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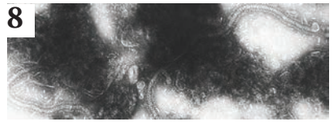

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Biochemist Peggy A. Whitson is gearing up for her next six-month tour aboard the International Space Station.

Image courtesy of NASA

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Two kinds of grants?

By Steven McKnight

Last month I speculated that in its review of grant applications, the National Institutes of Health may apply heavy focus to the feasibility of the science. In an attempt to assess this speculation more carefully, I asked if the Center for Scientific Review might share with me data collected over the past year on R01 grant applications. Regrettably, the CSR was unwilling to share these data.

Short of access to the requested CSR data, I solicited the input of biomedical researchers working at my home institution, the University of Texas Southwestern Medical Center at Dallas. My request was in the form of a simple e-mail seeking scoring information on grant applications reviewed in 2014 (irrespective of whether funded or not). I received 86 responses, allowing deduction of the correlative relationships shown in the figure.

Recall that the NIH uses five criteria in the review of most grant applications: significance, investigator, innovation, approach and environment. The most substantive correlative relationship with an application's "overall impact score" was the approach criterion (r = .86). Less striking but important correlations were seen for the significance (r = .65) and innovation (r = .54) criteria. Little or no correlation with overall impact score was seen for the environment (r = .37) or investigator (r = 0.36) criteria.

Admittedly, the 86 UTSWMC investigators included in these analyses represent but a small sampling of the thousands of researchers whose grant applications were reviewed by the CSR in 2014. Still, I believe certain conclusions can be drawn from these data — even if those conclusions are relevant for only my colleagues here in Texas.

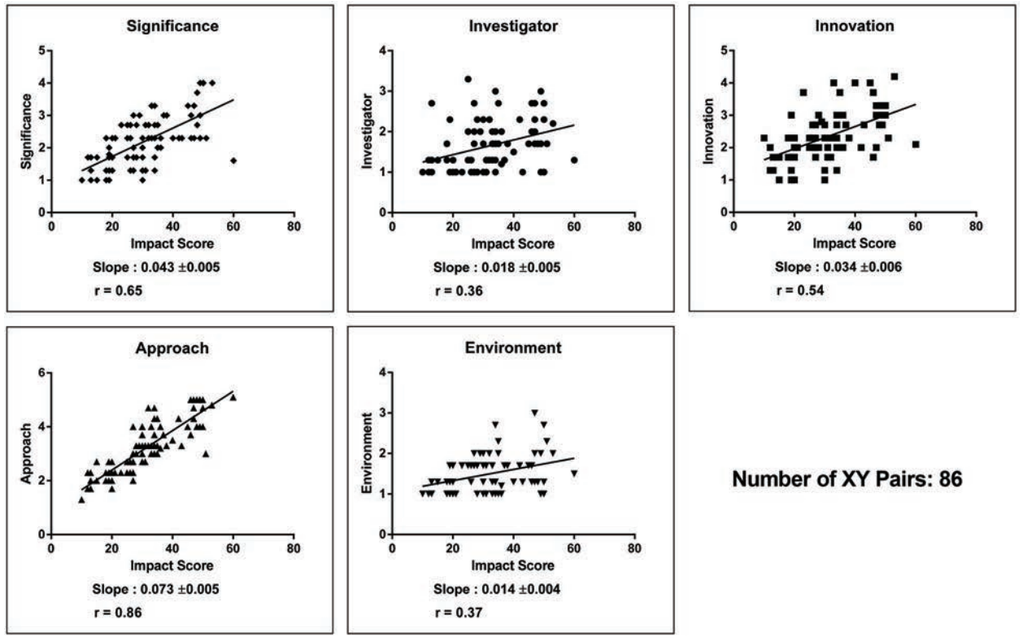
First, approach is the 800-pound gorilla dictating whether a grant application is to achieve a fundable score. Second, significance and innovation contribute to overall impact score with a positive correlative influence. Third, neither the environment score nor the investigator score appears to contribute significantly to the overall impact score.

I was not surprised in seeing the strongest correlation between approach and overall impact score. Indeed, in 2009 Jeremy Berg, then director of the National Institute of General Medical Sciences, came to the same conclusion with data he presented to the NIGMS council. Berg's analysis derived from the evaluation of 360 NIGMS grant applications, in which he found a correlation coefficient of r = .74 between approach and overall impact score.

What did surprise me from my more limited and recent data was the near absence of correlation between the environment and investigator scores and overall impact score.

These data stand as evidence that the NIH is fundamentally different from the Howard Hughes Medical Institute in weighing criteria that dictate funding decisions. The NIH wants the research plan to be sound but is largely unconcerned by the qualifications of the scientist. The HHMI bets its money on the scientist instead of the details of his or her research plan.

In thinking about the data in the figure, I offer that it might be best to split NIH grant applications into two categories. One category would be for research proposals wherein the exact nuts and bolts of the research plan are of paramount importance. These applications would be contract-like in helping fit the desires and objectives of the different research missions of the NIH's institutes and centers. If they are sound and highly likely to work, they should be funded. I will call these ASI grants (for approach, significance and innovation) and emphasize two things. First, ASI grants would be similar to most grants currently funded by the NIH (approach-dominated). Second, the product of this research should be of critical importance to the various missions of the NIH divisions.



The track record of the scientist and the quality of his or her environment should mean little to the reviewers of these sorts of applications, offering an unappreciated opportunity. I suggest that these applications be reviewed with the applicants' identities and institutions redacted. This proposed anonymity offers a means of combating the clublike behavior that I consider a detriment to our federal granting system in the biomedical sciences. If properly organized, this class of grant application/evaluation would place applicants on a level playing field. Simply put, the value of "club membership" would be mitigated.

A fundamentally different class of grants would be of the IE category (short for investigator and environment). These grant applications would be judged on the track record of the applying scientists rather than on the details of his or her proposal. Encouragingly, the NIGMS is now piloting its Maximizing Investigators' Research Award program — a program designed along the lines of the IE category of applications recommended herein (1).

Personally, I would recommend no more than minor attention to the environment criterion for IE grants. I say this for the simple reason that environment is difficult to measure. The most dominant influence of environment is the small microcosm of colleagues available for daily intellectual interaction. Dominant biomedical research centers may have hundreds of these micro-environments; smaller institutions might have no more than a handful. The worst microcosm of a superlative biomedical research center might well be inferior to micro-environments found in less-famed institutions.

Finally, I close with the question of how it might work to score the promise of scientists, young and old, in grant programs that would be, essentially, betting on the jockey. First and foremost, analysis of past performance should be strictly limited to the five-year period preceding submission of the grant application. The long-past accomplishments of an established scientist should bear no weight on this analysis.

With respect to young scientists, it is universally the case that grant applicants have had ample opportunities to demonstrate their capabilities and to amass notable accomplishments.

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For decades, my colleagues and I in the Department of Biochemistry have conducted job searches for the appointment of new, freshly independent members of our faculty. Whereas our track record in choosing winners has not been perfect, it is darned good.

How do we make our choices? We look at the track records of applicants just as reviewers should for the proposed IE category of grant applications. If a young scientist made a significant discovery as either a graduate student or a postdoctoral fellow, that accomplishment is precisely what makes us think that he or she will continue on a successful trajectory. It should be no harder for review bodies to grade the promise of young scientists than it is for the evaluation of established scientists: What has the applicant discovered over the past five years?

The key question to be asked of reviewers of IE grant applications would be this: "Has the applicant made a discovery of significance over the past five years?" I emphasize this in contrast to any general measure of so-called productivity. The quantity of papers published by a scientist may or may not be indicative of that scientist having contributed a discovery of significance. Thinking in the most optimistic of terms, if this proposed metric of review were adhered to in a strident manner, applicants for IE grant awards would evolve toward the generation of a discovery corps of American scientists.

Author's note: At press time, I was made aware of a new article in Science (2). Economists Danielle Li and Leila Agha conclude that the peer-review system is effective at selecting and funding impactful science using approach-dominated methods. The authors contend that it is healthy for grant funding to be largely divorced from the past accomplishments or institutional affiliations of applicants. I see this as a strong affirmation of the idea of ASI grants being reviewed without identifying information on the applicants and their home institutions.

Steven McKnight (steven.mcknight@utsouthwestern.edu) is president of the American Society for Biochemistry and Molecular Biology and chairman of the biochemistry department at the University of Texas-Southwestern Medical Center at Dallas.

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Efforts to sustain the research enterprise

By Benjamin Corb and Chris Pickett

Early in April, the National Institutes of Health issued a request for information titled "Optimizing Funding Policies and Other Strategies to Improve the Impact and Sustainability of Biomedical Research." Longtime readers of this column will recognize sustaining the biomedical research enterprise as a popular theme for the American Society for Biochemistry and Molecular Biology's Public Affairs Advisory Committee. We issued a whitepaper on the topic in 2012. This whitepaper defined the roles of the three major stakeholders of the research enterprise — academia, industry and government — and identified problems that each of the stakeholders needed to address to move the enterprise to a more sustainable path.

The ASBMB's sustainability efforts are focused on achieving consensus among the stakeholders on important issues like science funding, regulation and training. As such, the PAAC's 2013 Experimental Biology symposium brought together members of each stakeholder group to discuss these very issues. The vigorous discussion exposed many areas of consensus as well as contention.

In addition to our work, more than a dozen reports over the past three years discuss the important issue of ensuring a prosperous future for the American research enterprise. The President's Council of Advisors on Science and Technology, the National Academies, the American Academy of Arts and Sciences and our friends at the Federation of American Societies for Experimental Biology all issued reports aimed at highlighting the variety of challenges facing researchers today. These challenges range from unstable budgets and a burgeoning workforce to burdensome regulations and a lack of attention to important issues like diversity in the laboratory. And these reports go to great length to detail the variety of challenges plaguing the community, supported by memorable stories and credible data sets.

It appears the NIH now is conducting a similar exercise, and we're happy to see it. Specifically, the NIH is looking for the community's ideas on possible alternative funding models or policies that can maximize the NIH's investments. Additionally, the NIH hopes to receive feedback detailing "new policies, strategies and other approaches that would increase the impact and sustainability of NIH-funded biomedical research." We strongly encourage you to visit http://1.usa.gov/1ESgeB1 and submit your thoughts on this important matter.

The ASBMB's PAAC will draw on its experience on research enterprise sustainability and submit comments to this request for information. This is an opportunity for the entire community to have input on the reforms needed to improve how the enterprise functions. Moving forward, the ASBMB will begin focusing on how to identify and implement recommendations that the major stakeholders agree on. By finally moving to an implementation stage, the ASBMB and the entire scientific community develop an advocacy platform to take the steps necessary to sustain the future of American biomedical research.

We invite you to watch this space and our blog (policy.asbmb.org) for updates, and, as always, we appreciate your feedback.


Benjamin Corb (bcorb@asbmb.org) is director of public affairs at ASBMB. Chris Pickett (cpickett@asbmb.org) is a policy analyst at ASBMB.

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New Tabor young investigator award winner

RAMANI

Biswarathan Ramani, a graduate student at the University of Michigan, Ann Arbor, won a Journal of Biological Chemistry/Herbert Tabor Young Investigator Award. Ramani received the award at the 8th International Conference on Unstable Microsatellites and Human Disease earlier this year in Guanacaste, Costa Rica. Joel Gottesfeld, an associate editor for the Journal of Biological Chemistry, conferred the award.

Ramani investigates the pathogenesis of the hereditary neurodegenerative disease spinocerebellar ataxia type 3, or SCA3, in the laboratory of Henry Paulson.

Born in Bangalore, India, Ramani received his bachelor's degree in biochemistry from the University of Illinois at Urbana–Champaign before moving to Ann Arbor to pursue an M.D./Ph.D. through the university's Medical Scientist Training Program.

Ramani uses mouse models to study SCA3, in which the disease protein ataxin-3 is misfolded and thus aggregates in the nervous system. His project focuses on identifying factors that change ataxin-3 aggregation and the overall contribution of this aggregation to SCA3 pathogenesis and neurodegeneration. His work has helped uncover a potential role for alternative splicing in this process.

"I was definitely surprised but felt deeply honored for receiving the award, considering the number of talented, hardworking scientists at the meeting who presented beautiful work," Ramani said. He credits his mentor and lab members, adding, "I'm as proud of the people who have guided me through this as much as they are of me."

After completing his thesis research, Ramani hopes to continue pursuing his goal to become a physician-scientist with a focus on neurology and to continue his efforts to understand the molecular mechanisms that underlie neurological diseases.

Written by Aditi Dubey

Fierke named graduate dean at University of Michigan

FIERKE

Carol A. Fierke has been named the new dean of the Rackham Graduate School at the University of Michigan. Fierke is the Jerome and Isabella Karle Distinguished University professor of chemistry and current chair of the department of chemistry at the University of Michigan. Before arriving there in 1999, she was a faculty member in the biochemistry department of Duke University. Fierke earned her bachelor's of art degree in chemistry at Carleton College and her Ph.D. in biochemistry at Brandeis University. Fierke's research focuses on the catalysis and cellular regulation of post-translational modifications, tRNA processing and metal homeostasis. Fierke will serve five years as a graduate dean and will also serve as vice provost for academic affairs–graduate studies. Her term begins Sept. 1.

Utah state's Hengge wins D. Wynne Thorne Career Research Award

HENGGE

Alvan C. Hengge, head of Utah State University's chemistry and biochemistry department, is the winner of his institution's 2015 D. Wynne Thorne Career Research Award. Every year, this award is given to an individual who has conducted important research and who has been "recommended by a committee of peers, all previous award recipients," according to the university. Hengge's research focuses on phosphoryl transfer, an important process to every living organism involving enzymes and other biological components. However, research is not the only thing that interests Hengge. Before he began conducting his research, he was a teacher of high school chemistry and physics for seven years. His passion for teaching has made him successful in mentoring his undergraduates, master's and Ph.D. students. Hengge's research has garnered much recognition, and he has presented his research around the world. Hengge received his award in April at a gala that was part of the university's Research Week.

Written by Erik Maradiaga

Researchers identify proteins hijacked by respiratory syncytial virus

By Vivian Tang

Although the human respiratory syncytial virus is the most common cause of bronchiolitis and pneumonia in infants, neither a vaccine nor an antiviral therapy is available. Research groups worldwide are seeking possible drug targets for the disease, which also is particularly dangerous for the elderly and those with compromised immune systems.

One international team of researchers recently reported in the journal **Molecular and Cellular Proteomics** that it had found 24 proteins that may serve as drug targets, given their direct interactions with one of the most crucial viral proteins. Monika Bajorek at the Imperial College London and Doron Gerber at the Bar Ilan University in Israel led the study.

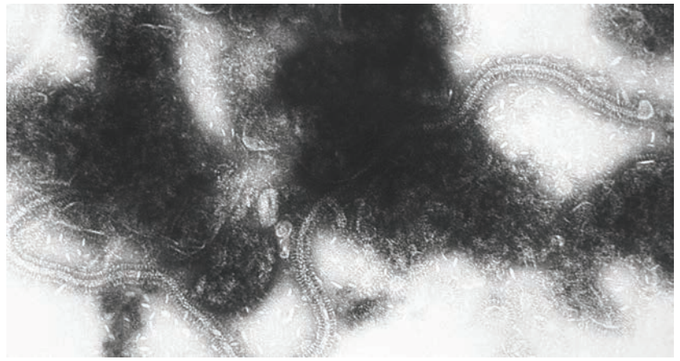

IMAGE COURTESY OF THE CENTERS FOR DISEASE CONTROL AND PREVENTION

This electron micrograph depicts the Respiratory Syncytial Virus (RSV) pathogen.

Four fundamental RSV proteins — fusion, matrix, phosphor and nucleo — are responsible for the virus's replication. The matrix, or M, protein specifically plays key roles in the viral life cycle through inhibition of host transcription and facilitation of viral transcription, assembly and budding. However, until now, only two of the host proteins engaged in viral replication had been known to interact directly with the M protein. The researchers reporting their findings in MCP uncovered another 24.

Using a high-throughput microfluidics screen, the researchers expressed 500 human proteins previously reported to be manipulated for RSV replication. After immobilizing the human proteins on a chip, they labeled them with a fluorescent tag. They expressed the M protein separately and labeled it with a different tag before flowing it over the chip to capture any human interactors. Finally, they detected all interactions with fluorescence from the human and M proteins.

The researchers verified some interactions with a different microfluidics screen and then verified 71 percent of them with a co-immunoprecipitation technique. In the latter technique, they precipitated the M protein out of the cells, which had been lysed, before capturing it onto affinity beads, and then they used the beads to co-precipitate human interactors from the samples before detecting the interactions with Western blotting.

After demonstrating the host-virus protein interactions in a cell-free approach, the researchers went on to prove that four human proteins — Caveolin 1, Caveolin 2, Cofilin 1 and a zinc finger protein — directly interacted with the M protein in a cellular environment. They did that by showing that all four co-localized with the M protein at an intracellular site where the M protein was expected to play its specific role in RSV replication. The researchers say that the four human proteins and other direct interactors could be potential targets of anti-RSV therapies, given that knocking down the genes encoding the four proteins significantly reduced viral infectivity.

The team already is planning future avenues of investigation. "The next step will be focusing on some of the other factors from the list with the goal of detailed mechanistic analysis. Although we showed they interact with M, we still need to see which factors are critical for virus replication and what the mechanism is," Bajorek said. She said her team is now set to crystallize some of the M-host protein complexes to analyze the interactions in detail in hope of designing drugs that inhibit or foil the interactions.

Gerber added: "We would like to solve one of the puzzling issues with RSV. What is the matrix protein doing in the nucleus?" To answer the question, the team will screen 5,000 host nuclear proteins to investigate their interactions with the RSV M protein.

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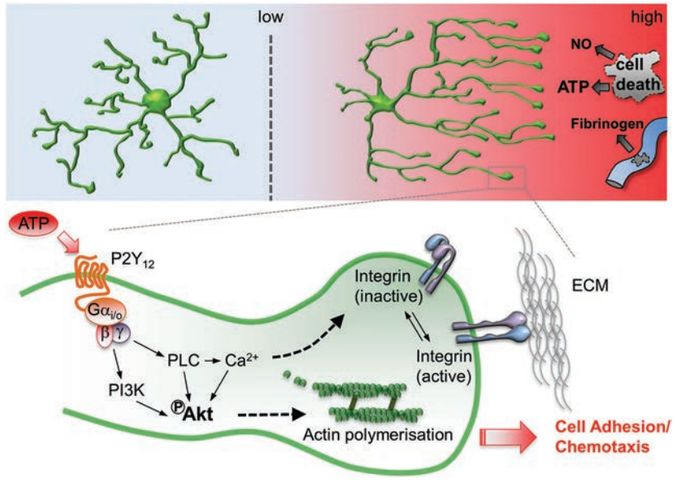
Microglia: the sentinels of the central nervous system

By Mollie Rappe

We all slip and fall or bump our heads, and while our heads are designed to withstand light bumps and taps, this can cause mild damage to the brain tissue. Clearly, this damage requires prompt detection and repair.

Microglia, the immune cells of the brain, constantly survey for signs of damage or infection. Microglia actively send their long, thin, branched processes throughout the brain, collectively scanning the entire brain once every few hours, according to the authors of a recent review published in the **Journal of Biological Chemistry**.

In this review, the authors, Christian Madry and David Attwell at University College London, "compare the key features of microglial baseline surveillance and targeted motility (chemotaxis) and then describe the receptors and signaling pathways controlling both processes."



Signaling involved in microglia chemotaxis

Baseline surveillance is modulated by ambient ATP levels. Degrading ATP or blocking ATP receptors leads to shorter, slower fingerlike processes, but the actual nucleotide receptor involved is not yet known.

The authors explain that light-deprived mice, which have reduced neuronal activity, have slower, more branched processes covering more volume. This suggests a biological balancing act influenced by neuronal activity between how fast the fingerlike processes move and how much area they cover.

Fractalkine, a vital cell-signaling protein, is also important in baseline microglial surveillance. Knocking out the receptor for fractalkine slows the rate of brain surveillance by 30 percent without changing the number and length of processes, researchers have found.

Once the microglial processes detect signs of brain damage, they stop randomly searching the surrounding area and immediately move toward the site of injury, isolating and phagocytosing the cellular debris or infectious agent.

Madry and Attwell describe three chemical signals indicating brain damage. The most powerful is ATP, which leaks from damaged cells. Also, fibrinogen leaks from damaged blood vessels, and nitric oxide is released from damaged spinal cord tissue.

Indicative of ATP's central role in damage-signaling, microglia have many extracellular nucleotide receptors. The most important receptor is P2Y12, which is activated by ADP and triggers a noncanonical phospholipase C-dependent phosphorylation cascade in microglial chemotaxis. Interestingly, knocking out P2Y12 stops targeted movement but not random surveillance.

In their review, Madry and Attwell note several unresolved questions in the field: How do surveying microglia know where they have already looked? How do they divide the brain between themselves? How can ATP, which is rapidly hydrolyzed, serve as an effective long-range signal?

By answering these questions and understanding how microglia carry out their vital tasks of brain surveillance and repair, researchers may be able to optimize microglial activity in cases of traumatic brain injury and neurodegenerative diseases.

Mollie Rappe (mrappe@asbmb.org) is an intern at ASBMB Today and a Ph.D. candidate in biophysics at Johns Hopkins University.

Escaping asthma's chokehold

By Indumathi Sridharan

Spring is a season for rejuvenation. But if you are one of the 25 million Americans suffering from asthma, you may dread this time of the year. The Asthma and Allergy Foundation of America designates May as National Asthma and Allergy Awareness Month because higher pollen count and air pollution, combined with increased outdoor activity, cause an increased number of asthma-related hospitalizations during spring and summer. Asthma incidence has increased by 28 percent in the past decade (1) and continues to rise, particularly among children (2). Identifying the physiological causes of asthma can help develop more targeted and comprehensive therapies.

What is asthma?

Asthma is a chronic immune system disorder in which the airways constrict and the mucous lining in the lungs becomes inflamed in response to environmental factors such as pollen, mold, dust mites, viruses and air pollutants. Symptoms include coughing, wheezing, congestion and shortness of breath.

How is the immune system involved?

Upon first exposure to an allergen, Th2 cells, a type of T cell, secrete interleukin-4 and interleukin-13, which stimulate B cells to produce immunoglobulin-E antibodies. The IgE antibodies bind to mast cells, which regulate inflammation. This process is called sensitization. Upon re-exposure to the same allergen, the mast-cell-bound IgE antibodies crosslink and set off the release of inflammatory mediators, like histamines and prostaglandins, that cause sneezing, shortness of breath and coughing. Next, white blood cells, like eosinophils and neutrophils, infiltrate the airways and release cytokines, lipids and proteases that cause congestion and constriction.

What are researchers investigating now?

Microorganisms in the gut and lung, which can regulate the immune system, now are linked to asthma. Helicobacter pylori, an intestinal bacteria, can protect indirectly against asthma by modulating global immune response. This protective effect is achieved by activating CD4 and CD25 regulatory T cells and increasing the production of intestinal hormones like leptin, ghrelin and gastrin, which have immunomodulatory effects (3).

An analysis of 16S ribosomal bacterial RNA revealed a greater variety and abundance of pathogenic bacteria in the airways of asthma patients (4). Resistance to anti-inflammatory corticosteroid treatments is a phenomenon observed in some asthma patients. The resistance emerges from the activation of the p38 mitogen-activated kinase phosphatase pathway in macrophages by the pathogen Haemophilus parainfluenzae (5). Inhibiting transforming growth factor-β–associated kinase-1, an upstream activator of the MAPK pathway, can restore sensitivity to the treatments.

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Philanthropies partner to support early-career faculty members

By Donna Kridelbaugh

The Howard Hughes Medical Institute in partnership with the Bill & Melinda Gates Foundation and the Simons Foundation recently launched a new Faculty Scholars program to invest in early-career scientists at the forefront of biological research. The program aims to support researchers as they transition from institutional startup funds to independent research funding, allowing them to explore transformative research and take more risks.

In a press release, HHMI Vice-President and Chief Scientific Officer Erin K. O'Shea discussed the motivation for creating the program: "We received a lot of feedback from scientists about what's most needed, and there was strong agreement that early-career researchers are facing significant challenges." These challenges over the past few decades include increased competition for a stagnant amount of federal R&D funding, a significant decline in the success rates for National Institutes of Health research awards and an increased average age at which a researcher receives his or her first NIH R01 grant.

The Faculty Scholars program will provide five-year, nonrenewable grants of $100,000 to $400,000 per year for up to 70 scholars each funding cycle. These scholars also will have access to the HHMI community, mentoring and career development support. Open proposals will be accepted from researchers who use creative approaches to conduct basic research of biological importance. Cross-disciplinary research at the interface of the biological and physical sciences and research that addresses fundamental biological problems surrounding global health issues in low-resource countries are considered high priority. As the HHMI model is to invest in people, applicants will be reviewed on their past accomplishments, innovative approach to studying complex biological questions and potential to make significant contributions to their field.

The creation of the HHMI program reflects a broader trend toward private sources of funding to compensate for reduced federal funding. Such programs also may strengthen the competitiveness of scientists by encouraging transdisciplinary research, which diversifies their potential funding opportunities. President Obama highlighted the program during the 2015 White House Science Fair as part of his Educate to Innovate initiative, calling upon the private sector to help improve STEM education and support innovative scientists.

The Faculty Scholars program is open to tenure-track associate professors (or those in equivalent positions) and physician scientists who have four to 10 years of professional experience beyond postdoctoral training and an established independent research program as principal investigator or co-PI on at least one active, nationally competitive research grant. Scholars will devote at least 50 percent of their time to research, and the funds can be used to support up to $70,000 in faculty salary for up to three months annually.

Applicants should complete the online eligibility section early to gain access to the full application. Women and minorities underrepresented in the biomedical sciences especially are encouraged to apply. There is no restriction on the number of applicants per institution. Applications are due by July 28, with finalists selected the next summer and awards made by November 2016. Find out more at http://www.hhmi.org/faculty-scholars.

Donna Kridelbaugh (@science_mentor) is a communications consultant and founder of ScienceMentor.Me. Her mission is to create an online field guide to self-mentoring in science careers. She offers writing, editing and marketing services for early-career professionals who are ready to advance their career to the next level. Learn more at http://sciencementor.me/.

ASBMB
Special Symposia Series

Membrane-anchored serine proteases

Join us at this small, focused meeting in September in Maryland

By Karin List and Toni Antalis

The unveiling of a new family of serine proteases that are anchored directly to the plasma membrane was an unexpected outcome of the complete sequencing of several vertebrate genomes at the turn of the millennium. The American Society for Biochemistry and Molecular Biology will host a special symposium this fall focusing on the biochemistry, biology and pathophysiological functions of membrane-anchored serine proteases, including the translational research opportunities afforded by this interesting group of enzymes.

Recent studies have revealed that the membrane-anchored serine proteases are important components of the mammalian degradome, playing critical roles in both health and disease through the regulation of metabolic homeostasis, fertilization, morphogenesis, epithelial biology, iron homeostasis, cardiovascular diseases, viral infection and cancer.

The main objectives of the symposium in September will be to bring together leading scientists to present their latest research on all aspects of this new, highly active and rapidly expanding area of research; to enhance the dissemination of the latest progress; and to accelerate the generation of new knowledge. Particular emphasis will be given to presentations of new insights into basic molecular and biological mechanisms and to translational research efforts.

The meeting also will be a venue for junior researchers at the graduate and postdoctoral levels to discuss their research and forge scientific connections, including collaborations.

Speakers will include both renowned, established investigators in the field and up-and-coming researchers. To encourage participation of a wide range of scientists, the majority of the speakers will be selected from submitted abstracts. We encourage researchers from academic institutions, government and industry to attend.

Karin List (klist@med.wayne.edu) studies the role of type II transmembrane serine proteases and their inhibitors in cancer progression at Wayne State University School of Medicine. Toni Antalis (tantalis@som.umaryland.edu) studies the physiological roles of membrane-anchored serine proteases at the University of Maryland School of Medicine.

ABOUT THE MEETING

WHEN: Sept. 17 – 20

WHERE: Potomac, Md.

SAMPLING OF SPEAKERS:

• Eva Böttcher-Friebertshäuser has provided key insights into the roles of host proteases in regulating viral pathogenicity. Her laboratory discovered that infection and dissemination of influenza virus is dependent on cleavage activation of influenza virus hemagglutinin by the host transmembrane serine proteases TMPRSS2 and HAT in the human airway epithelium.

• Thomas Kleyman, a longstanding investigator of epithelial Na+ channels, has made key contributions to understanding the molecular structure of the channel's pore and the key roles of Na+, divalent metal ions and membrane serine proteases in the regulation of channel activities.

• Qingyu Wu is a longtime investigator of corin, a membrane serine protease essential for natriuretic peptide processing and whose depletion is associated with hypertension, heart disease, preeclampsia and chronic kidney disease. His laboratory has made key contributions to the structure, function and genetics of corin and its roles in disease.

• Charles Craik is a pioneer in structure-function studies of proteases and their inhibitors using a combination of genetic, biochemical and biophysical methods. His emphasis is on identifying the roles and regulation of the activities of membrane-anchored serine proteases associated with infectious diseases, cancer and development.

• Jan K. Jensen is a structural biologist whose work has provided new insight into the structure and function of hepatocyte growth factor activator inhibitor, or HAI, domains, the proteins that act as cofactors for many of the type-2 transmembrane serine proteases.

DEADLINES:

- **June 11:** *Deadline to submit abstract for oral presentation consideration*
- **June 18:** *Deadline for discounted registration (save $100)*
- **July 15:** *Deadline to submit abstract for poster presentation*

MORE INFO: www.asbmb.org/SpecialSymposia/Proteases

2015 ASBMB Special Symposia Series

Evolution and Core Processes in Gene Regulation
June 25–28, St. Louis, Mo.

Membrane-Anchored Serine Proteases
Sept. 17–20, Potomac, Md.

Transforming Undergraduate Education in Molecular Life Sciences
July 30–Aug. 2, Saint Joseph, Mo.

Kinases and Pseudokinases: Spines, Scaffolds and Molecular Switches
Dec. 5–8, San Diego

ASBMB members receive registration discounts to these and other ASBMB-sponsored events. **www.asbmb.org/memberbenefits**

www.asbmb.org/specialsymposia

ASBMB

The many faces of lipins

By Symeon Siniossoglou

Glycerolipids are known to be key components of biological membranes in the form of phospholipids as well as a storage reservoir of fatty acids in the form of triacylglycerols. While we have recognized this for some time now, we are still discovering the critical enzymes, and aspects of their regulation, involved in the synthesis of these lipids.

One important step in the synthesis of glycerolipids involves the dephosphorylation of phosphatidic acid resulting in the generation of diacylglycerol. This key branching step determines the fate of glycerol backbones and fatty acids in lipid biosynthesis.

Diacylglycerol can be acylated to triacylglycerol that is stored in lipid droplets via the glycerol phosphate pathway, or it can be condensed with cytidine diphosphate choline or cytidine diphosphate ethanolamine for the synthesis of the membrane phospholipids phosphatidylethanolamine and phosphatidylcholine (the Kennedy pathway). Phosphatidic acid also is used for the synthesis of other phospholipids, such as phosphatidylinositol and cardiolipin, by condensation with CDP-diacylglycerol.

In addition to these roles in lipid synthesis, phosphatidic acid and diacylglycerol now are recognized to play important signaling and structural roles in biological membranes. Therefore, regulation of phosphatidic acid dephosphorylation is critical for several aspects of lipid and membrane homeostasis.

Lipins define a class of Mg^{2+}-dependent phosphatidic acid phosphatases collectively known as PAPs. Lipin 1, the founding member of this widely conserved family in eukaryotes, originally was identified as the gene mutated in fatty liver dystrophy mice. These mice display a lipodystrophic phenotype characterized by fatty livers and hypertriglyceridemia (1).

The demonstration that lipins are in fact PAP enzymes came later, when PAP was purified from budding yeast and found to be a member of the lipin family (2). Fungi, nematodes and insect genomes each encode one lipin, while human genomes encode three: lipin 1 (the paralogue that has attracted most attention so far), lipin 2 and lipin 3. Research in a multitude of model organisms has advanced our knowledge over the past 10 years, uncovering many surprising aspects of lipin biology and raising intriguing questions regarding their function and regulation.

Unlike the other enzymes of the triacylglycerol biosynthetic pathway, lipins lack transmembrane domains and exhibit in most cells a primarily soluble distribution. As a consequence, lipin membrane targeting is a key regulatory step in triacylglycerol metabolism.

Unlike the other enzymes of the triacylglycerol biosynthetic pathway, lipins lack transmembrane domains and exhibit in most cells a primarily soluble distribution. As a consequence, lipin membrane targeting is a key regulatory step in triacylglycerol metabolism.

Lipins are sequestered in the cytosol via hyperphosphorylation via growth/nutrient or cell-cycle-dependent phosphorylation catalysed by several kinases, such as TOR in mammals (3) and Pho85 or Cdc28, among others, in yeast (4, 5).

A highly conserved transmembrane phosphatase complex, originally described in yeast, mediates activation of lipins and their association with membranes (6, 7).

Recent studies have highlighted additional control of the membrane-bound lipins: Cytosolic pH via electrostatic interaction between phosphatidic acid and lipin 1 (8) and proteasome-mediated degradation of active lipin in yeast cells (9) are important determinants of PAP levels. Such multilevel regulation may allow lipins to modulate phosphatidic acid and diacylglycerol levels on different membranes.

Indeed, in addition to their biosynthetic roles in the endoplasmic reticulum, yeast and mammalian lipins also have roles in mitochondria, lipid droplets, nuclear membrane, vacuoles and the autophagosome.

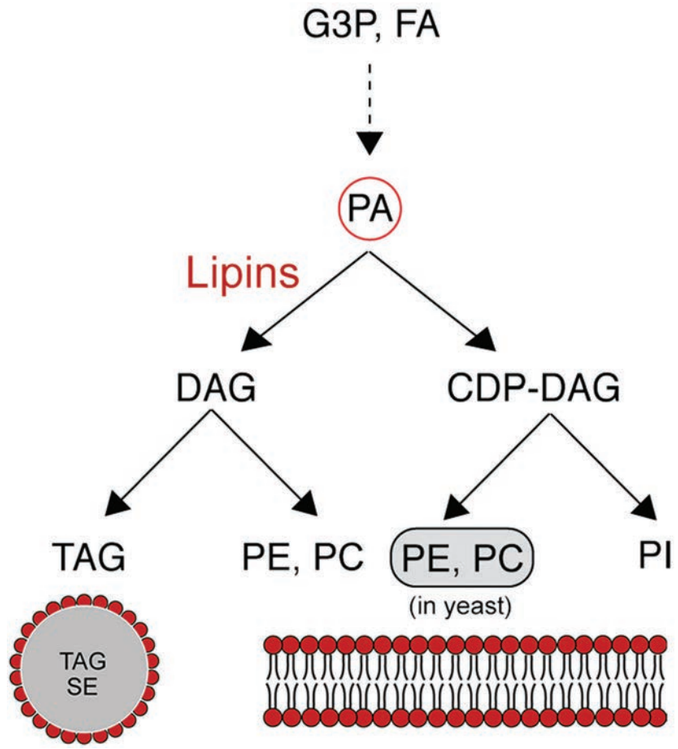
The physiological consequences of lipin dysfunction are emerging as an area of intense and exciting research.

As alluded to above, lipins are critical for triacylglycerol synthesis in yeasts, plants, worms and flies. Rodent models of lipin 1 deficiency display a lipodystrophic phenotype characterized by significant reduction in fat mass and lack of adipocyte differentiation (10). It also turns out that lipins are essential for maintenance of nuclear structure and endoplasmic reticulum membrane organization (11), suggesting that their dysfunction also could affect metabolic homeostasis through structural mechanisms.

Surprisingly, deleterious mutations in lipin 1 do not affect fat distribution in humans but instead cause severe myopathy in the form of rhabdomyolysis (12). Recently, this has been proposed to result from defective lipin 1-mediated autophagic clearance in muscle (13). The basis for the different fat pathologies between rodent models and humans remains a critical question to be answered.

Perhaps the most unexpected aspect of lipins is that they have a distinct intranuclear pool in many cell types (14). For example, lipin 1 can regulate expression of genes encoding fatty-acid metabolic enzymes via physical interactions with components of the transcription machinery (15). The presence of a nuclear PAP enzyme raises many intriguing questions.

One unresolved issue is whether the localization and function of lipin in the nucleus is linked somehow to its role in modulating lipid metabolism in the cytoplasm. It is also not known whether nuclear PAP affects nuclear membrane biogenesis and nuclear signaling.



Lipid metabolic roles of lipins

Given the emerging roles of the nuclear envelope in gene expression, lipins could control transcription through lipid remodelling at the nuclear membrane. For example, nuclear import of lipin 1 in response to nutrient depletion causes nuclear envelope remodelling, which down-regulates the major lipogenic factor SREBP (short for sterol regulatory element-binding protein) through unknown mechanisms (16).

While we've learned a lot about lipins, it is clear that there are many remaining questions. Addressing these questions will be vital to understanding the mechanisms that underlie the emerging roles of lipins in cellular and organismal homeostasis.

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A LAB WITH A VIEW

Biochemist Peggy A. Whitson is gearing up for her next six-month tour aboard the International Space Station

By Mollie Rappe

Peggy A. Whitson's favorite thing about living on the International Space Station is the view. Being outside the atmosphere, looking down at the Earth, watching the Earth zoom by at 17,500 mph — these are the things Whitson misses most from her time in space.

Next year, Whitson will go to space for the third time, reinforcing her title as the woman with the most time in space. Also, Whitson is one of two active U.S. astronauts with a biochemistry or molecular biology background.

As part of Expedition 50 to the ISS, Whitson will serve as the hands of many different investigators, including GeneLab, a new NASA bioinformatics program studying the molecular changes model organisms experience in microgravity.

Passion for space and biochemistry

Whitson grew up in a small farming town in southern Iowa, and like many others, she watched awestruck on July 21, 1969, as humans first walked on the moon. "I wanted to be an astronaut from a very young age. I always hate to date myself, but I was 9 when Neil Armstrong and Buzz Aldrin walked on the moon," Whitson recalls.

The January before Whitson graduated from high school, NASA selected the first female astronauts. Whitson says this "really made it much more than a dream — made it a goal." She adds, "It was naïve to assume that I could be an astronaut just because they had picked female astronauts, but I saw them doing it, and I was like, 'I wanna try and do that.'"

The 1978 class of 35 astronauts included six women. Sally Ride, the first U.S. woman in space, was among them. The class also included Judith Resnik, an electrical engineer who died on her second spaceflight in the Challenger shuttle explosion; Shannon Lucid, a biochemist; Margaret Rhea Seddon, a physician; Anna Fisher, a chemist and physician; and Kathryn Sullivan, a geologist.

Whitson went to a liberal arts college in southeastern Iowa — Iowa Wesleyan College — and ended up double majoring in biology and chemistry. The small school "had only one class in biochemistry, which I took my final year, and I just fell in love with it," she says. After college, Whitson's academic adviser suggested medical school, but, Whitson recalls with a chuckle, "I really felt like research was more up my alley."

Whitson earned her Ph.D. from Rice University in Houston, where she studied the thermodynamics of lac operon repression and the influence of DNA supercoiling on transcription in the lab of Kathleen Matthews, the winner of the 2015 ASBMB William C. Rose Award. After finishing her Ph.D., Whitson went to work at the nearby Johnson Space Center as a research biochemist.

There, Whitson performed molecular biology research studying tissue culture. She also studied urine biochemistry, focusing on the increased risk of forming kidney stones during spaceflight. This risk is caused by excess calcium and phosphate present in the urine due to the microgravity bone demineralization process. A potassium citrate therapy she developed is used today as an on-orbit countermeasure in those astronauts with a propensity to form kidney stones. Whitson went to the Johnson Space Center specifically because the work was directly applicable to the astronauts, and she hoped she might become an astronaut.

Peggy A. Whitson. IMAGES COURTESY OF NASA

'Watching the world go by'

In 1996, after almost 10 years working at the Johnson Space Center, Whitson's chance came. She was selected as a member of NASA's 16th

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class of astronauts. "I got lucky!" she explains humbly. "With thousands of applications for every position, there's got to be some luck involved." After years of training and evaluation, she was selected for International Space Station Expedition 5. Whitson left Earth for the first time on June 5, 2002.

Whitson recalls her two six-month tours in space rather wistfully. "Being outside the atmosphere, watching the world go by, going around the Earth in 90 minutes, all of that … is incredibly awe-inspiring." She continues: "It was a blast for me, because I enjoy being the hands of different investigators and making their experiments work on orbit."

Whitson was involved with many experiments while going 17,500 mph. An electrostatic microencapsulation technique she worked on is now used in a drug-targeting clinical trial. Whitson also grew soybeans in microgravity for the Pioneer seed company, which indirectly led to the development of Airocide, an air purifier now used in some operating rooms on Earth. Whitson also continued her own studies on the effects of microgravity bone demineralization on kidney stones — using herself as one of the 18 subjects.

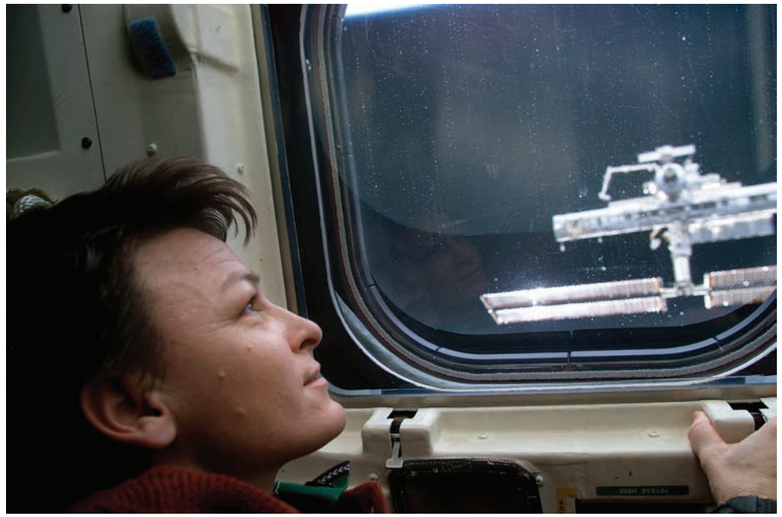
One of Whitson's favorite experiments started — like many other breakthroughs — with an accident. She was studying the electric field-induced phase transitions of a colloidal iron solution for investigators at the University of Delaware. "One day, I put in the frequency for the electromagnet at 2 Hz instead of 20 because my eyes were getting a little old and they didn't see the decimal point," she says with a little laugh. Instead of forming a solid structure, it made this wave-form structure. "It was not something that they had ever observed on the ground."

Astronaut Peggy A. Whitson works near the Microgravity Science Glovebox in the Destiny laboratory on the International Space Station.

GeneLab

GeneLab, a new NASA research program, will study the epigenomic, transcriptomic, proteomic and metabolomic changes of various common model organisms upon adapting to space. The model organisms to be studied include bacteria, yeast, plants, fish, mice and even common cell cultures. NASA is set to begin acquiring the data next year, so likely Whitson will be quite involved in the unprecedented high-throughput accumulation of biomolecular data.

These revolutionary studies are bound to experience some difficulties as part and parcel of doing research in microgravity. Since the U.S. space shuttles have been retired, the model organisms — along with other experimental material, food, ISS parts and care packages from home — will reach the station via various unmanned cargo vehicles.



Peggy A. Whitson looks at the ISS from Endeavour in December 2002.

Whitson explains that the U.S. laboratory module is designed to "plug and play" many different kinds of experiments, so the technical differences between studying mice and Saccharomyces cerevisiae won't pose much of a challenge. However, other experimental challenges do include needing to tether or Velcro everything down so little pieces don't float away and dealing with differences in fluid dynamics in microgravity, Whitson mentions. Even the humble pipette has difficulties in microgravity, requiring "technique development to make sure you don't do it too quickly, because you'll get air bubbles," Whitson explains.

Once the model organisms are grown on orbit in the desired amount of time — including multiple generations for some organisms — the biological samples will be harvested and preserved at -80 degrees Celsius. These biological samples will need to be brought back on the commercial unmanned cargo vehicle Dragon, which was developed by SpaceX, as it is the only cargo vehicle that survives reentry, or in the limited cargo room in the Russian spacecraft Soyuz. Once the biological samples have been returned, they will be processed with relevant ground controls and the DNA, RNA, proteins and metabolites will be extracted and analyzed. The vast databases of microgravity-induced changes will be available to researchers all over the globe to compare with their Earth-bound cousins.

'Really looking forward to going back'

Spending so much time on the International Space Station comes with some personal challenges too. "I know our folks have done just a tremendous job trying to make food as palatable as possible, but the lack of variety after a while is probably the most challenging part in my mind," Whitson says. While being away for six months is hard, with the satellite phone and the "pretty slow" Internet, she never felt isolated.

Those challenges aside, Whitson is excited to be a member of six-month long Expedition 50 in late 2016. "I'm really looking forward to going back up there." On her last two trips, she enjoyed being on the station long enough to feel like it was her home and her lab. One of the changes that excites Whitson the most is the new Cupola, a seven-window dome attached to the U.S. node Tranquility, which provides "a 360-degree view looking down onto the Earth, which I think will be quite spectacular," Whitson says.

Mollie Rappe (mrappe@asbmb.org) is an intern at ASBMB Today and a Ph.D. candidate in biophysics at Johns Hopkins University.

DEFYING STEREOTYPES:

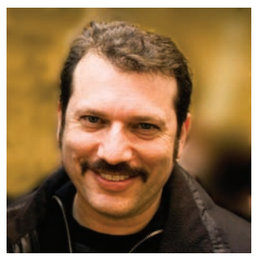
Analyze this: life as a sports journalist in the 21st century

Baseball writer Jay Jaffe's science background plays a critical part in his current job

By Geoffrey Hunt & Rajendrani Mukhopadhyay

"I am a very unconventional sports writer," admits Jay Jaffe. With the analytical mind of a scientist and a background that has taken him from a premed undergraduate track to the pages of Sports Illustrated, Jaffe is part of a new generation of baseball scribes more interested in using objective statistics than hagiographic mythology in their reporting and commentary.

Growing up in Salt Lake City, Jaffe was determined to follow in the steps of his father and grandfather and become a physician. But his father dissuaded him from doing so. Instead, says Jaffe, "he encouraged me to explore engineering, particularly biomedical engineering." Jaffe enrolled at Brown University in 1988 as an engineering major but changed to biology after his freshman year. "I switched my concentration to biology because I was still comfortable with the idea that I would stay on a premed track," he recalls.



Jay Jaffe

The senior Jaffes were equally influential when it came to baseball. "My father was a fan and still is a fan," says Jaffe. "My grandfather was actually a good enough player to have been offered a professional contract before deciding he wanted to become a doctor. The game was always around me." By the time the Los Angeles Dodgers and New York Yankees engaged in three epic World Series duels between 1977 and 1981, Jaffe was hooked.

Baseball remained a fan's pursuit during Jaffe's days at Brown, though he had developed an interest in writing. By his senior year, Jaffe was writing about music for Good Clean Fun, an entertainment magazine published by the Brown Daily Herald. His musical interests led him to internships within the publishing industry, during which time Jaffe also began honing his desktop-publishing software skills. Slowly, he began to realize that the idea of medical school was, as he puts it, "moving further and further afield."

However, science would continue to play a role in Jaffe's life. "I think a scientific background offers a certain level of objective right and wrong," he points out. "People have recognized that my background does bring some interesting skills to the table."

One example came during a stint doing graphic design at Bill Smith Studio, a graphic design studio specializing in textbooks and children's books. Jaffe recalls coming up with a design layout comparing meiosis and mitosis for a textbook that he was working on. "I was able to improve upon some of the presentations that (the client) had pitched based on my background," he says. His improvements were an immediate hit: the layout "just blew the client's mind. I think that vaulted me from just another designer to a keeper."

Despite his success in the design world, Jaffe could not ignore his passion for baseball. He had started writing about baseball in his free time and founded the Futility Infielder website in 2001 as an outlet for his compositions, which were heavily inspired by statistician Bill James and his revolutionary concept of sabermatics.

Broad metrics, such as home runs and strikeouts, traditionally have been used to evaluate individual baseball players. Sabermatics delves deeper, comprehensively analyzing various permutations of these raw numbers to generate a more accurate representation of a player's worth. Such a novel approach to data-based player evaluation greatly appealed to the analytically minded Jaffe, who used to run his own analyses on ballplayers as a child with his pocket calculator and an Apple II+, on which he used the first spreadsheet program, VisiCalc. "I was always comfortable with the math stuff," he recalls.

Thanks to the efforts of journalists such as Rob Neyer and Thomas Boswell, sabermatic-based thinking had finally become mainstream for sportswriters by the start of the new millennium. Jaffe's timing was perfect, and he turned his attention to baseball writing full throttle. He contributed regularly to the sports websites Baseball Prospectus and ESPN before finally landing a regular job at the Sports Illustrated website in 2012, where he now writes full time.

As the prominence of sabermatics has continued to grow, Jaffe and his like-minded colleagues have led a revolt against the previous generations of baseball reporters who, for decades, had simply used raw numbers in their storytelling with little consideration for context or deeper analysis. "In the past decade we've seen a culture war,"

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A primer on JAWS

Election to the Baseball Hall of Fame is a subjective process that relies on the opinions of the members of the Baseball Writers' Association of America . To bring some semblance of standardization to the process, Jay Jaffe used an existing metric called "Wins Above Replacement" to come up with his own Jaffe WAR Score system, known as JAWS for short . While not an official statistic, JAWS evaluates objectively the merits of individual players.

For example, 2015 Hall of Fame inductee Randy Johnson has a JAWS value of 82.0. The average JAWS value for players at Johnson's position is 62.1. By his JAWS measure, Johnson is qualified to be inducted into the Hall of Fame. In contrast, Jason Schmidt, who also was eligible for election in 2015 and played the same position as Johnson, has a JAWS value of 28.4, well below the average. Schmidt was not elected.

— Geoffrey Hunt

Jay Jaffe talks to Keith Olbermann

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says Jaffe. "Younger writers who came into the industry through alternative routes besides newspapers took up the (sabermatic) lexicon before the more traditional journalists did."

Jaffe's main contribution in this realm has been the Jaffe Wins Above Replacement Score, or JAWS, system, a data-driven framework that measures if a player is worthy of induction to the Baseball Hall of Fame. He sees his JAWS system as a natural extension of his scientific background. "Science never settles for one answer," argues Jaffe. "It's for searching for better answers even if they may not be simple and elegant explanations."

Jaffe also has applied his scientific training to other aspects of his writing, most notably with regard to performance-enhancing drugs. He contributed a chapter to the book "Extra Innings" that included a detailed breakdown of the chemistry and metabolic pathways of the illicit compounds that had become pervasive in professional sports. "I'm excited about the new ways science can be brought into professional sports," he says.

Geoffrey Hunt (ghunt@asbmb.org) is the ASBMB's public outreach coordinator. Follow him on Twitter at twitter.com/thegeoffhunt. Rajendrani Mukhopadhyay (rmukhopadhyay@asbmb.org) is the chief science correspondent for ASBMB. Follow her on Twitter at twitter.com/rajmukhop, and read her blog at wildtypes.asbmb.org. Both writers contribute equally in creating and developing the profiles for the "Defying Stereotypes" series.

2016 ASBMB Award Nominations are Open

Nominations for the 2016 ASBMB Awards are now being accepted. Nominate a colleague for a prestigious ASBMB award and recognition at the 2016 Annual Meeting in San Diego.

Deadline: June 2

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- ASBMB/Merck Award
- ASBMB Young Investigator Award
- Avanti Award in Lipids
- Alice and C.C. Wang Award in Molecular Parasitology
- Bert and Natalie Vallee Award in Biomedical Science
- DeLano Award for Computational Biosciences
- Earl and Thressa Stadtman Scholar Award
- Herbert Tabor Research Award
- Mildred Cohn Award in Biological Chemistry
- Ruth Kirschstein Diversity in Science Award
- Walter A. Shaw Young Investigator Award in Lipid Research
- William C. Rose Award
- William C. Rose Award

For more information, please visit www.asbmb.org/awards/2016.

DEFYING STEREOTYPES:

A curious mind

Stephanie Laurens, once a scientist and now a bestselling romance writer, says curiosity is the common driver in the two professions

By Rajendrani Mukhopadhyay & Geoffrey Hunt

What if?

That is the question that has driven Stephanie Laurens through her entire career. Asking "what if?" helped Laurens develop her passion for science as a kid. Asking "what if?" led to her transition from running a lab to becoming a romance novelist. And asking "what if?" has been the central starting point for each of the more than 50 novels she has written over the past 20 years, 32 of which have been on the New York Times best-seller list.

By continually exploring new territories, Laurens has chartered an unusual career path to become one of the most successful romantic fiction authors today.

As a preteen in Australia, Laurens showed an aptitude for math and science, so teachers encouraged her to follow the science trajectory. She got a bachelor's degree from Monash University in Australia with honors in immunology followed by a Ph.D. in biochemistry with a heavy leaning toward immunochemistry.

After a four-year stint at the Imperial Cancer Research Fund in the U.K. in the early 1990s, Laurens, her husband and two daughters moved back to Australia, settling in Melbourne, where they reside currently. Laurens became the head of an oncogene research laboratory at the Peter MacCallum Cancer Centre.

But she soon grew dissatisfied with the work. In desperate need of a break from the grant proposal she was working on, Laurens went to pick up a historical romance novel to take her mind off of science for a while. However, she discovered she had read all the ones set in her favorite era, the Regency period of British history (1810 – 1822).

So she went home and began to write her own novel simply for her own enjoyment. "It wasn't intended for publication at all," Laurens remembers. "It was purely for me."

But it turned out to be not for her enjoyment alone. At her mother's suggestion, Laurens sent her manuscript to a publisher. The result was "Tangled Reins." With that, Laurens had stumbled upon the beginnings of a new career, one that she kept as a hobby while maintaining her position as a researcher.

During that time, Laurens was forced to keep her novel writing quiet among her scientist colleagues, because "nobody would have believed it, quite frankly," she says. "I was so entrenched in the science hierarchy [that] it would have been a shock to most people." Laurens even wrote under a pseudonym, a practice which is common among English writers.

But she was getting buried under grant writing and committee work and not getting much opportunity to work at the bench.

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Stephanie Laurens

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"That was the point where I sat back and thought, 'Do I really want to stay in [science] for the rest of my life?'" she says. "I decided no, I didn't." When a round of cost cutting began at the institution where Laurens was working, she took a severance package and embarked on her new career as a writer of romance novels full time.

Laurens says that her skills as a scientist are always at work behind the scenes in her novels. The abilities to research and organize information have been crucial in constructing her novels. "My husband often laughs when he sees how organized my writing is in terms of the analysis that goes behind a plot," Laurens says. "I'll graph certain things like emotional relationships. You see intersecting sine curves."

The abilities to research and organize information have been crucial in constructing her novels.

Furthermore, Laurens' science background played a key role in helping her to develop the kind of financial astuteness required to translate her part-time hobby into a full-time business. "I had a patent which came out of my research in London that paid out royalties for 25 years," she remarks. This experience made Laurens keenly aware of the long-term financial gains from intellectual property, and she made sure she got the same reward for her writing.

When scientists find out she was once one of them, they often ask Laurens for writing advice. While she mentions the need for every author to find his or her own style and voice, she believes even more important is that every writer be a reader first.

"A lot of scientists actually are not readers. They think they have a book in them, but they haven't actually read enough to get a feel for what the audience wants," she says. "You have to be able to write something that other people want to read. If you're a big reader, it's much easier because you write for yourself, which is what I did."

Laurens points to her own interest in reading historical romance set during the Regency period, where she bases the vast majority of her novels. Right now, she is outlining a series of four books called "The Adventurers Quartet" where much of the action takes place in West Africa in 1824. "I'm having a marvelous time researching," says Laurens. "I spent a lot of yesterday on the Internet searching through all sorts of old maps of Freetown, Sierra Leone … I've learned all about schooners and the very early precursors of clipper ships and how their riggings were, how the masts were set, and how fast they went."

Despite having left behind the world of scientific research, Laurens actively encourages young people to consider a scientific education. "To me, a science training is possibly one of the best trainings you can have," she says. It is "amazing how adaptive scientists can be." The inherent curiosity and the ability to learn the skills needed to answer a question or solve a problem are assets in both science and writing, claims Laurens. "I think it all comes back to that curious mind."

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A small STEP toward peace

Supporting scientific training in Israel and adjacent Palestinian territories

By Mollie Rappe

"Science knows no borders," Allen Taylor at Tufts University says with earnest simplicity. A professor of ophthalmology, Taylor is founder of the Scientific Training Encouraging Peace Graduate Training Program, which facilitates advanced scientific training in Israel and adjacent Palestinian territories.


TAYLOR

The STEP program supports three pairs of graduate students who work closely together for at least a year at universities in the region. Each pair has one Palestinian and one Israeli. "A byproduct of this intensive and difficult training period — typical of the graduate student experience worldwide — is that the STEP fellows advance their careers while also seeing that they can trust one another," Taylor says.

Taylor explains: "I decided to do my little part to reintroduce Israelis and Palestinians to each other in cooperative, intense working relationships that build trust and advancement for the participants."

The participants

Ahmad Abu Al-Halaweh, a Palestinian graduate student at Ben-Gurion University of the Negev, said he joined the program primarily to get his Ph.D. without having to leave the area and his family. He applied to a public health Ph.D. program at Hebrew University in Jerusalem in 2008, but his application was refused. He says it is extremely difficult for Palestinians to secure admission to Israeli universities, and he tried to contact Hebrew University several times prior to submitting his application.

When Al-Halaweh saw an announcement for the STEP program in a local paper, he says, knew that it would be a unique opportunity to continue his higher education. A side benefit was the opportunity to meet other STEP fellows, including his partner, who he says is invaluable for her help with his Hebrew lessons. Katya Zelentsova, an Israeli Ph.D. student at Hebrew University of Jerusalem, says she joined the program for primarily ideological reasons. STEP allowed her to interact with Palestinian students daily and better understand them.

"We exchange ideas," she says. "We eat together. We hang around in our free time." She adds that she hopes that the friendships formed now can last forever.

Historical context

The STEP program is not the first program to attempt to use science for diplomacy. There is a storied history of Cold War-era scientific collaboration between the U.S. and the U.S.S.R., including the development, production and distribution of the polio and smallpox vaccines.

In addition, there are other programs that try to bridge the divide between the peoples in Israel and adjacent Palestinian territories using science as a common ground. The Malta Conferences help scientists from 15 Middle Eastern countries build collaborations and personal relationships. SESAME, which is short for the Synchrotron-light for Experimental Science and Applications in the Middle East, will be the first major intergovernmental scientific facility in the Middle East. It is set to begin operations — including a macromolecular crystallography beamline — later this year. The center's mission is to support scientific development and foster cultural bridges among its users.

In addition, the U.S. Agency for International Development has a research grant program for collaborations in the Middle East. One of the biggest health-related successes of the Middle East Regional Cooperation program is a physical therapy treatment for West Bank children with cerebral palsy.

What makes the STEP program special among these other programs is its focus on trainees. With the exception of an agreement between the Weizmann Institute of Science and Al-Quds University, the other programs do not support scientists in training. Science training is particularly important, as it serves as the foundation for

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improving public health capacity in the region of conflict and ameliorating the asymmetry of scientific capabilities and medical capacities, both of which have been proposed as prerequisites for a lasting regional peace.

How the program began

Taylor grew up in a Zionist-oriented family and decided to experience life in Israel as more than a tourist. From 1998 to 1999, he took a sabbatical as a senior Fulbright scholar at Tel Aviv University, where he worked with Yossi Shiloh on DNA damage response. He spent that year working in the lab, hiking and exploring the cultures. "This was one of the deepest experiences of my life and left me loving the people and the region," he says.

In the years since Taylor's sabbatical, Israel and the adjacent Palestinian territories have experienced a great deal of turmoil. The Second Intifada — or Palestinian uprising — from September 2000 to February 2005 led to the construction of the Israeli West Bank barrier (also known simply as "the wall"), which severely restricts the travel of Palestinians. The Gaza War throughout 2009 destroyed the Islamic University of Gaza laboratories. From 2012 to just last summer, the area has been plagued by one- to six-week long eruptions of violence.

"Although the wall and travel restrictions help bring safety and stability, it also caused a dangerous estrangement of Israelis and Palestinians," Taylor says, adding, "the temporary periods of quiet are only a mirage of safety." To build a lasting peace, he says, the estrangement must be broached: "You don't need to make peace with your friends or neighbors because there is already trust and cooperation. Generally, you make war with people you don't know. Now we must reintroduce people so they can be more friendly and less disposed to seeing war as a solution to the estrangement."

Taylor used his contacts in the area to establish the STEP program based out of Ben-Gurion University of the Negev, Al-Quds University in East Jerusalem (a Palestinian area) and Tufts University, with additional collaborations with Hadassah Medical Center and other universities and medical centers in the region.

The STEP trainees

The program's six trainees are pursuing advanced training in biomedical graduate programs. A pair of graduate students studies diabetes at Ben-Gurion University of the Negev, approaching the problem from complementary public health angles.

Al-Halaweh is the director of the Diabetes Care Center at Augusta Victoria Hospital in East Jerusalem. For his master's thesis at Ben-Gurion University, he will be analyzing the impact of a multidisciplinary, comprehensive diabetes treatment model spearheaded at the Diabetes Care Center. This model has spread within the Palestinian Ministry of Health system and the United Nations Relief and Works Agency system. For his Ph.D., Al-Halaweh says, he will study the impact of this model around the Palestinian territories and see if it can be implemented even more broadly. His STEP partner is a master's nursing student who works on a complementary project. Efrat Tal Kotegaro is studying how to advance psychological support for obese diabetic patients.

Two pairs of students conduct research at the Institute of Dental Sciences at the Hebrew University of Jerusalem. Zelentsova and her STEP partner study cellular differentiation. Zelentsova's Ph.D. project focuses on the neurogenesis or generation of new neurons, even in adults. She is studying how a natural anticoagulant is involved in neural development with the goal of being able to replace neurons damaged by trauma or neurodegeneration. Her partner, Anas Ala'Aldin Atieh, is studying blood vessel growth and differentiation, focusing on those factors hijacked in cancerous tumor growth. Another pair of STEP trainees at the dental institute is exploring the mechanism of periodontitis in order to improve dental care.

'A point of light'

In addition to the clear benefits that supporting advanced scientific training yields, Taylor hopes the trainees will gain knowledge of each culture's common humanity. By fostering first-person knowledge of the benefits of cooperativity in respected members of the medical and scientific community, Taylor says, each trainee can serve as "a point of light which radiates out into the community." Al-Halaweh says that he hopes the STEP partnerships will continue past his Ph.D., helping both communities and institutions in the long run.

The STEP program is poised to double its impact every year, if only it had more funding. Taylor and his wife leverage personal connections and use word of mouth to raise money. A lot of the usual international funding agencies are reluctant to fund the program, as it is new and very intentionally crosses the border between the two states. "This is probably amongst the most important kind of initiative that one could invest in," Taylor insists, "because it's … really trying to bring peace on the ground."

To learn more about the STEP program, visit http://step-gtp.org/ or watch the video at https://vimeo.com/108606136.

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Changing the next generation

By Erik Maradiaga

He always told me that I was not only going to learn biology in his class, but I also was going to learn simple skills that would help me become a better student.

Before I became interested in biology, I wasn't a big fan of school. I basically thought of school as a place to see friends and socialize.

Like every school in my region, my school required that students take a biology course. Since science was the only subject I was ever good at, I thought it should be easy for me to get at least a C in the course.

See, the problem with me when I was starting biology was that I did not set a high standard for myself and just wanted to cruise through high school getting Cs in every course. That mindset, however, changed when I met my biology teacher.

The first day in my biology class was not what I expected. I was hoping for a regular day when we would just go over the syllabus and the classroom rules. However, once we all got settled into our desks, my biology teacher just stood in front of the class analyzing each of our faces. After a long moment of silence, he finally started class in an unusual way.

He started asking each of us: What are your goals in life? Where do you see yourself 10 years from now?

After hearing my classmates and their goals, I knew that I had a different goal than some of them. I have always wanted to become a doctor.

Then my biology teacher said something that really caught my attention. He said that many students in high school do not have high standards for themselves and do not achieve to their highest abilities.

After hearing that, I remember thinking, "There goes my C in the course," as I was sure I was going to fail the class because this teacher was going to be hard.

Turns out, though, I was really good at biology. While some of my other friends were struggling to understand the material, I was achieving. Admittedly, my biology teacher did give a lot of work and expected us to finish it before we left the classroom, but I believe that is what helped me realize the meaning of hard work. He always told me that I was not only going to learn biology in his class, but I also was going to learn simple skills that would help me become a better student.

At the end of the year, I looked up to my biology teacher as a mentor, because all of his life lectures helped me change my mindset about school. I started working hard for my other classes and realizing the importance of an education.

Luckily, I had the same teacher again during my senior year for an advanced-placement biology class. Every one of my classmates was always amazed by his lectures. Instead of giving us speeches about being a successful person, he told us valuable lessons that would help us get through college. He knew that each of us was a hard-working student, and he always reminded us to chase our goals.

On the last day of school, he said that he wished that he could follow us to each of our colleges and be with us. In that moment, my classmates and I were sad to know that we were saying our good-byes. After becoming very close to my teacher, it was hard to part ways at graduation, but I knew I was prepared for college.

After finishing my first year in college, I am one step closer to achieving my dream of becoming a doctor. I am majoring in biology. While my first year of college was hard, because I was not used to the system, I knew that if I worked hard I could achieve my goals. This journey may have obstacles in the way, but I know that with hard work, anything is possible to achieve.

Open to interpretation

For more essays, poems and artwork exploring the "Generations" theme, visit www.asbmb.org/asbmbtoday/collections/generations/.

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A majestic model

A walk-through model of the solar system to educate the mind and ensnare the imagination

By Mollie Rappe

When Julián Gómez-Cambronero's daughter Julia was in the fifth grade, she had a homework assignment to draw a picture of the solar system. Cambronero, a professor of biochemistry and molecular biology at Wright State University, challenged the little girl's colorful yet not-to-scale picture. In reality, the planets are not equidistant.

If the sun were located in their kitchen, then Mercury would be in the living room, and Venus would be in the yard, Cambronero explained to his daughter. Earth would be across the street, Saturn would be all the way at her school, and Neptune and Pluto would be in the neighboring city.

Upon seeing Julia's dawning comprehension, Cambronero was inspired to construct a scale model of the solar system. By actually walking the distances between the planets people — and children especially — could tangibly appreciate the enormous distances of the solar system, he reasoned.

The summer after this inspirational homework assignment, while Cambronero was on vacation visiting his parents, he contacted the mayor of his hometown, Manzanares, in central Spain. The town has about 20,000 people, and though Cambronero emigrated to the U.S. many years ago, he says he still knows pretty much everybody. Eventually, he wrote a proposal and won funding from the municipality to construct the educational and eye-catching combination of science and art.

Cambronero's initial idea of simple traffic-sign-like markers through the city underwent an evolution, and three years later, in September 2010, the final Walk Through the Solar System opened in a public park in Manzanares. This quarter-mile brick walk through the city park is studded with 6-foot-tall steel monoliths holding beautiful Fiberglass planets on rotatable axes with informational yet entertaining placards.

Model of the Earth.

IMAGES COURTESY OF JULIÁN GÓMEZ-CAMBRONERO

Model of Saturn.

Construction challenges

The construction of the installation was not a simple walk in the park. Cambronero had to coordinate contractors and artisans from halfway around the world. Even in the design stage, he ran into some difficulties. Determining the scale of the orbital distances was easy given the limit of the size of the park, but he could not use the same scale for the diameters of the planets. "If you were to use the same scale," he says, "the size of the Earth would be microns!"

Deciding on the scale for the planets' diameters was difficult because both the sun and Pluto have to coexist. "I knew that the sun is much bigger than the Earth — everybody knows that — but I didn't realize how big it is, so absolutely huge," Cambronero says. The first scale he considered was based upon making Earth the size of a basketball, but then the sun would have to be almost 25 stories tall!

Even rescaled based upon an Earth the size of an orange, the sun's diameter of 27 feet was too big to manufacture as a Fiberglass sphere. So, instead, Cambronero decided to represent the sun with a 27-foot steel ring around a 7-foot Fiberglass sphere. On this final scale, dwarf planet Pluto is a mere half-inch in diameter, smaller than a grape.

New generations

Last year, 19 elementary school classes, seven middle and high school science classes, four library field trips, and three amateur astronomy groups from Manzanares visited the model. Roughly the same number visited each year for the past four years, and that count doesn't include casual local visitors or people from neighboring towns. Cambronero says he is very proud that his model has turned out how he wanted it to be — a hub to attract children and amateur astronomers.

"Children love it," Cambronero says. "What children want to do — adults also, all humans want to do — is touch. Everybody touches." You learn by touching and explore by touching, he says. By getting up close to these gigantic spheres, by rotating them about their axes, by walking the distances between them, you come to understand the solar system better, he says.

It has been seven years since Cambronero's daughter was that fifth-grader drawing a picture of the solar system, and, while her interest in science has waned, she was very excited about seeing the final model and is proud of her father. Cambronero says he will consider his model a success if it can influence the minds of a few children and keep them interested in the "beautiful wonders of nature."

For more information

Julián Gómez-Cambronero invites you to visit the Walk Through the Solar System the next time you are in central Spain.

- To learn more, visit www.manzanares.es/paseo-sistema-solar/english-synopsis.
- Take a virtual walk at www.turismomanzanares.com/que-visitar/paseos-virtuales/paseo-del-sistema-solar.

IMAGE COURTESY OF FREE VECTOR MAPS

Cambronero leads a library field trip.

Mollie Rappe (mrappe@asbmb.org) is an intern at ASBMB Today and a Ph.D. candidate in biophysics at Johns Hopkins University.

Brewing an interest in science

ASBMB outreach initiative Science by the Cup concocts palatable science events for adults

By Garner Soltes

Once high school or college ends, many adults are more than happy to let memories of science class slip to the same dark place reserved for cheap beer and cafeteria food. As a result, it's easy to lose sight of the scientific foundations that support the world around us.

Take coffee production, for example: One might foggily consider this process as one's morning brew drips down, but countless enzymatic and chemical changes occur from the time the coffee cherry leaves the tree to the moment its extract reaches a cup. At a recent Science by the Cup event in central New Jersey, not only caffeine but thoughts about solubles extractions and Grignard reactions buzzed about participants' heads. (1)

Surrounded by the aroma and sound of fresh coffee beans roasting, attendees investigated everything from the pyrolysis of green coffee beans to the molecular details of the flavors they experienced. Throughout the event, Ph.D. student volunteers shared their knowledge of the underlying biochemistry of taste-receptor interactions and led participants through even broader topics from the subjectivity and genetics of flavor perception to the potential for bias in our thoughts about quality.

This roastery tour and tasting is one of many events from the Science by the Cup & A Tall Drink of Science initiative, an adult science literacy and awareness effort born of a partnership between Ph.D. researchers from the Princeton Graduate Molecular Biology Outreach Program (2) and the American Society for Biochemistry and Molecular Biology.

The initiative began with our recognition that few adult science education events exist and that these opportunities are single, temporary moments of contact between scientists and the public. Therefore, we designed Science by the Cup events to facilitate informal conversations about the scientific foundations of familiar processes. We partner with local businesses and empower brewers, roasters or experts to share their knowledge of their craft, and our volunteers focus on the science and modern advances connected to the topic.

By removing the scientist from the podium and joining the crowd, we eliminate distance between practicing researchers and the public. Ultimately, we work to inspire a sense of everyday inquiry that may have been lost since the participants' disconnection from formal science education.

Thoughts about fermentation

A few months after the roastery tour, a new crowd met at a Princeton brewpub to try some interesting beers and explore the hidden biology of fermentation. Most participants came to ask about the differences between ales and porters or how beer spoils. But at the end of the evening, our genetics Ph.D. student volunteers used this discussion to shift the focus to the scientific benefit and ethical implications of using common genetic tools to engineer novel brewer's yeast strains (3).

In this way, even complex and important national concerns such as the use of genetically modified foods were framed as simpler, recognizable concepts. And as a result, it was easier to have a candid, informative conversation about these touchy topics. A single night of discussion isn't an opportunity for people to learn as they might in a classroom. However, it is a perfect time to break down barriers between practicing scientists and the larger public.

Founding Science by the Cup

With support from an ASBMB Outreach seed grant, Science by the Cup began a year and a half ago as an effort to complement Princeton University's successful K – 12 Molecular Biology outreach program. Much of our inspiration for this initiative came from parents and adults that we met at science festivals and school events.

In many cases, adult attendees seemed shy about participating in demonstrations alongside the children or thought that the material would be too simple. We recognized that it was just as crucial to engage adults, as many hadn't directly interacted with science in a decade or more. And although many adults don't feel comfortable conducting banana DNA extractions at Princeton science fairs, we find they will gladly participate in a double-blind tasting experiment at their favorite coffee shop.

IMAGE COURTESY OF GARNER SOLTES

Rojo's Roastery head roaster, J. David Waldman, explains the process of empirically analyzing coffee beans for moisture and other characteristics after roasting.

IMAGE COURTESY OF ELIZABETH ROWLANDS

Participants learned about the chemistry of roasting as Rojo's 1956 gas-fired Probat roaster produced a fresh batch of beans.

"It's fulfilling to see adults, who already teach their children to engage with science, start to think and get excited about all of the science behind something they may have taken for granted," says volunteer Allison Hall.

The success of this model became evident at the science pub trivia night that we host at the end of each year's cycle of varied events. In order to attract a broad audience, we designed "punny" science questions (such as a holiday-themed category called 'On Comet!' that explored the mysteries of reindeer and astrophysics) that would reveal some interesting science but could be answered with just knowledge of wordplay.

During the first year of Science by the Cup, we worried that many of our previous participants still would be hesitant to put their scientific knowledge to the test. In spite of our concern, the pub was packed with returning and new participants sharing jokes and knowledge about topics they may never have imagined discussing in that space before.

Moving forward

With this success in mind, we are convinced that, given appropriate informal opportunities and the use of interesting, relatable topics, we can erase adults' sense of scientific ennui.

"We like using a 'top down' approach where adults/parents can get as involved as their children with events that are geared specifically to their interests," says Hall.

To this end, we are pursuing additional connections with area experts (such as cheesemakers and chefs) and seeking new ways to engage an even broader audience. Our goal is to integrate this initiative seamlessly with our general outreach to reach students and adults alike. In the end, we hope that Science by the Cup will help adults think about the world differently, one beer or coffee at a time.

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Advice for new graduates

By Mariana Figuera–Losada & Jen McGlaughon

As the spring semester comes to a close, thousands of graduate students are preparing to bid farewell to the place they have spent so much of their lives for the past several years. For many new Ph.D. recipients, life after graduate school can be both exciting and daunting at the same time.

Luckily, there are many who have come before us and are willing to share their insight on this transition. We asked a number of members of the American Society for Biochemistry and Molecular Biology, winners of the ASBMB's recent awards and others to provide some advice for those graduate students who will be closing one chapter and entering a new and exciting phase of life this year.

Suzanne R. Pfeffer

Stanford University School of Medicine, ASBMB President (2010 – 2012)

Grad school has provided you with diverse skills that will serve you well in so many careers. In addition to perseverance and strategic planning, you can boast of training in teamwork, public speaking, writing, teaching and maybe even small-meeting organization. Ask your graduate adviser to help connect you with lab and department alumni, who surely will be happy to tell you how they chose and pursued their unique career paths. Don't be shy to apply for internships that will give you a chance to experience something other than bench science. If you love it, great; if not, you can always apply for a more conventional postdoc position. Find your passion and take charge of your career!

Randy Schekman

Howard Hughes Medical Institute and University of California, Berkeley, Winner of the Nobel Prize for Physiology or Medicine (2013)

Although there has been a lot of naysaying about the prospects for a meaningful career for Ph.D.s in the life sciences and repeated calls for a reduction in training programs, the opportunities now outnumber those that were available when I completed my Ph.D. in 1974. Back then, the options outside of a standard academic career were severely limited. The biotech industry did not exist, and few careers in law, government or publishing were open to scholars trained in basic biomedical research. The key is to remain flexible and to recognize that your analytical and critical skills have tremendous application in a variety of professional careers.

Cori Bargmann

Howard Hughes Medical Institute and Rockefeller University

The most valuable resource you have as a scientist is your motivation. Maintaining your enthusiasm is as important as any other aspect of your career.

Thomas C. Südhof

Howard Hughes Medical Institute and Stanford University School of Medicine, Winner of the Nobel Prize for Physiology or Medicine (2013)

Follow your interests, and don't try to calculate a career. Work on a question that you feel satisfying, that you like, that you feel is inherently valuable, and do not fashion your career after the fashion of the day. If you choose a professional path, this will be your life, and I believe it is better to do something you like but is not as well paid than something that is better paid but that you will dislike doing after a few years.

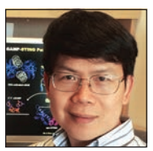
Joan A. Steitz

Howard Hughes Medical Institute and Yale University

My advice to newly minted Ph.D.s, especially women, is to not worry excessively about the far-distant future. If you love doing science, look at people one step ahead of you and ask yourself whether that seems possible; too many things change to make looking farther ahead very useful.

Zhijian "James" Chen

Howard Hughes Medical Institute and University of Texas Southwestern Medical Center, Winner of the ASBMB-Merck Award (2015)



It's an exciting time to do biomedical research, with so many powerful technologies at your disposal — CRISPR, mass spec, genomics, imaging, etc. But the technologies are the means, not the end. The traditional way of doing science — identify an important biological problem and use whatever tools it takes to solve the problem — is still a tried-and-true approach. Whatever the approach, imagine how it feels when you are the first in human history to solve an important problem, discover a new molecule or find a cure!

Erica Ollmann Saphire

The Scripps Research Institute, Winner of the ASBMB Young Investigator Award (2015)

Go to Toastmasters. Being able to communicate clearly and effectively and to enjoy the process is essential to any biomedical career.

Jack E. Dixon

University of California, San Diego, Winner of the ASBMB Earl and Thressa Stadtman Distinguished Scientist Award (2015)

My first message is to love what you do and do what you love and have a true passion for. The second message is do not be afraid of failure. It is a part of life and can make you stronger and can influence your future path. The third message is that you should find good mentors all along your way. Finally, do not underestimate the influence you can have on others. At the end of the day, the only thing that matters is what you do for other people, how you help them and how you inspire them.

Vijay Pande

Stanford University, Winner of the ASBMB DeLano Award for Computational Biosciences (2015)

First, when one is young and has just gotten a Ph.D., one has the opportunity to take a risk to do something tremendously great and impactful; maybe it works or maybe it doesn't, but doing something incremental isn't something you look back at fondly at the end of your life, whereas trying something great and failing somehow always seems to lead to some other new open door. Second, in addition to academia and traditional industry, new Ph.D.s should consider startup companies. As a corollary of my first point, a startup can give the opportunity to change the world, albeit at some risk, but when one is a young Ph.D., that's a great time to take risks to do something truly great.

Rachel Klevit

Washington University, Winner of the ASBMB Fritz Lipmann Award (2015)

Be self-reflective and think creatively about what aspects of being a scientist most excite you: being at the bench, writing, communicating, teaching, thinking about how to transform a discovery into something practical, etc. Use your insights to guide your decisions of a path to follow. The most obvious one may seem to be the path of least resistance, but a path less followed may be the one for you.

James Berger

Johns Hopkins University School of Medicine

I guess the advice that I would give to newly minted Ph.D.s is to work on something that they are truly interested in and passionate about. They shouldn't feel compelled to default into a postdoc out of graduate school, but rather they should take some time to think about and identify their personal drivers and motivators. Whether they ultimately decide to pursue a postdoctoral project or switch into a different field entirely (e.g., law, business, public policy), the choice should be considered carefully and deliberately. The same advice applies to choosing a lab, discipline or project of future study. The world is an increasingly competitive place; only a real internal fire will see one through the trials that inevitably arise.

Kathleen S. Matthews

Rice University, Winner of the ASBMB William C. Rose Award (2015)

Think broadly, creatively and carefully about your long-term goals, and seek advice and mentoring from multiple individuals with experience in the areas of your interest. In sifting through this information, listen both to your brain and to your gut (your "second brain" — see the book by Michael Gershon and the Scientific American article at http://www.scientificamerican.com/article/gut-second-brain/)! Both internal resources can offer wise counsel.

New Ph.D.s get free ASBMB memberships.
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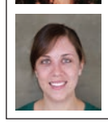

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Meeting the needs of a diverse membership

A look at your ASBMB education department

By Erica Siebrasse & Andrew Macintyre

Are you an undergrad, grad student, postdoc, faculty member, department leader, research staff member or scientist — research or nonresearch — working outside academia? Oh, wait! Did we just include the entire membership of the American Society for Biochemistry and Molecular Biology?

The ASBMB education and professional development department aims to provide resources for members at all stages of their careers. As new department managers, we are planning to continue the excellent initiatives the society offers while expanding our programming to support the needs of our increasingly diverse membership.

Established and ongoing programs

For biochemistry and molecular biology programs. The ASBMB began its accreditation program in 2013 as a way to recognize undergraduate biochemistry and molecular biology programs that fulfill the educational expectations of the society; to provide access to an independent instrument to assess student achievement and program effectiveness; and to provide a mechanism for students to obtain certified degrees. To date, 30 undergraduate programs have been accredited.

Students from accredited programs are entitled to take the ASBMB certification exam. The exam offers schools and students a nationally recognized marker of achievement. Programs interested in accreditation can find more information on the accreditation website. The next application deadline is Oct. 15.

For early career scientists. The society began hosting an annual grant-writing workshop in 2013. The workshop is designed to help senior postdoctoral fellows and early-career faculty, particularly those from underrepresented backgrounds, develop successful National Science Foundation grant applications.

The program includes mock review panels, presentations from NSF program directors and panel discussions on how to respond to reviewer feedback. Critically, workshop participants receive individualized feedback on their proposals. The next workshop is scheduled for June 4 – 6 in Washington, D.C.

For educators. The ASBMB received a grant from the NSF in 2010 to develop the concept-driven teaching strategies project. The project's goal is to develop a resource library of classroom tools to help biochemistry and molecular biology educators.

Over the past five years, the project's leaders have hosted workshops across the country to bring together educators with expertise in concept inventory development, science education research and student assessment. While the full resource library is still in development, the core biochemistry and molecular biology foundational concepts and skills identified at the workshops and a compilation of assessment instruments and tools are already available on the website (http://asbmb.org/education/).

Educators interested in the project should consider attending our upcoming workshop at the University of Michigan-Dearborn on May 30 or our special symposium on transforming undergraduate education in the molecular life sciences July 30 through Aug. 2 in St. Joseph, Mo.

For undergraduates. The ASBMB Student Chapters program (formerly the Undergraduate Affiliate Network) provides networking and career development opportunities at regional and national conferences, access to research and science outreach, and funding awards to facilitate these aims. There are currently 100 ASBMB student chapters nationwide. Those interested in establishing a chapter must have a faculty mentor and five students interested in membership.

To help undergraduates find summer research opportunities, the society maintains a database of opportunities across the U.S. While most students probably already have made their summer plans, research programs can begin submitting new or updated 2016 information now.

For members interested in increasing diversity. The ASBMB is committed to supporting and promoting diversity in BMB. The EPD department runs the Partnership for Diversity listserv and organizes the Research Spotlight series, which profiles the accomplishments of scientists from diverse backgrounds. At the 2015 annual meeting in March, the society announced a new undergraduate scholarship to recognize students who contribute to the diversity of the field.

Future initiatives

For graduate students and postdoctoral scientists. The EPD committee recently established a new subcommittee to study how better to support graduate student and postdoctoral members. In particular, the number of people holding Ph.D.s who are pursuing careers outside of academic research is growing, and their needs are diverse. The society has a number of resources available to undergraduates, educators and faculty members, but we aim to expand and improve our initiatives to serve other groups within the community.

For all members. We are also enhancing the content available on our website, including the education, minority affairs and careers sections. We intend to make it clearer where resources are located and to improve and expand existing resources. These changes will come alongside the work of the new EPD subcommittee.

The programs and ideas described above would not be possible without the many ASBMB members who volunteer their time and expertise. In particular, members of the EPD, minority affairs and student chapters committees have worked incredibly hard to ensure the ASBMB has quality programs to offer its members. In addition, more than 70 ASBMB education fellows have contributed to the development and administration of the accreditation program.

More information on the programs and committees is on the education department website: http://asbmb.org/education/. It is our hope that the education department reflects the needs of our membership. If you have ideas or would like to get involved in any of our programs, please contact us at education@asbmb.org.

Program managers

SIEBRASSE

Erica Siebrasse (esiebrasse@asbmb.org) attended a small high school in rural Kansas before completing a bachelor's in biochemistry/molecular biology at Hendrix College. In high school and college, she was very interested in science, particularly in infectious diseases. Siebrasse completed a Ph.D. in molecular microbiology at Washington University in St. Louis, where she discovered new viruses and studied how these viruses infect humans. While in graduate school, Siebrasse also helped run a large science-outreach organization. Her lab and volunteer experiences led her to seek a career outside the lab where she could work with people to use science to improve society. After graduate school, Siebrasse was a science policy fellow at the ASBMB before taking her current position.

MACINTYRE

Andrew Macintyre (amacintyre@asbmb.org) grew up in Scotland, where he earned an undergraduate degree in biochemistry at the University of Glasgow and a Ph.D. in molecular and cellular biology at the University of Dundee. During graduate school, Macintyre became interested in the role of sugar metabolism in immune cell fate, a topic that largely had been overlooked for 40 years. After some globetrotting interview trips, he took a postdoctoral position at Duke University in North Carolina, where he worked with leaders in the field and many clinical collaborators. Toward the end of his postdoctoral stint, Macintyre spent a lot of time mentoring graduate and undergraduate students, eventually teaching an undergraduate biochemistry course at a local college. He enjoyed working with this cross-section of the biochemical community, leading him to take on his current role at the ASBMB.

Designing Scientific Teaching Tools for Underlying Concepts and Skills for BMB Education

This workshop is designed to increase participant knowledge and use of student assessment techniques around the pre-identified biochemistry and molecular biology underlying core concepts and to actively engage participants in creating assessment tools and best practices. This workshop is open to all undergraduate faculty, postdoctoral fellow and graduate students interested in undergraduate science education.

University of Michigan–Dearborn, Cost: Free
Saturday, May 30, 2015, Hosts: Marilee Benore, Peter Oelkers
Presenters: Cheryl Bailey, Joseph Provost

IMAGE COURTESY OF UNIVERSITY OF MICHIGAN-DEARBORN

11 tips for your first undergraduate research experience

By Shane Falcinelli

So you have been accepted to that summer research internship you applied for? Congratulations! You have worked hard to get to this point. But now what? You may have questions like these: "How can I be successful this summer? Will my supervisor like me? What will be expected of me?"

As a summer intern in research laboratories for the past four summers, I have asked myself these questions. Here are some tips that I have learned:

1. Be enthusiastic. First impressions are important. Showing your supervisor and principal investigator that you are excited and grateful to work for them will start you off on the right foot. Say, "Thank you for having me," and greet your supervisor with a firm handshake on your first day.

2. Dress the part. Most laboratories do not require a suit and tie. At the same time, though, jeans and a T-shirt often will not suffice. Try to mirror what your supervisor wears. Looking professional will give others the impression that you are autonomous and capable of doing good work.

3. Keep an open mind. You might not get your first choice of project. Not every experiment or task will be fun or interesting. Be open to learning all that you can, and do your best to pick up skills such as being adaptable, anticipating needs and solving problems.

4. Take initiative and work hard. If you think of an interesting experiment, ask your mentor about doing it. Offer to help with laboratory or office duties such as taking out the trash.

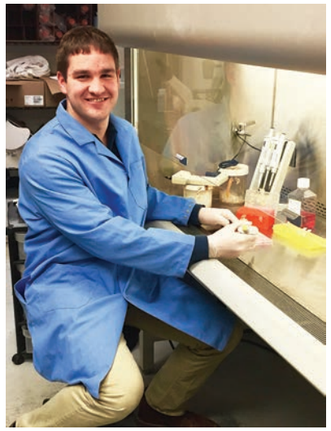
5. Ask good questions. Before you ask for help, try to solve the problem yourself. Scientific literature and product protocols are often very helpful. But make sure you ultimately understand why you are doing what you are doing — do not be afraid to ask questions if you cannot solve the problem on your own!

6. Be a good listener. Many people in the laboratory you will be joining have worked there for years. They have extensive knowledge about what you will be working on; use this to your advantage! Listening to someone who has experience with a certain technique could save you weeks of trial and error.

7. Get to know your mentor and laboratory members. Take a genuine interest in the projects and lives of the other people in your laboratory. Learning to build connections with people is instrumental to your future successes.

8. Accept that failure is a part of science. Experiments often will fail, even if you executed everything perfectly. Use your failed experiments to inform your future work.

9. Always think about what you are doing. Experiments can become monotonous. It is easy simply to follow a protocol. Always stay alert and ask yourself: "Does what I am doing make sense? Is there a better way I could test this hypothesis?"



10. Keep a good laboratory notebook. One of my mentors once told me: "If you did not write it down, it did not happen." Also, developing the ability clearly to express your work is a skill you can take with you wherever you go.

11. Enjoy the ride. Be serious and put effort into your work, but do not be too attached to the results. Science is a process, and summer internships should give you a sense of what that process is. Do your best, enjoy the experience and do not stress too much when things do not go as planned.

Shane Falcinelli (shanefalcinelli@gmail.com) is a junior at the University of Maryland, College Park, studying microbiology and global poverty.

Upcoming ASBMB events and deadlines

MAY

May 7: Early registration deadline for ASBMB Special Symposium: Transforming Undergraduate Education in Molecular Life Sciences meeting, Saint Joseph, Mo.
May 15: Proposal deadline for sessions at ASBMB 2016 Annual Meeting to be led by graduate students and postdocs
May 30 – June 2: American Society for Microbiology meeting, New Orleans, Journal of Biological Chemistry booth #119

JUNE

June 2: 2016 ASBMB awards nominations deadline
June 5: Abstract deadline for ASBMB Special Symposium: Transforming Undergraduate Education in Molecular Life Sciences, Saint Joseph, Mo.
June 10 – 12: ASBMB Hill Day, Washington, D.C.
June 11: Short talk abstract deadline for ASBMB Special Symposium: Membrane-Anchored Serine Proteases, Potomac, Md.
June 18: Early registration deadline for ASBMB Special Symposium: Membrane-Anchored Serine Proteases, Potomac, Md.
June 25 –28: ASBMB Special Symposium: Evolution and Core Processes in Gene Regulation, St. Louis, Mo.

JULY

July 1: Deadline for call for papers for Molecular & Cellular Proteomics special issue on chromatin biology and epigenetics
July 30 – Aug. 2: ASBMB Special Symposium: Transforming Undergraduate Education in Molecular Life Sciences, Saint Joseph, Mo.

SEPT

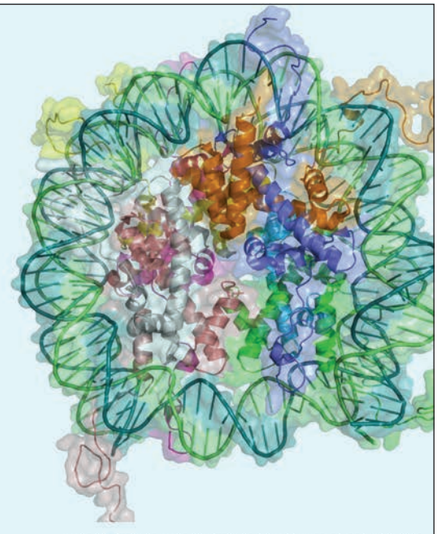
Sept. 17 – 20: ASBMB Special Symposium: Membrane-Anchored Serine Proteases, Potomac, Md.
Sept. 27 – 30: 14th Human Proteome Organization World Congress (HUPO 2015), Vancouver, Canada, Molecular & Cellular Proteomics booth #413

ASBMB
American Society for Biochemistry and Molecular Biology

MCP MOLECULAR & CELLULAR PROTEOMICS

CALL FOR PAPERS:
Chromatin Biology and Epigenetics

The Journal of Molecular & Cellular Proteomics invites submissions for a special issue on chromatin biology and epigenetics. The deadline for manuscripts is July 1. The issue will be published by the end of the year. www.mcponline.org



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ASBMB

2016

Annual Meeting

SAN DIEGO

April 2–6

WWW.ASBMB.ORG/MEETING2016

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