Vol. 13 / No. 2 / February 2014

ASBMBTODAY

THE MEMBER MAGAZINE OF THE AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

Scourge below the surface

With a mortality rate of up to 100 percent, white spot syndrome virus can take out entire populations of shrimp — and economies.

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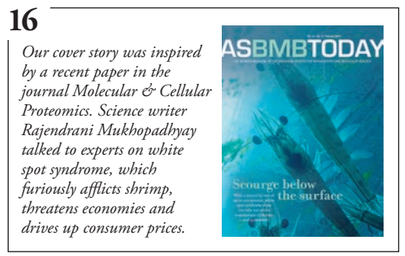

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ASBMB TODAY
THE MEMBER MAGAZINE OF THE AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

The promise vs. the payoff of the NIH intramural program

'In these times of tremendous scientific opportunities and highly constrained budgets, the relative value of these investments must be examined carefully'

By Jeremy Berg

Most researchers probably think of the National Institutes of Health as primarily a grant-making agency. However, the NIH also directly supports research on its campuses as part of the Intramural Research Program.

The IRP mission statement (1) asserts that the IRP should "conduct distinct, high-impact laboratory, clinical, and population-based research" and that it should support research that "cannot be readily funded or accomplished in traditional academia."

This is a noble aspiration. However, while the NIH's budget is shrinking, the IRP's share of it is growing, which means that other components of the NIH portfolio are being sacrificed, including extramural investigator-initiated basic research.

Growth of intramural activities

In 2003, when I became an NIH institute director, the overall NIH appropriation was $26.74 billion, while the overall intramural program consumed $2.56 billion, or 9.6 percent. In fiscal 2013, the overall NIH appropriation was $29.15 billion, and the intramural share had grown to $3.26 billion, or 11.2 percent.

Some of this growth is because of ongoing intramural activities, such as those involving the NIH Clinical Center, where, like at other hospitals, costs are very hard to contain below rates of inflation, or because of new activities, such as the NIH Chemical Genomics Center. The IRP is particularly expensive in terms of taxpayer dollars, because it is difficult to leverage the federal support to the IRP with funds from other sources as occurs in the extramural community.

Individual investigators within the IRP have, no doubt, been feeling the pinch of budgets that do not keep up with the increased costs of doing biomedical research. Nonetheless, in these times of tremendous scientific opportunities and highly constrained budgets, the relative value of these investments must be examined carefully.

What we do know

Funding for investigators within the IRP can be examined through the NIH RePORTER site (2) by searching for projects with the activity code ZIA. For fiscal 2013, this search yielded 2,788 awards totaling $1.93 billion, with a median size of $514,000 total costs for the year. The effective average indirect rate for the IRP is not reported, to my knowledge, so it is not straightforward to convert this into direct costs. But even at an indirect cost rate of 100 percent, this is larger than an average extramural grant.

One IRP principal investigator can have multiple ZIA awards, and the separation of funds into different awards is largely at the discretion of the PI (based on how distinct different projects are). These awards can be aggregated into total funding for each of the 1,207 PIs to yield the distribution shown in the figure.

At the very high end (budgets of more than $5 million) are investigators who run large multi-investigator programs, such the National Institute of Allergy and Infectious Diseases Vaccine Development Center (with a 2013 budget of $12.7 million). Some individual investigators also appear to be very well funded, such as NIH Director Francis S. Collins, for whom NIH RePORTER lists three projects totaling $4.24 million. The median for all 1,207 PIs is $1.27 million.

'Much should be expected of IRP investigators'

Boards of Scientific Counselors typically review the scientific plans and progress of IRP investigators every four years (3). These BSCs serve a role analogous to study sections in the extramural program, evaluating progress and plans for upcoming projects.

The reviews are relatively heavily weighted toward past accomplishments as a predictor of future achievements. This approach to evaluation has many benefits, potentially allowing IRP investigators to take on long-term or risky projects or to change directions relatively nimbly.

With these levels of support and this relatively flexible review system, much should be expected of IRP investigators.

Through the use of publicly available tools, such as those noted in my column last month about NIH Pioneer awardees and Howard Hughes Medical Institute investigators (4), it should be possible to evaluate in at least semiquantitative terms how the discoveries and other outputs from IRP investigators compare with those from other groups.

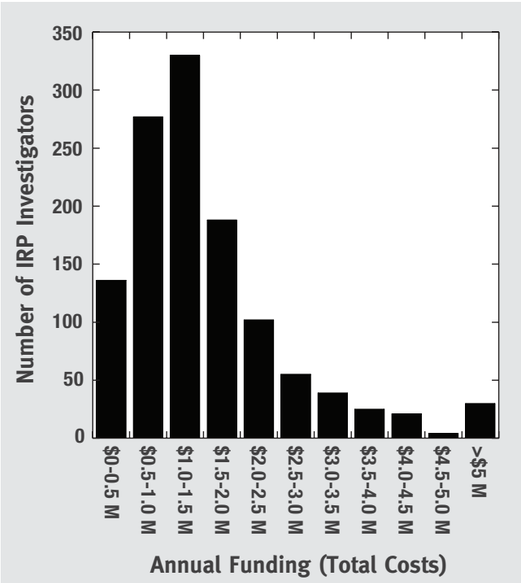
Giving credit where credit is due

The IRP sports some tremendous accomplishments as part of both its long-term and recent history. The accomplishments made within the IRP fall into several categories.

The first involves fundamental discoveries made by individual investigators. An archetypal example that should be familiar to American Society for Biochemistry and Molecular Biology members is Christian Anfinsen's studies of protein folding, including the Nobel Prize-winning discovery (5) that reduced, denatured ribonuclease A spontaneously refolds to produce active enzyme in high yield, indicating that the amino-acid sequence of a protein encodes its three-dimensional structure.

The second category involves longer-term research projects that would have been very challenging to support in most other settings. A key example is the development of macromolecular structure determination by nuclear magnetic resonance methods. In this arena, IRP researchers contributed, along with those in European laboratories, to the birth and development of this important and still developing approach (6).

The third involves both basic and clinical research related to humans and human tissues. Two factors helped drive IRP research in this field, the so-called "doctor draft" and the NIH Clinical Center. The "doctor draft" encouraged many talented young physicians to train within the IRP, particularly during the period of the Vietnam War (7), while the NIH Clinical Center is a unique institution for conducting clinical research, particularly for rare or emerging



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A new reproducibility initiative at the NIH

By Chris Pickett

Recent articles in The Economist have highlighted a growing problem within biomedical research – high-profile findings relevant to human health are often irreproducible outside of the lab making the original report (1, 2). This problem may be new to the public, but it is not new to scientists. Several articles have been published in scientific journals recently discussing issues of reproducibility in research (3, 4, 5). Many of these discussions place the blame for the lack of reproducibility on the community's bias against reporting negative results and insufficient reporting of methodological approaches or erroneous approaches altogether – few papers report blinded or randomized trials in animal models or sample-size power calculations. To be clear, this is not an issue of intentional fraud but honest omission, lack of an attention to detail and systemic poor training in experimental design in preclinical research of all types.

To be clear, this is not an issue of intentional fraud but of honest omission, lack of an attention to detail, and systemic poor training in experimental design in preclinical research of all types.

Most, if not all, of the research called into question was funded in some part by the National Institutes of Health, and reports of irreproducible research have spurred the agency to action. Last year, an ad hoc committee appointed by NIH Director Francis S. Collins identified three underlying problems:

- poor training in experimental design;
- poor evaluation of submitted manuscripts and grant applications by journals and grant reviewers, respectively; and
- perverse reward incentives, or as NIH Deputy Director Lawrence Tabak put it, "It's publish or perish on steroids out there."

Over the past several months, Tabak and other NIH institute and center directors have been discussing the findings of the ad hoc committee with each institute's and center's governing council as well as making presentations to individual scientific societies. The ad hoc committee established five principles and two suggestions for rectifying the reproducibility issue:

1. RAISE COMMUNITY AWARENESS: Institute and center directors are disseminating information about this initiative to all of their advisory councils, and council members are encouraged to further distribute the information to their colleagues.

2. ENHANCE FORMAL TRAINING: The Office of Intramural Research is going to create and pilot a teaching module for students on experimental study design. When complete, the Office of Extramural Research will post the module online as a model for the extramural community.

3. IMPROVE THE EVALUATION OF GRANT APPLICATIONS: Select institutes and centers will examine methods to improve the grant-review process to value study design, including asking reviewers to review not only the grant application but also the main papers on which the application is based.

4. PROTECT THE INTEGRITY OF SCIENCE BY ADOPTING MORE SYSTEMATIC REVIEW PROCESSES: The NIH will partner with journals to determine the value of recently adopted reporting guidelines. (For example, see references 6 and 7.)

5. INCREASE STABILITY FOR INVESTIGATORS: Improve the biosketch so that a scientist can indicate his or her contribution to the work listed.

SUGGESTION A: Consider the use of guidelines or checklists to evaluate grants: This would encourage reviewers to evaluate grants based on a checklist of topics the grant must communicate. This will be piloted by select institutes and centers.

SUGGESTION B: Fund reproducibility studies and centers. The National Institute of Neurological Disorders and Stroke and the National Institute on Aging have piloted funding replication studies prior to launching clinical trials.

Tabak, in his presentations on the issue, has stressed that the NIH leadership understands there are many problems with implementing any or all of the principles to improve the reproducibility of research.

First, asking overburdened grant reviewers to put more work into the grant applications they review could doom the entire initiative. Second, policies that improve reproducibility in one field may be overly burdensome in another, and a one-size-fits-all policy may not be appropriate. Third, the NIH wants to minimize any differential effects of these policies on early vs. late-stage investigators. Finally, publishing or otherwise disseminating negative results is essential for improving reproducibility, but the best mechanism to do this is not clear.

The American Society for Biochemistry and Molecular Biology and its members have a significant role to play in this process. The NIH Reproducibility Initiative is still a new program with many kinks to work out. While guidelines to improve reproducibility have been established, the agency still is soliciting comments from the extramural community about how best to implement these guidelines, while various institutes and centers are piloting several possible solutions.

However, the success of this program is important not just for the progress of science and improving human health but also for public perception. The NIH and scientists across the nation would suffer a loss of credibility should their work be viewed as largely irreproducible. This might even invite congressional action. To prevent this loss of credibility while maintaining the rigor of basic biomedical research, the ASBMB will continue to advise the NIH on how best to implement reproducibility policies without negatively affecting basic researchers. In addition, the ASBMB is engaging with a number of congressional offices to ensure that lawmakers understand the complexities of scientific research.

Chris Pickett (cpickett@asbmb.org) is the ASBMB's senior science policy fellow.

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PRESIDENT'S MESSAGE CONTINUED

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diseases.

The final area involves activities that serve the national and international scientific community, represented by the National Center for Biotechnology Information, which houses important databases such as PubMed, GenBank and PubChem.

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The NCBI averages 45 million pageviews from 3.7 million unique users per day with a peak Web hit rate of 7,000 hits per second. It is hard to overestimate how great an impact the evolving tools available through NCBI have had on biomedical science.

Congress urges 'extra level of scrutiny'

Interestingly, the report language that accompanies the recently passed omnibus appropriations bill (8) includes the recommendation that the "extra level of scrutiny" being applied recently to well-funded extramural investigators "apply equally in intramural investigators as well."

I have written previously in support of extra scrutiny for well-funded investigators (9). It is important to note that I do not favor a hard cap but rather a process so that the output of well-funded investigators is examined in the context of their level of funding when funding decisions are made. This should help ensure that scarce federal resources are distributed in a manner that promotes the most productive and robust biomedical research system. I welcome your thoughts on how best to achieve this essential goal.

Jeremy Berg (jberg@pitt.edu) is the associate senior vice-chancellor for science strategy and planning in the health sciences and a professor in the computational and systems biology department at the University of Pittsburgh.

Sonenberg, Wong win Wolf Prize

SONENBERG

WONG

American Society for Biochemistry and Molecular Biology members Nahum Sonenberg of McGill University in Montreal and Chi-huey Wong of The Scripps Research Institute in La Jolla, Calif., have been named winners of Israel's Wolf Prize. Sonenberg is a co-winner of the prize in medicine along with Gary Ruvkun at the University of Massachusetts Medical School. Wong, president of Academia Sinica in Taiwan, is the winner of the prize in chemistry. Each category carries a $100,000 purse. All eight winners in five categories will receive their awards in May at a state ceremony in the Knesset. The Wolf Prize, established in 1978 and regarded by some as a predictor for the Nobel Prize, is funded by the Wolf Foundation, which was founded by German-born inventor Ricardo Wolf, who once was the Cuban ambassador to Israel.

IN MEMORIAM: Peter C. Maloney

MALONEY

Peter C. Maloney of the Johns Hopkins Medical School died in December at the age of 72. Maloney was a longtime member of the ASBMB and had served on the editorial board of the Journal of Biological Chemistry. Maloney completed his bachelor's in 1963 at Swarthmore College and his Ph.D. in 1972 at Brown University. He was a postdoc at Harvard University before being recruited in 1976 to Hopkins, where he worked for 37 years. He studied transport proteins and for 12 years was associate dean for graduate students, during which time he established outreach efforts to attract minority students to the school.

Maquat wins Athena Award

MAQUAT

Lynne E. Maquat of the University of Rochester School of Medicine and Dentistry won the 2014 Athena Award, which is issued by the Rochester Business Alliance's Women's Council. The yearly award honors women who excel in their professions, give back to their communities and mentor other women for leadership roles. Maquat is the founding director of Rochester's Center for RNA Biology and was the 2013 recipient of the ASBMB's William C. Rose Award. A member of the National Academy of Sciences and the American Academy of Arts and Sciences, Maquat was recognized for her work in support of women in the sciences.

Snyder: 'What I've learned'

SNYDER

Solomon Snyder of the Johns Hopkins School of Medicine had an essay in the Jan. 15 issue of The Gazette, the institution's monthly publication. In it, he writes about his father, about how he became adept at keeping secrets and about his pet peeves. Here's an excerpt: "As biomedical science advances, especially with the dawn of molecular biology, our power to innovate is just dazzling. Today's students take all of this for granted, but those of us who have been doing research for several decades are daily amazed by our abilities to probe the mysteries of life." Read more at bit.ly/1kSqNv7. Snyder also published in 2011 a full "Reflections" article in the Journal of Biological Chemistry. You can read it at www.jbc.org/content/286/24/21023.

Caruthers wins 2014 Award in Chemical Sciences from NAS

CARUTHERS

Marvin H. Caruthers at the University of Colorado, Boulder, has won the National Academy of Sciences' 2014 Award in Chemical Sciences. The award honors research that "in the broadest sense, contributes to a better understanding of the natural sciences to the benefit of humanity," the NAS said in a statement. Caruthers was recognized for "his pioneering contributions to the chemical synthesis of DNA and RNA that made it possible to decode and encode genes and genomes." The award comes with a $15,000 purse, supported by the Merck Company Foundation. Caruthers and 14 other award winners will fêted at a ceremony during the NAS annual meeting in late April.

Tabor award winner

Prokunina-Olsson recognized at cytokine and interferon meeting

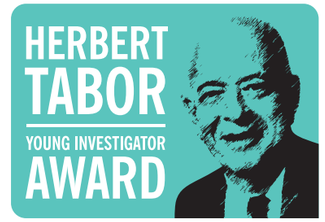
By Sapeckshita Agrawal

Ludmila Prokunina-Olsson, a tenure-track investigator at the Division of Cancer Epidemiology and Genetics at the National Cancer Institute, is the latest recipient of the Journal of Biological Chemistry/Herbert Tabor Young Investigator Award, given to her for the discovery of a novel human interferon, interferon lambda 4. Ludmila received the award in October at the meeting of the International Cytokine and Interferon Society in San Francisco.

As a graduate student in the lab of Marta Alarcon-Riquelme at Uppsala University in Sweden, Ludmila already was on her way to advancing the field of immunology through her studies on genetic susceptibility to autoimmune diseases, such as lupus and rheumatoid arthritis. Her interests in genetics and immunology brought her to the United States, where she joined the group led by National Institutes of Health Director Francis S. Collins as a postdoc and identified molecular phenotypes of genetic susceptibility to type 2 diabetes using results from genomewide association studies.

Ludmila Prokunina-Olsson of the National Cancer Institute received the JBC/Herbert Tabor Young investigator award in October from Associate Editor Charles E. Samuel of the University of California, Santa Barbara.

The discovery of IFNL4 by Ludmila and the group that she now heads at the NCI is a matter of great excitement. "IFNL4 is unique among the human genes because it is created by a genetic variant present in 90 percent of individuals of African ancestry, 50 percent of Europeans but only 10 percent of Asians," says Ludmila. Intriguingly, the presence of this interferon impairs the clearance of certain infections like hepatitis C virus. Ludmila and her group continue to explore the role of IFNL4 in other conditions, such as infections, immunity and even cancer.



Sapeck Agrawal (sapeck.srivastava@gmail.com) recently earned her Ph.D. in molecular microbiology and immunology from The Johns Hopkins University.

Potential target in allergic responses

By Teodora Donisan

Scientists have discovered a new and important role for the inositol-requiring enzyme 1α in immune response.

IRE1α traditionally is known for its role in the unfolded protein response. The UPR helps the endoplasmic reticulum, the main organelle responsible for protein folding, properly respond to the high demands of activated cells. IRE1α, a serine-threonine kinase, is one of the proteins that activate UPR.

In a recent issue of **The Journal of Biological Chemistry**, scientists at the Northwestern University Feinberg School of Medicine showed that IRE1α also promotes the production of cytokine IL-4, a key regulator in adaptive immunity. Among its effects in the immune system is the stimulation of B-cells to produce IgE, an immunoglobulin associated with allergies.

After encountering and recognizing a specific antigen, T lymphocytes proliferate and develop specific effector functions that allow them to respond to particular types of pathogens or control the amplitude of the immune response.

"The strength of T-cell receptor

signal, cytokine milieu and the role of co-stimulatory molecules have been analyzed to determine the effect on the development of effector functions," says Kyeorda Kemp, the first author of the JBC paper. "This study identifies a role for the UPR in promoting T helper effector functions."

To better assess the functional roles of IRE1α, Kemp and her team analyzed splenocytes from IRE1α mutant mice and noticed that T cells proliferated normally, but IL-4 production was diminished in activated T cells. This was not caused by abnormalities at the transcriptional level but by reduced IL-4 mRNA instability.

Additionally, a more drastic inhibition of IRE1α by treatment of activated T cells with a potent and specific antagonist further suppressed IL-4 production and inhibited other cytokines associated with a Th2 response, such as IL-13.

"Cytokines IL-4 and IL-13 are associated with the induction of a number of pathologies – most famously allergy and asthma – and inhibiting IRE1α allows for inhibition of these cytokines, making IRE1α an attractive target for the treatment of diseases caused or exacerbated by IL-4 and other Th2 cytokines," says Kemp. "However, further research will have to be performed to determine if there are any clinical applications for inhibition of IRE1α in Th2 cytokine-mediated pathologies."

Teodora Donisan (teodora.donisan@gmail.com) is a medical student at Carol Davila University in Bucharest, Romania.

Structure-specific tear lipid changes in dry-eye syndrome

By Jane Campanizzi

People with dry-eye syndrome can experience scratchy or burning eyes, the sensation of something foreign in the eyes and blurred vision. Advanced cases may damage the front surface of the eye. Current diagnostic markers for dry-eye syndrome lack sensitivity and specificity, so researchers are seeking activity markers that align with the major axes of disease progression.

In light of this need, a research team with members from Singapore and China, using a comprehensive lipidomic platform, analyzed the human tear lipidome of 93 individuals to identify changes in their tear lipid compositions.

The patients were classified in the following clinical subgroups based on the presence of symptoms and signs: asymptomatic controls, those at risk of developing dry-eye syndrome (aqueous-deficient and nonaqueous-deficient), and symptomatic patients

According to the American Optometric Association, most people over the age of 65 experience some symptoms of dry eyes

(aqueous-deficient and nonaqueous-deficient).

The team reported positive correlations between tear secretion and the levels of cholesteryl sulfates and glycosophingolipids in the tears. The researchers noted that this indicates a possible origin of these lipids in the lacrimal gland instead of the meibomian gland.

In addition, the researchers found that wax esters of low molecular mass and those containing saturated fatty acyl parts significantly decreased in both aqueous-deficient and nonaqueous-deficient patients. Both of these wax esters showed significant correlation with the dry-eye syndrome clinical parameter ocular surface disease index as well as with the parameters of tear breakup time and total tear secretion.

The study reported that these structure-specific changes in tear composition with dry-eye syndrome could be indicators of disease symptoms and signs. In addition, the authors wrote that the structure-specific alterations in tear lipids "did not reveal an actual 'lipid-deficiency' on the lid margins" of the dry-eye syndrome patients of subtypes with or without aqueous deficiency, but they suggested "a common pathology for both DES subtypes."

Dry-eye syndrome represents one of the most frequently encountered eye diseases, particularly in older adults. It affects up to one-third of the world's population.

The team's research was published in a recent issue of the **Journal of Lipid Research**.

Jane Campanizzi (jcmtechservices@gmail.com) is pursuing graduate studies in the science-medical writing program at Johns Hopkins University and serves on the Publications Committee of the American Medical Writers Association.

Lipid composition of human tears elucidated and clinical implications

By Mary L. Chang

Dry eyes become more common as the human body ages, but previous eye surgery, heat or chemical burns, and an autoimmune condition called Sjogren syndrome can cause dry-eye syndrome.

In a companion paper in the **Journal of Lipid Research**, Sin Man Lam of the Chinese Academy of Sciences and the National University of Singapore and colleagues extracted lipids and performed mass-spectrometry analysis on samples of tears and meibum, an oily substance that prevents evaporation of tear film protecting the eye.

From their research, they identified novel proteins, put together a comprehensive lipidome of human tear fluid, and observed that tear fluid contains bactericidal proteins whose actions work synergistically with lipids like lysophosphatidylcholine and lysophosphatidylethanolamines that can increase neutrophil activity and have antifungal and antibacterial activity, respectively.

Their findings suggest tear fluid can be a future source for lipid biomarkers for systemic diseases, giving their comprehensive lipidome potential clinical relevance.

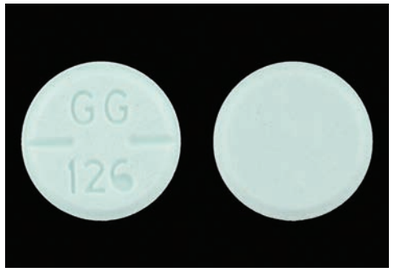
Mary L. Chang (mchang@asbmb.org) is publications manager for the Journal of Lipid Research and Molecular & Cellular Proteomics.

Wild Types

Highlights from the blog by Rajendrani Mukhopadhyay

Why do antipsychotics take so long to kick in?

Antipsychotic drugs have been used clinically since the 1970s, but it's not yet clear why it takes three or more weeks for them to become fully effective. A team led by Eric Klann and Moses Chao at New York University analyzed neurons in culture and in live mice to see what happened at the molecular level when neurons were exposed to haloperidol, a first-generation drug for schizophrenia. Previous studies had shown that the drug acts on the kinase Akt. The Klann and Chao laboratories have a longstanding interest in an Akt pathway that involves a protein complex called mTORC1. This Akt-mTORC1 pathway is important for protein synthesis. The investigators showed that Akt became activated and turned on mTORC1 when haloperidol was given to neurons. The activation of this pathway led to increased protein synthesis. The cells made more proteins involved in mRNA translation, which was followed by production of more cytoskeletal proteins. The neurons also appeared to become morphologically more complex, creating more branches to make more connections with other neurons. Klann says some of the proteins they found "were also reported as being altered in the brains of both (autopsied) rodents and human patients treated chronically with antipsychotics." One question



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the work raises is "whether or not chronic administration of haloperidol would maintain the morphological complexity or if this is an initial response that declines over time," says Klann. The work was published in the journal Science Signaling.

Sniff-n-scratch: how mosquitoes sniff us out

A team led by Anandasarkar Ray at the University of California, Riverside, identified an important class of neurons in mosquitoes that detect our skin odors. Mosquitoes follow carbon dioxide emitted when we breathe, and, once close enough, dive toward our bare skin, attracted by its odors. While the neuron that picked up carbon dioxide had been known, the identity of the neuron or neurons with odor receptors that attracted mosquitoes to human skin scents remained elusive. For years, Ray and colleagues looked for human-skin odor receptors on the complex mosquito antenna. They ignored the simpler maxillary palp organs — small, fingerlike sensory structures that contain the carbon dioxide

receptors. Conventional wisdom was that the carbon dioxide receptor "was narrowly tuned, responding primarily to carbon dioxide," says Ray. But they recently found "the carbon dioxide receptor is an extremely sensitive detector of several skin odorants," says Ray. "In fact, it is far more sensitive to some of these odor molecules when compared to carbon dioxide." To see if the carbon dioxide receptor neuron, called cpA, can be targeted by chemicals that might be developed as mosquito traps, the investigators screened nearly half a million compounds to find ones that either activated or shut down cpA. They settled on two compounds: ethyl pyruvate, a fruity-smelling cpA inhibitor used as a flavor agent in food, and cyclopentanone, a minty-scented cpA activator used as a flavor and fragrance agent. Ethyl pyruvate substantially reduced the mosquitoes' attraction toward a human arm, in effect acting as a repellent. Cyclopentanone, meanwhile, lured mosquitoes, so it could be used as an attractant in a trap. The work was published in the journal Cell.

2014 ASBMB Special Symposia Series

Translating the biophysics of molecular switches

Signaling mechanisms and inhibition of Ras and Rho GTPases

It is a particularly exciting time for studies of small Ras and Rho GTPases! Finally, after decades of cloudy skies, bright spots are emerging as the drugability of these critical molecular switches now appears promising.

Furthermore, building upon structural, biochemical and biological exploration, new mechanisms have been discovered involving these GTPases — specifically, the role of phosphorylation, ubiquitination, intra- and inter-protein allostery, and new effector and regulatory protein interactions.

This special symposium will provide a platform for the discussion of front-line research in these and other key areas. The symposium will cover a range of topics, including the application of biophysical and computational methods that have reshaped significantly our understanding of Ras and Rho GTPases, elucidation of new regulatory mechanisms, and deciphering complex signaling pathways and feedback loops.

Through these advances, new therapeutic strategies to target small GTPases are emerging, as highlighted in the sessions. The conference will start with a special session for young investigators with a discussion on topics important for career development. Half of the presentations will be chosen from abstracts with a preference for graduate students, postdocs and young investigators. Poster sessions, meals and a reception will provide opportunities for extensive interactions.

Translating the Biophysics of Molecular Switches: Signaling Mechanisms and Inhibition of Ras and Rho GTPases

July 17 – 20

Location: Wyndham Virginia Crossings, Glen Allen, Va.

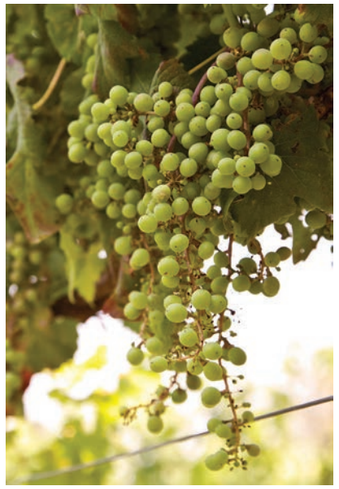
Organizers: Matthias Buck, Case Western Reserve University; Sharon Campbell, University of North Carolina; Alemayehu Gorfe, University of Texas Medical School at Houston


BUCK


CAMPBELL


GORFE

Early registration and abstract submission deadline: April 16


VIRGINIA TOURISM CORPORATION

Na,K-ATPase and related transport ATPases

Structure, mechanism, cell biology, health and disease

This symposium continues a long-standing series of conferences on P-type transport ATPases organized every three years since 1973. The conference covers all aspects of the P-type transport ATPases from the molecular level to the role of these enzymes in health and disease.

Whereas several ATPases have extremely important physiological roles as ion transporters, some P-type ATPases are phospholipid transporters. And for many others substrate specificity still has to be assigned. Thus, being much more than ion pumps, P-type ATPases play key roles in cell biology as underscored by their crucial function in many pathogenic processes and their involvement in numerous human inherited diseases. This makes them major pharmacological targets.

Tremendous progress was achieved in recent years toward understanding the function of P-type ATPases by the elucidation of high-resolution crystal structures, which has given way to novel approaches of investigation. Moreover, the scope of new discoveries and medical implications in the field is expanding rapidly.

Altogether, this interdisciplinary symposium aims to assemble biochemical, biophysical, cell biology, genetic, physiological and medical investigators with a strong core of shared interests, providing a platform for fruitful interactions and discussions.

Na,K-ATPase and Related Transport ATPases: Structure, Mechanism, Cell Biology, Health and Disease

Aug. 30 – Sept. 4

Location: De Werelt Conference Centre, Lunteren, The Netherlands

Organizers: Jan Koenderink, Radboud University Medical Center in The Netherlands, and Thomas Freidrich, Technische Universität Berlin


KOENDERINK


FREIDRICH

Early registration and abstract submission deadline: May 29

Transcriptional regulation

Chromatin and RNA polymerase II

RNA polymerase II and chromatin are instrumental in regulating eukaryotic gene expression. A challenge to current research is to understand how RNA polymerase II coordinates messenger RNA synthesis and processing while contending with the formidable barrier of the nucleosome, resulting in proper cellular regulation and development. In light of the central importance of RNA polymerase II and chromatin in gene regulation, cellular development and the pathogenesis of human diseases, the American Society for Biochemistry and Molecular Biology is sponsoring this symposium.

The ASBMB has hosted this highly successful meeting on a biennial basis since 2004. Attendance is capped at 200 participants — principal investigators, postdoctoral fellows, students, and scientists from the pharmaceutical and biotech industries. The intimate setting provides extensive opportunities for interactions and networking between the participants.

The sessions will explore recent findings in transcriptional initiation, elongation and termination; co-transcriptional mRNA processing; and the role of RNA polymerase II in these processes. In addition, the contributions of chromatin structure, remodeling and covalent histone modifications in mediating gene regulation will be addressed.

Steven Henikoff of the Fred Hutchinson Cancer Center and the Howard Hughes Medical Institute will present the keynote lecture and will describe his research on nucleosome dynamics, chromatin remodeling and the functions of histone variants.

We look forward to seeing you at this exciting and enlightening symposium!

Transcriptional Regulation: Chromatin and RNA Polymerase II

Oct. 2 – 6

Location: Snowbird Ski and Summer Resort, Snowbird, Utah

Organizers: Raymond Trievel, University of Michigan, and Joseph Reese, Pennsylvania State University

TRIEVEL

REESE

Early registration and abstract submission deadline: Aug. 5

Post-translational modifications

Detection and physiological role

Post-translational modifications, or PTMs, create the enormous structural and functional diversity required to integrate information regarding the nutrient/stress status of the cell and regulate essential cellular functions. There are more than 400 known PTMs, and, almost without exception, virtually all polypeptides are post-translationally modified.

Recent technological advances, particularly in the area of mass spectrometry, are revealing new modifications and providing insights into the role of PTMs in integrating information and regulating signal transduction. This biannual meeting brings together leading experts in the study of a wide variety of different PTMs to allow cross-fertilization, presentation of the most exciting breakthroughs in the methodology and biological functions of PTMs, and lively discussions of new concepts and approaches.

Most of the talks will be selected from abstracts submitted by participants, allowing discussion of the most recent and exciting developments within the field. Natalie Ahn of the University of Colorado and the Howard Hughes Medical Institute will present the keynote lecture describing her research on the allosteric regulation of MAP kinase activity and new approaches aimed at revealing mechanisms underlying cell polarity and directional movement.

This meeting not only will benefit newcomers to the field of PTMs but also will provide a forum for sharing breakthroughs in both methodology and biology for established investigators.

Post-Translational Modifications: Detection and Physiological Role

Oct. 16 – 19

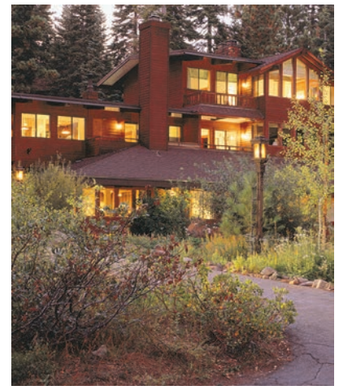
Location: Granlibakken Conference Center & Lodge, Tahoe City, Calif.

Organizers: Lauren Ball, Medical University of South Carolina, and Lance Wells, University of Georgia

BALL

WELLS

Early registration and abstract submission deadline: Aug. 12



DONNA REID - GRANLIBAKKEN CONFERENCE CENTER & LODGE

Scourge below the surface

With a mortality rate of up to 100 percent, white spot syndrome virus can take out entire populations of shrimp — and economies.

By Rajendrani Mukhopadhyay

STEPHEN G. NEWMAN/AQUAINTECH INC.

STEPHEN G. NEWMAN/AQUAINTECH INC.

The front part of a shrimp is called the cephalothorax, and it is covered by a thick shell called the carapace. It is on the carapace that the trademark spots of white spot syndrome virus appear.

For shrimp and shrimp farmers, white spot syndrome virus is bad news.

Outbreaks of the virus can be economically devastating: It wreaked so much havoc in the Ecuadorian shrimp industry in 1999 that the country's economy collapsed and the government was forced to adopt the U.S. dollar as the national currency in 2000.

The virus was first detected in Taiwan in 1992. From there, it spread throughout Asia, including India and the Middle East. It landed in the Americas in 1995, thought to be transported through frozen shrimp bait from Asia, at a south Texas shrimp farm. The virus also appeared in Mozambique. The virus doesn't infect only shrimp; other aquatic animals, such as crayfish, plankton and crabs, can carry the virus.

When shrimp get infected with WSSV, they develop visible white spots in their shells just before they die. Tools have been developed to detect the virus, which have helped to eliminate contaminated shrimp stocks. But lapses of oversight still occur, and outbreaks still happen. The problem is that once the virus infects shrimp there isn't a way to treat the infection.

STEPHEN G. NEWMAN/AQUAINTECH INC.

Penaeus monodon is commonly known as the giant tiger prawn or the Asian tiger shrimp. A female can grow to over a foot long, while males are a bit smaller.

Mastering a new species

Until WSSV appeared, marine viruses were thought to be ecologically unimportant, because their types and numbers were underestimated. For this reason, marine viruses are less understood than other types.

WSSV is a new beast in terms of species: A new family (Nimaviridae) and genus (Whispovirus) had to be created just to accommodate it. Under the microscope, the virus resembles mammalian sperm, with a round head and a flexible tail.

The viral DNA was first isolated in 1997 and shown to be a double-stranded, circular molecule. By 2005, at least three different strains from various Asian locations had been sequenced.

Genomic analyses have shown that "most of the approximately 180 genes included in the genome had unknown functions," explains Timothy Flegel at the National Science and Technology Development Agency

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GULF COAST RESEARCH LABORATORY AT THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Shrimp is the most-traded fish in the international market. There has been no evidence to date to show that white spot syndrome virus affects human health.

Clinical signs

- Shrimp display reduced appetite.
- They become lethargic.
- Calcium salt deposits, in the form of white spots between 0.5 and 2 millimeters in diameter, appear on the inside surface of the hard upper shell.
- Shrimp die within three to 10 days.

Thailand is the world's leading exporter of shrimp. Over the past couple of years it has been hit hard by yet another disease, known as early mortality syndrome, which has reduced significantly shrimp production in the region and has driven up global shrimp prices to a 12-year high in 2013. The cause of EMS recently was found to be bacterial.

STEPHEN G. NEWMAN/AQUAINTECH INC.

Whiteleg shrimp, also known as Pacific white shrimp, has gained in popularity over the past decade, in part because genetically screened, virus-free broodstock is available.

Birds pick off infected shrimp. STEPHEN G. NEWMAN/AQUAINTECH INC.

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and Mahidol University in Thailand. "It is our belief that studying the functions of the mystery genes and understanding how they interact with host shrimp genes and even with each other will reveal new ways to combat the virus, in terms of both preventing infections and therapy after infection."

In a recent Molecular & Cellular Proteomics paper, Flegel, Chu-Fang Lo at the Cheng Kung University in Taiwan and colleagues described a proteomic analysis of WSSV in an effort to better understand how the virus functions and interacts with its host. The investigators used yeast two-hybrid screens to look at more than 700 possible interactions between about 180 proteins. To confirm that the interactions they saw were not experimental anomalies, the investigators then performed coimmunoprecipitation assays and other analyses.

Flegel, Lo and colleagues identified a subset of proteins that acted as hubs capable of interacting with multiple proteins to trigger various molecular cascades. In particular, the investigators showed two proteins, WSSV051 and WSSV517, were important. WSSV517's function is unknown, but WSSV051 is thought to be a structural protein in the viral envelope. The investigators think it could be an essential player in viral assembly.

This mapping of protein–protein interactions within a virus is a first for "a shrimp virus or virus of any other invertebrate," says Flegel. Identifying hub proteins is important, because these proteins are thought to be central to various viral functions.

"This work clearly demonstrates the importance of several proteins for WSSV replication and disease progression and presents them appropriately as excellent future targets for antiviral therapy," says Fraser Clark at University of Prince Edward Island in Canada, who is an expert in marine viruses but not involved with the research in the MCP paper. "These hub proteins could represent excellent targets for future antiviral therapy through interfering RNA, small-molecule inhibitors or antibodies capable of disrupting protein signaling."

The next step, say Flegel and Clark, is to generate a protein-interaction map between WSSV and shrimp proteins.

"Many studies have shown the interaction of shrimp and WSSV proteins, but an extensive interaction map would demonstrate the importance of a subset of proteins that could be targeted for antiviral therapy," explains Clark. "WSSV hub proteins are critical once infection has been established, but the disruption of the initial WSSV and shrimp protein interactions that facilitates infections could potentially prevent WSSV infections from becoming established in the first place."

Editor's note: *Many thanks to Stephen G. Newman, marine microbiologist and president and chief executive officer of AquaInTech Inc., for his help with illustrating this article. AquaInTech, based in Lynnwood, Wash., supplies science-based products, tools and services to the international aquaculture community. Find out more at www.aqua-in-tech.com.*

Hatchery tanks with WSSV-infected larvae spread the problem to farms. STEPHEN G. NEWMAN/AQUAINTECH INC.

Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is the senior science writer and blogger for ASBMB. Follow her on Twitter at www.twitter.com/rajmukhop.

Meet Roger Colbran

A new associate editor of the Journal of Biological Chemistry

By Rajendrani Mukhopadhyay

Roger Colbran at Vanderbilt University became an associate editor for the Journal of Biological Chemistry in September. His laboratory focuses on the functions and regulation of calcium/calmodulin-dependent protein kinase II. The American Society for Biochemistry and Molecular Biology's science writer, Rajendrani Mukhopadhyay, interviewed Colbran to learn more about his scientific interests, his career trajectory from the United Kingdom to the United States, and his work as a JBC associate editor. The interview has been edited for length and clarity.

Would you briefly explain what your research group is studying?

Research in my lab is centered on one protein, calcium/calmodulin-dependent protein kinase II, or CaMKII, which is ubiquitously distributed in mammalian tissues and cells. We are working to develop a molecular understanding of the processes that modulate its activity, extending from structure–function analyses of the protein kinase itself all the way through to its interactions with other proteins that control its activity in defined subcellular compartments. Most of our current work is focused on CaMKII signaling in dendritic spines, which are small, postsynaptic compartments of neurons that are critical for both the short- and long-term regulation of synaptic activity associated with learning and memory.

Tell us about your academic background and research training.

I generally enjoyed all STEM subjects throughout my days in elementary and high school. At the time, the educational system in England required students to choose about seven subjects at the age of 14 and then only three at the age of 16 for advanced-level study. I persuaded the school to allow me to take four subjects for A-level studies, and I chose math, physics, chemistry and biology.

I went on to study biochemistry at the University of Bristol. In the first undergraduate year, I studied chemistry, biochemistry and biology, and in the second year I studied chemistry, biochemistry and physiology. My final year was 100-percent focused on biochemistry. This accounts for my relatively one-track scientific mind. I sometimes regret that I missed out on the more balanced education provided by the diversity of the U.S. system.

My interests at Bristol were influenced by ongoing work on mitochondrial transporters and the regulation of the tricarboxylic acid cycle by calcium signaling and a general interest in signal transduction. This was fortified by graduate studies from 1982 to 1986 at the University of Newcastle upon Tyne in Steve Yeaman's lab, which focused on the regulation of hormone-sensitive lipase by protein phosphorylation. We prepared milligrams of purified protein from fat, which was not a pretty sight and meant sometimes a traumatic trip to the local abattoir!

For my postdoctoral studies, I wanted to get back to calcium signaling — and also work on more abundant and soluble proteins! In 1986, I was fortunate to have the opportunity to join Tom Soderling's lab at Vanderbilt Univesrity not long after the identification and purification of CaMKII from a variety of tissues. I was very pleased to be able to work on the enzymology of a protein that could be purified in five to 10 times larger quantities than hormone-sensitive lipase and from only about 50 grams of brain rather than from kilogram quantities of bovine fat! The availability of substantial amounts of purified protein was key to our success, because the work predated the widespread availability of cDNA to express large quantities of protein in heterologous cells.

This was an exciting time, because similar work on basic regulatory mechanisms of CaMKII was being done in parallel in the labs of Mary Kennedy, Paul Greengard, Howard Schulman, Paul Kelly and others. Our combined efforts identified key biochemical mechanisms that suggested CaMKII can serve as some sort of so-called "memory" molecule, an idea that has since become well established through the work of probably over a hundred labs. A final piece of good fortune during my postdoctoral training was that Tom Soderling was recruited to the Vollum Institute when I was beginning to look for an independent position, creating an opportunity for me to stay at Vanderbilt.

Did anything occur, in a milestone sort of way, that made you choose science as a career?

My high-school biology teacher, Mr. Slater, probably had the biggest impact on my career direction. I was particularly fascinated by the idea that shining sunlight on a leaf resulted in the synthesis of sugars, storing energy, and that this energy was liberated by respiration. I think that this inspired a general interest in the interface between biology and chemistry that continues to this day.

During grad school and/or postdoc, did something especially impress you to choose the path you took in research?

The thing that probably had the single biggest impact on my career path has been the discovery of the relatively unique regulatory properties of CaMKII. This led me down a fascinating path into neuroscience — trying to

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understand the molecular events that regulate excitatory synapses, learning and memory.

What does it mean to you, on a personal level, to be an associate editor for JBC? What was your reaction when you were asked to be an associate editor?

I was deeply honored to be asked to serve as an associate editor, although a little wary of the possible time commitment. I certainly had developed a deep respect for the editorial process and the associate editors who had handled my papers over the years. I was very gratified to be asked to give back to the journal and help continue the JBC legacy.

How is the new role going so far? Have you been surprised by anything during your tenure with JBC?

By publishing over 20 papers in the JBC during my career and serving on the editorial board, I thought I had a pretty good idea how the journal worked. Having been on the job for a couple of months, I can say that I have been quite surprised how little I actually knew! The biggest adjustment has been the fact that there is a nearly daily arrival of email messages and new assignments, meaning that JBC work needs to be done almost every day. I also feel a strong obligation to turn things around quickly after they land on my desk, having experienced the editorial process from the author's perspective so many times. This is rapidly becoming easier and, I think, more efficient as I become more comfortable with the process and the BenchPress submission system.

What do you do outside of the lab? Hobbies? Do you have any advice for balancing life in the lab with life outside of the lab?

A good work–life balance is very important to me, as it should be to anyone, although I think different people have different set points as to what is a good balance. My work has been balanced by family time, which has always been important to me and has probably been my biggest diversion. It has certainly saved my sanity on those occasions when critiques of grant applications or manuscripts have been not quite as positive as one would like.

I have always enjoyed vacations or just taking a day to go hiking in local parks. A key part of my daily ritual for many years has been the mental relaxation of taking my dog for a walk in the park. I also enjoy working on any number of DIY or yard projects and, when I get the chance, a game of golf.

For scientists in training, do you have any words of wisdom or a favorite motto?

I think science will always be fun if you follow your instincts and interests. If you are going to do an experiment, do it right and with the right controls, and don't wait until tomorrow to do it unless absolutely necessary.

Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is the senior science writer and blogger for ASBMB. Follow her on Twitter at www.twitter.com/rajmukhop.

Meet Amanda Fosang

A new associate editor of the Journal of Biological Chemistry

By Rajendrani Mukhopadhyay

Amanda Fosang, a faculty member at the University of Melbourne and the Murdoch Childrens Research Institute in Australia, joined the ranks of the JBC associate editors in September. Fosang coordinates the bachelor's honors program for the University of Melbourne Department of Pediatrics and MCRI. Recognition of her research includes the Selwyn–Smith Medical Research Prize from the University of Melbourne in 2007 and the Basic Science Award from Osteoarthritis Research Society International in 2009. Below is a Q&A with Fosang by the American Society for Biochemistry and Molecular Biology's science writer, Rajendrani Mukhopadhyay, to find out about Fosang's research interests, career trajectory and life outside the laboratory. The interview has been edited for length and clarity.

Would you briefly describe what your research group is studying?

My expertise is in matrix biology, proteoglycans and metalloproteinases. My group is focused on understanding the pathways and catabolic processes involved in cartilage pathology in joint disease. Cartilage is a dynamic tissue in which carefully balanced anabolic and catabolic processes maintain an extracellular matrix rich in aggre-

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can and collagen that enables joints to bear weight. In arthritic disease, this balance is disturbed.

Much of our work in cartilage ECM over the past 15 years has been with genetically modified mice. For example, to identify which aggrecanase was responsible for destroying the cartilage proteoglycan aggrecan, we used mice lacking the catalytic domains encoded in the genes for ADAMTS-4 and ADAMTS-5. Our discovery that ADAMTS-5 was the major aggrecanase was published in Nature in 2005, back to back with a paper from (the pharmaceutical company) Wyeth, and was certainly a research highlight for our group.

At the same time, we were making knockin mice: Instead of mutating the aggrecanases or collagenases, we mutated the substrates at the cleavage sites, making them resistant to aggrecanase or collagenase. We discovered that these mice also behaved as functional knockouts for the native degradation products that no longer could be produced. We are now characterizing the bioactivities of the native degradation products of aggrecan and type II collagen.

Tell us about your academic background and research training.

I was educated in a Catholic girls' convent school in Melbourne, Australia, and completed a four-year science degree with honors at Monash University in Melbourne. My Ph.D. studies in the biochemistry department at Monash University with Chris Handley and Dennis Lowther gave me a solid grounding in the biochemistry of the extracellular matrix. I did my postdoctoral studies with Tim Hardingham at the Kennedy Institute of Rheumatology in London.

For a young girl from Australia in the mid-1980s — no Internet, no mass media and international travel considered a big deal — the Kennedy Institute was a wondrous place. Very few matrix biology researchers, other than my long-term mentor Vince Hascall, transited through Melbourne on their way to anywhere, but I discovered that everybody transited through the Kennedy Institute on their way to everywhere. I was lucky enough to meet them all. I met many of the doyens of matrix, cartilage and arthritis research during my four years in London as an impressionable postdoc, and I treasure many of the professional relationships established then and maintained to this day.

Did anything occur, in a milestone sort of way, that made you choose science as a career?

After my postdoctoral studies, and with friends, colleagues and collaborators dotted around the world, what could possibly have been better than a career in science? The language and the qualifications were universal and portable, not to mention the lure and thrill of discovery. But I guess it started before that. As a child, I had always loved animals and nature. I especially loved my summer vacations that were filled with outdoor exploration of the gardens, paddocks, the creek and the river bed on my auntie's farming property in northern Victoria. My mum and dad were school teachers. Dad was a math and science teacher at secondary school level, and Mum taught the little kids in prep grade. Mum developed rheumatoid arthritis in her mid-30s and suffered dreadfully with it; in those days, the new biologics that are now used so successfully to manage rheumatoid arthritis were only a dream.

How did you come to join the ranks of the JBC associate editors?

I was a member of the JBC editorial board from 2005 to 2010. After that, I served terms as an associate editor for the journals Osteoarthritis & Cartilage (2008 – 2012) and Arthritis & Rheumatism (2011 – 2013). Earlier this year, (JBC Editor-in-Chief) Marty Fedor and (Associate Editor) Vince Hascall asked if I would consider joining the JBC associate editors team. I was completely surprised, especially since the JBC had never appointed an associate editor from Australia. I felt honored to receive this invitation and excited by the opportunity to contribute to an iconic journal, despite the chronic overcrowding in my Outlook calendar.

Amanda Fosang camps with her old dog, Jaffa.

Fosang spent time in the mountains during her 2013 Christmas holiday break.

Fosang makes friends with the female golden who is the mother of her new puppies.

How is the new role going so far? Have you been surprised by anything during your tenure with the JBC?

So far so good! Other than minor hiccups with my command of (the manuscript-handling system) BenchPress and missing an associate editors' telephone conference due to incompatible time zones and some confusion on my part, I am learning the ropes. I have been surprised, even amazed, by the enormous amount of in-house support available from JBC staff. I have a marvellous assistant, Scott Magid, who monitors the status of my manuscripts and helps resolve my hiccups. Another surprise is the level of communication and the scope of activities in which the associate editors engage. As a newcomer from abroad, I realize now that this reflects the fact that the JBC is embedded in the ASBMB and that the ASBMB and the JBC support each other, which is essential.

What do you do outside of the lab? Hobbies? Do you have any advice for balancing life inside the lab with life outside the lab?

Outside the lab, I love my garden, my golden retrievers and, of course, my husband. I lost my 16-year-old golden retriever just recently, but I'm gearing up for the onslaught of two new golden retriever puppies scheduled for arrival in the new year. Spending time in my garden is meditative for me. In my garden, I can switch off the lab, the office, the budgets and the deadlines and absorb myself in the roses or the fishpond or the rainbow lorikeets at the birdfeeder. Pilates and yoga are also meditative activities for me. There is nothing like a down-face-dog to focus the mind away from the to-do list and onto stretching out neck and shoulders, tense from swatting over a difficult manuscript. I also love good food – especially when someone else makes it!

For scientists in training, do you have any words of wisdom or a favourite motto?

Be brave and remember that it is high risks that yield high gains. But do be sensible! When faced with an obstruction, find a way to step around, under, over or through it. Consult. Share. Always double-check.

Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is the senior science writer and blogger for ASBMB. Follow her on Twitter at www.twitter.com/rajmukhop.

An open letter from a not-so-good Brahmin boy

Dear Professor S.,

I hope this finds you well. I am at a recruitment weekend for prospective Ph.D.s in the immunological and microbiological sciences. Having received my undergraduate degree in biotechnology and having followed it up with an M.S. in microbiology with a strong immunology focus, I always have known people forging ahead in academia, getting Ph.D.s, publishing, running labs, sparring with fellow scientists, attending conferences and so forth. This is all I have ever known, and I have yearned to join their number.

Why? Well, because I love science. More specifically, I love immunology. I am awed by the subterfuges that pathogens employ and the countersubterfuges of the immunocytes: The immune response is a devastating romance set to the stylings of a cytokine signaling suite.

And me? I will be the agent who discovers those symphonies, those diamonds in the rough that play in an anonymous niche of the cell, and publish papers about them so that the world will know and laud my genius and that of my findings. Of course this will happen. This is what I am meant to be. It is something I always have known.

I remember coming out of the closet. I remember it because it was the most excruciating experience I have had so far in life and also because I was the last one to know. It appeared that my friends always had known. It was evident from their lack of surprise and, for some, a sense of understanding and closure. I wish they could have given me this closure: I wish I hadn't had to go hunting for it within. But how could they? This was meant to be my journey. That I was to embark on this journey was a fact that I was the last to know.

Today, as I sat in the unusually cold Memphis air deep in conversation with a scientist, a product of our home lab, I found myself gingerly opening the door of yet another closet: For, you see, I am a closeted writer. And, like before, I was the last to know.

My lab mates, it appeared, always had known. The scientist in question always had known. She reminded me of the essays I had written for an immunology course she'd taught and of how much she had enjoyed the way I drew parallels between the events in "Richard III" and the pathogenesis of HIV. She told me to look again at all the blog posts that I'd written and think hard about what I was throwing away.

Was I truly throwing something away? Really? This life is as awkward and undecided as someone meandering around an airport in Amsterdam, unsure of which connecting flight to take to get him home. So many revelations, and, as always, I am the last one to know.

In truth, Professor S., I always have known this: The times when I wondered, at the end of every American literature course I surreptitiously took as an undergrad, if I should change majors, now feel just like the times when I'd catch a handsome, ashen boy's eye and wonder what if but then retract because I was a Good Brahmin Boy.

I always have known that Good Brahmin Boys do not kiss other boys. Good Brahmin Boys ensure futures of procreations and publications

I am not a Good Brahmin Boy. I cannot pretend to be one anymore, because that would be akin to living a Richard Yates novel.

I felt liberated today as I confess to myself that I am not like them. My mind is not the kind that does the dogged, logical thing that they do as they plan experiments, do experiments and launch into a "Hunger Games"-esque race for grant money.

I always have known I am not a shark. I am not a shark, and that is OK, because I'd rather create. I am at my happiest when I write, more so when I write about immunology and infectious disease.

It was with these revelations that I decided to fill out this application to your scientific journalism program only to discover that the deadline is tomorrow. Well, today. And here I am: the last one to know. Figures.

I remain yours sincerely,
Akshat Sharma

Akshat Sharma (asharma28@wisc.edu) received his M.S. in microbiology from North Dakota State University and is a Ph.D. student in the department of medical microbiology and immunology at the University of Wisconsin, Madison. This letter is adapted from an actual letter he sent while applying to a creative-writing program before deciding to pursue his Ph.D. after all. Read his blog at http://fasterkilltcell.wordpress.com/.

A hero for me

By Kyeorda Kemp

When I was 8 years old, I was obsessed with dinosaurs, and I was determined to find a fossil in my backyard. I eventually found what I decided was a fossilized dinosaur egg. After weeks of telling me that it was just a rock, my parents took me to the Detroit Science Museum, where I learned that dinosaur fossils are absent from our area. While I was disappointed to discover that my "fossil" was just a rock, this experience helped me to realize what I wanted to be when I grew up — a scientist.

My father decided that I needed a role model that I could look up to, so he started telling me stories about George Washington Carver and his work involving soybeans and peanuts. One day I asked him to tell me about other black scientists. My dad brought home a book on black inventors, doctors and scientists. On the nights when my dad could leave the factory early, we would read a story about one of these amazing people. If he couldn't get home, and many nights he could not, I would read one of the stories on my own and tell him about it the next morning as he drove me to school.

I learned about Madam C.J. Walker and how she became the first black female millionaire due to her hair tonics and creams; Garret Morgan, who invented the modern traffic signal and the gas mask; and Daniel Hale Williams, who performed the first successful open-heart surgery.

However, my favorite was Charles Drew. His research in the field of blood transfusion resulted in improved techniques for blood storage and led to the development of blood banks that saved thousands of lives during World War II. It was at this point that I made the connection between science and medicine. I realized that Dr. Drew was a hero and that I could make a difference and help others through science.

Charles Drew U.S. NATIONAL LIBRARY OF MEDICINE

I began to emulate him, and I even dressed up as him for Halloween one year. My father took to calling me Dr. Kemp and told me that if Dr. Drew could succeed while struggling against the bonds of racism and poverty in the Jim Crow era, then I too could succeed. He was right.

However, as I grew older and began to tackle the many obstacles in my way, it was not the memory of my childhood heroes that I called upon to motivate myself but the memories of my parents. What my father did not realize was that he did not need to look far to find me role models, because I had them all along in him and my mother.

Kyeorda Kemp (kyeordakemp2010@u.northwestern.edu) is a postdoctoral researcher at Northwestern University.

Moving into administration

Should you stay or should you go? Observations from a new dean

By Benjamin D. Caldwell

So you are an effective teacher, and you have published or acquired funding for your research. You have served on multiple departmental and institutional committees, and you have moved through the faculty ranks to become a tenured associate or full professor. Those higher up in the academic food chain have noted your efforts, and you have been offered a position within the institution's administration.

Administration! There, I've said it. This could mean being asked to become chair of your academic department or to become an associate dean, the director of an office (i.e., grants and sponsored programs) or – heaven forbid! – a dean.

Now you are faced with a decision many faculty members hope they can avoid: Should you stay in your comfortable world of teaching and research, or should you venture into the unknown realm of administration?

Many faculty members equate "administration" with a four-letter word, and those who cross the line are viewed as having gone over to the dark side! Faculty members often view administrators, deans, vice-presidents, provosts, chancellors and the like with suspicion and mistrust.

How you got here

The actual leap into administration can happen in a multitude of scenarios. Some faculty members are tapped as associate deans to help with special projects over a few semesters and then return to their normal faculty positions. A department chair may be a rotating position that is assumed by different members of a department on a regular basis (sometimes much less regularly).

So what if you are asked about the possibility of moving from the relative comfort and regular routine of being a faculty member and researcher to the netherworld of administration? While our graduate education taught us about a particular area of research, few graduate programs offer training to prepare graduate students to become faculty members. Pretty much no one really is prepared for an administrative position.

Fortunately, we scientists have great potential as administrators, because we generally have good organizational and analytical skills and our time in graduate school trained us to be good problem solvers.

What this means for you

There typically is a steep learning curve during the first year in which a new administrator simply is trying to learn the role. A new administrator must learn policies specific to the particular unit or units that he or she oversees and then be able to see the bigger picture of how that unit fits into the larger entity of the institution.

Running a research group can be good training for running a department or university unit. You have had to manage your group's budget, and you will have similar responsibilities for your unit although on a much larger scale. Running a research group requires planning for managing multiple projects and personnel (students, postdocs, technicians). These experiences can be very helpful, but there are a number of duties in which most faculty members generally do not have experience before moving into administrative roles.

These duties include

- faculty hiring and evaluation (promotion and tenure),
- scheduling classes,
- program evaluation and accreditation (at the unit level and institutionally),
- building and growing new and existing programs,
- recruiting and marketing,
- evaluation and development of current and new policies, and
- dealing with student and faculty issues and complaints.

A different vantage point

Department chairs and deans are essentially middle managers who must listen to the needs and demands of those they supervise and those they answer to in the institutional chain of command. Transitioning from a faculty position to an administrative one requires that your priorities change. Becoming an administrator means trying to see both sides of an issue – from the faculty or student perspective as well as from the institutional side. Before moving into an administrative role, most faculty members have the luxury of taking only one side of an issue. Making those hard decisions requires a thorough understanding of policies related to

SHANNON HALL

the issue at hand and the processes in place for handling certain issues.

For instance, if a student files a complaint about a faculty member's grading of an assignment or even the final grade for a course, the department chair or dean needs to know exactly what the policy and process for handling this type of situation requires. The administrator must follow the protocol as fairly as possible for all involved.

There also is the fear that you no longer will be viewed as one of the faculty even though most administrators still hold their faculty ranks and tenure privileges. Faculty members who become department chairs obviously are still faculty members, but they have new administrative duties and responsibilities. Depending on a department's size and institutional policies, some chairs become full-time administrators, and some continue to teach and supervise their research groups. For positions higher up in administration, such as dean, the sense of suspicion and mistrust on the part of faculty members creeps into play, especially when hard decisions must be made with regard to tightening budgets for resources and personnel.

Navigating a minefield

So how do you gain or maintain the trust, or at least the respect, of faculty members? The key is to listen. When you have to make decisions that may not be popular, make sure faculty members and students understand the rationale used to make decisions. This is usually referred to as transparency. Some individuals or groups may not agree with a decision, but if you are honest and open about the decision-making process it will demonstrate that you listened and considered many positions on the subject along the way.

Administrative positions truly are service roles, or at least they should be viewed this way! When I became a department chair, I took on the view that my primary role was to be there to help solve other people's problems – students', faculty members' and the institution's problems. It wasn't about me anymore. How could I help my department, our faculty, our students and the university? Do faculty members need time for projects? What resources do students or faculty members need? How can I help them succeed?

Special considerations

What are the conditions of the move? Will you be able to retain your faculty rank and privileges? Will you be able to return to the faculty once your term is over? What are the financial implications of and compensation for the move? Is there a stipend (typical for department chairs), or will you be signing an administrative contract (to become a dean, for instance)? If you accept an administrative contract, you are not likely to have the same time off faculty members often enjoy over breaks between academic terms.

What are the actual administrative duties? Developing budgets and making financial decisions that may affect students, faculty programs or departments? You need to ask yourself if you have the skills needed for whatever tasks are required. Do you have the confidence, and do you have a thick enough skin to handle the criticism that will undoubtedly follow?

My own experience

I have been a dean for about a year and a half. My first year was consumed primarily with learning about the programs and policies that I now am stewarding. This past semester seemed to be filled with solving student-related problems and issues. But I also have retained my faculty position and am teaching a half-time load of courses. This kind of split position is a bit unusual, and I often find myself switching hats in the middle of a conversation or meeting. Time management can be demanding, and it has been challenging in many different ways. But it is gratifying to help a young, growing group of academic programs.

So my advice to new administrators or anyone considering such a move is to ask why you would want to make the move and what you can contribute to the larger goals of your unit or institution. What do you bring to the table? What is your vision for your role, and how can you add to the institution's initiatives?

And be prepared to attend more meetings – lots of meetings!

Benjamin D. Caldwell (caldwell@missouriwestern.edu) is a professor of chemistry and dean of the Missouri Western State University Graduate School.

Every lab needs a hall of fame

By Eleftherios P. Diamandis

According to a Google search, there are more than 200 halls of fame in the world covering diverse areas such as music, theater, all kinds of sports and many more. Halls of fame have been created to capture the history of certain disciplines by inducting each year their most famous representatives and by highlighting their achievements.

Rather surprisingly, there are no internationally recognized science halls of fame. Perhaps this gap is filled by other means, such as internationally renowned prizes (e.g., the Nobel Prize) and memberships to national science academies.

Consistent with this idea of honoring excellence is my proposal of establishing halls of fame in research labs with the objective of identifying and honoring those members who have made lasting contributions. Other workplaces, such as restaurants and hotels, have other creative ways to boost the morale of their employees, such as employee-of-the-month designations and parking spaces.

Consistent with practices followed by other halls of fame, members could be inducted on a yearly basis and after they have been out of the laboratory for at least a year. The laboratory director or a selection committee, which would include other lab members, could select inductees. The induction should not be exclusive of nonscientific staff, such as managers, secretaries and technologists, if those individuals have contributed critically to the lab's success.

My own laboratory was established in 1988 and today includes about 30 members, with a turnover rate of about four or five individuals per year. Since 1988, we have inducted 27 individuals into the lab's hall of fame, of whom four were technologists, one was a secretary, six were postdoctoral fellows and 16 were graduate students. Each entry (see figure) mentions the years spent in the lab, cites two or three of the inductee's most important publications (if applicable) and includes a 50- to 70-word citation describing his or her most significant contributions.

Feedback received from previous inductees has been very positive. For example, one former graduate student who now works in Switzerland visited the lab five years after she graduated and was surprised and thrilled to see her inclusion to the lab's hall of fame. As she put it, it was an unexpected and very welcome recognition of her contributions. Our hall of fame is displayed in the corridor leading to the lab and is visible to the many individuals — scientists, students, patients — who pass by.

An individual's contributions to a research lab are indelibly documented in publications, theses, conference presentations, patents and other materials that originated from their research. The hall of fame is another way of recognizing significant contributions of staff in a research laboratory. It is just another way of saying thank you for a job well done.

How important might a hall-of-fame induction be? This question can be answered with an anecdote from a lab technologist who applied for a senior technologist position and did not get it. The promotion did not include any financial benefit or change of responsibilities, and I asked him why he was sad about not being selected. He replied, "Even a small recognition of my work is very important for me."

Members of my hall of fame

GEORGE M. YOUSEF

Years in Lab: 1998 – 2002

Most important publications: *J. Biol. Chem.* 274, 37511–37516 (2000); *J. Biol. Chem.* 275, 11891-11898 (2001); *J. Biol. Chem.* 276, 53-61 (2000).

Citation: George is credited with the cloning of many novel kallikrein and other genes, the characterization of the kallikrein locus and the demonstration that many of these genes are regulated by steroid hormones and can act as effective cancer biomarkers.

VATHANY KULASINGAM

Years in Lab: 2004 – 2008

Most important publications: *Nat. Rev. Cancer.* 5, 371–378 (2010); *Nat. Clin. Pract. Oncol.* 10, 588-599 (2008); *Mol. Cell. Prot.* 6, 1997-2011 (2007).

Citation: Vathany was the first to systematically standardize our proteomic methods for biomarker discovery and wrote influential reviews on how to discover cancer biomarkers by using mass spectrometry.

Eleftherios P. Diamandis (ediamandis@mtsinai.on.ca) is a professor and head of the clinical biochemistry division at the University of Toronto and holds an endowed chair in prostate cancer biomarkers at Mount Sinai Hospital and University Health Network.

Thoughts on MOOCs

Two researcher-professors from the traditional mold share their perceptions of and questions about online education with a particular emphasis on the growing number of science classes that are free and open to all.

The American Society for Biochemistry and Molecular Biology will host a session focused on online science instruction at its annual meeting in April in San Diego. The session, "Online Education and the Rise of MOOCs," will be part of a symposium titled "21st-Century Approaches to Teaching and Communicating BMB."

Conversations about best practices for online instruction and the changing definition of "student" are being had all over the world. So in the lead-up to the session on massive online open courses, we asked ASBMB members Joseph Provost of the University of San Diego and Michael J. Pikaart of Hope College in Holland, Mich., about the implications for brick-and-mortar colleges and universities and about the potential impact of MOOCs like those offered by Coursera, Udacity, edX and other providers. Their exchange has been edited for length, clarity and style.

Tell us how you integrate Web technologies in your traditional classrooms today.

Pikaart: From intro courses to upper-level classes, my institution uses a standard course-management system. I use it for class notes, homework, quizzes. Actually, being in the Midwest, we even had a couple snow days last semester, and I video'd myself giving the lecture I would have done in person and put it online for students to watch. Worked out pretty well, I thought.

Provost: I think we all try to draw on various online resources for students to look at macromolecule structures, read literature and search -omics-type data.

All MOOCs are taught entirely online, but they do come in numerous forms. To you, what is a MOOC?

Pikaart: "Open" means, well, the course is open to anybody as opposed to a typical college course that you have to go to and actually register for, usually as part of a degree program. "Massive" must just mean what is says … and I guess you could have thousands of people taking an individual MOOC.

Provost: But "open," I think, also implies free or at really minimal cost. Which is probably the thing that gives college administrators something to worry about — because, if people can just go online to learn, with anytime-anywhere convenience, why would they want to have to actually go to college to take classes and pay for it?

That sort of turns the whole idea of higher education on its head. For — what, 500 years? — universities and colleges have been places where learners and teachers come together to study and work, where knowledge is produced and communicated. I don't know how a MOOC fits into that idea.

Some MOOCs offer certificates to formally recognize students' completion of them, for whatever that's worth. What are your thoughts on those? And what have you seen out there for those interested in biochemistry and molecular biology?

Provost: If I remember right, many provide individual course certificates. There is a growing number of comprehensive online degrees, although I haven't been able to find any that are biochemistry or molecular biology degrees offered via MOOC. There seems to be quite a bit of diversity in approaches.

In one biochemistry MOOC course, the content is mostly links to material from other institutions like (the National Center for Biotechnology Information) and various universities. The University of New England has a medical-oriented biochemistry MOOC for preprofessional students and advertises a number of medical and physician-assistant programs that accept the course as credit.

I do find myself looking at and learning from some of the better MOOC offerings like the (Massachusetts Institute for Technology), Harvard (University) and (the University of California at Berkeley) courses and the material on iTunes. I guess caveat emptor is the best guidance now.

In your view, who might be best served by MOOCs?

Pikaart: There seems to be several audience markets for MOOCs. Certainly those looking for a topic or professional development on a targeted subject can find very interesting classes. Some focus on vocational training. Students and incumbent workers can find individual courses that they hope to use to increase flexibility and diversity in their education and to achieve their degree. I have sent students to MOOC sites to learn and review topics in all sorts of areas.

Provost: Me too. I even told my daughter, a sophomore chemistry and biochemistry major, to watch a few of these single-class MOOCs to help her studies … One has to wonder: The diversity of MOOC offerings must create conflict for universities to decide how and which courses to accept for completion of their degrees. In fact, this also impacts the faculty who have students who may have taken a number of prerequisite offerings sitting in on their biochemistry or molecular biology courses.

Pikaart: I imagine the same thing will be seen in graduate and medical schools too.

Provost: Yeah. We, academia and the ASBMB, have an obligation to keep access to learning and help broaden the experience. I remember seeing many business and political leaders evangelize on how brick-and-mortar universities need to change the paradigm and reduce costs to make education affordable and more exciting. Some of this is certainly true. I wonder what my future biochemistry and molecular biology students will look like if things keep going on this way. At the same time, I wonder about the effectiveness of MOOCs to reach these goals.

Pikaart: I think a lot of people are wondering that same thing. The excitement about MOOCs of a couple years ago has been replaced by a cold, hard pessimism about their effectiveness. One of Udacity's founders, Sebastian Thrun, who taught one of Udacity's very first online courses in computer science, recently described a for-credit venture with San Jose State University as a "lousy product."

So, going back to who is best served …

Pikaart: It seems it's turning out that the people who are best served from learning via MOOCs are well-educated professionals, not the educational have-nots who might most benefit from readily available and low-cost courses.

When Udacity ran its first MOOCs out of Stanford (University), the courses on robots and artificial intelligence were taken by people who already had strong computer-science backgrounds. So for people who already have, as they say, "learned how to learn" and who maybe are looking at a MOOC as a way to further explore a topic they're interested in or obtain specific professional training, the content-delivery system of a MOOC probably works quite well.

But what about all the things we do in the classes we teach beyond just conveying content? Things like encouraging the hesitant student — and reining in the overconfident! Like giving feedback and assessment on how our students are progressing and helping students place what they're learning in the context of their life goals. I don't know how those could happen in a MOOC.

Some MOOCs are offshoots of real, face-to-face classes. The students at the brick-and-mortar institution actually go to class and then do the online work with the MOOC enrollees. Are there other ways these worlds are intersecting?

Provost: I have seen a few cases where professors use the MOOC materials, mostly the video lectures, and adapt that material for their course as a sort of flipped classroom. One professor at a Florida school does that for biochemistry. Another instructor at Vanderbilt (University) wrote about his work doing the same for his

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classes. Sounds like a unique way to help students.

I guess that I am ambivalent. MOOCs and online teaching take away the small group and faculty engagement. And at the same time, I wonder if bringing science to more students using MOOCs is all that much different from when I was teaching huge numbers of students in a single class.

Are there any other aspects of all this that seriously concern you?

Pikaart: It might be pretty challenging for a student who earned a whole degree using MOOCs to get the kind of laboratory experience or research experience that a good biochem or molecular biology student should get.

Provost: I wonder the same thing. I would hate to drive over a bridge where the engineer learned how to design the bridge based on online courses only or be the patient of a surgeon taught medicine only by MOOC. Going on to a career at the bench at any level would be pretty concerning.

Pikaart: The economics of MOOCs aren't obvious either. There are significant costs to create, host and maintain the site. Are the people asking to have access to free degrees willing to provide their services for free? I don't recall seeing similar offerings by other professions or vocations.

Provost: It takes years and hard work to become a biochemist and more years of experience to become an effective teacher. Should I be expected to give all of my skills away for free? Would a plumber be expected to provide cheap or free services?

Pikaart: Yes, but we do have to think about how to manage the costs of higher education to keep things accessible. MOOCs and online learning certainly do this.

Provost: Agreed. I think there is a place for MOOCs, but in sciences like biochemistry and molecular biology in undergraduate, graduate and health professions schools, they have to be carefully considered.

MOOCs certainly have a place, and how they are bundled and how they can reshape teaching has real potential, but a free degree is debatable. I guess we should just see MOOCs as a resource — one more tool in our teaching toolbox, like textbooks. They are a resource to make teaching and learning more effective and efficient.

ONLINE EDUCATION AND THE RISE OF THE MOOC

When: 9:55 a.m. to 12:10 p.m., April 28

Where: San Diego Convention Center, Room 14B (Mezzanine Level)

Transforming spectators into scientists

Q?rius learning center at the Smithsonian tears down barriers with bare hands

By Sapeck Agrawal

Some of my fondest childhood memories are of frequent trips to the local science museum with my father.

I remember looking at images of Marie Curie holding a glass beaker, listening to the oceanic reverberations from a conch shell and marveling at the diorama of the early man building a fire. A trip to the museum really was an all-around excitation of the senses and curiosity. After these visits, I told friends that I would become a scientist when I grew up, and that's exactly what I did.

Perhaps the foundation for the advancement of science and technology in a society is indeed set in childhood. Introducing science early on can cultivate children's innate sense of wonder and inquisitiveness, and museums do a wonderful job at that. The experience, however, is often limited to that of a spectator, with placards reading "do not touch" appearing as often as the displays.

To foster a more interactive and real experience for young minds, the Smithsonian National Museum of Natural History has gone a step further and introduced a unique learning center called Q?rius (pronounced "curious"). Located in the heart of the nation's capital, Q?rius features pieces from scientific labs, collection vaults and creative and hangout spaces, creating an enormous hub for students to learn firsthand key concepts from real staff scientists and experts.

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JAMES DI LORETO, SMITHSONIAN

A visitor looks through a microscope in the Smithsonian's National Museum of Natural History's new interactive learning center, Q?rius, which opened to the public on Dec. 12 in Washington, D.C.

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The microscopes

Upon entering, the first thing that jumps out at Q?rius is the abundance of professional-level microscopes.

DONALD E. HURLBERT, SMITHSONIAN

Visitors explore the Natural History Museum's new education center, Q?rius, in Washington, D.C.

JAMES DI LORETO, SMITHSONIAN

Museum visitors get up-close and personal with museum specimens in the National Museum of Natural History's new education center, Q?rius, in Washington, D.C.

The star is the DSX100, a free-angle, wide-zoom microscope introduced by Olympus in 2012 — the microscope I wish I had had while pursuing my Ph.D. Using this machine, students can study samples from all sides without ever having to move them or refocus the scope. The associated touch-screen interface makes microscopy child's play! What's even more remarkable is that the images from the sample can be stitched together to create an amazingly detailed three-dimensional, panoramic image.

And what is the most popular specimen viewed under this microscope?

"Of course, one's own finger," reports Matt, a geologist and a volunteer at Q?rius. Visitors, he says, "are blown away by what they see. The level that you can zoom in to be able to see the sweat and pores — I think it blows their mind that it's all part of them."

Other advanced microscopes at the learning center include:

- the BX63, equipped with optics for fluorescence and differential interference contrast illumination and an advanced digital camera;
- the BX53 for polarized light microscopy;
- several BX43 upright compound teaching microscopes with five viewing heads for simultaneous use by multiple people; and
- dozens of dissection and stereo scopes set up at each station.

Seeing as how not all schools are as well equipped, Q?rius provides students the rare opportunity to handle an advanced microscope and systematically study various samples. Several enthusiastic volunteers and experts stand by and offer assistance and training.

The collection vaults: Do touch!

Ever wondered what kinds of birds are capable of crashing a Boeing 747?

At Q?rius, you can deduce the answer to this question and many others using real samples, such as bone fragments, fossils and DNA evidence, with training and guidance from Smithsonian staff scientists. Q?rius provides access to more than 6,000 genuine natural history objects that have been taken out of their locked glass cases and made available to the visitors.

"You can take them out, look at them, touch them … it's my favorite part," says Yefim, a young Russian boy visiting with his grandmother.

Vital fossils, some as old as 485 million years, are ready for exploration by the pioneers of tomorrow.

The digital field book

Q?rius also is instilling the importance of keeping a good lab notebook, an indispensible skill in research, in these young scientists. Participants can create an online field book and add the details to all their activities and observations at Q?rius by scanning associated QR codes.

This field book can be accessed on the Web, and students can continue to update it as they engage in the ever-evolving activities on the Q?rius website, including live webcasts with paleobiologists and videos of scientists in action at the Arctic.

So, are you Q?rius?

In the first three weeks since its opening, Q?rius already had entertained about 12,000 visitors. A fun, interactive, learning center, Q?rius is a one-of-a-kind hub that is using the expertise of staff scientists, unlocking invaluable specimens, providing superior equipment and engaging anyone who is curious and inquisitive. When I was a child, the playground was my lab — where I would pretend rocks were fossils. So I can imagine the utter amazement that young children feel upon holding an actual fossil — a relic of millions of years past — made possible by Q?rius.

JAMES DI LORETO, SMITHSONIAN

Q?rius lets visitors touch museum specimens and learn about the science behind the collections.

Sapeck Agrawal (sapeck.srivastava@gmail.com) recently earned her Ph.D. in molecular microbiology and immunology from the Johns Hopkins University.

Coming soon to a science center near you: You!

The Portal to the Public network connects scientist-volunteers with informal science-education institutions to enhance public programs

By Meena Selvakumar

Did you love going to science centers as a kid and want to give back as a science center volunteer? Or maybe you feel an obligation to communicate your research to general public audiences because you receive federal funds for your work? Perhaps it's even a requirement of your work.

These are just a few of the reasons a growing number of scientists are getting involved with education and outreach activities – including those outside of the formal K – 12 system. Informal science-education institutions include, for example, science and technology centers, natural history museums, children's museums, zoos, nature centers, parks and aquaria.

But where do you begin? How do you find a partner? How do you determine your audience? And how do you engage it effectively?

Research shows that visitors to informal science education, or ISE, settings present unique challenges: They come with their own agendas, and their levels of engagement with programs and exhibits vary. They also enter learning situations with their own experiences, interests, misconceptions and understandings.

Over the past 50 years, ISE professionals have developed a number of strategies and techniques grounded in the field of learning sciences to overcome these issues and effectively engage with their audiences.

PORTAL TO THE PUBLIC

Portal to the Public Network programs are characterized by face-to-face interactions between scientists who have participated in science-communication workshops and visitors to informal science institutions. The programs use conversational approaches and inquiry-based activities.

Now, through The Portal to the Public Network, a system of 30 (and growing) ISE institutions is applying a set of these same strategies but has modified them for scientists who wish to connect with their communities in ISE settings.

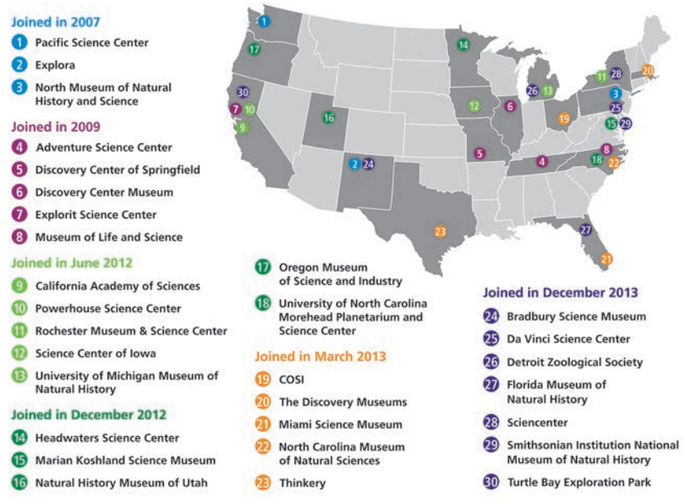
Pacific Science Center is the lead organization of the network, through which training is provided for staff from ISE institutions across the country to help them partner with and provide science-communication workshops for scientists in their communities. Each ISE institution adopts what is called the Portal to the Public model to match its own needs and resources, resulting in diverse science-communication workshops and events featuring scientists.

Portal to the Public's core values are based on the idea that understanding the principles of effective science engagement in an ISE venue needs to extend to anyone – including scientists – who might encounter visitors in these places. In the science-communication workshops, active researchers and those who use science as part of their daily work use a learner-centered, inquiry-based approach that focuses on interactive, minds-on experiences, which helps them to become informal science educators of their own research or expertise.

Through role-playing activities, scientists use questions to support learners in making their own discoveries and practice discussing concepts related to their own research with different audiences. And rather than using questions to probe for correct answers that explain phenomena, scientists are encouraged to ask questions to facilitate inquiry-rich learning experiences that allow the visitors to probe and discover. For example, a scientist might ask visitors the following questions:

- "What did you see here?"
- "How might we test this?"
- "What would you expect happens next?"

Scientists work with ISE staff to brainstorm and experiment with materials-rich activities that represent their work. Importantly, scientists understand that face-to-face interactions with visitors often leads to dialogue about the scientists' own personal passions for their work and anecdotes about their own backgrounds, thereby infusing the conversation with the scientists' personalities.



PORTAL TO THE PUBLIC

The Portal to the Public Network has 30 U.S. sites. In the next two years, at least another 13 will join.

Because the ultimate goal of the Portal to the Public endeavor is to create events that bring scientists and public audiences together in face-to-face interactions, ISE staff members schedule a public program for the scientist shortly after the completion of the science-communication workshop.

While public programs can vary in approach from site to site, most use a conversation-based format complemented by hands-on, tabletop activities that highlight the scientists' work and target small groups or individuals. Some programs have included large group presentation-style events and off-site field trips.

The events bring value to the ISE institution by positioning it as a place where public audiences can have meaningful conversations with researchers. During the events, it is common to see parents and children exclaiming how excited they are to meet a real scientist and learn about scientific work in progress. Adults, teens and children often become engrossed in lengthy conversations with scientists instigated by materials-rich activities that explore real-life questions, challenges and processes from active research areas.

Scientists at all career levels, in multiple fields of research and from various organizations have participated in the programs, and many of the scientists continue to volunteer with the ISE institution year after year.

To find a Portal to the Public site near you or to learn more about the program, go to http://popnet.pacificsciencecenter.org. The Portal to the Public Network has been funded by grants from the Institute of Museum and Library Services (MP-00-11-0026-11) and the National Science Foundation (DRL-1224129).

Meena Selvakumar (MSelvakumar@pacsci.org) is project director of the Portal to the Public Network.

Q&A with George Langford, dean at Syracuse University

By Weiyi Zhao

Tell us about yourself.

I am a neuroscientist and serve as the dean of the College of Arts and Sciences at Syracuse University. My research focuses on the cellular mechanisms of learning and memory, specifically how the brain recalls information and how Alzheimer's and other neurodegenerative diseases impair the process.

Prior to Syracuse, I served as dean of the College of Natural Sciences and Mathematics at the University of Massachusetts–Amherst. Prior to that, I was the Ernest Everett Just professor of natural sciences at Dartmouth College and professor of physiology at the University of North Carolina at Chapel Hill.

In 1998, I was appointed by President Clinton to the National Science Board, the governing board of the National Science Foundation. I have dedicated my career to increasing minority representation in the sciences by designing and implementing programs to support and mentor minority students. I was honored to be named inaugural chair of the Minority Affairs Committee of the American Society for Cell Biology and the inaugural holder of the Ernest Everett Just professorship … at Dartmouth College. While in this position, I established the E.E. Just Program to increase the number of minority students in the sciences.

How did you first become interested in science?

In the ninth grade, my chemistry teacher, Mrs. Clark, encouraged me

to explore the sciences. She gave me a special project for the science fair on photography. I learned to develop film and print, and this experience piqued my curiosity about the science of photography.

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?

During my early career, I found it difficult to establish a network of collaborators among my peer scientists in the U.S. I succeeded in my goal, however, by working with German colleagues.

What advice would you give to young people from underrepresented backgrounds who want to pursue a career in science similar to yours?

You must maintain excitement for your science. It is incumbent upon you to familiarize yourself with forms of racial discrimination and bias. You should develop strategies. Stay attuned to your goals, and try to understand the roadblocks.

What are your hobbies?

I love music, piano playing and listening to an array of performers. I also love spending time on the beach, playing racquetball and spending time with my grandchildren.

What was the last book you read?

I recently finished reading Philip Roth's "Indignation," published in 2008.

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

The excitement of discovery and the ability to contribute to new knowledge. I want to help improve the human condition, specifically through research in the biomedical arena, but especially to enhance our understanding of the neuroscience of learning and memory. I am committed to training the next generation of students and increasing the number of underrepresented students in the (science, engineering, technology and math) disciplines.

Weiyi Zhao (wzhao@asbmb.org) is the ASBMB manager of education and professional development.

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- Enzyme Mechanisms & Chemical Biology
- -Omics, Systems Biology and Their Translational Applications
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- Frontiers in Glycobiology
- Signal Transduction
- Science of Addiction
- 21st-Century Approaches to Teaching and Communicating Biochemistry and Molecular Biology

Late-Breaking Abstract Deadline: **Feb. 21**

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