*

Last year ASBMB Today received three awards and this year we received another three APEX Awards for Publications Excellence from Communications Concepts, Inc., which specializes in business publications. Public Affairs Officer Peter Farnham, received an Excellence in Columns and Editorials Award for his very prescient forecast, "Stormy Weather, Rough Seas Ahead for Science in 2005," in the February 2005 issue of the magazine. Designer, Wendie Lubic, received an Award for Excellence in Design and Layout for the December issue with its feature on "Lincoln's Inn Fields, The Heart of Cancer Research in the UK," and an Award for Excellence in News Writing for his Biotech Business News section went to John Thompson, Editor.

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Stephen Dahms Leaving SDSU To Head New Foundation

A. Stephen Dahms, Professor of Chemistry at San Diego State University (SDSU), has resigned effective January 2 to take the post of President and CEO of a new foundation, the Alfred E. Mann Foundation for Biomedical Engineering.

In his new position, Dahms said he will oversee the creation and operational elements of 12-15 new biomedical translational research and commercialization institutes that will be funded at $150 to $250 million each at selected universities, mostly in the U.S. These will be specialized institutes positioned to move university technologies to commercial success far more rapidly than has been achieved previously. They are structured financially to operate in a unique mode, without university resources yet capable of generating substantial new funds for the universities.

Dahms, who has been serving as chair of the committee selecting universities to participate in the new program, reported that the first three institutes would be announced September 10. A further three institutes are to be selected each year for 4-5 years, with ultimately 45-50 universities being considered, reviewed, and site-visited in the first round of these philanthropic investments

Industrialist Arthur Mann started the new foundation with a $2 billion contribution, the first step in a 10-year process that Dahms expects will greatly exceed the initial investment. All of these resources will flow through and be overseen by the Alfred E. Mann Foundation for Biomedical Engineering. I will have a sizable staff and budget. I will fill you in on other aspects of this unique process if you are interested.

Dahms has been at SDSU since 1972 and his research has centered upon biological membranes. He served as founding director of the SDSU Molecular Biology Institute from 1974 until 1992, and from 1992-97 he was director of the campus-wide interim Biotechnology Research and Training Program, a program designed to bring together diverse elements from engineering, sciences, and business in a coordinated campus endeavor to address the biotechnology, bio/pharmaceutical, and medical device industries. In 1997 he was appointed Director of the new SDSU Center for Bio/Pharmaceutical and Biodevice Development and since 1987 he has also been Executive Director of CSUPERB, the biotechnology research and education program in the 23-campus California State University (CSU) system.

Giulio Cantoni 89, NIH Lab Chief, Biochemistry Researcher

Giulio Leonardo Cantoni, 89, who overcame internment in England and Canada as an enemy alien during World War II to become director of the National Institutes of Health's biochemistry laboratory for 40 years, died of congestive heart failure July 27 at his home in Chevy Chase.

Dr. Cantoni, an emeritus member of ASBMB, established the NIH's Laboratory of Cellular Pharmacology, now the Laboratory of General and Comparative Biochemistry at the National Institute of Mental Health, in 1954, and directed it until 1994. He solved the fundamental biochemistry problem of how molecules in cells are methylated, a chemical process which leads to the synthesis of important molecules. In 1952, he first isolated

S-adenosylmethionine (SAMe), which plays a vital role in nervous system health and cognitive function. Four years later, Dr. Cantoni and a colleague found that SAMe is naturally formed in the human body.

Dr. Cantoni published 150 scientific papers and co-wrote several scientific books. He also self-published through an online publisher "From Milan to New York By Way of Hell: Fascism and the. Odyssey of a Young Italian Jew" (2000), drawn from his experience as a young man.

In that book, he described his early life and his education as a physician at the University of Milan. Just as he earned his medical degree in 1938, the fascists abolished the Italian parliament and instituted anti-Semitic laws. Dr. Cantoni and his mother and sister fled Italy for England, en route to the United States.

The family was in line for a first-class berth on the ship Britannic, on June 11, 1940, the day after Italy declared war on England. Dr. Cantoni, who wrote that he was dressed in "an impeccable gabardine suit, with silk shirt and tie, gold cuff links and suede shoes," was pulled from the ship boarding line by British police and interned as an enemy alien,

After months in a tent camp in England, he was among those transferred to a camp in Canada, where his status was changed to prisoner of war. His family was misinformed that he had been one of those drowned when another Canada-bound ship of incarcerated Italians sank. They were later told he had been sent to Australia.

Months later, Dr. Cantoni was allowed to go to Havana. From there, thanks in part to the sponsorship of an old friend, the conductor Arturo Toscanini, his long-expired visa to the United States was renewed, and on November 18, 1941, he arrived in New York. He became a U.S. citizen in 1947.

by John D. Thompson, Editor

Days of Dependence on Blockbuster Drugs May be Numbered

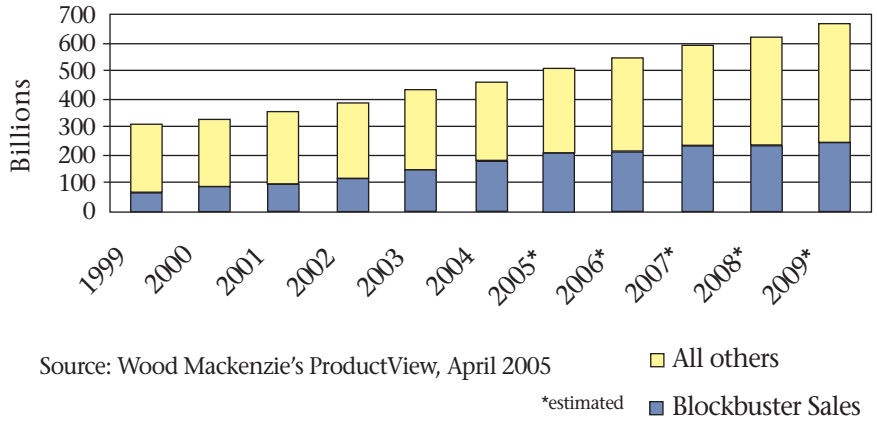
According to Wood Mackenzie's latest Horizons report, "It Ain't Your Parents' Pharma Industry Anymore," the future of new Big Pharma business models will be focused on innovation and customer-focused approaches, and not blockbuster products.

The report said that blockbusters can be the key to a company sustaining competitive advantage for a while, but without a diversified portfolio to protect itself the company could be in financial difficulty when patents expire. The number of blockbusters and the percentage they contribute to sales have declined since they were introduced in the late 1990s. Wood Mackenzie has identified three distinct business models the pharmaceutical industry may pursue to offset to this decline in sales: focus on key specialty audiences in marketing, a limited number of therapy areas in R&D, and a much more customer-centric selling model.

"For the past 20 years, the leading pharmaceutical companies have all looked very similar," said Dr. Keith Redpath, Head of Life Sciences Research for Wood Mackenzie. "They all had in-house R&D across many therapeutic areas, were vertically integrated, and their growth was driven by the blockbuster model – with one product accounting often for 30% or more of their sales. Now, these evolving models mean drug companies are beginning to look different."

Does this mean the days of blockbusters are numbered? "Maybe. Maybe not," explains James Featherstone, Global Head of Consulting. "Blockbusters can be the key to a company sustaining competitive advantage for a while, but without a diversified portfolio to protect itself from patent expiries, the company could find itself on the block for acquisition by larger and stronger players." His advice! The industry needs to focus on science driven strategies, targeted at fundamental product differentiation focused on the unmet medical needs of global markets.

Sales of pharmaceuticals are forecast to continue to grow, but sales from blockbusters are forecast to flatten over the next 5 years.



Source: Wood Mackenzie's ProductView, April 2005

*estimated

Public R&D Funding Pays Off in Germany

Businesses receiving support from the German Ministry of Education and Research invest more than one euro in research and development for every euro they receive from the ministry. This was the finding of a study, *Public Support for Research and Innovation Activities of Businesses in Germany,* conducted by the Centre for European Economic Research for the German ministry. One in six industrial companies receives public funding for research and innovation in Germany and a third of these participate in national research programs.

The study of businesses which had received funding for basic research and high risk projects. found that those receiving government funds own more patents and are significantly more successful in getting their products onto the market. It also determined that more funding now targets collaborative projects than previously. While such projects were the exception 20 years ago, two thirds of funding now goes to collaborative projects, almost half of them public-private partnerships.

Annual funding by the German Ministry of Education and Research is currently more than $535 million. The number of businesses receiving funding has more than doubled in the last 10 years, with small and medium sized enterprises making up 65 per cent of these newly funded companies.

Takeda Chemical and Beth Israel Deaconess Sign Research Agreement

Takeda Chemical Industries, LTD, and Beth Israel Deaconess Medical Center (BIDMC) have signed a research agreement to investigate the molecular basis of diabetes and obesity and to develop new therapies for these metabolic disease. The $13.7 million three-year agreement calls for collaboration between Takeda and a team of world-renowned scientists led by BIDMC Chief Academic Officer Jeffrey S. Flier. Principal investigators include BIDMC Chief of Endocrinology Barbara Kahn,* Dr. Bradford Lowell, Dr. Joel Elmquist, and BIDMC Chief of the Division of Signal Transduction Lewis Cantley.*

Takeda Chemical Industries, an industry leader in the development of diabetes therapies, is Japan's largest pharmaceutical firm and one of the 15 largest pharmaceutical companies worldwide. More than 1,000 researchers at Takeda carry out world-class research using advanced technology in such fields as human genetics, receptors, and enzymes.

Under the terms of the three-year agreement, Takeda Chemical Industries will have an exclusive option to negotiate a license to new intellectual property derived from the collaboration. BIDMC and Takeda researchers will collaborate on a number of specific projects designed to elucidate the biological mechanisms of diabetes and obesity, with the overall goal of discovering novel proteins and new drug targets implicated in these life-threatening diseases.

As part of the collaboration, BIDMC will gain access to Takeda's expertise in medicinal chemistry and drug discovery as well as resources to develop important core facilities at BIDMC including animal metabolic physiology, mass spectrometry, and proteomics.

Taiwan Stem Cell Banks Embrace U.S. Technology

Rancho Cordova, California-based ThermoGenesis Corp. recently received its fourth BioArchive order from Taiwan. The system was ordered by the company's Distributor, Cosmo Medical, for Taiwan Advance Biopharmaceutical, which now joins Healthbanks and the Tzu-Chi Foundation Cord Blood Bank as the third cord blood stem cell bank in Taiwan using the BioArchive System for their cord blood program. Four more such blood banks in mainland China have also acquired these systems for the production of therapeutic units of cord blood stem cells for the treatment of leukemias, lymphomas, diverse inherited anemias, such as sickle cell anemia and thalassemia, and other genetic diseases.

Kevin Simpson, ThermoGenesis President and COO, noted that in mainland China a new stem cell project was planning to an inventory of one million samples, and predicted continued demand for BioArchive in Asia, which he said have been under served by traditional U.S. and European bone marrow registries. "Cord blood," he stated, "serves as a readily available source of stem cells for bone marrow rescue treatment, especially for diseases such as Thalassemia, which occurs at an incredibly high rate in Asia.

Avant to Develop Oral Anthrax and Plague Vaccine for Defense Department

The Defense Department has awarded Avant Immunotherapeutics, Inc. a subcontract to develop an oral combination vaccine against anthrax and plague using Avant's proprietary vaccine technologies. Under the agreement, Avant may receive over $8 million in a two-year period, covering vaccine development through preclinical testing. Avant executed the subcontract with DynPort Vaccine Company LLC, the prime contractor for the Defense Department's Joint Vaccine Acquisition Program headquartered in Fort Detrick, Maryland.

"This contract represents one of the first awards from a major U.S. Department of Defense (DoD) initiative to apply modern biotechnological innovations to the development of vaccines that can offer rapid, effective protection from multiple biological agents," said Una S. Ryan, Avant's President and CEO. "Current vaccines against bacterial bioweapons like anthrax and plague require a protracted dosing regimen or only limited protection, and each protects against only a single agent. The Defense Department is looking for new, improved generation vaccines that are effective, single-dose, and can protect against multiple agents.

Calendar of Scientific Meetings

SEPTEMBER 2005

European Life Scientist Organization Meeting

September 3-6 • Dresden
For information contact: Ph. +49 6224 925613
Website: www.elso.org/index.php?id=elso2005

Second World Congress on Synthetic Receptors

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

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

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

International Conference on Enzyme Technology RELATENZ 2005

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

2nd Symposium on Enabling Technologies for Proteomics

September 22–23 • The Fairmont Palliser, Alberta, Canada
For information contact www.conciergeconnection.com/etp/
Email: etp@genomeprairie.ca

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

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

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

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

ComBio 2005

September 25-29 • Adelaide Convention Center, Australia
For information contact: Email: asbmb@bigpond.net.au
Tel.: 618 8362 0009; Website: www.asbmb.org.au/combio2005

OCTOBER 2005

Supramolecular Chemistry

October 14-19 • Obernai (near Strasbourg), France
A European Science Foundation conference. For information:
Ph: +33 (0)3 88 76 71 35; Fx: +33 (0)3 88 36 69 87
Email: conferences@esf.org

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

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

NOVEMBER 2005

International Workshop on Biosensors for Food Safety and Environmental Monitoring

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

BioConferences International 6th European Biotechnology Symposium

November 13–15 • Radisson SAS Scandinavia Hotel, Copenhagen
Contacts: Aimee Burt; 800-524-6266; aburt@liebertpub.com
Nilda Rivera; 800-524-6266; nrivera@liebertpub.com
Website: www.bioconference.com/ebs/

Cambridge Healthtech Institute Second Annual Fluorescent Proteins in Drug Development

November 14–15 • Hyatt Regency La Jolla, California
Contact: Pete DeOlympio
Ph: 617-630-1359, Email: peterd@healthtech.com
Website: www.healthtech.com/2005/gfp/index.asp

Third Annual World Congress on the Insulin Resistance Syndrome Clinical manifestations of the Insulin Resistance Syndrome - Metabolic Syndrome X

November 17-19 • Palace Hotel, San Francisco
For information on registration, abstracts submission, accommodations and exhibits: Ph: 818-342-1889; Fax: 818-342-1538
Email: insulinresistance@pacbell.net
Website : www.insulinresistance.us

DECEMBER 2005

Xth PABMB Congress: Panamerican Association for Biochemistry and Molecular Biology

December 3-6 • Hotel del Bosque, Pinamar, Province of Buenos Aires, Argentina
For more information contact:
SAIB President. Ernesto Podestá: ernestopodesta@yahoo.com.ar
SAIB Secretary Carlos Argaraña: carga@dqb.fcq.unc.edu.ar, or
PABMB Chairman Juan José Cazzulo: jcazzulo@iib.unsam.edu.ar
website: http://www.saib.org.ar

2005 Congress Expanding Proteomics: New Directions in Biology, Chemistry, Pharmaceutical Sciences and Medicine

December 5-7 • Zurich, Switzerland
For information contact:
Email: sps.congress@nlight.ch; Ph: +41 21 802 1163
Website: http://sps05.swissproteomicsociety.org/qsPortal/Home.asp

Cambridge Healthtech Institute Sixth Annual Metabolic Profiling

December 7–8 • Wyndham Palace Resort and Spa
Contact: Pete DeOlympio
Ph: 617-630-1359, Email: peterd@healthtech.com
Website: www.healthtech.com/2005/gfp/index.asp

3rd Cachexia Conference

December 8-10 • Rome
For information contact:
Website: www.nataonline.com/LMS-Group/events/2/index.ph

American Society for Cell Biology Annual Meeting

December 12–14 • San Francisco
Contact: John Fleischman; Ph: 301-347-9300
Email: jfleischman@ascb.org; Website: www.ascb.org

Non-VesicularIntracellular Traffic

December 15-16 • Goodenough College, London, UK
Contact: Meetings Office, Biochemical Society, 3rd Floor, Eagle House, 16 Procter Street, London, WC1V 6NX
Email: meetings@biochemistry.org
Website:www.biochemistry.org/meetings/focused.htm

Pacifichem 2005

December 15-20 • Honolulu
For information contact:
Website:www.pacifichem.org/e-mail: pacifichem2005@acs.org

JANUARY 2006

Pacific Symposium on Biocomputing

January 3-7 • Wailea, Maui
For information contact: http://psb.stanford.edu/
Email: psb@helix.stanford.edu; Phone: (650)725-0659

Building Bridges, Forging Bonds for 21st Century Organic Chemistry and Chemical Biology

January 7-9 • Pune, India
Tel.: 202-872-4523; Email: t_nameroff@acs.org
Website: http://www.ncl-india.org/occb2006/index.htm

FEBRUARY 2006

The 11th Annual Proteomics Symposium

February 3-5 • Erskine on the Beach, Lorne, Australia
Email: mp@asnevents.net.au
www.australasianproteomics.org.au/lorne.htm

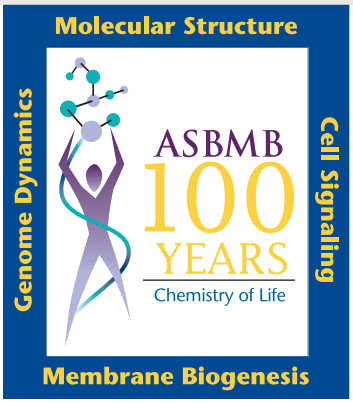
The 31st Lorne Conference on Protein Structure and Function

February 5-9 • Erskine on the Beach, Lorne, Australia
email: mp@asnevents.net.au; www.lorneproteins.org/

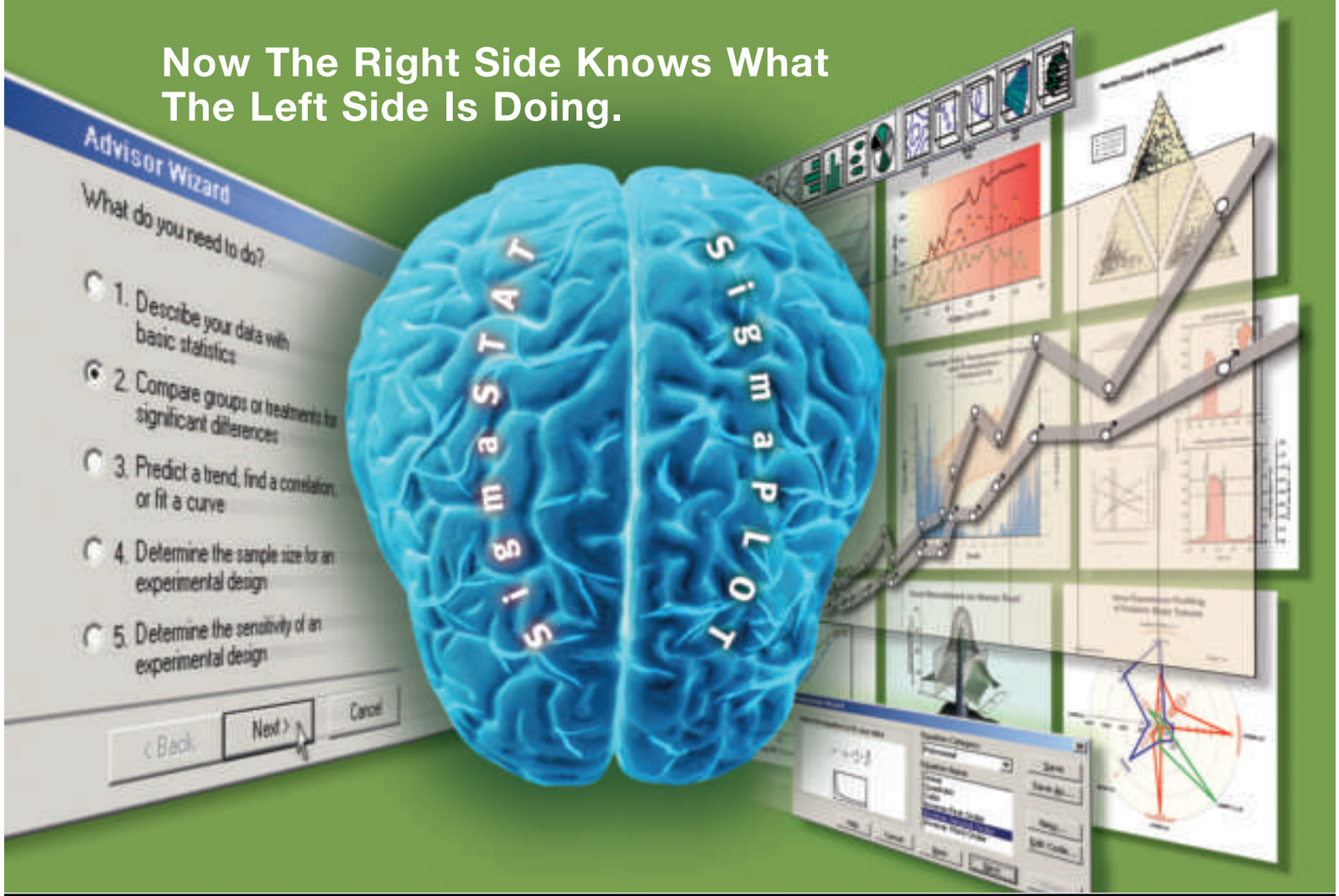
APRIL 2006

American Society for Biochemistry and Molecular Biology Centennial Meeting in Conjunction with Experimental Biology 2006

April 1–5 • San Francisco
For information contact: www.asbmb.org/meetings
Email: meetings@asbmb.org
Ph: 301-634-7145; Website: www.asbmb.org/meetings



Now The Right Side Knows What The Left Side Is Doing.



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> Checks assumptions in the data to avoid statistical error
> If your data violates any of those assumptions, the Advisor Wizard suggests another test
> Generates an intelligent report that explains your results in plain English – not statistical jargon
> Even handles messy data with missing values

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