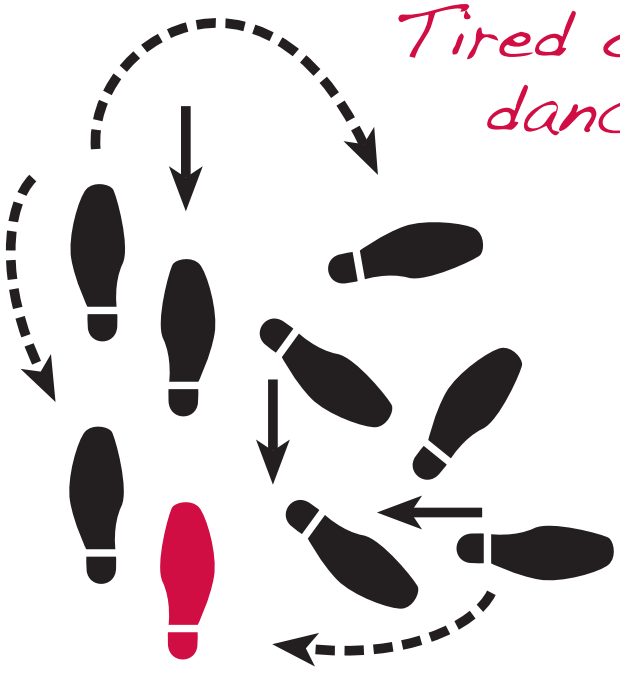
ASBMB today

May 2011

American Society for Biochemistry and Molecular Biology

Affymetrix® | USB® Products



One step
and you're done.

USB® HT ExoSAP-IT® High-Throughput PCR Product Cleanup means the ease of one-step purification.

The HT ExoSAP-IT method is a unique, one-step enzymatic cleanup of PCR products. Now, specifically designed for the unique requirements of high-throughput, automated platforms, and multichannel pipettes.

- 100% sample recovery – no loss of PCR products regardless of the fragment size
- Removes excess primers and dNTPs – does not interfere with downstream applications
- Exceptional accuracy with HT ExoSAP-IT reagent – achieve high data quality and sequencing accuracy, even with long read lengths

Take a step closer at usb.affymetrix.com/onestep

NOW for high-throughput PCR purification.

contents

MAY 2011

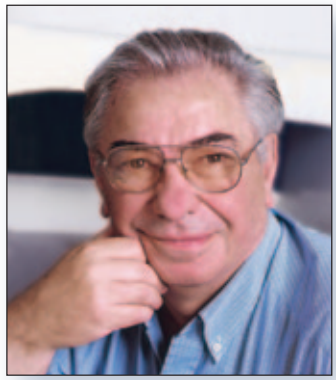
On the Cover:
This month, we look at science around the world.

news

features

departments

A look back at the life and work of Héctor Norberto Torres. 8



A timeline of Asian-Pacific American contributions to science. 18

asbmb today online

Go to the online version of ASBMB Today to see a video of Seeding Lab's founder Nina Dudnik talking about her organization at PopTech 2010 and to watch the arrival of a container of Seeding Lab supplies at Kenyatta University.

www.asbmb.org/asbmbtoday

ASBMB today

A monthly publication of
The American Society for
Biochemistry and Molecular Biology

ASBMB Today

Nicole Kresge *Editor*
nkresge@asbmb.org
Nancy J. Rodnan *Director of Publications*
nrodnan@asbmb.org
Barbara Gordon *Executive Director*
bgordon@asbmb.org

For information on advertising, contact
Capitol Media Solutions at 800-517-0610
or Danf@capitolmediasolutions.com

www.asbmb.org

2008 APEX® AWARDS FOR PUBLICATION EXCELLENCE

president's message

International biochemistry and molecular biology

BY SUZANNE PFEFFER

One of the best parts of my job is the opportunity to visit scientists in other countries and share our recent research findings with them. Last year I visited Sapporo, Japan; Prague, Czech Republic; and Hamburg, Germany. This year I get to visit Potrero de los Funes, Argentina; Geneva, Switzerland and Heidelberg, Germany. Unlike conferences in the U.S., meetings in other countries are much more likely to include wonderful cultural side trips: I will never forget a chamber music concert I enjoyed with colleagues at a conservatory in the south of France or a demonstration of traditional dance with colleagues in Tokushima, Japan. The world of science is small, and it becomes much smaller all the time as we are all brought closer together by the internet and access to free (or low-cost) internet telephone calls.

Lucky for me, at least, is the fact that a great deal of science is communicated in my native language. But there also is a great deal of science that is transacted in other languages. My knowledge of conversational German made it possible for me to participate in a student workshop on women's issues at an otherwise English-language conference two years ago in Konstanz. But in Argentina, I have been warned that many talks will be in Spanish; hopefully, gels, graphs, protein structures and microscopic images represent a universal language that all biochemists and molecular biologists (me included) can understand.

Even though students now learn excellent English in school, many are shy to use it, even if they speak quite well. Encouraging student participation at international meetings and speaking English with students when traveling abroad can do much to add confidence to young scientists in training. These types of exchanges can be transformational for a young scientist's career and will continue to be supported by the American Society for Biochemistry and Molecular Biology. In addition to sponsoring student travel awards, ASBMB is supporting exchange programs and joint meetings in cooperation with the Pan American Association for Biochemistry and Molecular Biology, the Chilean Society of Biochemistry and Molecular Biology and the International Union of Biochemistry and Molecular Biology. We also are running a special symposium on recent advances in pathogenic human viruses July 24 – 26, 2011, in Guangzhou, China.

Students who have the opportunity to study abroad not only learn additional languages, they also learn about cultural distinctions that influence the practice of science in a particular country. Xiaodong Wang, who just returned to Beijing after many years in the U.S., tells me that one of the biggest challenges Chinese science faces is in fact cultural: Confucianism involves interpretation of knowledge rather than the idea of seeking truth through new discoveries. In addition, he pointed out that the long history of Chinese medicine thrives on secrecy among traditional healers rather than dissemination of helpful cures. As director of the National Institute of Biological Sciences, Wang is working to bring the highest standards of excellence to Chinese science and to spread the important mes-

sage that the product of scientific activity should be new and widely shared discoveries rather than just long lists of publications.

Cultural differences also are reflected in government priorities for science funding. Over the past ten years, science in China, India, Korea and Taiwan has exploded, and this advance has been accompanied by major investments from their respective governments. In the United Kingdom, scientists stood together to resist major funding cuts last winter at a time when the rest of the budget was not spared. Here in the U.S., President Obama values the importance of science funding, but Congress is under enormous pressure to reduce deficits without raising taxes. As I have written previously, we need to help Congress understand that science funding creates jobs and has much broader positive impacts throughout the economy. Please continue to let your congressional representatives hear just how much science benefits us all.

Lifestyles of biochemists around the world vary tremendously. One of my former postdocs returned to a biotech job in Hyderabad, India, where she and her husband have at their service a daily housekeeper and cook in addition to full-time child care for their two children located in a building immediately adjacent to her lab. If only all of us could have it so good! Labs also are funded in different ways in different countries. In Germany, for example, a faculty position comes with a certain number of staff or student positions and grants pay for supplies. In contrast, U.S. universities rarely provide postdoctoral or staff salaries, and thus salaries represent the largest proportion of grant budgets. This makes it tough for investigators when grants don't get renewed – often, staff must be laid off. In many countries, such as Germany and Japan, young scientists are discouraged by the lack of tenure-track, independent investigator positions that are common in the U.S. Funding mechanisms also vary widely: I have reviewed a few applications from the U.K.'s Wellcome Trust; compared with a typical U.S. National Institutes of Health grant proposal, these were brief and seemed like they practically could have been written in the shower. It was a relief to see a funding agency take into account an investigator's track record and focus primarily on the importance of the question to be studied.

At the moment, our thoughts are with all of our Japanese colleagues still recovering from the earthquake and tsunami of March 11. The Japanese people are strong, and the government seems well equipped to oversee reconstruction and redevelopment of a large swath of northeastern Honshu Island. Let us hope that the crisis at Fukushima Daiichi Nuclear Facility soon will be stabilized with minimal adverse health consequences.

ASBMB is an international organization, and we need to continue to do more to address the needs and interests of our international membership. Just read the table of contents of any of our journals or the lists of our journal editors, and you will see that our authors and editors span the globe. In the months ahead, watch for new collaborations with the International Union of Biochemistry and Molecular Biology. ASBMB represents all biochemists and molecular biologists, because we share a desire to understand the molecular basis of life.

ASBMB President Suzanne Pfeffer (pfeffer@stanford.edu) is a biochemistry professor at the Stanford University School of Medicine.

Fixing a hole

Improving the U.S. patent system

BY GEOFFREY HUNT

For scientists, patents complete the bench-to-bedside process by bridging the gap between basic research and industrial commercialization. Yet there is concern that patents on scientific discoveries impede research by instituting legal and procedural barriers that limit access to materials, thereby hindering experiments and preventing the advancement of knowledge. While a 2006 report from the National Research Council concluded that "access to patented inventions or information inputs into biomedical research rarely imposes a significant burden for biomedical researchers," there are several examples that indicate otherwise.

The Wisconsin Alumni Research Foundation holds patents on several of the initial human embryonic stem cell lines derived by University of Wisconsin researcher James Thompson in 1998 as well as certain techniques used in the derivation process of the cells. Researchers in the field protested that the patents imposed a significant administrative burden on their work, requiring them to file loads of paperwork just to use the cell lines or attempt to derive their own lines. The patents eventually were appealed on the basis of not differing enough from techniques used for the derivation of mouse embryonic stem cells that already were in the public domain. After a succession of court challenges, the WARF patents finally were overturned in May.

Defining what constitutes patentable material remains a challenge. Consider gene patenting: After the advent of cloning in the 1970s, the U.S. Supreme Court ruled in 1980 that products of genetic engineering were eligible to be patented, allowing groups to file patents for individual genes over the objections of researchers who argued that products of nature should not be patentable. This ruling went virtually unchallenged until last year, when a federal judge ruled in favor of a consortium of advocacy groups, scientists and patients looking to invalidate patents held by Myriad Genetics for two breast cancer genes. After the company appealed, the U.S. Department of Justice surprisingly filed a brief stating its support for the plaintiffs, a drastic change in policy that is encouraging for basic scientists.

Patents do hold beneficial value. In addition to sparking creativity and protecting innovation, patents also represent a quantitative measure of intellectual capital. By this measure, the U.S. is far ahead of the rest of the world; it has been granted twice as many biology-related patents from the U.S. Patent and Trademark Office in 2008 as every other country combined. The U.S. also was awarded nearly 10 percent of patents granted by the European Patent Office in 2009, the same number as Germany, the most productive European Union country. A major source of American innovation has been universities, which have dramatically increased their filings since passage of the federal Bayh-Dole Act in 1980, which allowed academic institutions to claim intellectual property rights from work carried out on their premises using federal funding.

Even acknowledging these advantages, the American system has its flaws, some of which finally are being addressed. The National Academies released a study last year that recommended updating the Bayh-Dole Act to promote sharing of technologies while de-emphasizing any potential financial gains from university-based intellectual property. Meanwhile, Congress is working to change the American patent system from a first-to-invent system to the first-to-file setup that is used by the rest of the world. The move theoretically will decrease costs and improve efficiency in the patent process by removing the need to prove priority of invention and streamline transnational patent filings. Across the Atlantic Ocean, the EU also is trying to remove barriers between countries, recently voting to create a unified patent that would cover all of its 27 constituent members, thereby removing the need for inventors to file patent applications with each individual country. As legislators and bureaucrats continue to refine and improve the patent system, scientists can turn their focus back to what they do best: science.

Geoffrey Hunt (ghunt@asbmb.org) is the ASBMB science policy fellow.

NIH summer research program breeds success

FASEB report highlights summer research experiences of students and science educators

BY ANNE M. DESCHAMPS

On Feb. 11, the Federation of American Societies for Experimental Biology released the second in a pair of reports analyzing the experiences of high school students, undergraduates and science educators who participated in the National Institutes of Health's American Recovery and Reinvestment Act-supported summer research program. The ARRA funds allowed more than 2,000 participants to take part in laboratory research throughout the continental United States and Puerto Rico during the summer of 2010. Drawing on information obtained through an online survey, the report, titled "Energizing & Investing in the Future of Science: NIH Summer Research Program Immerses High School Students, Undergraduates, and Teachers in Science," highlighted how the program helped participants develop research and laboratory skills, influenced students' decisions to pursue a career in scientific research, and enhanced the work of science educators.

Most program participants had never participated in a structured research opportunity before, yet their experience conducting research in an NIH-funded laboratory sparked their interest in pursuing additional science education. All of the high school students surveyed planned on attending college, with more than 80 percent planning to choose a science-related major. Close to two-thirds of participating undergraduates, the majority of whom were majoring in the biological sciences, planned on pursuing a science master's or doctorate degree after graduation. Both groups of students indicated that their participation in the program was vital to those decisions.

Students' interest in pursuing additional training in science likely was fueled at least in part by the quality of the research experiences they had. Three-quarters of the students indicated that the program exceeded their expectations. Moreover, most students thought that the person supervising or mentoring them through their summer research experience was above average or outstanding. Both high school students and undergraduates noted that their mentors made them feel as though they were a part of the research team and talked to them about careers in science. Aside from contributing to a particular research project, students were exposed to other activities relevant to a career in research, such as delivering a presentation, attending scientific seminars and preparing a report for publication.

The program also allowed science educators from the elementary through university levels to spend the summer immersed in biomedical research. Most of the educators taught in the biological sciences, with some teaching in multiple disciplines. Close to three-quarters of these teachers said that their research experience was related to the subjects in which they specialized. The program not only gave science educators practical laboratory experience, it gave them the opportunity to participate in a variety of other scientific and professional development activities. For example, they attended seminars, participated in laboratory meetings and gave presentations at scientific conferences. One of the most exciting findings of this survey was that the research experience provided educators with confidence to better teach their subject matter and allowed them to apply what they learned in the laboratory to their classrooms.

Because of the funding made available to the NIH through the ARRA, students and educators had the opportunity to take part in a hands-on research experience in research facilities across the country. The resulting experiences encouraged students to pursue more advanced scientific training and helped science teachers improve classroom content and methods. We anticipate that many of these newly energized teachers will inspire students to pursue research careers.

Anne M. Deschamps (adeschamps@faseb.org) is a Science Policy Analyst in the Office of Public Affairs at FASEB.

asbmb member update


FUCHS


HORWITZ


CLORE


POULTER

Fuchs named 2011 Passano laureate

Elaine Fuchs, a world leader in skin biology and its human genetic disorders, will receive the Passano Prize for her landmark contributions to skin biology and its disorders, including genetic syndromes, stem cells and cancers.

Fuchs, who is Rebecca C. Lancefield professor and head of the laboratory of mammalian cell biology and development at Rockefeller University, also is an investigator at the Howard Hughes Medical Institute. Her work has provided insights into our understanding of how stem cells of all types are able to rejuvenate tissues throughout life and also repair them after injury. Fuchs currently is trying to understand how the multipotent stem cells of mammalian skin give rise to the epidermis and hair follicles.

The Passano Foundation, founded in 1945, is devoted to encouraging medical science and research, particularly activities that have broad impact and clinical application. More than 20 of the Passano award winners have gone on to win a Nobel Prize.

Horwitz receives Award for Lifetime Achievement in Cancer Research

Susan Band Horwitz, the Rose C. Falkenstein professor of cancer research and co-chair of the department of molecular pharmacology at Albert Einstein College of Medicine of Yeshiva University, is the recipient of the eighth American Association for Cancer Research Award for Lifetime Achievement in Cancer Research.

Horwitz, who also is the associate director for therapeutics at the Albert Einstein Cancer Center, discovered the mechanism of action of the chemotherapeutic drug paclitaxel (Taxol), which prompted the development of this drug as an important therapy for many common solid tumors. Her work also has contributed to the understanding of how microtubules function in normal and malignant cells and why stabilization of microtubules is a promising target for drug discovery. Horwitz's current research focuses on issues surrounding a variety of new natural products that share a similar mechanism to paclitaxel but also have differences that may enhance their therapeutic value.

The AACR Award for Lifetime Achievement in Cancer Research was established in 2004 to honor an individual who has made significant fundamental contributions to cancer research either through a single scientific discovery or a body of work. These contributions, whether they have been in research, leadership or mentorship, must have had a lasting impact on the cancer field and must have demonstrated a lifetime commitment to progress against cancer. PHOTO: SUSAN BAND HORWITZ.

Clore receives Hillebrand Prize

G. Marius Clore, chief of the protein NMR section at the National Institute of Diabetes and Digestive and Kidney Diseases at the National Institutes of Health, received the Hillebrand Prize from the Chemical Society of Washington section of the American Chemical Society.

The annual award for original contributions to the science of chemistry by CSW members is named for William F. Hillebrand, one of Washington's most distinguished chemists.

Clore's research focuses on solution studies on the structure and dynamics of proteins, protein-protein complexes and protein-nucleic acid complexes using multidimensional NMR spectroscopy and on the development and application of novel NMR and computational methods to aid in these studies. Specifically, he studies complexes involved in signal transduction and transcriptional regulation and on AIDS and AIDS-related proteins. In addition to his NMR work, Clore also is engaged in a major effort relating to the development of potential HIV Env-mediated fusion inhibitors and vaccines using chimeric gp41 proteins designed on the basis of the NMR structure of gp41 solved in his laboratory.

Poulter honored with Nakanishi Prize

C. Dale Poulter, the John A. Widtsoe distinguished professor of chemistry at the University of Utah, has been awarded the 2011 Nakanishi Prize from the American Chemical Society.

The prize, which recognizes significant work that extends chemical and spectroscopic methods to the study of important biological phenomena, was established in 1995 by the students and colleagues of Koji Nakanishi.

Poulter studies the reactions catalyzed by enzymes in the isoprene biosynthetic pathway with special emphasis on establishing the mechanisms of the enzyme-catalyzed transformations and how the enzymes promote the reactions. One of the most important isoprenoid reactions Poulter has studied is protein prenylation, in which isoprenoids attach to soluble proteins. This interaction allows the proteins to bind to cellular membranes and thus become pivotal in signal transduction networks.


JORDAN


VOCADLO


WESSLER


SILVERMAN

Jordan awarded prize for breast cancer research

V. Craig Jordan, scientific director at the Lombardi Comprehensive Cancer Center at Georgetown University Medical Center, has received the St. Gallen Breast Cancer Award in Clinical Breast Cancer Research for his contributions to developing the scientific principles used in the effective antihormonal adjuvant therapy for early breast cancer.

The Swiss prize recognizes Jordan's strategy of targeting the estrogen receptor and administering long-term (five-year) adjuvant tamoxifen therapy resulting in increased patient survivorship around the world. Millions of women continue to benefit from the use of tamoxifen.

To celebrate Jordan's prize, the U.S. ambassador to Switzerland, Don Beyer, is hosting an event in his honor at the ambassador's residence in Washington, D.C.

The St. Gallen Breast Cancer Award is given every two years to a scientist who has made exceptional contributions to the field of breast cancer research.

Vocadlo wins E.W.R. Steacie Memorial Fellowship

Simon Fraser University chemistry professor David Vocadlo is one of six recipients of the E.W.R. Steacie Memorial Fellowship for 2011.

Vocadlo's work centers on understanding and manipulating the enzymes that assemble and break down glycoconjugates as well as the roles of these enzymes in biology. His research has helped clarify how enzymes that process the glycoconjugate O-GlcNAc work at the molecular level. By controlling these enzymes in cells, Vocadlo has shed light on the involvement of O-GlcNAc in insulin resistance and type 2 diabetes. Taking this work further, he provided new insights into how the same glycoconjugate could play a role in Alzheimer's disease.

Vocadlo's group also is investigating an innovative carbohydrate-based approach to fighting antibiotic-resistant bacteria. The group is working to create compounds that block the bacteria from sensing and resisting the effects of certain antibiotics. This new stealth approach to the problem might overcome the growing threat of certain types of antibiotic resistance.

This fellowship from the Natural Sciences and Engineering Research Council of Canada is for a two-year period. It is named in memory of Edgar William Richard Steacie, a chemist and research leader who made major contributions to the development of science in Canada during and immediately following World War II.

Wessler elected home secretary of the National Academy of Sciences

Susan R. Wessler, distinguished professor of genetics at the University of California, Riverside, and the University of California president's chairwoman, has been elected home secretary of the National Academy of Sciences.

During her four-year term beginning July 1, Wessler will oversee the NAS's membership activities and serve as secretary of its governing council. Elected to the NAS in 1998, she is the first woman to serve as the academy's home secretary.

Wessler's research looks at transposable elements in plants with a focus on the characterization of active transposable elements and determination of how they contribute to genome evolution and adaptation. To address these questions, Wessler uses a combination of genetic, biochemical and genomic approaches.

Silverman wins award for discoveries in medicinally active substances

Richard B. Silverman, John Evans professor of chemistry at Northwestern University, has been awarded the American Chemical Society's E.B. Hershberg Award for Important Discoveries in Medicinally Active Substances.

Silverman is best known for his synthesis of pregabalin, a glutamate decarboxylase activator that was marketed as Lyrica and approved to treat epilepsy and neuropathic pain. Silverman has made other important contributions to the field of medicinal chemistry, including the discovery of a GABA aminotransferase inhibitor that is 300 times more potent in treating addiction than the currently marketed anticonvulsant vigabatrin. Silverman also has designed several neuronal nitric oxide synthase blockers that have shown strong activity in a rabbit model of cerebral palsy.

The biennial Hershberg Award is meant to recognize and encourage outstanding discoveries in the chemistry of medicinally active substances. The award was established in 1988 by Merck & Co. Inc. (formerly Schering-Plough Research Institute) to honor the contributions of Emanuel B. Hershberg to the pharmaceutical industry.

Retrospective: Héctor Norberto Torres (1935–2011)

BY LUTZ BIRNBAUMER

Héctor Norberto Torres, professor emeritus at the University of Buenos Aires and founding director of Argentina's Institute for Molecular Biology and Genetic Engineering, died on April 2 of a sudden heart attack. He was 75.

Torres, or Doc, as his students and close colleagues called him, had a distinguished career as one of Argentina's leading biological chemists that started with his joining Nobel laureate Luis F. Leloir's research group at the Institute of Biochemical Research, Fundación Campomar, in 1959, immediately after finishing medical school. There, Torres studied the mechanisms that regulate glycogen biosynthesis and earned a doctorate degree from the University of Buenos Aires in 1966.

Working mostly with graduate students and his lifelong collaborator and spouse, Mirtha Flawiá, in the early 1970s Torres discovered that the adenylyl cyclase-cAMP signaling system, which had recently been shown to mediate actions of peptide hormones and biogenic amines in vertebrates, also existed in the primitive fungus Neuropora crassa and proved that cAMP is a developmental cue in this organism.

After 1983, Torres focused on the molecular nature and roles of signaling pathways in the development of trypanosomes, specifically Trypanosoma cruzi, a protist that is one of the most primitive eukaryotes and is the etiologic agent of Chagas disease. Torres characterized enzymes controlling glycogen metabolism through phosphorylation/dephosphorylation mechanisms involving cyclic nucleotide phosphodiesterases, cyclic AMP and Ca/diacylglycerol stimulated protein kinase, adenylyl cyclase, nitric oxide synthase, G proteins and energy transducing systems — all possible targets of intervention to attack this parasite.

Among Torres' later contributions are the finding that the signal by which an intermediary nonpathogenic form of T. cruzi progresses to the pathogenic form is the second messenger cAMP, generated in response to a peptide generated from globin in the hindgut of the transmitting insect; the discovery of a nitric oxide synthase in T. cruzi and the assignment of a role for nitric oxide in regulating the parasite's motility; the discovery of phosphoarginine in T. cruzi; and the finding that the biosynthetic enzyme arginine kinase is evolutionarily related to arthropod arginine kinase, suggesting horizontal gene transfer.

More recently, Torres' group cloned and characterized a T. cruzi SR-like protein and proved that it is the functional orthologue of a classic mammalian mRNA splicing factor. This proved that T. cruzi has the same machinery for splicing RNA as higher eukaryotes.

Torres remained scientifically active until the end. Death found him working on mechanisms that control osmoregulation in T. cruzi epimastigotes, on the regulation of poly (ADP-ribose) metabolism as it affects the DNA damage-response and cell death pathways, and on manipulating T. cruzi's redox equilibrium to affect detoxification and pro-drug transformation, thus connecting basic research results to a possible solution for a major public health problem in his country.

Torres was a stalwart of Argentine science. Except for a short time in the U.S. as a Guggenheim Fellow, he worked exclusively in his home country, where he assumed multiple leadership roles. Torres served on the executive councils of both the University of Buenos Aires and the Argentine National Research

continued on page 13

Challenges facing the international postdoc

Tips for postdoctoral fellows and their mentors to make the training period go smoothly

BY LOLA OLUFEMI

International postdoctoral fellows and their mentors often are faced with distinct challenges, such as immigration status and language barriers. With almost half of the postdoc positions in the U.S. occupied by foreign nationals, it is becoming increasingly important to find solutions to these challenges. Teams at the Children's Hospital of Philadelphia and the National Postdoctoral Association have recognized some of these issues and have compiled informative modules to help overcome them. Some of their suggestions are summarized below.

Recruiting international postdocs

The search for the brightest postdocs often can take mentors beyond their borders. However, this presents the mentor with a problem: How do you evaluate the experience of someone you've never met? The solution? Skype. Mentors can conduct interviews with interested candidates via video conference. CHOP also suggests utilizing a surrogate interviewer — a collaborator or colleague who lives or is travelling near the candidate. This will allow the mentor to have someone assess the applicant in person. Coupling these methods with traditional tactics like examining the candidate's publication record will give mentors a better sense of candidates.

Immigration and visa status

Visa status is one of the most sensitive issues for international postdocs. The visa process is time consuming, expensive and confusing. Unfortunately, some mentors do not comprehend the weight of this issue. When PIs hire international postdocs, it is crucial for them to understand the process of getting and changing one's visa status. If the mentor doesn't appreciate the significance, then it needs to be emphasized by the trainee. Important deadlines and requirements should be communicated to ensure that the status of the trainee is never jeopardized during the length of the fellowship.

Transitioning to life in the U.S.

Acclimating to a new country can be overwhelming for international postdocs. To ease this transition, institutions should provide assistance to incoming trainees. This can include housing suggestions and information on setting up bank accounts and utilities, getting a social security number, and transportation options. Clearly explaining the institution's payment system before the postdoc's arrival can ease his or her transition. Mentors also should help postdocs feel included by encouraging open communication and camaraderie within the lab.

Dealing with communication barriers

While international postdocs may be fluent in English, some find it difficult to communicate and often resort to corresponding in their native languages. The inability to communicate well causes a strain, potentially hindering the mentor's capacity to train the postdoc. For the most beneficial postdoctoral experience, the postdoc should find ways of overcoming issues with communication. If oral communication is a problem, the postdoc can try communicating by writing or chalk talk. Taking advantage of accent reduction courses also can improve the trainee's language skills. Another helpful hint for mentors is to organize meetings with postdocs during which they can voice their concerns. The meeting should be documented and followed up with an email to ensure that everyone is on the same page. Learning to communicate effectively will help postdocs become better overall scientists.

The case of a bad fit

PIs and their trainees invest time and effort to ensure that the postdoctoral training experience is productive. Unfortunately some relationships can turn volatile. Before things make a turn for the worse, the mentor and postdoc

continued on page 23

Emerging science

ASBMB spotlights members from developing and emerging countries

BY NICK ZAGORSKI

The American Society for Biochemistry and Molecular Biology, like the science it represents, truly is an international entity. Most of the society's nearly 12,000 members have some connection to the global scientific community; some were born or trained abroad, others have mentored foreign students in their labs, and many have no doubt gone abroad for collaborations, sabbaticals or conferences. And of course, numerous ASBMB members carry out their research endeavors at institutions outside of the U.S. In recognition of this global reach, ASBMB Today once again presents profiles of some of our international scientists, this time focusing on those who deal with the challenges and opportunities of working in emerging scientific nations.

Albert Ketterman

Associate Professor
Institute of Molecular Biosciences
Mahidol University, Thailand

"I'm not a big fan of heat and humidity," Albert Ketterman confesses. Of course, making that confession from his office at Mahidol University's Institute of Molecular Biosciences in Bangkok — where Ketterman has been since 1996 — might seem odd.

Although the tropical climes of Thailand admittedly were not an anticipated destination for Ketterman while he was an undergraduate biochemistry major at the University of California, Riverside, he has adapted well to the unusual circumstances that have brought him here.

Shortly after Ketterman began working in a lab the University of California, San Francisco, the lab head was killed in an automobile accident, throwing the lab into chaos. Ketterman received an offer to work with Susan Pond, though she warned him that her husband might receive a department chair back in her native Australia, which would uproot her lab. Ketterman accepted, and before he knew it, he was a graduate student, looking on the other side of the Pacific Ocean, at the University of Queensland in Brisbane.

His graduate work entailed analyzing mammalian carboxylesterases and glutathione transferases, enzymes found in copious amounts in the liver that help break down various xenobiotics. That led to a postdoctoral position in the entomology department at the London School of Hygiene and Tropical Medicine, where Ketterman applied his knowledge of these conserved enzyme families to look at the role of GSTs and carboxylesterases in mosquito insecticide resistance.

But during a second postdoc at Imperial College London, Ketterman developed an interest in c-Jun N-terminal protein kinases, which respond to external stimuli and regulate processes like cell growth and apoptosis. "I had hoped to continue this area of research as faculty, but finding a position proved fruitless, because schools were looking for someone with 10 years of JNK experience as opposed to only two," he says.

A Thai student in Ketterman's lab overheard his plight and noted that Mahidol University had a job opening that would fit Ketterman's skill and expertise with malaria enzymology, bringing the intrepid researcher to where he is today.

And while the long distance didn't bother Ketterman much at all — he grew up with a father in the Air Force and moved around constantly as a kid — the adjustment to Thailand's research culture has taken a little longer.

Financial resources are indeed an issue, though it's not a simple cut-and-dried proposition. "Budgets, grants and salaries may be much smaller in Thailand," he says, "but so is the cost of labor, so getting bodies and hands into a lab is not hard at all."

Ketterman adds that the Thai government has placed an emphasis on improving science education, so the labs are filled with eager students in addition to technicians and support staff.

Supplies tend to be more of a concern, however, as Ketterman has to pay prices for products that are similar to those paid by any U.S. lab. "The deliveries for these products can take a while, and we don't really have the capabilities to handle frequent shipments," he notes, "so you often have to plan far ahead in your experiments and anticipate what

reagents you might need in a month or two." That planning can be tricky, because given limited resources, funding priorities can shift abruptly.

In Ketterman's case, he slowly shifted his GST work from malaria-related questions to a more general understanding of the enzyme family; as part of this effort, he recently pulled out all 41 GSTs identified in the Drosophila proteome for some comparative analysis.

But then engineers took over funding policy positions, and the government cut back basic research money to prioritize applied science. That meant Ketterman had to put his Drosophila GST collection on hold and find a new project.

So he teamed up with five other Mahidol investigators to study chikungunya virus, a tropical mosquito-borne pathogen that has re-emerged in the past few years.

The formation of such megagroups is an increasing trend in Thai research projects, as it provides a way to combine resources and use a variety of approaches to try to solve a problem more quickly. For his part, Ketterman will use his enzymology background to study a protease critical for chikungunya replication.

It's a worthwhile task, for the virus has come back stronger than before. "It used to be the virus induced joint pain similar to arthritis, but it wasn't too serious," Ketterman says. "But now people are starting to die from chikungunya infections, so it's become an active research area here."

Hector Riveros-Rosas
Associate Professor
Department of Biochemistry
Universidad Nacional Autónoma de México

A generation ago, protein scientists followed a straightforward paradigm: "one protein, one structure, one function." But research now has revealed that moonlighting is not restricted to struggling Hollywood actors. Several protein families have developed a degree of promiscuity and can carry out activities not related to their main functions.

The actual paradigm goes something like, "one protein sequence, several structures, many functions."

Hector Riveros-Rosas can take pride in the fact that he played a role in shifting this paradigm when he showed that alcohol-metabolizing enzymes might have evolved differently than people had thought.

It all began back when Riveros-Rosas was an undergraduate at the Universidad Nacional Autónoma de México. He was invited to participate in a research project studying the metabolic effects of chronic ethanol administration on isolated rat liver mitochondria.

That independent work solidified his interests in biochemistry, particularly alcohol metabolism, and he continued his research career at UNAM School of Medicine, first receiving his master's in 1996 and his doctorate in 2004.

During this time, while studying the properties of the main enzymes involved in alcohol metabolism, alcohol dehydrogenases (ADHs) and aldehyde dehydrogenases (ALDHs), he observed that ADHs could utilize a huge diversity of alcohols as substrates. Other groups also had found that ADHs display higher catalytic efficiency for many endogenous substrates, such as retinol, steroids and dopamine.

"Thus, we proposed that the main physiological role of ADHs is the metabolism of these important endogenous substrates, and not ethanol oxidation," he says.

To help validate this conclusion, Riveros-Rosas began to investigate the evolutionary history of ADHs. He and colleagues uncovered a big piece of evidence when they showed that the origin of ADHs predates the major natural dietary source of ethanol (fermentation of fruit sugar by yeast). Thus, ethanol availability could not be a selective force that directed the evolution of these proteins.

This discovery seemed unexpected given that the presence of ADHs in animals had been assumed to be a consequence of chronic exposure to ethanol. However, if the origin of the different ADHs predates the origin of angiosperms with fleshy fruits, then perhaps, ethanol metabolism was not an adaptive function in animals but just an incidental one.

"This opens up new ways of thinking about the deleterious effects of ethanol consumption," says Riveros-Rosas. "People who drink heavily can acquire ethanol concentrations in their blood that reach the millimolar range. Even though ethanol is not the preferred substrate, this amount can significantly impair the metabolism of natural ADH substrates, which occur in the micromolar range."

(Interestingly, like the moonlighting proteins he studies, Riveros-Rosas conducted a secondary project on the chemistry of air pollution with the National Institute of Ecology during this time; his team's work provided some of the necessary data to push the Mexican government to prohibit the addition of lead to gasoline.)

Since starting his own lab several years back, Riveros-Rosas has been eagerly following up those initial studies with more detailed evolutionary analyses into the roles of ADHs and ALDHs in animals. His group also is employing bioinformatic and phylogenetic tools to obtain broader insight into the forces that drive enzyme evolution, using both

ADHs and chromate transporters as model systems.

That such an intriguing discovery would come from Mexico is both surprising and expected, Riveros-Rosas thinks. While Mexico is considered an emerging country in research, he notes, it does have a respected biochemical history.

Back in the 19th century, Leopoldo Rio de la Loza, who founded Mexico's National Academy of Medicine in 1864, was honored by many scientific societies in Europe and the United States for his pioneering work introducing chemistry into medicine. Later, Juan Roca Olivé, who spent several years working with Journal of Biological Chemistry co-founder John Abel at the Johns Hopkins University, brought the concept of physiological chemistry to Mexico and became the country's first great biochemistry teacher.

At the same time, limited funding, equipment and even lab space did prevent research in Mexico from really blossoming. However, some economic changes in the past couple of decades have enabled the creation of many new research laboratories in several Mexican universities and also have improved the number of grants available.

"On the other hand, this increased research development has not yet reached the job sector," Riveros-Rosas says. "Recent graduates have been encountering problems finding jobs, and this is discouraging new students from enrolling in master's or Ph.D. programs."

Still, Riveros-Rosas has been encouraged by the growth and believes the situation will balance out eventually. In his own life, the recently tenured professor is looking forward to leaving Mexico temporarily for a sabbatical to further enrich his training and get a taste of the outside world.

Veronica Okochi
Professor
Department of Biochemistry
University of Lagos, Nigeria

Initially, Veronica Okochi's scientific journey seemed on track to become another one of America's immigration success stories.

She arrived in the United States in 1967 to begin her undergraduate studies, following in the tradition set by her two older brothers, both students at the University of Illinois. It was fortuitous timing for Okochi, as her native Nigeria was experiencing rising instability that would soon lead to civil war.

She enrolled at Barat College of the Sacred Heart in Lake Forest, Ill., and studied chemistry, a topic she had excelled at in secondary school. She also received the chance to work in the lab of noted clinical chemist Norbert Tietz at the Mount Sinai Hospital in Chicago, where she became fascinated with the relationship between chemistry and diseases, and sought to continue her education in this area.

After receiving her undergraduate degree in 1971, Okochi completed her Master of Science degree in clinical biochemistry at the University of Health Sciences/Chicago Medical School (today, Rosalind Franklin University of Medicine and Science), in 1974.

But at that point, Okochi made a big decision. "I chose to come home to Nigeria," she says. "I knew it would not be easy, but I was inspired by the events I saw in the U.S. — the civil rights struggles and the teachings and hope of Martin Luther King. The civil war had ended, and Nigeria was rebuilding, and I had the zeal to give my service to my country."

She found a job as a demonstrator (lecturer) in the biochemistry department at the University of Lagos, a staff position that also enabled her to pursue her doctoral degree. She began studying the membrane properties of the parasite Trypanosoma vivax, a serious livestock pathogen. "Trypanosome diseases not only cause tremendous human suffering in endemic areas, but they can render vast areas of grazing land unsuitable, causing serious economic and social consequences," she explains.

Her hope was to gain more knowledge about the parasite's biology and then explore the abundant medicinal flora in the region for potential antitrypanosomal agents. As Okochi completed her doctorate and rose to the rank of professor, her lab identified several promising trypanocides and conducted preliminary studies.

Unfortunately, Nigeria's deficiencies in facilities and resources hindered the full-scale translation of her work for any commercial use. "The lack of infrastructure is a big challenge many Nigerian scientists face," she says. "Our work does receive interest and sponsorship from more developed nations in those areas that have international dimensions, like HIV/AIDS and malaria, but that still leaves most of our research under-appreciated abroad."

However, hope is visible on the horizon, as the Nigerian government recently set out a policy goal to make Nigeria an industrially developed nation by 2020. And understanding that research is at the base of all development and progress, the government is making conscientious efforts to increase funding to the universities and research institutes across the country as part of its ambitious national goal.

"This is great news for the scientists here who are striving to make an impact in their research and help solve the problems of poverty, hunger and disease in our country," claims Okochi.

Okochi also has shifted her focus, in part to join the biotechnology movement, but also to appease interests

she developed through her travels. Over the years, she has accompanied her husband as he served at foreign missions in Japan and France, and she has had the privilege of working in places like Juntendo University in Tokyo and the Jacques Monod Institute in Paris. Studies with respiratory chain enzymes and protease inhibitors awakened a strong curiosity in enzymology.

Currently, Okochi is isolating pure cultures of fungi like Aspergillus niger and Penicillium chrysogenum from industrial plant wastes such as sawdust, corn cobs and sugar cane pulp and using them to produce enzymes like cellulases, pectinases and xylanases. In turn, these enzymes can hydrolyze the wood wastes into simple sugars for a variety of applications, such as animal feed or biofuels; she also has developed a technique to produce natural penicillin.

"I envisage this research as an environmentally friendly way to extract value from the volumes of cellulosic wastes that constitute a major source of pollution in our urban cities," says Okochi, who now is looking at improving yields. "It's important that as we develop as a nation, we do so in a responsible way."

Nick Zagorski (nicozags@gmail.com) is a freelance science writer.

asbmb *news* continued from page 8

Retrospective: Torres *continued from page 8*

Council. In 1983, under the auspices of Leloir's Institute and the Argentine Research Council, he founded South America's first Institute of Molecular Biology and Genetic Engineering. As INGEBI's director, Torres fostered the development of young graduate students into mature scientists in an atmosphere of political freedom.

After 1985, in a newly democratized nation after twenty years of political oppression, Torres became dean of the University of Buenos Aires School of Sciences (1988 – 1990). In his role as dean, he is credited with having greatly diminished the wounds caused by the 1966 military intervention in academic affairs that all but destroyed that school's scientific standing and prevented academic freedom under its roof.

Torres and his collaborators at INGEBI successfully mentored more than 138 graduate students and organized numerous advanced graduate courses with faculty members drawn from around the world, including the U.S. and Europe. INGEBI, which Torres directed until 2009, is home to 35 independent investigators, including Pew Latin American Fellows and Howard Hughes Medical Institute investigators, attesting to the high scientific standard Torres was able to attain for the research institute.

Deservedly, Torres was well recognized by his peers and won numerous honors and awards. He was a member of the Argentine National Academies of Science (1998) and Medicine (2005) and corresponding member of the Brazilian (1999) and Chilean (2002) Academies of Science. Among his awards are the Premio Odol in Biology (1969), the Konex Platinum Award in Genetics (1993), the Luis F. Leoir Award in Chemistry (1996), the Bunge y Born Award in Molecular Biology (2000) and the J.J. Kyle Award from the Argentine Chemical Society (2005).

On a personal note, between 1964 and 1967, I was the Doc's first graduate student. I always will remember when I first met him in his laboratory at the Fundación Campomar as a prospective graduate student with a "research plan" in hand, he said "Here, we do not speculate, we pipet," thus seeding my research career as an experimentalist. I am forever thankful I am forever thankful to him for infusing in me enthusiasm for researching the wonders that make us living beings.

Please feel free to add your reflections on Héctor Norberto Torres to the comment section of the online version of this article at http://bit.ly/ATodayTorres.

Lutz Birnbaumer (birnbau1@niehs.nih.gov) heads the transmembrane signaling group within the laboratory of neurobiology at the National Institute of Environmental Health Sciences.

Providing a way to support a scientific will

From pipettes to PCR machines, Seeding Labs donates scientific supplies to resource-poor institutes in developing nations

BY NICK ZAGORSKI

Scientific curiosity can be found in every corner of the world. On the other hand, the resources necessary for the science to reach its potential typically are not so well distributed. But thanks to the efforts of a nonprofit group known as Seeding Labs, scientists in developing nations are receiving the equipment they need to let their talent shine.

Seeding Labs began in 2002 through the efforts of a small but dedicated group of graduate students at Harvard University who took notice of the outdated but still functional lab equipment found on the crowded shelves and in the cabinets and hallways of almost every major university research lab. Many of these students had spent time in labs in Africa, Asia and Latin America and realized how valuable these unwanted items could be in the right hands. So they worked together with their departments and shipped out a few small boxes to some colleagues in Paraguay and Guatemala.

The group didn't originally plan on turning its initial donation into a full-blown enterprise, but as word spread around the Harvard campus, other students and faculty members took up the cause and made even more extraneous equipment available to scientists in the developing world.

Since then, not too much has changed; Seeding Labs, founded and headed by former microbiology student Nina Dudnik, remains a small but dedicated organization operating with a minimal volunteer staff and a shoestring budget. But while their means are modest, their impact is not.

So far, the group has provided more than $600,000 of laboratory equipment and supplies to researchers in 14 countries worldwide, which has helped those labs train more than 250 students and staff and educate thousands more.

And the investments have been paying off; recipient scientists report increased staff recruitment, productivity and publications. All of this plays a part in improving future funding opportunities and fostering growth, eventually building a self-sufficient research community.

To further this goal of an international community, Seeding Labs recently has begun implementing an exchange of intellect in addition to the exchange of equipment. With support from the Novartis Institutes for Biomedical Research, they recently launched a summer fellowship program to bring talented junior faculty from Africa to the United States to train at NIBR labs in Cambridge. Likewise, with support from the genetics department at Harvard Medical School, Seeding Labs just established an ambassador program that gives U.S. graduate students and postdoctoral fellows a chance to travel to Kenya and share their knowledge and skills with their African counterparts.

Seeding Labs also has plans to make the research of the scientists receiving donated supplies available on its website. This would mitigate some of the publication barriers that scientists in developing nations face while also creating a forum to encourage collaboration.

Seeding Labs has been making tremendous progress in gaining national awareness, and they have a solid network of universities, research institutes and biotech companies donating surplus supplies. There's always room for growth, however, and every bit of equipment can make a difference. So if you happen to have an instrument that's currently collecting dust, consider passing it along to someone who can use it to make a difference.

Nick Zagorski (nicozags@gmail.com) is a freelance science writer.

For more information:

To see a video of Nina Dudnik talking about Seeding Labs at PopTech 2010 or to watch the arrival of a container of supplies at Kenyatta University, go to the online version of this article at http://bit.ly/ATodaySeedingLabs.

Culturing controversy

Strict regulations on stem cell research in the U.S. resulted in many scientists moving their labs abroad

BY LESLIE W. CHINN

Madison, Wis., 1998: After months of waiting, watching and testing, James A. Thomson was finally ready to announce to the world that his laboratory had performed the first successful isolation and culture of human embryonic stem cells (1).

The cells were a veritable cellular fountain of youth: They were immortal and able to divide nearly without limit, but they also had the valuable property of being able to differentiate, under the proper conditions, into more specialized cell types. The possibilities seemed endless: a deeper understanding of developmental biology, lab-grown tissues for transplantation, even a cure for cancer.

Fanfare and furor

The development and propagation of human stem cell lines was hailed as the Scientific Breakthrough of the Year by Science magazine in 1999 (2). "We salute this work, which raises hopes of dazzling medical applications," read the write-up. The alluring sparkle of human stem cells drew scientists in, and the number of publications on stem cells increased markedly. But along with the enthusiasm came a measure of doubt. The cells were derived from germ cells, from embryos, from potential living, breathing human beings. Was it ethical for scientists to do experiments on embryonic stem cells, or were they getting a little too close to playing God?

No one was more aware of these questions than Thomson. Several years earlier, he had consulted with bioethicists at the University of Wisconsin about the implications of his research. In a 2007 interview with The New York Times (3), Thomson spoke about his uneasiness regarding the use of human embryos in his work. "If human embryonic stem cell research does not make you at least a little bit uncomfortable, you have not thought about it enough," he commented. "I thought long and hard about whether I would do it."

Thomson's discomfort was shared by scientists, the public and politicians alike. An appropriations bill passed by Congress in Oct. 1998 declared that federal funds could not be used for "research in which a human embryo or embryos are destroyed, discarded, or knowingly subjected to risk of injury or death," allowing the funding of research utilizing a human embryonic stem cell line but not the creation of new stem cell lines (4). Restrictions tightened even further in 2001, when President George W. Bush announced that federal funds would be made available only for research on existing embryonic stem cell cultures, limiting National Institutes of Health-funded labs to the use of eighteen lines.

Follow the money

Thomson himself had been very careful to perform work related to the establishment of the embryonic stem cell line in a separate lab that was privately funded by Geron Corporation rather than relying on the NIH for financial support (4). But the hassle of finding alternate sources of funding and the mess of keeping separate laboratories and accounts was too much for some stem cell researchers. At the same time, other countries were investing in biotechnology and using financial incentives and less stringent research regulations to entice American stem cell scientists to move overseas.

Singapore was one of these countries — it had developed an ambitious National Biomedical Science Strategy in 2000 (5) and built Biopolis, a gleaming new complex of buildings that served as Singapore's biomedical research hub. Singapore also had established regulations regarding human embryonic stem cell research, permitting cloning for therapeutic — but not reproductive — purposes (6). The city-state's appetite for science and the availability of research funding convinced Neal Copeland and Nancy Jenkins to leave the National Cancer Institute for Biopolis in 2006. "We will be on the ground floor of something new and exciting," Copeland said in an article in Nature (7). Molecular cardiologist Judith Swain and her husband Edward Holmes, a translational scientist, made the move from the University of California, San Diego, to Singapore in 2006 as well, citing "federal hostility towards embryonic stem-cell research" as a factor in their decision (8).

The United Kingdom scored a prominent scientist of its own: Roger Pedersen, a leading researcher in the area of the differentiation and specialization of stem cells. Pedersen

resigned from his position at the University of California, San Francisco, and went to England, where he started the Cambridge Center for Stem Cell Biology and Medicine in 2003. The regulations governing the use of human embryonic stem cells in the UK are similar to those in Singapore, which made it easier for Pedersen to carry out his research. "Here, there is government funding," Pedersen said of the UK, "and the funding goes where the science goes" (9).

Brain drain?

The exodus of top scientists was worrying. "American scientists have been pioneers in all major branches of medical research," observed Senator Orrin Hatch in 2007. "If we don't act quickly, the United States may lose the opportunity to lead the world with stem cells" (10). A 2006 study examined this so-called brain drain by analyzing the results of two surveys, one administered to stem cell scientists and the other to scientists who didn't work on stem cells (11). The surveys asked scientists to document the number and source of job offers received in the past year, hypothesizing that if the brain drain was real, stem cell scientists would have entertained more job offers than other scientists — especially offers to move overseas. And indeed, this was the case: Researchers working on stem cells were 1.6 times more likely to receive a job offer, and 5.3 times more likely to receive an international offer, than researchers working in other fields (11).

In the meantime, states were taking matters into their own hands. In 2004, New Jersey became the first state to appropriate funds for adult and embryonic stem cell research. Later that year, voters in California approved Proposition 71, which provided $3 billion to fund stem cell research while prohibiting research on reproductive cloning. Money from the bond proceeds was distributed by the California Institute of Regenerative Medicine to scientists like Cynthia Kosinski, who received a grant when she was a graduate student at the University of California, San Francisco. While the federal restrictions didn't apply to Kosinski because she worked with adult stem cells, she noted that for researchers who worked on embryonic stem cells, the CIRM funds filled holes when federal grant money couldn't be used. "CIRM funding actually attracted some scientists to California," says Kosinski, "which has helped to make California a hotbed of stem cell research."

The 2006 report supports Kosinski's observation: Of the domestic job offers received by stem cell researchers, a third originated in California, compared to 11 percent for non-stem cell scientists (11). In effect, California — as well as states such as Massachusetts and New Jersey in which legislation supporting stem cell research had been enacted — was playing the role of a local Singapore. The budgets may have been smaller, and there wasn't a Biopolis, but scientists didn't have to move their stem cell cultures across oceans either.

Change and change again

"Living in a state that doesn't have state-approved [embryonic] stem cell funding can be frustrating and risky, because the policy on stem cell research can change from administration to administration," says Kosinski. Stem cell scientists have found themselves riding a roller coaster of federal regulations with dizzying highs and sickening lows. One of the highs came in March 2009, when President Barack Obama issued an executive order revoking President Bush's 2001 restrictions on the federal funding of embryonic stem cell research and increasing the number of cell lines acceptable for use in NIH-funded labs. The celebratory mood among stem cell scientists was short-lived, however: In August 2010, federal Judge Royce Lamberth banned federal funding for work involving embryonic stem cells based on the Dickey-Wicker Amendment, which was intended to stop the destruction of human embryos. Judge Lamberth's ruling brought funding of research involving embryonic stem cell lines to an immediate halt. To allow the research to resume, the Department of Justice quickly filed a stay, so for now, work on embryonic cell lines continues, cautiously — with U.S. scientists watching and waiting to see what happens next.

Leslie W. Chinn (leslie.chinn@gmail.com) is an ORISE fellow at the U.S. Food and Drug Administration.

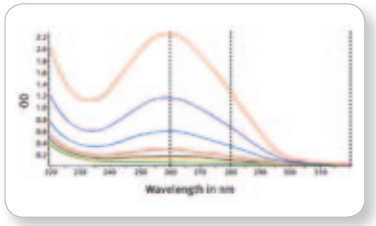
REFERENCES

1. Thomson, J. A., Itskovitz-Eldor, J., Shapiro, S. S., Waknitz, M. A., Swiergiel, J. J., Marshall, V. S., and Jones, J. M. (1988) Embryonic stem cell lines derived from human blastocysts. *Science* **282**, 1145 – 1147.
2. Vogel, G. (1999) Capturing the promise of youth. *Science* **286**, 2238 – 2239.
3. Kolata, G. Man who helped start stem cell war may end it. *The New York Times*. Nov. 22, 2007.
4. Marshall, E. (1998) A versatile cell line raises scientific hopes, legal questions. *Science* **282**, 1014 – 1015.
5. Normile, D. (2007) An Asian tiger's bold experiment. *Science* **316**, 38 – 41.
6. Walsh, B. Asia's stem cell city. *Time Magazine, Asia Edition*. Oct. 23, 2006.
7. Wright, J. (2006) Neal Copeland and Nancy Jenkins, principal investigators, Institute of Molecular and Cell Biology, Singapore. *Nature* **439**, 1028a.
8. Wright, J. (2006) Ed Holmes, executive deputy chairman, Biomedical Research Council, Singapore; and Judith Swain, executive director, Singapore Institute for Clinical Sciences. *Nature* **442**,106a.
9. Rohm, W. G. The Stem Cell Refugee. *Wired Magazine*. December 2003.
10. Senator Dianne Feinstein press release. Senators Hatch and Feinstein promote stem cell research, human cloning ban. March 8, 2007.
11. Levine, A. D. (2006) Research policy and the mobility of U.S. stem cell scientists. *Nature Biotech.* **24**, 865 – 866.

Yes it can! SPECTROstar *Nano* - instantly capture a full spectrum for low volumes, microplates and cuvettes

It is that easy with single push button operation and predefined protocols for absorbance assays such as ELISAs, DNA, RNA, protein, cell growth, and many more. Features of the SPECTROstar *Nano* include:

- Ultra-fast UV/Vis spectrometer
- Spectrum 220 - 1000 nm in <1 sec / well
- Microplate formats up to 1536 wells
- Cuvette port for standard and low volume cuvettes
- Low volumes down to 2 µL
- Automatic path length correction
- Multimode shaking and incubation
- Well scanning, kinetic and endpoint measurements
- Gas vent for atmospheric sensitive samples
- Powerful MARS Data Analysis Software
- Robot compatible



DNA quantification with SPECTROstar Nano

LVis Plate for low volume measurement

BMG LABTECH

The Microplate Reader Company

Australia · Germany · France · Japan · United Kingdom · United States

Asian-Pacific American contributions to science

BY NICOLE KRESGE

1901 ***Jokichi Takamine*** isolates and purifies the hormone adrenaline (the first effective bronchodilator for asthma) from animal glands, becoming the first to accomplish this for a glandular hormone.

1953 ***Min Chueh Chang*** invents the first combined oral contraceptive birth control pill with Gregory Pincus.

1971 ***James C. Wang*** discovers DNA topoisomerases, the proteins that unwind DNA during synthesis and replication.

1986 ***Yuan Tseh Lee*** shares the 1986 Nobel Prize in chemistry with John C. Polanyi and Dudley R. Herschbach. Lee's work involves using advanced chemical kinetic techniques to investigate and manipulate the behavior of chemical reactions for relatively large molecules using crossed molecular beams.

1968 ***Har Gobind Khorana*** shares the Nobel Prize in physiology or medicine with Robert Holley and Marshall Nirenberg "for their interpretation of the genetic code and its function in protein synthesis."

1901 1927 1953 1959 1968 1970 1971 1985 1986 19

1927 ***Yellapragada Subbarao*** and Cyrus Fiske discover phosphocreatine.

1959 ***Khem Shahani*** discovers the DDS-1 strain of Lactobacillus acidophilus.

1970 ***Choh Hao Li*** synthesizes pituitary growth hormone (somatotropin), the largest protein molecule synthesized up to that time.

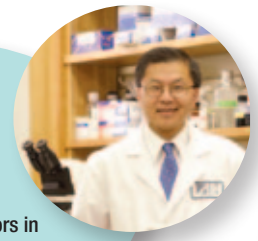
1985 ***Flossie Wong-Staal*** becomes the first scientist to clone HIV and determine the function of its genes, a major step in proving that HIV is the cause of AIDS.

May is Asian-Pacific American Heritage Month. To join in paying tribute to the generations who have enriched America's history, we have compiled a timeline of noteworthy Asian-Pacific Americans and their contributions to the life sciences. The list is by no means complete, and you should feel free to go to the online version of this article at http://bit.ly/ATodayMayTimeline to add other scientists and their contributions.

Nicole Kresge (nkresge@asbmb.org) is the editor of ASBMB Today.

1987 ***Charles J. Pedersen*** shares the 1987 Nobel Prize in chemistry with Donald J. Cram and Jean-Marie Lehn for his work on crown ethers.

1990 ***Chang-Lin Tien*** becomes the chancellor of University of California, Berkeley, making him the first Asian-American chancellor of a major research university.



1996 ***David Ho*** is named Time magazine's Man of the Year for pioneering the use of protease inhibitors in treating HIV-infected patients.
PHOTO CREDIT: DAVID HO.

2002 ***Amit Patel*** becomes the first person to inject stem cells directly into the heart.

2008 ***Roger Y. Tsien*** shares the Nobel Prize in chemistry with Osamu Shimomura and Martin Chalfie "for the discovery and development of the green fluorescent protein."

87 1988 1990 1995 1996 2000 2002 2003 2008 2009

1988 ***Enrique M. Ostrea Jr.*** devises a method for detecting the presence of drug metabolites in the meconium of newborn infants.

2000 ***Christine Poon*** becomes worldwide chairwoman of Johnson & Johnson's pharmaceuticals group, managing the biggest division of the company.

1995 ***Balamurali Ambati*** graduates from the Mount Sinai School of Medicine at age 17, becoming the world's youngest doctor.

2003 ***Peter S. Kim*** becomes president of Merck Research Laboratories, overseeing all of Merck's drug and vaccine research and development activities.

2009 ***Venkatraman Ramakrishnan*** shares the Nobel Prize in chemistry with Thomas A. Steitz and Ada E. Yonath "for studies of the structure and function of the ribosome."

Meet some international members

For our global science issue, we asked several of our international members to answer some questions about themselves and science in their countries.

BY NICOLE KRESGE

Maurizio Brunori

Professor in the department of biochemical sciences
Sapienza— Università di Roma
Rome, Italy

Q: ***How long have you been an ASBMB member?***

A: Maybe as much as 40 years? I am not sure. I believe it was not called ASBMB yet. My name was submitted by my mentor, Professor John Fuller Taylor, a pupil of Mansfield Clarke.

Q: ***What do you study?***

A: My field of research has been, by and large, the structure, function and dynamics of proteins. I worked on myoglobin and hemoglobin for years and than on oxidases and other redox proteins. Over the last decade or so, my main interest has been protein folding.

Q: ***What are some hot research areas in your country?***

A: Limiting myself to the life sciences, structural biology of proteins, stem cells and cellular therapy, immunology and molecular oncology, and micro RNA and cellular control.

Q: ***Where do you see research going in your country in 5 to 10 years?***

A: Unfortunately, at present the perspective is very negative. Many politicians talk about the roles of research and universities as essential components for the recovery of Italian national and international standing, but there is very little positive action. Very few of our research institutions command the respect of the public. We still have good students sometimes, but many of our best Ph.D.s go abroad for good. If there is no serious change in the course of action, the shortest response to your question would be: down the drain.

Q: ***Are there any barriers to collaboration?***

A: It is so variable from place to place that I can hardly present a sensible answer. In principle, of course, collaboration is encouraged and sometimes it works well. Italians working abroad, and especially in the U.S., have been very hospitable and positive.

Q: ***Where do you get most of your funding?***

A: The Italian Ministry of Education, University and Research, private foundations, and the European Union.

Q: ***How do you think research in your country differs most from research in the United States?***

A: The paucity of funds for curiosity-driven science and of grants targeted to younger researchers makes it difficult for most starting scientists (no matter how smart) to become financially independent and thus to pursue their ideas. If and when they succeed, it is often because they are protected by the system. Moreover, the peer review procedure needs to be perfected, and evaluation of merit should have concrete effects in the allocation of resources.

Q: ***Did you do any of your training abroad?***

A: Yes. At the Max Planck Institute in Goettingen, Germany (with Manfred Eigen) and afterward at the University of Illinois in Urbana with Gregorio Weber (both in the second half of the sixties).

Ashwini Kumar Nepal

Graduate student in the department of biochemistry
B.P. Koirala Institute of Health Sciences
Dharan, Nepal

Q: ***How long have you been an ASBMB member?***

A: I have been a member for two years.

Q: ***What do you study?***

A: I am hoping to earn an M.Sc. in medical biochemistry.

Q: ***What are some hot research areas in your country?***

A: Micronutrients (zinc, iodine, iron) and supplementation, endocrinology (thyroid hormones, thyroglobulin, etc), diabetes screening, infectious diseases (tuberculosis, visceral leishmaniasis, HIV, malaria), antioxidant and oxidative stress in various diseases, waste water analysis, prevalence based studies (e.g., snakebites, diarrhea, sanitation, maternal mortality), and clinical research.

Q: ***Where do you see research going in your country in 5 to 10 years?***

A: There are very limited sources of funding for research in Nepal from the government. Research in the next 5 to 10 years is expected to get more funding from governmental, nongovernmental and international agencies, and collaborators. Advanced laboratory facilities for molecular methods and other recent technologies for experimental research need to be established. There is a lot to be done to meet the emerging research needs to improve the health and nutrition status of the population.

Q: ***Are there any barriers to collaboration?***

A: No, there is no barrier for collaboration. However, more international collaboration is needed on our part for technology transfer and development of the capacity of the local researchers.

Q: ***Where do you get most of your funding?***

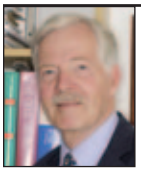
A: The government provides very limited funding for research due to poor economic conditions. However, there is some funding for university faculty members through the university research committees and grant commissions. Students get no funding at all for their research. Most of the funding for research is through international collaboration.

Q: ***How do you think research in your country differs most from research in the United States?***

A: Research in Nepal differs from that in the United States in that we have to deal with emerging infectious diseases and malnutrition, diarrhea, maternal mortality, snake/mosquito bites, etc., which developed countries usually don't have. So more focus is needed to improve the health status of the communities by creating awareness and

conducting research, which will have a significant effect on enhancing health standards of the population.

Q: ***Did you do any of your training abroad?***
A: No.



Helmut Sies

Professor of biochemistry
Heinrich Heine Universitat
Dusseldorf, Germany

Q: ***How long have you been an ASBMB member?***
A: Since 1988.

Q: ***What do you study?***
A: Oxidative stress, oxidants and antioxidants, redox signaling, micronutrients (carotenoids, polyphenols, selenium), nutritional biochemistry, hepatic metabolism, vascular responses, and cell-cell communication.

Q: ***What are some hot research areas in your country?***
A: Structural biology, systems biology, stem cell research, neurobiology, hepatology and cardiovascular biology.

Q: ***Where do you see research going in your country in 5 to 10 years?***
A: I predict more disparity between large, high-level research clusters at universities (for example, the Excellence Initiative) and nonuniversity organizations (such as the Leibniz, Helmholtz and Fraunhofer institutes) on one hand and the normal university research chairs on the other.

As for research topics, the big questions tackled worldwide will also be tackled in Germany. The research atmosphere is good (although one can always complain on a high level).

Q: ***Are there any barriers to collaboration?***
A: Fortunately not.

Q: ***Where do you get most of your funding?***
A: From the Deutsche Forschungsgemeinschaft (the German equivalent of the National Institutes of Health) and also the National Foundation for Cancer Research in Bethesda, Md.

Q: ***How do you think research in your country differs most from research in the United States?***
A: There is no fundamental difference in my view. Competitive grants are the mainstay. My feeling is that cooperation among German scientists themselves could be encouraged more, but the core grants at local universities (Sonderforschungsbereich) do a good job at this.

Q: ***Did you do any of your training abroad?***
A: During my postdoctoral research time at the Ludwig-Maximilians-University at Munich I had the privilege to spend research visits with Britton Chance at the Johnson Research Foundation in Philadelphia.

Monique Decastel

Researcher
Institut National de la Santé et de la Recherche Médicale
Pointe-à-Pitre, Guadeloupe

Q: ***How long have you been an ASBMB member?***
A: I have been a member since 2010.

Q: ***What do you study?***
A: I am studying the molecular and cellular mechanisms involved in the physiopathology of sickle cell anemia, an inherited disorder characterized by a defect in hemoglobin synthesis.

Q: ***What are some hot research areas in your country?***
A: Knowledge and valorization of tropical plants (at CIRAD, INRA and the University of the French West Indies); health, sickle cell disease, prostate and colorectal cancers (at INSERM, the Sickle Cell Center and the University Hospital Center); and volcanic and seismic studies (at the Magma and Volcano laboratory).

Q: ***Where do you see research going in your country in 5 to 10 years?***
A: I think it will focus more on valorization of pharmacopoeia and agronomy and on development of new therapeutic strategies to improve sickle patients' quality of life.

Q: ***Are there any barriers to collaboration?***
A: No.

Q: ***Where do you get most of your funding?***
A: From France, Europe and local organizations such as Conseil Régional and Conseil Général.

Q: ***How do you think research in your country differs most from research in the United States?***
A: Guadeloupe is a French West Indies island located in a strategic place (the Caribbean and Central America) that represents Europe in this part of the globe. We have our proper culture, history and economy. So our research is centered on subjects specific to the area.

Q: ***Did you do any of your training abroad?***
A: Yes, at the Laboratorium voor Biochemie, Faculteit van de Wetenschappen, Rijksuniversiteit Gent, Belgium and Uppsala University Sweden.

Yumi Tohyama

Professor in the division of biochemistry, faculty of pharmaceutical sciences
Himeji Dokkyo University
Himeji, Japan

Q: ***How long have you been an ASBMB member?***
A: I have been an ASBMB member for five years.

Q: ***What do you study?***
A: I study the molecular mechanism of immune/blood cells from the viewpoint of the signal transduction system, especially phagocytic cells, including macrophages, osteoclasts and neutrophils.

Q: ***What are some hot research areas in your country?***
A: In Japan, one hot area is research on induced pluripotent stem cells related to regeneration medicine, and another area is the epigenetic study of malignant neoplastic disease. The inflammatory mechanism in innate immunity is also a hot area.

Q: ***Where do you see research going in your country in 5 to 10 years?***
A: Research leading to a novel technology that generates safe energy including biologic energy or plant biology.

Q: ***Are there any barriers to collaboration?***
A: I do not think so.

Q: ***Where do you get most of your funding?***
A: The Japan Society for the Promotion of Science.

Q: ***How do you think research in your country differs most from research in the United States?***
A: In Japan, it seems to me, few researchers exchange between public laboratories and other ones.

Q: ***Did you do any of your training abroad?***
A: I did not.

Nicole Kresge (nkresge@asbmb.org) is the editor of ASBMB Today.

AuthorAID: Internet working for scientists from the developing world

Online global research community provides networking, mentoring, resources and training for researchers in developing countries

BY SARAH CRESPI

As a technophile, I have to ask, What doesn't the internet make easier? Case in point: the poor distribution of scientific mentors and one nonprofit's network-based solution.

AuthorAID is much like a social networking site, but with a greater purpose: to bring scientists into places where government or local institutions don't have the resources to support local researchers in this way.

Scientists from developing countries often are disadvantaged when it comes to publishing their work. According to Julie Walker of AuthorAID, which connects mentors with potential authors, "There are many barriers to publication for developing country researchers," including:

- limited resources (large classes, lack of access to computers and the internet),
- limited staff for personal mentoring and support,
- language limitations (technical writing in a foreign language) and
- lack of writing-skills training (funds instead are directed toward core needs).

AuthorAID is an effort by the International Network for the Availability of Scientific Publications to overcome these barriers by harnessing the connectivity offered by the internet, allowing researchers and editors to meet and mentor scientists regardless of location.

"Volunteering to be an AuthorAID mentor is a perfect way for retiring editors to remain involved in editing and publishing and to keep in touch with their research areas," says Walker. The site has 481 registered volunteers. Many of them, be they mentors or editors, are drawn from such organizations as the Council for Science Editors and the International Foundation for Science. But this kind of volunteer work can be rewarding at any point in one's career.

Jackie Goodrich, a fourth-year graduate student in toxicology at the University of Michigan, has been a mentor with AuthorAID for about a year. She's worked with two students in East Africa, and they were at different points in their scientific careers. One was an early undergraduate or high school student with some simple questions about obtaining references. Her second interaction, with a research scientist with the government working on epidemiology studies and public health who has two papers at the peer-review stage, has been much more longstanding. "I have learned much about her specific areas of research during this process, as our areas of research do not overlap. Additionally, the editing experience has improved my own writing skills by forcing me to think about better ways to present data and information to a broader audience," Goodrich says. Her second mentee has obtained a bachelor's degree and hopes to attend graduate school.

AuthorAID started as a pilot program in 2007 and, after a three-year evaluation, was established on a permanent basis. The site's emphasis is on supporting scientists in the developing world, with partner institutions in Africa, Asia and Latin America and more than 2,800 registered users.

AuthorAID also provides online resources for those looking to teach or write about science and a forum in which members pose and answer questions. Walker says the online tools, mentoring and workshops conducted in multiple languages work together.

AuthorAID's international funders and partners

- Swedish International Development Cooperation Agency
- The Norwegian Agency for Development Co-operation
- U.K. Department for International Development
- International Foundation for Science
- National University of Rwanda
- The Special Program for Research and Training in Tropical Diseases.

"Workshops and training complement the online exchanges and help researchers to learn new skills and consolidate their existing knowledge," she says, "as well as providing an opportunity to work on revising their papers in a peer group."

Devendra Adhikari, a physics doctoral candidate and associate professor at Tribuhuvan University in Nepal, was grappling with suggested revisions from an Elsevier journal when he attended one of the AuthorAID workshops.

"I knew that if we do not agree with the reviewers, we can submit [a rebuttal] logically and politely," Adhikari says. After attending the workshop, Adhiakri wrote his response and published his paper with the journal.

Another volunteer with the service, Daniel Korbel, has a doctorate in infectious disease immunology and serves as a science adviser for the Wellcome Trust. He has taken two mentees under his wing, one from Nigeria studying in Romania and the other from Cameroon. According to Korbel, the decision to aim for an international journal can be a difficult one to make.

"My mentee's work was certainly good enough to at least give it a try … but, unfortunately, she was overruled," he explains. As a result, his mentee's lab in Romania decided that the difficulties involved in submitting internationally were not worth the payoff.

This series of events can become a vicious cycle in which labs that don't get much funding to do preliminary work don't feel confident about submitting the results for international publication, which can inhibit the lab's ability to get more funding. As Korbel puts it: "Both my mentees complained about the fact that they and their labs find it difficult to attract sufficient or any funding for their research, mainly because they are not viewed as internationally competitive."

Despite these frustrations, Korbel says he has found his participation rewarding. "I have a strong desire to support more junior researchers and the research-into-policy process in low- and middle-income countries, and I realized that the AuthorAID scheme would be a good way for me to contribute."

Although quantifying the value of the program can be challenging, speaking with volunteers and members made it clear that this type of international outreach is worth it for the participants.

Sarah Crespi (screspi@asbmb.org) is a multimedia communications specialist at ASBMB.

Challenges facing the international postdoc

continued from page 9

need to make their expectations and dissatisfactions with the training experience clear. The interaction then needs to be handled with communication and consideration, because for an international postdoc, the situation presents a two-fold problem. The postdoc now needs to be concerned about searching for a position elsewhere and how this change may affect his or her visa status. Communicating early on will give both individuals time to plan and make necessary changes. Despite the issues that exist, handling the situation with tact will allow the transition to occur smoothly.

As research institutions become more culturally diverse, it is important that the scientific community also evolves to address the challenges that arise. Taking advantage of the resources from CHOP and the NPA will bring clarity to these issues and allow research environments to be cohesive and progressive.

Lola Olufemi (olufemi_lola@yahoo.com) is a doctoral candidate/NSF BRIDGE fellow at the Southern Illinois University School of Medicine.

For more information:

- The Children's Hospital of Philadelphia international mentoring site: http://bit.ly/CHOPmentor
- The National Postdoctoral Association's International Postdoc Survival Guide: http://bit.ly/NPASurvivalGuide
- An NPA checklist of questions to aid prospective postdocs in search of positions: http://bit.ly/NPAquestions.

Science in Peru: building research capacity in the biomedical sciences

The Research Experience for Peruvian Undergraduates is a peer-organized program that trains and unites the next generation of Peruvian scientists

BY ABEL ALCÁZAR-ROMÁN AND V. KENYI SAITO-DIAZ

Funding for research and support for graduate students and postdoctoral fellows in Peru is minimal. Young scientists often are forced to take on additional jobs to support themselves and end up pursuing masters and doctoral degrees abroad. To make matters worse, most of these scientists lose their connection to Peruvian scientific networks. The net result: Peru produces only a small number of scientists with graduate or post-graduate training, and many promising students follow other career paths or leave the country, resulting in a Peruvian scientific brain drain.

Many experts underscore the necessity of a concerted effort by international institutions, the national government, the private sector and academia in reversing this trend (1). A commitment from the top is critical for sustained national scientific development. However, efforts by current graduate students and postdoctoral fellows can provide unique help, as they are, in many respects, better suited for reaching and guiding the younger generation of scientists.

With this in mind, in 2007, two Peruvian graduate students at Vanderbilt University and Hospital do Cancer A.C. Camargo launched the Research Experience for Peruvian Undergraduates, a program that seeks to complement Peruvian undergraduate scientific education with a three-month research-intensive internship in laboratories in the United States. REPU aims to establish a strong connection among participants and encourage students to be active in the greater scientific community in Peru and abroad.

The first year

REPU received 16 applications in its first year and was able to invite one student to Vanderbilt University in January 2008 thanks to the support of faculty members Susan Wente and Daniela Drummond-Barbosa. For three months, V. Kenyi Saito-Diaz worked on stem cell regulation in the fly egg chamber in the Drummond-Barbosa lab.

"Kenyi's visit to our lab was a very positive experience for everyone involved," recalls Drummond-Barbosa. "We all enjoyed having him in the lab… he showed a lot of interest in the research going on in the lab, he read the literature with enthusiasm, he learned a lot of new experimental procedures, he kept his data organized, and he was always willing and eager to learn new things. It is always a pleasure to work with smart, enthusiastic and motivated students."

The response to the program in its first year showed that Peruvian students were interested in this type of scientific training and that the U.S. scientific community was willing to help with the initiative. However, it also became apparent that networks for Peruvian undergraduate and graduate science students were minimal. As a result, undergraduate students were not familiar with available training opportunities or the work of Peruvian scientists abroad.

The growth of the program

In 2009, REPU moved to Yale University and was able to invite one student to work on small noncoding RNAs with faculty members Christian Tschudi and Elisabetta Ullu. In 2010, the REPU program received more than 70 applications from all over Peru, and the program expanded to invite four students who worked in labs studying autophagy, ribosome biogenesis, protein quality control and calcium signaling. Again, REPU participants were very successful, and two of them were invited by their Yale advisors to stay for a year to continue their research with full financial support from their host labs.

As the number of REPU participants grew, the program started to implement new training approaches. In 2010, students presented papers relevant to their projects to each other at weekly journal clubs. They also presented their research to their peers and lab members at the end of the program. Students began to develop professional skepticism when reading

manuscripts and came to understand that presenting science in a clear and engaging way was a challenge for everyone. The students also attended informal meetings in which they discussed common research approaches and techniques, the scientific interests of established Peruvian scientists, and how best to help the development of science in Peru.

"REPU provides a unique opportunity that makes you redefine yourself as a scientist, your interests, what you are capable of doing, and the way you approach and think about science as well as your future goals and the role and type of contribution you would like to make to science in the long run," says María Jesús Olarte, who participated in the program in 2010.

"REPU is a young and promising program, and I am very proud to be part of it at this stage," adds 2010 participant Omar Julca. "I am confident that we are helping Peru in different ways, but there is still much to be done, and I am sure we will improve the program every year."

The 2011 REPU program invited three new students and facilitated the return of another two. The students worked on topics ranging from the biophysics of DEAD-box helicases and autophagy to stem cell activation, germline development and neural crest formation. The students also were encouraged to apply for international training internships and to communicate their experiences with their peers at their home institutions and at conferences in Peru.

"REPU was a great opportunity to know about research, grad school and a grad student's lifestyle," says 2011 participant David Romero.

Jill Goldstein, a graduate student in Romero's lab, adds, "It was a great experience to work with the Peruvian student program. David brought a curiosity and enthusiasm with him that was contagious in the lab. He cultivated a number of scientific techniques during the program and organized his work into a sophisticated final presentation at the end of the program. This was a great experience for everyone in the lab."

REPU 2011 participants and mentors. Back row (left to right): Enrique De La Cruz, Martin García-Castro, and Valerie Horsley. Front Row: Omar Julca, Sofia Espinoza, Enith Sifuentes, Eliana Torres and David Romero. Photo courtesy of Pablo Tsukayama.

REPU's impact

The program's priority is to give students a strong foundation in scientific research and communication in order to prepare them for success in their future scientific training. In addition, REPU seeks to create a strong network of scientists who will work together and help each other at different stages of training.

REPU has served as a springboard for students to pursue additional training opportunities. Sofia Espinoza, who participated in REPU in 2009, was invited to attend the Pan American Studies Institute on Function and Regulation of the Cytoskeleton in Rio de Janeiro, Brazil. REPU 2010 participant María Jesús Olarte presented her research at the American Society for Biochemistry and Molecular Biology's recent annual meeting in Washington, D.C. And, in the summer of 2011, REPU 2010 student Omar Julca will be the first Peruvian student to participate at the Vienna Biocenter Summer School in Austria.

REPU also has established a connection between extremely talented students from Peru and graduate programs in the U.S. In 2009, Kenyi Saito-Diaz joined the interdisciplinary graduate program at Vanderbilt University, and Sofia Espinoza will start in the biological and biomedical sciences doctorate program at Yale University in August 2011. These achievements increase the recognition for these programs in Latin America and serve as an example of how these institutions can work to benefit scientific development in Peru while providing a new source of bright and motivated future graduate students.

REPU participants also have had an impact on the greater Latin American community by collaborating with University of California, San Francisco researcher Ronald Vale and his graduate student Sarah Goodwin and the American Society for Cell Biology to translate 27 iBioMagazine lectures from English to Spanish. These free online lectures are given by leading scientists from around the world, highlighting top-notch science and the human side of research. The lectures are powerful educational tools for biology classes all over Latin America.

REPU alumni starting in doctoral degree programs automatically are involved in the selection process and organizational decisions of REPU. In this way, the program secures a continuous flow of people and ideas and maintains a population of younger scientists who can relate to and mentor senior undergraduate students. A promising sign for the continuity and growth of the program is that several REPU students

beginning graduate training are planning on starting REPU sites at their own universities.

"Being part of REPU has given me invaluable opportunities," says Sofia Espinoza. "So now, as a grad student, I plan to pay that forward by mentoring and hosting new Peruvian students."

Limitations

REPU's success has been limited by three main hurdles: recruiting laboratories, securing visas and obtaining funding. As REPU learned from previous experiences, the first two limitations were overcome. Economic support remains the main restriction on the growth of the program. Participants invest personal funds to cover the expenses of visas, travel and room and board. Limited support from Peruvian universities and the Peruvian government is funneled to students with greater economic needs. This lack of funding reduces the pool of qualified students. As a consequence, many gifted students have been unable to participate in the program.

Future Plans

REPU's success in the biomedical sciences suggests that the same approach can be applied to other fields, such as chemistry, physics and ecology. Expanding to these disciplines would help nucleate a wide network of Peruvian undergrads, graduate students, postdoctoral fellows, faculty members and professional scientists. This network would impact Peruvian science positively and give a natural foundation for interdisciplinary collaborations. Importantly, one of the main goals of the program is network building. Therefore a long-term goal is to expand beyond Peru and include other Latin American countries with similar needs, such as Ecuador and Bolivia.

Programs like REPU are well suited to complement scientific development in countries where graduate education in the sciences has not developed fully. This is the case in most countries in the region, the big exceptions being Argentina, Brazil, Chile, Uruguay and Mexico, where an established scientific community thrives in comparison. In fact, these countries invest five to 10 times more in research and development than their neighbors. As a result, exceptional opportunities like the one offered by the Pew Latin American Fellows Program mostly benefit these countries (97 percent of Pew Latin American Fellows come from these countries).

Generating a strong peer network of budding scientists is a critical component for advancing science in Latin America. A generation of well-trained, well-connected, socially engaged scientists will support the long-term goal of establishing a strong scientific community in developing countries. This approach constitutes a perfect complement to the ongoing efforts to transform the scientific reality of Latin America.*

We would like to thank Mev Dominguez, cofounder of REPU, the Office of International Student and Scholar Services at Yale and Vanderbilt Universities, and hosting department business offices for help with visas; Enrique De La Cruz, Michael Bradley, Dawn Turton, David Castro (BioUnalm), Hugo Flores, Modesto Montoya, Kristy Lamb, the De Camilli and Wente labs, PIs and labs hosting students, REPU participants, CONCYTEC and UPCH for financial support; and Yale and Vanderbilt Universities for providing a site for the program to develop.

Abel Alcázar-Román (abel.alcazar@yale.edu) is a postdoctoral associate in the department of cell biology at Yale University School of Medicine.

V. Kenyi Saito-Diaz (kenyi.saito@vanderbilt.edu) is a graduate student in the department of cell and developmental biology at the Vanderbilt University School of Medicine.

* In Peru, important initiatives to organize scientists and to stimulate research and education are well underway. The National Center for Technology and Technological Innovation in Peru has secured a large investment grant from the Inter-American Development Bank and the Peruvian government to fund several research and development projects. Large international scientific meetings (ECIs) hosted in different parts of the country and high school science fairs that introduce children to the wonders of the discovery process disseminate information about science. And major universities have established re-entry grants to attract highly trained Peruvian scientists working abroad. In this context, and in a collaboration with UPCH, Carlos Bustamante at University of California, Berkeley, has established a mirror lab at UPCH to conduct single molecule studies on proteins of clinical interest in Peru. The REPU program fits perfectly with these initiatives and complements these efforts.

REFERENCE

1. Sagasti, F. (2004) Knowledge and Innovation for Development: The Sisyphus Challenge of the 21st Century. Edward Elgar Publishing Ltd, Cheltenham, Gloucestershire.

For more information:

- An ASBMB initiative to unite scientists in the U.S. and Latin America: http://bit.ly/ASBMBLatinAmerica.
- iBioMagazine lectures in English and with Spanish subtitles: www.ibiomagazine.org.

Science without borders

Resources for scientists interested in training in Europe

BY NANCY VAN PROOYEN

American scientists will happily cross the Atlantic Ocean to attend scientific meetings, but few seek postdoctoral fellowships or scientific jobs in Europe. In fact, less than 3 percent of U.S.-born science doctoral recipients choose to train or work abroad. In contrast, 55 to 60 percent of postdocs in the U.S. are foreign citizens, according to the National Science Foundation.

Why is this? Logistical hurdles such as obtaining funding and a work permit may seem overwhelming. Many young scientists also fear that a stint at a European lab might make it harder to obtain a tenure-track job when they return to the U.S. These concerns, combined with language and cultural barriers, prevent many scientists from even considering leaving the U.S.

In reality, an experience abroad can expand a scientist's network and expose him or her to different approaches to science. Many former expatriates report that their experience was worth the journey overseas both culturally and scientifically. And there are many support networks to help overcome challenges in finding the ideal European job that can help launch a successful scientific career and provide a rich personal experience.

EURAXESS and EuroScienceJobs are two websites that provide a wealth of information on available jobs in Europe. The EuroScienceJobs site is broken down into four sections: job search, upload CV, career guides and recruiters. The job search section contains hundreds of job postings organized by scientific discipline, job type (academic versus industrial) and country. By registering, site users also can upload their CVs to the site for potential employers and recruiters to look at. The career guide section of the site gives advice on preparing for job interviews and updating a CV and also offers a self-evaluation guide to help job candidates highlight their strengths during interviews. The recruiters section gives an overview of the site's users (55 percent have doctoral degrees and 93 percent are willing to relocate) and shows that some of the site's clients include Johnson and Johnson, the European Molecular Biology Laboratory and CERN.

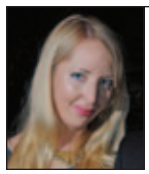
EURAXESS also lets users post their CVs and hunt for science jobs. The site offers a broad range of other services to assist scientists in making smooth transitions to their new countries. This includes a support network for European researchers working outside Europe and a section listing more than 300 funding opportunities.

EURAXESS also will provide customized assistance free to any researcher looking to relocate to Europe. The site has 200 centers in 37 countries to assist scientists and their families. Users are walked through the process of obtaining a visa and work permit and supplied with useful information on legal issues, social security, health and taxes, everyday life, and family support. The site even includes information on accommodations.

Language barriers can be an additional burden for researchers doing training abroad. Luckily for Americans, most science is conducted in English. However, people adapt best if they learn enough to follow casual conversation. With that in mind, EURAXESS provides information on language classes in different countries.

EURAXESS also has a separate section on the rights of researchers and a code of conduct for the recruitment of researchers. Although abuse of researchers is becoming less common, it is important to understand a scientist's rights to help prevent or lessen conflict.

Remember: Great science has no borders — the perfect job could be waiting for you across the ocean.



Nancy Van Prooyen (nancy.vanprooyen@ucsf.edu) is a postdoctoral fellow at the University of California, San Francisco.

For more information:

Several countries also have websites to facilitate finding and transitioning into jobs.

- Destination AUSTRALIA: www.mobility.org.au
- Destination CHILE: http://movilidad.conicyt.cl
- Destination JAPAN: www.jsps.go.jp
- Destination SOUTH AFRICA: www.esastap.org.za

An interview with Erika T. Brown

Brown, an assistant professor at the Medical University of South Carolina, talks about her research and some of the challenges she's faced in her scientific development.

ASBMB: ***Tell us about your current career position.***

BROWN: I am an assistant professor in the department of pathology and laboratory medicine at the Medical University of South Carolina in Charleston, S.C. I also hold administrative positions as the director of institutional informatics and as an institutional coliaison to the South Carolina Commission on Higher Education.

ASBMB: ***What are the key experiences and decisions you made that have helped you reach your current position?***

BROWN: One of my key decisions was to be open to relocating. I would not be in my present position if I had not relocated twice during my postdoctoral studies. Another decision was to cast a big net during my job search for an independent position and submit my application materials wherever I saw an opportunity available that fell in line with what I wanted to do professionally. And lastly, I developed professional relationships with colleagues, senior scientists and senior administrators who have been very helpful in teaching me how to navigate my career in academia.

ASBMB: ***How did you first become interested in science?***

BROWN: I always had a passion for both science and math, starting at a very early age. As a child, my parents really encouraged this. I would get gifts for Christmas such as a biology or slide specimen kit, miniature microscope and math workbooks. I enjoyed being stimulated by activities that were analytically challenging (i.e., word puzzles, brain teasers, etc.) when I was younger. And I found as an adult that biomedical research continued to feed the enjoyment I have always received from analytically challenging activities.

ASBMB: ***Were there times when you failed at something you felt was critical to your path? If so, how did you regroup and get back on track?***

BROWN: As a junior faculty member, it is crucial to still have mentoring. Mentoring does not stop once the postdoctoral fellowship has been completed. In the early years of my independent position, I did not have a committed scientific mentor at my institution, because there was a lack of investigators who had a similar or overlapping research interest. I learned from this experience that if your needs are not being met at your institution, it is imperative to seek assistance from outside senior faculty with expertise in your field of research. And in some cases, it may be advantageous to work with an expert in your field who is based at another institution. It is an excellent way to increase your professional and scientific networks and resources.

ASBMB: ***What advice would you give to young persons from under-represented backgrounds who want to pursue a career in science similar to yours?***

BROWN: My advice would be to make sure you collaborate with or be mentored by someone who has a sincere and highly motivated interest in your professional growth and future career as a scientist, first and foremost. That can be someone of any race or gender. However, it is good to have a support system composed of other faculty/scientists/clinicians who may be experiencing the same challenges that you are. That is where being an active member of groups targeted to under-represented minorities and/or women in science can be very helpful.

ASBMB: ***What are your hobbies?***

BROWN: Since my job requires an immense amount of reading, problem-solving and other cognitive duties, my hobbies involve more physical or sensory activities. I enjoy belly dancing, exercise, watching a good comedy (Judd Apatow movies are the best!), traveling, attending concerts, and eating Asian and Middle-Eastern food.

ASBMB: ***What was the last book you read?***

BROWN: "Beyond the Cosmos," by Hugh Ross, in which the author, who is a physicist, attempts to use scientific explanations to defend the existence of God.

ASBMB: ***Do you have any heroes, heroines, or role models? If so, describe how they have influenced you?***

BROWN: My heroine would be my third grade teacher, Ms. Kay Hollingshed. She immediately took notice of my academic talents and had me tested for the gifted-student program. I scored very well and was admitted into the program.

ASBMB: ***What is it that keeps you working hard and studying science every day?***

BROWN: I always remind myself that I am in a position to make a positive impact and that I am very blessed to be here. XOXO

Feting biochemistry and molecular biology

Tennessee Tech University hosts a celebration of biochemistry and molecular biology

BY CASEY J. MCCORMICK

The Tennessee Technological University's Undergraduate Affiliate Network chapter recently commemorated the anniversary of the discovery of the structure of DNA by James Watson and Francis Crick with an inaugural Celebration of Biochemistry and Molecular Biology event.

The idea sprang from discussions about campus student groups taking part in activities for week-long national celebrations of science, such as the American Chemical Society's National Chemistry Week. We felt that biochemistry also should have this type of event, because its relevance is evident in our everyday existence and there are so many important accomplishments within the field to share with the students on campus.

We could think of no better day than February 28 — the day that Watson and Crick ran into the Eagle Pub and announced that they had built a model of DNA. It was an unforgettable day for the progress of biochemistry and molecular biology.

We began our celebration with a look at training future researchers in the field. We held a scientific writing workshop conducted by undergraduate students involved in research on campus. "One of the most important things to learn as an undergrad student is how to write scientifically," says Kathleen Broderick, vice-president of the UAN chapter and workshop coordinator. "The format is completely different from what we are taught in high school English class. This was a fun and interactive activity that gave the participants excellent references and resources, and the best part is that it was done for students, by students."

After the writing workshop, attendees were invited to an interactive undergraduate poster session that was a part of a science café — a casual and interactive atmosphere for the sharing of ideas, food and roundtable discussions. Our chapter also hosted a special agent with the Tennessee Bureau of Investigation who has been involved in many different areas of biochemistry research, forensics and field work. There also was a chance for collaboration with many other student groups on our campus, including the student members of the ACS, the newly formed Eagle Science Journal Publication Association (the group responsible for the publication of the TTU Journal of Sciences) and the TTU green committee. Discussion topics with these groups included bioinorganic chemistry, biochemical approaches to alternative energy and computational biochemistry.

"The chance to present my research in a casual setting was a new experience. I felt proud of my research and excited to tell viewers about it. The feeling from meeting people interested in my work and wanting to hear more or getting students interested in doing research was invigorating. This event also gave me another opportunity to practice before I head off to Anaheim, Calif., for the ACS meeting. I am more stoked than ever!" said Talon Hill, a senior ACS chemistry major conducting research in bioinorganic chemistry.

Attendees also were invited to a special showing of the 1987 BBC dramatization of Watson and Crick's discovery, "The Race for the Double Helix." The film stars Jeff Goldblum as James Watson and is no longer being distributed. It is a very difficult film to come by, but one of the chemistry department faculty members had a VHS version. More than 200 students and professors gathered in the auditorium for this feature as we celebrated one of the greatest moments in the history of biochemistry and molecular biology.

Based on the turnout for the event and its success in accomplishing our goals of career development, presentation of research and the celebration of the past, we plan to continue this as an annual event. Although this year saw a large number of participants, it is our hope to grow the event into a statewide conference, to increase the amount of participation in the research poster session, and to include a graduate and professional school fair.

We encourage all UAN chapters to help make the next anniversary of Watson and Crick's discovery a national hit.

Casey J. McCormick (mccormick.cj2@gmail.com) is an undergraduate student at Tennessee Technological University and president of the TTU Undergraduate Affiliate Network.

Service-learning in biochemistry

Even small connections to the community increase student motivation

BY NEENA GROVER

Many of the concepts that we teach in our undergraduate biochemistry classes, from protein structure and function to metabolism, are easily linked to defects and diseases. The theoretical aspects of diseases are intellectually fascinating, especially to us professors. However, including people who are living or working with a disease in the learning experience significantly increases students' motivation by providing a human face to the disease and an opportunity to discuss things like drug side effects and cost and the stigma of living with a chronic disease.

In my nucleic acids biochemistry course, I use the human immunodeficiency virus to teach standard biochemical concepts: replication, transcription, reverse transcription, translation, DNA repair pathways and the immune system. Students read current literature and give several literature-based presentations as part of the class.

Community outreach

In general, the students are fairly interested in learning the concepts covered in this course. However, their dedication to the learning changes dramatically after a single visit to a local clinic that provides counseling and financial assistance to HIV/AIDS patients. Early in the course, students are given an introduction to the work done by the clinic and a tour of the facilities. Students spend a few additional hours over the duration of the course performing small tasks at the clinic, such as mailing out flyers about HIV/AIDS events or organizing a free HIV testing day on campus. Students are primed to ask questions about the disease and its effects on families and communities. Surprisingly, the work students do at the clinic is not as important as seeing the human face of the disease: A single visit to the clinic gives students some perspective on the challenges faced by people living with HIV or AIDS.

Toward the end of the course, students present an HIV 101 workshop to the local community on the basic science of viral replication, drugs and resistance. The students advertise their talks in local newspapers and on local radio stations. Students present the information in jargon-free English, and create material for public dissemination.

During the HIV 101 workshop, one or two people who are living with the disease also are invited to speak. These presentations have a powerful impact on the students — they recognize that learning about the science behind a disease is not the same as living with it. Also, the need for more research becomes immediately apparent. Students report that presenting the talk to the community is the most difficult part of the course.

Having taught this class with a service-learning component for the past twelve years, I have observed the impact that the community has on the students. In all these years, not one student has opted out of the service-learning portion of the course. And, every student has rated the service-learning portion as an important and essential aspect of this course. Students often note that the community activities both motivated and empowered them to use their scientific knowledge to make a difference.

As a professor who feels the pressure to cover myriad topics, from the current research in riboswitches to DNA repair pathways, I find that these few hours of community exposure assist me in the classroom. The students are motivated by a need to make a difference, and they realize that a better understanding of biochemical processes is necessary to combat diseases.

I am convinced that incorporating service-learning is a powerful way to bring students' energy and motivation into the classroom. Exposing students to the murkiness of the challenges of living with diseases has a powerful impact, and it motivates them to participate in research to find better solutions.

Neena Grover (ngrover@coloradocollege.edu) is an associate professor of biochemistry and chairwoman of chemistry and biochemistry at Colorado College.

MCP MOLECULAR AND CELLULAR PROTEOMICS

Spotlight on degradation pathways

BY ANGELA HVITVED

This month, Molecular and Cellular Proteomics features a special issue highlighting recent advances in ubiquitination and protein degradation research. The issue, titled "Protein Degradation and Ubiquitin Pathways," was coordinated by three guest editors: Lan Huang from the University of California, Irvine; Thibault Mayor from The University of British Columbia; and Peipei Ping from the University of California, Los Angeles.

The issue features new techniques and developments presented at the 2010 Proteomics of Protein Degradation and Ubiquitin Pathways meeting held in Vancouver, British Columbia, jointly sponsored by the International Forum of Proteomics and PPDUP and organized by the guest editors. The Vancouver meeting was the first in a series the organizers hope will "promote the elucidation of protein degradation pathways and the understanding of downstream physiologic consequences using cutting-edge proteomic tools."

Ubiquitination and regulated control of protein degradation are fundamental biological processes that play a critical role in virtually every aspect of eukaryotic cellular function. The cell's system of tagging proteins for trafficking or degradation by attaching ubiquitin remains an important area of study that continues to provide new insights into cell maintenance and the causes of cellular dysfunction. As the guest editors note in their introduction, "The biological insights offered herein have begun to unveil the functional lesions within these pathways and the potential roles they contribute to the pathogenesis of diseases."

Much of the research featured in the May issue focuses on understanding the fundamental biology at work. Lan Huang's laboratory reviews advances in understanding proteasome structure and function during oxidative stress and how cells cope with oxidative stress through proteasome-dependent degradation pathways. A group led by Donald Kirkpatrick at Genentech Inc. presents its progress in quantitative mass spectrometry methods for characterizing complex ubiquitin signals. They reveal the complexity of ubiquitin signals in the cellular proteome by showing that polyubiquitinated substrates purified from mammalian cells can be modified by mixtures of K48, K63 and K11 linkages.

Raymond Deshaies and colleagues at the California Institute of Technology describe novel signaling mechanisms for the SCF ubiquitin ligase complex. Using quantitative mass spectrometry-based approaches, they show that inhibiting conjugation by Nedd8, a ubiquitin-like protein that modifies SCF ubiquitin ligases, increases SCF complex levels, suggesting that other mechanisms maintain the cellular pool of SCF ubiquitin ligases in addition to Nedd8.

Jun Qin and colleagues from the Baylor College of Medicine describe an affinity-based reagent for large-scale isolation of polyubiquitinated proteins that identified 294 ubiquitination sites on 223 proteins from human cells, 15 percent of which were mitochondrial. In a separate contribution, Qin and colleagues highlight the central role of unbiased proteomic technologies in pushing forward the field of global ubiquitin profiling in complex systems.

Michael Glickman from the Technion-Israel Institute of Technology and colleagues report on a method for rapid lysis that allows for global profiling of conjugated cellular ubiquitin directly from whole cell extract. They found that almost half of conjugated ubiquitin was nonextended monoubiquitin. Further studies with lysine-less ubiquitin (K0 Ub), which cannot be extended, revealed that K0 Ub was unevenly distributed between the two branches of ubiquitin processing, degradation and trafficking, despite both systems utilizing a common pool of ubiquitin. In a second contribution, Glickman and colleagues review the activation mechanism of the proteasome activator PA200, thought to regulate proteolytic activity. Crystallographic analysis revealed the detailed interactions of PA200 and the proteasome core particle 20S and suggested that PA200 stabilizes a partially open conformation of 20S.

Other manuscripts feature research that is distinctly disease-related. Daniel Finley and colleagues from Harvard University examine deubiquitinase activities and potential mechanisms for enhancing protein degradation; their findings could have therapeutic implications for diseases involving toxic proteins that are targeted for degradation. A research group led by Ugo Mayor at the CIC bioGUNE in Spain reports a novel proteomics strategy to isolate ubiquitin conjugates from Drosophila melanogaster embryonic neurons and the identification of 48 novel neuronal ubiquitin substrates, many of which play important roles in synaptogenesis.

Alain Doucet and Christopher Overall from the University of British Columbia describe a novel liquid chromatography-mass spectrometry approach for identifying the amino termini of protein cleavage fragments in solution. Bioactive cleavage products play important cellular regulatory roles, and identifying cleavage sites is critical to understanding the pathology of many diseases.

Matthew Bogyo and colleagues from Stanford University and Scripps Research Institute present the first global map of the proteolytic processing events that occur as Plasmodium falciparum, the parasite that causes malaria, ruptures and emerges from host red blood cells. Their findings will aid the study of proteases that could serve as potential therapeutic targets.

A group led by Peipei Ping describes the first isolation

and characterization of functional cardiac 19S complexes, unique among proteasome regulators because they affect both the capacity and specificity of protein degradation. They found that cardiac 19S complexes were heterogeneous, with one subpopulation exhibiting greater sensitivity to Hsp90 inhibition. Identifying these features opened up new avenues for proteasome-targeted therapeutic interventions in cardiovascular diseases.

The next conference will be held Jan. 22 to 25, 2012 in San Diego, Calif., and MCP already has signed on as a sponsor.

Angela Hvitved (angela.hvitved@gmail.com).

jbc THE JOURNAL OF BIOLOGICAL CHEMISTRY

Amyloid: misfolded and misunderstood?

BY ANGELA HOPP

Researchers who study the fibrous protein aggregates known as amyloid are beginning to come around to the idea that amyloid's bad reputation may be unfairly one-sided, because its ruinous role in debilitating and sometimes lethal neurodegenerative disorders such as Parkinson's and Alzheimer's diseases is only part of the story. As the study of amyloid structure and function advances and as more organisms that use its biophysical properties to their advantage are identified, the current understanding of amyloid is being re-evaluated to accommodate such nonpathological functions.

Although obtaining high-resolution structural information for amyloid has been challenging due to its insolubility and aggregated nature, electron microscopy and solid-state nuclear magnetic resonance studies are providing a clearer picture of amyloid structures and the physical properties shared by the pathogenic and functional forms.

In response to these developments, in the May 13 issue of the Journal of Biological Chemistry, Frank Shewmaker of the Uniformed Services University of the Health Sciences and Ryan P. McGlinchey and Reed B. Wickner of the National Institute of Diabetes and Digestive and Kidney Diseases tackle the evolving concept of amyloid and review various pathogenic and functional amyloids within the framework of the latest structural models.

"Amyloid's traditional link to disease has led some to assert that the term 'amyloidlike' should be used for proteins that possess the hallmarks of amyloid but are not associated with pathological plaques," the authors write. "Regardless of localization or functionality, there exists a protein biophysical state that is not limited to disease and more broadly represents a low-energy conformation that is common to many polypeptides."

The minireview is titled "Structural Insights into Functional and Pathological Amyloid."

Angela Hopp (ahopp@asbmb.org) is managing editor for special projects of the Journal of Biological Chemistry.

JLR THE JOURNAL OF LIPID RESEARCH

Patient-oriented lipid research

BY MARY L. CHANG

The Journal of Lipid Research has an important section that highlights clinical studies of lipids called "Patient-Oriented and Epidemiological Research." The first two papers in this category were published in September 2006 and included an investigation of apolipoprotein A-IV in patients with decreased kidney function (1) and studies on a drug with hypoglycemic action in healthy, non-diabetic subjects (2). Since then, JLR's section on patient-oriented and epidemiological research has seen articles on obesity, diabetes, atherosclerosis, coronary heart disease, liver disease and many other clinically important topics. We encourage researchers who study lipids in human subjects to submit their research to JLR for consideration.

This month's issue of the journal features a variety of topics in clinical research. JLR is quickly becoming known for publishing high-quality papers in the area of lipidomics, and the May issue is no exception, with papers such as the one by Mario Ollero of INSERM, France, titled "Plasma lipidomics reveals potential prognostic signatures within a cohort of cystic fibrosis patients." Also in the May issue, Charles B. Stephensen of the University of California, Davis, has a paper focusing on nutritional studies titled "ALOX5 gene variants affect eicosanoid production and response to fish oil supplementation," and Ting-Ting Tang of Union Hospital in China presents clinical data on a statin's effects on people with arthritis. Marjan Shafaati of the Karolinska Institutet in Sweden also shares results on the role of oxysterol 27-hydroxycholesterol in neurodegeneration.

Mary L. Chang (mchang@asbmb.org) is the managing editor of the Journal of Lipid Research.

REFERENCES

1. Lingenhel, A., Lhotta, K., Neyer, U., Heid, I. M., Rantner, B., Kronenberg, M. F., König, P., von Eckardstein, A., Schober, M., Dieplinger, H., and Kronenberg, F. (2006) Role of the kidney in the metabolism of apolipoprotein A-IV: influence of the type of proteinuria. *J. Lipid Res.* **47**, 2071 – 2079.
2. Bodles, A. M., Varma, V., Yao-Borengasser, A., Phanavanh, B., Peterson, C. A., McGehee, R. E. Jr., Rasouli, N., Wabitsch, M., and Kern, P. A. (2006) Pioglitazone induces apoptosis of macrophages in human adipose tissue. *J. Lipid Res.* **47**, 2080 – 2088.

How do you do that?

Going from foreign postdoc to science policy analyst

BY JONATHAN GITLIN

When I started at King's College London as a fresh-faced pharmacology undergraduate back in 1994, I had no idea my future would involve living in Washington, D.C., or working in science policy. Sure, I had an interest in politics, policy and how the world worked in much the same way that I had scientific curiosity about how cells or organisms or pathways worked, but I'm not sure I grasped back then that these interests intersected and that it was possible to make a career at that intersection.

While I was working on my Bachelor of Science degree, I spent a year in a lab at the National Heart and Lung Institute, part of Imperial College, and evidently did something right, as I was offered a place in their graduate program. I still didn't quite know what I wanted to do when I grew up, and a doctorate seemed like a good idea in general and a useful way to spend three years thinking about an answer. I did start to have inklings that being a research scientist might not be my ideal choice; the daily grind of repeating immunoassays and feeding cells was much less interesting than organizing collaborations with other groups or learning firsthand from some truly talented scientists. The most enjoyable part of the process was the months I spent writing up my thesis, a statement that still garners some strange looks from colleagues.

Although I'd learned quite a lot about vasodilator pathways, inflammation and cyclooxygenase during my time in graduate school, I still wasn't much closer to discovering my optimum career. So I did what most new doctorate holders do at this point and found a postdoctoral position. I'd spent most of my life living in London and figured that if I were going to move, California seemed like a good place. I liked the idea of selling my car, packing a couple of bags and flying halfway across the world for a year or two and then coming back to make use of the new techniques I'd learned.

Coming to America

I accepted a position working on cardiovascular disease at the Scripps Research Institute in La Jolla. Around that time (2002), there was a growing realization among postdocs in the U.S. that something was amiss with the postdoctoral experience, as evidenced by ever increasing numbers of scientists leaving the bench.

My research project had a lot of downtime waiting for mice to breed and so on, so I got involved with the Scripps postdoc organization, the Society of Fellows. SoF did a range of things at Scripps, from arranging a distinguished lecture series and research symposia to organizing social events. Back then, there was little official career development provided to the postdocs beyond workshops from faculty members on grant writing. This ought not to have been that surprising, given that our PIs were training us the way they'd been trained, but with so few postdocs going on to faculty positions, the career needs of everyone else were being underserved.

Taking matters into our own hands, SoF started organizing workshops and talks about nonbench careers for doctorates. Peter Fiske came and gave a talk on other ways

Jonathan Gitlin is a science policy analyst in the Policy and Program Analysis Branch of the Office of the Director at the National Human Genome Research Institute. He received his Bachelor of Science in pharmacology from King's College London and his doctorate in pharmacology from Imperial College London, after which he did postdoctoral fellowships at the Scripps Research Institute and the University of Kentucky. Gitlin also is a contributing writer for the online publication Ars Technica, and he taught international science and technology policy at the University of Kentucky's Patterson School of Diplomacy and International Commerce.

to use your degree, and the take-home message was to work out what you most enjoyed doing and then match that to a career. It's a theme that is echoed a lot in Career Insights, but it's important advice. It's a lot easier to wake up in the morning if you're looking forward to your day rather than dreading it.

I knew that I enjoyed writing and the process of communicating science to the wider world. I also knew that there were important decisions that affected the way science was conducted and that I wanted to be involved in the process. My first real experience with science policy was representing SoF on a lobbying day in D.C. organized by the Joint Steering Committee for Public Policy (now the Coalition for Life Sciences).

I also had begun to realize that scientists needed to do a better job communicating with the general public. Much of our work is funded with public money, and that brings with it a responsibility to let the taxpayers know what we do with it and why it's important. I also noticed there was not a lot of great science journalism out there; this was before the proliferation of science blogs and scientist bloggers. Wanting to do something about this, I started contributing science articles to the technology website Ars Technica (http://arstechnica.com). This served several functions: It helped me look busy in the lab, and it let me work on my writing skills, especially for a nonspecialist audience.

La Jolla to Lexington: talk about culture shock

By now I'd been at Scripps for two years, and it was time to move on. I wanted to stay in the U.S., but this also meant I'd have to take another postdoctoral position. I found what looked like a great project at the University of Kentucky that combined the techniques I'd learned at Scripps with the biology of my doctorate degree. Despite an interesting project and a supportive PI, I knew my talents lay elsewhere. I was most interested in science policy, but the standard route from the bench to the Hill involved the American Association for the Advancement of Science policy fellowship program, and that was restricted to U.S. citizens only. Knowing that I would have to create my own path, I looked at the skills and experience that would make me an attractive candidate and worked on getting them when I was not running experiments.

I continued to write for ArsTechnica, covering science policy when possible, and began attending meetings like the AAAS Forum on Science and Technology Policy in order to start meeting people in the field. I also started working with the National Postdoctoral Association and chaired a committee for two years, followed by a two-year term on the board of directors, where I served as vice chair for a year. A friend on the faculty at the University of Kentucky's Patterson School of Diplomacy suggested I teach a class on international science and technology policy as a way to broaden my résumé.

When I arrived in the U.S., it was only supposed to be a temporary stay, but once I realized that I wanted to be in science policy and not science, that began to change. Since my wife and I had planned to move back to London, I hadn't even applied for permanent residence, something I'd need in order to work as anything other than a researcher. Returning to the UK to work in policy wasn't really an option, as I was well versed in the U.S. system by then. My professional network was mainly based in D.C. and Bethesda, and since that's where science policy happens, that was where I needed to go.

Once I had my green card and was able to look for positions outside of academia, I was fortunate enough to see a position advertised at the National Human Genome Research Institute. I knew that a friend from my days at Scripps had moved there to work in policy several years ago (you can read about her career path in the Feb. 2008 issue), and I contacted her to see if it would be worth applying. The answer was yes (this proves the value of maintaining a network). Despite not having been through the AAAS Science Policy fellowship program, my résumé was attractive enough to land me an interview, and I started working as a science policy analyst at NHGRI in 2009.

So what does my job actually entail? There's a fair amount of writing — our yearly congressional justification for our budget, issue briefs for senior leadership, meeting reports. Staying abreast of the various issues that our institute has a stake in is a major part of my job, whether those issues are the latest developments in the court case involving Myriad's BRCA gene patents or the possible regulation of the direct-to-consumer genomic test market by the U.S. Food and Drug Administration. NHGRI recently published a new strategic plan, and we're starting to see the first applications of the sequencing revolution in the clinic, so it feels like an exciting time for the field. Importantly for me, there's always something new to do or to learn. And yes, I do wake up in the morning and look forward to going to work.

Lipidomics in Europe

Phosphoinositides remain a key interest in the UK

BY MICHAEL WAKELAM

Lipid research has a long history in Europe. In the past, it has progressed in two distinct research communities: the signalers, and the metabolic and membrane lipid biologists. However, the advent of lipidomic methodologies, in particular advances in liquid chromatography-mass spectrometry, has helped to bring these communities together.

In the UK, there is a nascent group called UKLipidomics that has brought together the main UK lipidomics labs, the bioinformaticians and others who wish to benefit from the power of lipidomic analysis. In Europe as a whole, 26 labs from 14 countries are part of the European Commission FP7-funded LipidomicNet large-scale integrating project focusing on lipid droplets. In contrast to the U.S. LIPID Metabolites and Pathways Strategy effort, the European program is less focused on method development and more centered on translational research. However, there is regular collaboration between some of the European and the U.S. groups and, in particular, there is a clear emphasis on ensuring commonality in data analysis, bioinformatics and nomenclature. The inclusion of Fritz Spener, Gerrit van Meer and myself on the International Lipid Classification and Nomenclature Committee together with LIPID MAPS colleagues and Takao Shimizu and Masahiro Nishijima from Japan has gone a long way toward achieving this. However, the lipid community needs to ensure that this communication and collaboration continues as the methodologies become more widespread.

Much of the lipid research in the UK remains heavily focused on signaling, and phosphoinositides are a particular emphasis. PI-3-kinase research has matured to the point where inhibitors are being trialed extensively. Nevertheless major questions remain, particularly relating to the physiological roles of individual isoforms and the importance of distinct molecular species of PtdIns(3,4,5)P_3. The development of knock-out and knock-in mice is facilitating the former analysis while the development of novel mass spectrometry-based analysis is assisting in addressing the latter.

The analysis of PtdIns(3,4,5)P_3 by mass spectrometry has been a persistent problem in the lipidomics field. A number of methods have been developed, including an earlier procedure from my lab, but these have proven, for a number of reasons, to be unreliable and thus have not been adopted widely. One of the major reasons for this has been the very nature of the phosphate headgroups that provide the lipid with its signaling properties. These charged molecules bind strongly to glass, steel and proteins, and thus their recovery, not just from cells but from analytical systems, can be poor. Additionally, the phosphates can be labile and migrate around the inositol ring when exposed to the extreme pH sometimes used to extract the lipid.

A recent publication from our institute has reported a solution to this problem (1). The novel methodology involves methylation of the phosphate groups and the use of neutral loss mass spectrometry following reverse phase chromatography to identify molecular species of PtdIns(3,4,5)P_3, PtdInsP_2 and PtdInsP. As yet, the procedure cannot separate the different PtdInsP_2 and PtdInsP forms, but use of the method allows the quantitative determination of PtdIns(3,4,5)P_3 species in cells and tissues. The technique will be of great use in both research studies and in monitoring clinical trials.

Michael Wakelam (michael.wakelam@bbsrc.ac.uk) is director of the Babraham Institute in Cambridge, UK.

REFERENCES

1. Clark, J., Anderson, K. E., Juvin, V., Smith, T. S., Karpe, F., Wakelam, M. J. O., Stephens, L. R., and Hawkins, P. T. (2011) Quantification of PtdInsP3 molecular species in cells and tissues by mass spectrometry. *Nat. Methods* **8**, in press.

For more information:

- LipidomicNet: www.lipidomicnet.org
- LipidBank: www.lipidbank.jp
- LIPID MAPS: www.lipidmaps.org

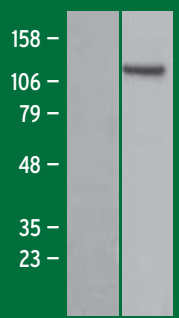
TrueORF Gold cDNA Clones

Protein Expression **Guaranteed!**

Why settle for clones with little validation?

Choose TrueORF Gold.

- Expression validated by Western
- Sequence verified
- Transfection ready
- Easily shuttled into 60 vectors
- Next-day shipment



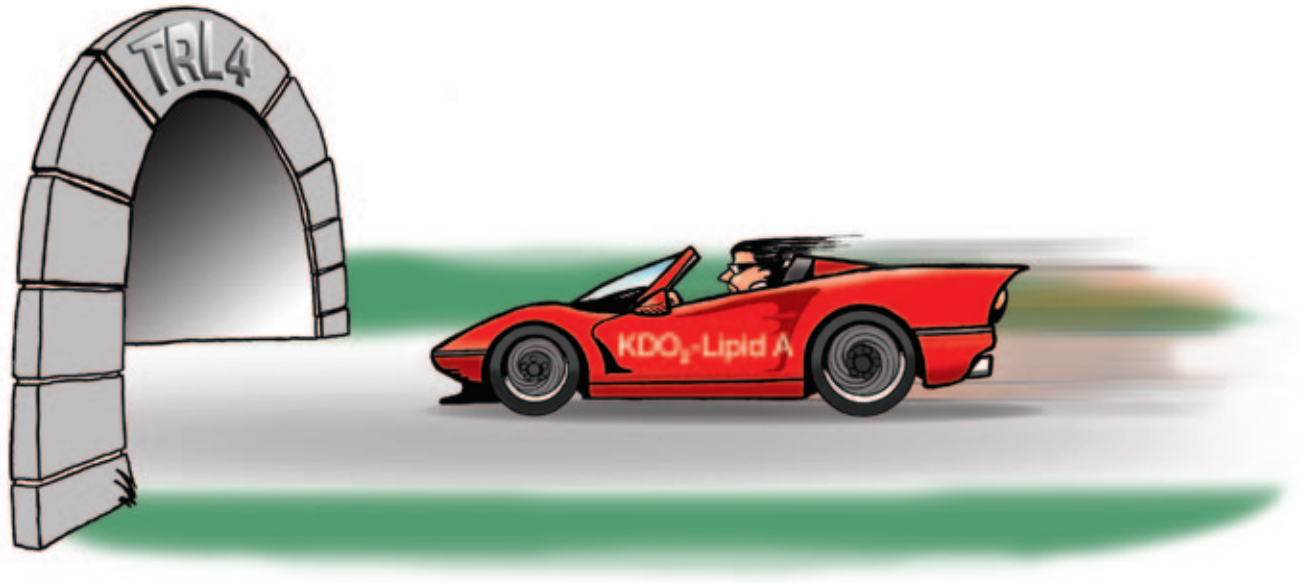
HEK293 were transfected with L) empty vector R) TrueORF for Myc/DDK-tagged hTERT(Cat# RC217436). The lysates were analyzed using anti-DDK antibody to show over-expression of hTERT. *DDK is the same as FLAG.

ORIGENE
Your Gene Company

origene.com/TrueORF_Gold

SURELY, YOU'RE NOT STILL USING LPS.

Why? 1μg KDO_2* induces the same hypersensitivity as 10μg LPS!



Saito, O., *et al.* (2010). Spinal glial TLR4-mediated nociception and production of prostaglandin E and TNF. *Br J Pharmacol* 160:1754-64.

*Also referred to as KLA

www.avantilipids.com

There is only one Avanti

Avanti® Polar Lipids, Inc.

AVANTI FOR THE MS STANDARDS YOU CAN TRUST