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education issue

five ways to get scientific about learning and teaching

MBoC Call for Papers

Fifth Special Issue on Quantitative Cell Biology

Image by Hafuy Wolfenson, courtesy of Michael Sheetz

Submit by: Oct. 15 • **Release Date:** Spring 2019 • **Issue Co-Editors:** Diane Lidke, Jennifer Lippincott-Schwartz, and Alex Mogilner

About the issue:

ASCB and *Molecular Biology of the Cell* (*MBoC*) recognize the profound influence that concepts and technologies from the physical and computational sciences are having on cell biology. This issue will build on the great success of the first four issues, published in 2014, 2015, 2016, and 2017, and will provide an opportunity for researchers whose work crosses disciplines to reach a wide audience.

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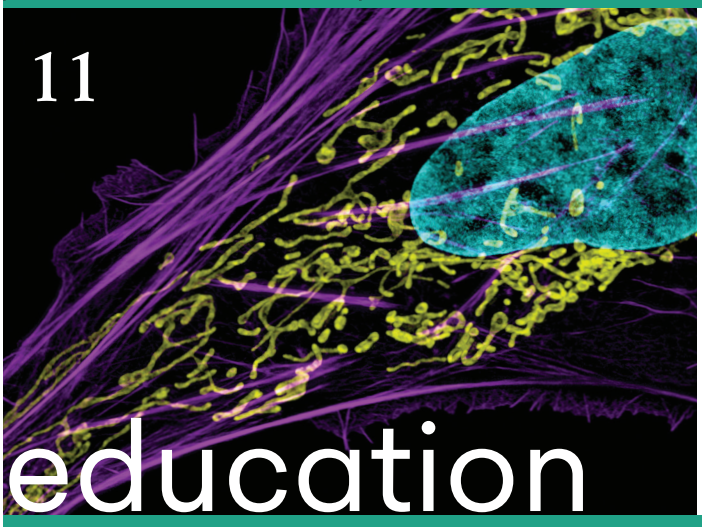

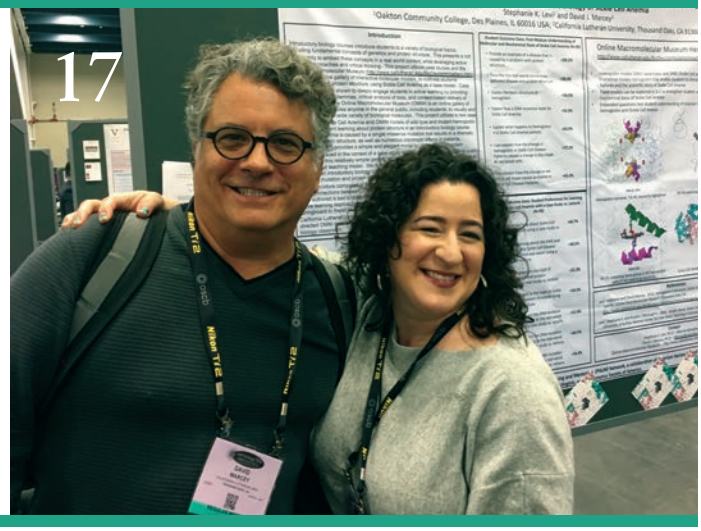

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Thinking about Teaching and Mentoring

by w. mark leader, editor

Most cell biologists teach. Even those who don't spend much of their time in a classroom are probably engaged in mentoring trainees or in sharing the joy and power of science with the public The features and many of the columns in this issue of the *Newsletter* explore important aspects of education: how to become a better teacher; how we should evaluate teachers; how to take mentoring to the next level; and how to get started in public outreach. We know a lot about what makes teaching and mentoring effective, and in this issue's President's Column, guest columnist Erin Dolan addresses the question of how knowledge will move from being practiced by single individuals in isolation into wholesale use across institutions.

As always, we welcome your comments and suggestions. Please interact with your *Newsletter*! If you have ideas you'd like to share with the ASCB community, we'd be happy to consider publishing your Letter to the Editor. We welcome submission of images for the Under the Microscope section. If you have ideas for feature articles related to the themes of upcoming issues, please let us know. (Upcoming themes include the Annual Meeting, Technology, and Public Policy/Advocacy.) You can contact me at mleader@ascb.org or 301-347-9317 about any of those matters. You can respond to the President's Column by contacting the ASCB President at president@ascb.org. And if you have a career conundrum, I encourage you to write to Labby at labby@ascb.org.

On the Cover: *Participants at the 2018 USA Science & Engineering Festival*

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the american society for cell biology

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Chief Executive Officer

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ascb asks...

For each issue of the *Newsletter*, ASCB will post a question to our followers on social media. Follow @ASCBiology on Twitter or like the American Society for Cell Biology Facebook pages for posts with the hashtag #ASCBAsks and share your thoughts. Thanks to those below who responded to the question for this issue:

Who was your favorite faculty member in college (graduate or undergraduate) and why?

Stephen Arch, Professor of Biology, Reed College, for showing me the joy of following the infinite rabbit hole that starts in a paper's reference section to discover the deep history of a scientific problem

~ Justin Taraska, @taraskalab

Grad school. Jon Beckwith for showing me the beauty of the logic in class papers and in creating an environment where all could participate and no one felt stupid.

~ Mark Peifer, @peiferlabunc

From undergrad Omar Quintero @_OmQu! He is a fabulous teacher, mentor and colleague. My scientific journey would sure be different (may not have existed) without him and his constant support! #ASCBasks #supportivementors

~ Rebecca Adikes, @radikes

From grad school, def @hhiggslab, because of the fantastic mentoring, guidance, and opportunity to grow as a scientist. Not to mention, Harry was willing to jump into a frozen pond w me... #biased #ASCBasks #actin

~ Pinar Gurel, @pinar_gurel

Follow us on Twitter at **@ascbiology** to find out the next question.

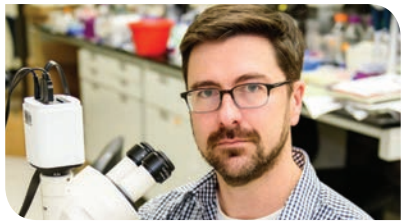
members in the news

Marileen Dogterom

Elaine Fuchs

J.K. Haynes

Brian Lewis



Benjamin Martin

Meng Wang

Marileen Dogterom, professor of bionanoscience from TU Delft in The Netherlands, was named one of the 2018 NWO Spinoza Prize Laureates. The Spinoza prize is the highest award in Dutch science. Dogterom was the first to measure the forces generated by the microtubules of the cytoskeleton during cell division.

Elaine Fuchs, professor and head of the Laboratory of Mammalian Cell Biology and Development at The Rockefeller University in New York, was appointed to the Pontifical Academy for Sciences by Pope Francis. Fuchs does ground-breaking research on skin stem cells, studying how these cells make and repair tissues, how they communicate with neighboring cells, and how this communication malfunctions during cancer and aging.

J.K. Haynes received the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. Haynes is the David Packard Professor in Science at Morehouse College, where he teaches biology, cell biology, and the senior seminar.

Brian Lewis, associate professor of molecular, cell, and cancer biology, was appointed to a newly created role of Assistant Vice Provost for Outreach and Recruitment at the University of Massachusetts (UMASS). Lewis will lead efforts to increase diversity in the student population at the UMASS schools of medicine, nursing, and biomedical sciences.

Benjamin Martin, associate professor in the Department of Biochemistry and Cell Biology at Stony Brook University School of Medicine, was awarded the 2018 Pershing Square Sohn Prize for Young Investigators in Cancer Research. Martin uses zebrafish as a model, state-of-the-art microscopy, and genetic analysis to understand how circulating tumor cells are able to exit blood vessels and invade new sites in the body. He will receive $200,000 in funding per year for up to three years.

Meng Wang, associate professor of molecular and human genetics at Baylor College of Medicine in Houston, TX, was awarded the 2018 Michael E. DeBakey Excellence in Research Award. The award is given annually to Baylor College of Medicine faculty who made a significant published scientific contribution to clinical or basic biomedical research during the past three years. Wang is investigating organism aging, lipid metabolism, and reproductive senescence.

members in the news

Clifford Brangwynne

Samara Reck-Peterson

Gia Voeltz

HHMI Investigators Named

Meng Wang was also among four long-time ASCB members in the 2018 group of new HHMI Investigators. Each investigator receives approximately $8 million in finding over a seven-year term, which is renewable pending a scientific review.

Other new HHMI Investigators include:

Clifford Brangwynne, associate professor of Chemical and Biological Engineering at Princeton University, who is studying self-assembly in biological materials;

Samara Reck-Peterson, professor in the Department of Cellular and Molecular Medicine at the University of California, San Diego, who studies the mechanisms and regulation of the molecular motors dynein and kinesin; and

Gia Voeltz, associate professor in the Department of Molecular, Cellular, and Developmental Biology at the University of Colorado, Boulder, who seeks to understand the processes that regulate the structure and function of the endoplasmic reticulum.

Does Your Institution Pay for Your ASCB Membership?

It may be possible to bill ASCB membership dues to direct or indirect costs under a National Institutes of Health (NIH) grant. NIH guidelines state that subscriptions are allowable as direct costs and memberships as indirect costs (see section 200.454 of the U.S. Federal Government Uniform Guidelines). Your ASCB membership includes an annual subscription to *Molecular Biology of the Cell* valued at $626 per year.

Some universities allow membership fees as a direct cost to a project if it reduces the overall cost of attending a conference by more than the fee. The difference in price between a nonmember and member ASCB Annual Meeting registration far exceeds the cost of an ASCB membership. Savings range from $13–25 for undergraduate students, $75–85 for graduate students, $107–192 for postdocs, and $68–75 for regular members. You will also save $30 on your abstract submission as a member.

Check with your university, granting agency, or professor to find out if either of these circumstances applies to you.

If you have questions, contact ascbinfo@ascb.org.

president's column

Time for Second Order Change

By Erin L. Dolan, Guest Columnist

I have had the privilege of serving as Editor-in-Chief of *CBE—Life Sciences Education* (*LSE*) for almost a decade now. During this time, I have seen exponential growth in education research, especially research beyond K–12 schools and outside of colleges of education. Much of this work is being done by scholars who identify as "discipline-based education researchers" or "science faculty with education specialties," who have been trained in a scientific discipline. I am one such scholar. I trained as a neuroscientist and applied this training to the study of undergraduate research experiences and research mentoring at the undergraduate, graduate, and postdoctoral level.

This surge in education research has provided evidence indicating that what and how we teach is not meeting the needs of 21st-century learners. Consequently, there have now been strong calls for real changes in higher education from influential organizations and agencies, from industry, and even from the general public.

These changes include:

MOVING AWAY FROM...	MOVING TOWARD...
Memorization: Teaching students many disconnected and decontextualized facts	**Expertise development:** Helping students develop conceptual understanding and scientific competencies in solving real-world problems in real-world contexts
Exclusion: Weeding students out of science	**Inclusion:** Cultivating and harnessing the talents of people from all backgrounds
Teaching and mentoring based on wisdom of practice: Expecting faculty to teach and mentor without formal training or support and make educational decisions in the absence of data	**Teaching and mentoring based on research and evidence:** Preparing and supporting faculty in teaching and mentoring effectively and using evidence to inform educational decision-making

We Know How to Teach

What has become increasingly clear to me over the past decade is that we know a lot about how we should be teaching in the classroom and mentoring in the lab to support the education and development of all

Got Questions?

Labby has answers. ASCB's popular columnist will select career-related questions for publication and thoughtful response in the *ASCB Newsletter*. Confidentiality guaranteed if requested. Write us at labby@ascb.org.

president's column

learners (see pieces from Owens and Pfund on pages 11 and 41, respectively). For instance, we know that learning experiences, whether in the classroom or the lab, should be designed with goals and objectives in mind and should include multiple opportunities over time to practice what is being learned. We know that learning experiences should be structured to meet learners where they are. Learning experiences should be sufficiently challenging and relevant to motivate learners, becoming more complex as learners develop expertise without becoming so complex that learners give up. We also know that learners benefit from receiving feedback from peers and experts, from being prompted to reflect on what they know and can do (or not), and from having opportunities to act on that feedback and reflection. We even have insights into how to help faculty prepare to teach and mentor and become better at it over time (see pieces from Spiro on p. 17 and Finkelstein and Keating on p. 14). Some of this knowledge is making a difference—resulting in some shifts in how we teach,[1] in student learning and success,[2,3] and in support for faculty to teach effectively.[4]

Now We Need to Use That Knowledge (Everywhere)

While all of this knowledge is necessary to respond to calls for change in higher education, it is not sufficient to actually achieve widespread change. Rather, we need "second order change." Second order change is the point at which effective teaching and mentoring moves from being practiced by single individuals in isolation into wholesale use across institutions. Achieving this kind of change is much more difficult because it requires concerted effort at all levels: individuals, programs and departments, institutions, and disciplinary communities.

As you will see in this themed issue on Education, ASCB is well equipped to support its members in achieving second order change. ASCB publishes the leading biology education journal—*LSE*—a treasure trove of peer-reviewed research in biology education and tried-and-tested strategies for teaching and mentoring in the life sciences. ASCB's Annual Meeting offers a robust suite of education and career development sessions, and plans are underway to offer regional meetings and webinars to ensure that all members have access to these resources. The Society is also collaborating with other disciplinary societies to make national level recommendations for instruction in the life sciences, such as the ASCB-endorsed framework for undergraduate cell biology instruction (www.coursesource.org/courses/cell-biology) and ASCB's partnership in the Promoting Active Learning and Mentoring Network (see article from Spiro on page 17).

[T]here have now been strong calls for real changes in higher education from influential organizations and agencies, from industry, and even from the general public.

Here are four things you can do to capitalize on these resources and promote second order change:

First, gather evidence. Perhaps your response to hearing about these calls for change is to harken your own success as a scientist and question whether there is indeed need for change. If so, do what you do best. Don't rely on *N*=1. Gather some data! What data would convince you that change is needed (or not)?

Start with something you care about—such as

whether students understand a fundamental principle from a course you teach or whether the factors used to make graduate admissions decisions relate to your graduate students' success. For example, ask your students to draw three water molecules interacting with as much detail as possible. Do their drawings indicate a sophisticated understanding of hydrogen bonding? Ask your students to diagram protein synthesis in the context of a cell and to include key structures in their diagrams (DNA, gene, chromosome, mRNA, tRNA, ribosomes, etc.). What do their drawings indicate about their understanding of how these structures relate to one another and how each structure is involved in protein synthesis?

If GRE scores are a factor in your graduate admissions decisions, is there any relationship between students' scores and their number of publications, number of first author publications, time to degree completion, or other indicators of success? If not, what factors might be better predictors of success? And should GRE scores even be considered in graduate admissions decisions? These kinds of data can be useful not only to you in making decisions about your educational activities, but also to your program or department in decision making and accreditation.

ASCB is well equipped to support its members in achieving second order change.

Second, use an education resource. As an ASCB member you have automatically been signed up to receive the *LSE* table of contents by email. You have the journal right at your fingertips! The next time you receive the electronic table of contents alert, take two minutes to read it and pick one paper to read. I am confident you will find something in the journal that is relevant to you. In the June 2018 issue alone, there are papers on undergraduates' research abilities and science process skills, recruiting and retaining graduate students from underrepresented backgrounds, professional identities of postdoctoral scholars, and effective models for faculty professional development.

If you have never participated in an Education or Career Development session at the Annual Meeting, pick just one to attend. There are many choices—from the education and mentoring award talks to the Education Minisymposium short talks to the career development table talks to the education section of the poster sessions. If you come with an open mind and a learning stance, I am confident you will find one strategy or idea you can apply in your classroom or your lab.

Third, involve a colleague. As much as we like to think that we as scientists are convinced by data and data alone, all people have limited time in the day and limited capacity to spend time and mental energy critically evaluating data. We often spend our time and brain space focused on thinking deeply and critically about data that are most near and dear to our hearts (i.e., our research). In areas that are equally important but may feel less central, such as our teaching and mentoring, we are more likely to make decisions not based on data, but on the credibility of the source and the attractiveness of the message (or the messenger)—a phenomenon known as the elaboration likelihood model of persuasion. If you collect some educational data, read a thought-

What data would convince you that change is needed (or not)?

president's column

provoking education paper, or attend an interesting education session at the Annual Meeting, you can be that credible and attractive messenger by sharing what you have learned or found with a colleague! (You can encourage your colleagues to sign up for *LSE* table of contents alerts by sending an email with the subject line "alerts" to lse@ascb.org from the email account where they would like to receive the alerts.)

Finally, consider the next generation. Even if teaching and mentoring comprise a small component of your professional responsibilities, you may have trainees in your research group who are interested in education careers or who want to be more prepared for these responsibilities than we were a generation ago. You can help them by steering them to the education and career development resources available through ASCB, including those listed above and those available through ASCB's Committee for Postdocs and Students. By tapping these resources and others likely to be available at your own institution, you will be helping your trainees not only build their awareness of the variety of career options available to them, but also build their abilities to be effective teachers and mentors from day one on the job.

Yesterday I was clever, so I wanted to change the world.
Today I am wise, so I am changing myself. — Rumi

We can achieve second order change if we follow Rumi's example. If every ASCB member dedicated just four hours—one hour for each item listed above—this would be a game changer. We would be well on our way to second order change.

References

[1]Stains M, Harshman J, Barker MK, Chasteen SV, Cole R, DeChenne-Peters SE, …Young AM (2018). Anatomy of STEM teaching in North American universities. *Science* 359, 1468–1470. https://doi.org/10.1126/science aap8892.

[2]Freeman S, Eddy SL, McDonough M, Smith MK, Okoroafor N, Jordt H, Wenderoth MP (2014). Active learning increases student performance in science engineering and mathematics. *Proc. Natl. Acad. Sci. U.S.A.* 111, 8410–8415. https://doi.org/10.1073/pnas 1319030111.

[3]Hanauer DI, Graham MJ, SEA-Phages, Betancur L, Bobrownicki A, Cresawn SG, … Zimmerman A (2017). An inclusive Research Education Community (iREC): Impact of the SEA-PHAGES program on research outcomes and student learning. *Proceedings of the National Academy of Sciences* 114, 13531–13536. https://doi.org/10.1073/pnas 1718188115.

[4]Manduca CA, Iverson ER, Luxenberg M, Macdonald RH, McConnell DA, Mogk DW, Tewksbury BJ (2017). Improving undergraduate STEM education: The efficacy of discipline-based professional development. *Science Advances* 3, e1600193. https://doi.org/10.1126/sciadv.1600193.

About the Author
Erin L. Dolan is Georgia Athletic Association Professor of Innovative Science Education at the University of Georgia, Editor-in-Chief of *LSE*, Co-chair of the ASCB Education Committee, and 2018 recipient of the Bruce Alberts Award for Excellence in Science Education.

Five Ways to Get Scientific about Learning and Teaching

By Melinda T. Owens

It is August, and many of us are preparing for the upcoming academic year. Whether we instruct students in classes, mentor students informally, or just give seminars on our own research, now is a great time to reflect on all the teaching we do. As scientists, we have the opportunity to view learning and teaching as a scientific endeavor, both in how we use the results of previous research and how we approach our own teaching practice. Below are five ways we can get scientific about learning and teaching.

Remember that learning is about changing the brain.

As biologists, we know that learning and memory arise from physical changes in brain cells. When we teach, it may be helpful to remind ourselves of the scientific consensus that learning occurs when neurons are repeatedly co-activated and that this process is influenced by the chemical milieu around those neuronal connections. For example, does our teaching give students repeated opportunities to strengthen associations between concepts and to practice skills we would like them to learn? Does it motivate and interest our students, potentially releasing neurotransmitters that tend to enhance learning such as acetylcholine, norepinephrine, or dopamine? Or perhaps would some of our practices instead trigger undue stress, which causes the release of hormones like cortisol that over time may impede learning?[1]

Collect evidence of student thinking *regularly* from *everyone* to inform what you do.

If learning and teaching are fundamentally about changing cells in the brain, it also means that we can approach these subjects like we approach our own science. We can ask questions about what our students are learning, experiment with various teaching approaches, and collect data, such as student writing or student attendance, to evaluate the outcomes. Taking this kind of scholarly approach lets us identify what our students do and do not yet understand and to iteratively improve upon our teaching.[2]

Collecting evidence regularly to guide our instruction can be simple. For example, we can ask the room a question or give everyone a "challenge statement" and have students respond to it via clickers or by writing their responses on index cards.[3] Those of us who teach large classes can read a random selection of 30 or so student answers and still get a good sense of the difficulties that many people have. Just as large, unbiased samples are desirable in research, it is important

to hear from all or at least a random sample of our students instead of only from the biased sample of students who are willing to raise their hands or come speak to us in person.

More evidence collection does not necessarily mean more grading! In fact, having "low-stakes" assessments graded for participation, not accuracy, allows students to focus on their understanding and reasoning instead of the right answer.[4] It also lets us collect evidence *before* teaching the corresponding material, to anticipate areas where many students have misconceptions. It is particularly powerful to ask the same questions before and after teaching a particular topic to gauge how students have changed their thinking.

Give *every student* the chance to talk or write about biology *every time you meet*.

Extensive research has shown that engaging with biology through writing or talking often deepens understanding.[5] During these activities, students reinforce and apply their biological knowledge. In classrooms, lab meetings, or seminars, we can ask participants to discuss questions with each other or draw a diagram of a biological process on an index card. Activities involving writing and collaboration also give students the opportunity to tackle cases or problems that would be too complex for them to solve individually, allowing them to practice skills needed for doing authentic science.

In addition, having varied activities in class or meetings creates a welcoming culture for everyone. Some people are most comfortable processing their ideas through discussing them with others, while other people appreciate having time to collect and organize their thoughts through writing. In classrooms, having students discuss science with their peers allows them to form personal connections and feel less isolated.[6]

Analyze the extent to which your materials are *inclusive of people from diverse groups*.

As scientists, we know the value of having people with diverse backgrounds and perspectives in research. Members of our increasingly diverse group of students will be more likely to see themselves in science when we vary the types of people and names shown in our slides, include stories of scientists from diverse backgrounds in our classes, and invite scientists from diverse backgrounds to speak in our meetings.[6] That diversity includes not only people from different cultural and ethnic backgrounds but also people of various genders and sexual orientations, people from all socioeconomic classes, and people who are the first in their families to go to college. It also makes sense to avoid inadvertently making some people feel excluded, for example by checking to see whether any questions in a genetics exam implicitly assume all people are heterosexual.

In addition, most people, but particularly many students from underserved groups, hunger to know how science is relevant to their lives. Including connections between our material and real-world topics, like the cell cycle and cancer or industrial pollution, shows students that science can help address problems facing their communities.[6]

Build on the research other scientists have done on learning and teaching.

An increasing number of scientists have turned their research focus to how to educate students about biology. We can use their work to inform our teaching practice. A good place to start is ASCB's education journal, *CBE—Life Sciences Education* (www.lifescied.org). In particular, the Evidence-Based Teaching Guides (https://lse.ascb.org) and the sho rt review articles in the "Approaches to Biology Teaching and Learning"

feature collection give concrete tips and are written to be accessible to everyone.

In short, as we create or review our teaching materials for the upcoming year, let us ask ourselves, "What are my goals for my teaching? What are some practices that I would like to keep doing, and what are some I would like to change?" By approaching learning and teaching like we approach our science, we can all become more effective and equitable instructors.

References

[1]Owens MT, Tanner KD (2017). Teaching as brain changing: exploring connections between neuroscience and innovative teaching. *CBE Life Sci Educ*. 16, fe2.

[2]Handelsman J, Miller S, Pfund C (2006). *Scientific Teaching*. W. H. Freeman, New York.

[3]EdComm (2017). How to know what your students know before it's too late. *ASCB Newsletter* 40(3), 20–21.

[4]Schinske J, Tanner K (2014). Teaching more by grading less (or differently). *CBE Life Sci Educ*. 13, 159–166.

[5]Freeman S, *et al.* (2014). Active learning increases student performance in science, engineering, and mathematics. *Proc. Natl. Acad. Sci. U. S. A.* 111, 8410–8415.

[6]Tanner KD (2013). Structure matters: twenty-one teaching strategies to promote student engagement and cultivate classroom equity. *CBE Life Sci Educ*. 12, 322–331.

About the Author

Melinda T. Owens is an incoming assistant teaching professor at the University of California, San Diego.

Promoting Scholarly Evaluation of Teaching: Addressing the Third Rail of Academia

By Noah Finkelstein and Jessica Keating

Education is perhaps the fundamental form of investment societies or individuals can make in their own future welfare. It is a core enterprise of our research universities, and national discussions around improving the quality of higher education have been growing in voice and prominence. Yet evaluations of this key form of professional practice continue to lack scholarly rigor. In recent years, there have been increasing attention and interest in designing and implementing more scholarly approaches to teaching evaluation.

Why Reconsider Teaching Evaluation?

Many current evaluation practices are flawed. The dominant form of teaching evaluation is the student end-of-term (SET) rating, and institutions typically rely on the "overall" rating of instructor and/or course. A variety of studies suggest these do not measure teaching effectiveness—no matter how "effective" is defined. The samples are small and not necessarily representative; the instruments are often biased; we apply statistics and comparisons inappropriately; and the omnibus questions do not correlate with validated measures of learning or success.

We have the opportunity to improve practices. If our measures of teaching effectiveness were more scholarly and aligned with our goals, they could be used by individuals and institutions to continuously improve. Rather than using solely reductionist and summative approaches (which are too often punitive or ignored), we could use these assessment measures to document improvement over time, and align the vast resources directed at improving teaching at our institutions with our evaluation (value) systems.

There is a growing national movement within the academy (and, indeed, outside) to use teaching evaluations as a lever for change. National organizations—including the Association of American Universities, Cottrell Scholars, the National Academies, disciplinary societies, funders, and accreditation organizations—are attending to the need for and potential impact of improved teaching evaluations.

We know how. There are decades of scholarship on better models and processes for evaluation, many drawing from the longstanding and early work at the Carnegie Foundation for the Advancement of Teaching. In parallel, we know more than ever before about the nature of institutional change and how to implement successful and sustainable reforms in higher education.

What Does a Scholarly Approach Look Like?

While there are multiple successful models of teaching evaluation, they share common principles that many of our institutions are well placed to enact. In fact, many of our existing practices are fruitful and can be adapted to scholarly approaches.

Collecting appropriate data: Three voices for teaching effectiveness. While SETs themselves are often problematic, engaging students is essential. We must simply collect data that students are better suited to provide. Similarly, faculty peer observation is common but highly varied in practice. Finally, the

instructors themselves are key in providing insight into their approach. Thus, some successful models of assessment involve providing better tools and guidance for the three key voices: students, peer review, and self-reflection.

For example, instead of asking students to rate the professor or state whether they've learned a lot (questions they are not well prepared to answer), students can be asked to reflect on their instructor's practices and approaches and the opportunities provided. An assessment of student work may be used in the evaluation. Peer observers, using research-based rubrics, can report on the effective use of practices that are known (or not) to impact student outcomes. Instructors reflecting on their own work provide essential insight into the design, outcomes, externalization, and revisions of their work. Notably, the very act of collecting each of these data sources can contribute to the professional development of those providing the data!

A scholarly structure for teaching evaluations. A number of models for better teaching evaluation structures exist. The model for our work at the University of Colorado, Boulder, in collaboration with teams at the University of Kansas and the University of Massachusetts, Amherst, is based on the more expansive understanding of academic scholarship first proposed by Ernest Boyer in 1990.[1] Building on the early Boyer work and that of subsequent researchers in higher education,[2] we identify seven categories that may be examined in the evaluation of teaching. How evaluation of these categories are realized in practice, and the relative weights across them, will depend upon the discipline. Nonetheless, we see these as spanning the space of scholarly teaching evaluation.

- **Goals, content, and alignment:** *What are students expected to learn from the courses taught? Are course goals appropriately challenging? Is content aligned with the curriculum?* These may be measured by peer observation of practice, review of syllabi, and a self-assessment of the faculty member.
- **Preparation for teaching:** *Does the instructor have the requisite content/background knowledge and understanding of classroom preparation?* Again, these may be assessed from self-reflection, materials review, and peer review of the instructor.
- **Methods and teaching practices:** *Is class time used effectively? Are evidence-based practices used? Are these aligned with the course, department, and campus goals and appropriately designed for the whole student population?* Here one may assess through student survey of practice, peer review, and faculty self-assessment.
- **Presentation and student interaction:** *How are the methods enacted? What are the students' views of their learning experience? How has student feedback informed the faculty member's teaching?* One may use surveys of students, observation of practices, and reflection to assess these ends.
- **Student outcomes:** *What impact do these courses have on learners? What evidence shows the level of student understanding? Does this class have long-term impacts on student persistence, inclusion, etc.?* Student voices, peer observation, campus data analytics, and self-reflection will inform these outcomes.
- **Mentorship and advising:** *How effectively has the faculty member worked individually with undergraduate or graduate students?* Reports, letters, and surveys of students, peer observations, and evidence from the faculty member under review are used in measuring these outcomes.
- **Reflection and teaching service/scholarship:** *How has the faculty member's teaching changed over time? How has this been informed by evidence of student learning? In what ways has the instructor contributed to the broader teaching community, both on and off campus?* Reflective analysis by the instructor and material artifacts (e.g., publications, presentations, etc.) will demonstrate level of proficiency here.

As efforts currently confined to individual campuses strengthen and this movement evolves, we are in a position to engage collectively, share resources, enact

locally, and demonstrate how these practices work. While significant work is going on at institutions across the country, there are opportunities for individuals to make the case for scholarly approaches to teaching evaluation and to showcase better assessment practices at their institutions and within professional societies and organizations.

References

[1]Boyer E (1990). *Scholarship Reconsidered: Priorities of the Professoriate,* Jossey-Bass. https://bit.ly/2pAtqWk. (An expanded version was published in 2015.)

[2]Glassick CE, Huber MT, Maeroff GI (1997). *Scholarship Assessed: Evaluation of the Professoriate.* Jossey-Bass.

TO LEARN MORE

Dennin M, Schultz ZD, Feig A, Finkelstein N, Greenhoot AF, Hildreth M, Leibovich AK, Martin JD, Moldwin MB, O'Dowd DK, Posey LA, Smith TL, Miller ER (2018). Aligning practice to policies: Changing the culture to recognize and reward teaching at research universities, *CBE—Life Sciences Education 16*(4) es5.

Flaherty C (May 22, 2018). Teaching eval shake-up, *Inside Higher Ed.* https://bit.ly/2keTp5p.

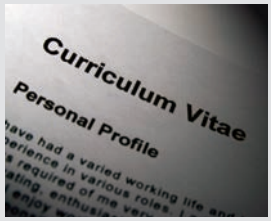
National Academies of Sciences Engineering and Medicine (2018). *Indicators for monitoring undergraduate STEM education*, National Academies Press. https://bit.ly/2u6A9MA.

About the Authors

Noah Finkelstein is professor of physics at the University of Colorado, Boulder, and co-director of the University of Colorado Boulder Center for STEM Learning (CSL). Jessica Keating is the project lead for CSL's Teaching Quality Framework initiative.

Volunteer to Review CVs

Give back to your cell biology community by signing up to help younger ASCB members with online CV review. We are always looking for more volunteers, including ASCB members in academia and industry, to help review cover letters, CVs, and resumes of young ASCB scientists. We will match you, and will only ask you to review two or three times a year. If you can help, please contact Thea Clarke at tclarke@ascb.org.



Are You Getting ASCB Pathways?

You should be regularly receiving our monthly email update, ASCB Pathways—alerting you to the latest ASCB happenings and Annual Meeting updates. If you aren't seeing the e-newsletter in your inbox, please check your spam filter, and/or contact your system administrator to whitelist *ascb.org.

PALM Network: Developing Science Educators One Best Practice at a Time

By Mary Spiro

David Marcy and Stephanie Blumer

Helping to develop top-notch science educators is among ASCB's top goals as a society. To support this endeavor, in 2016 ASCB and other societies and organizations piloted the Promoting Active Learning and Mentor (PALM) Network. The PALM Network is a National Science Foundation–funded program that employs best practices to foster high-quality, evidence-based, undergraduate science education by pairing postdocs or faculty at any stage of their career in mentor/mentee relationships. The program welcomes participants from any post-secondary institution, especially those serving minorities.

In the last two years, the PALM Network has awarded funding to more than a dozen mentor/mentee pairs. Fellows receive up to $2,000 for expenses associated with mentoring. Mentors receive a $500 stipend, and the Fellow and mentor each receives up to $1,000 in travel costs to present the results of their research.

Among the first pairs funded was Stephanie Levi Blumer, assistant professor of biology at Oakton Community College in Illinois, and her mentor, David Marcey, the Fletcher Jones Professor of Developmental Biology at California Lutheran University. Marcey previously taught Levi Blumer as an undergraduate at Kenyon College. Here Levi Blumer (SLB) and Marcey (DM) answer questions and share insights from their experiences as a fellow and mentor, respectively.

What motivated you to seek mentorship?

SLB: I was a first-generation college student, and mentorship has been central to my success. It felt completely natural to seek out mentorship to become more skilled as an educator. I really enjoyed my research career, but it was clear that my primary interests involved teaching biology, evaluation, and assessment to better understand how students learn and working toward equity and access in higher education. I knew I needed to learn from others to support my ability to create positive change.

When your parents don't have experience with higher education, it can be extremely daunting to figure out where to start. Without some familiarity with admissions standards, it's easy to slip into an imposter mentality that presumes that you won't get in anywhere. Then, if you're from a low-income

background, you have to figure out how to pay for it. Beyond that, when you have no examples or immediate mentors, how do you communicate with a professor appropriately? How do you secure a research position? How do you build a network? How do you intentionally cultivate a career? How do you factor work into the rest of your life? There are so many campus resources at institutions that are wonderful and help students and alumni answer the questions, but it is also helpful to have someone who knows you and is invested in your success who can share their struggles with these questions and present solutions.

> "I knew then that I wanted to look for a career...which would allow me to have a broader impact on society than the relatively narrow focus of my academic research."

What was going on with your career that you thought it would help?

SLB: I wanted mentorship at this point in my career for a couple of reasons. First, I had really committed myself to teaching as my profession. Regardless of whether or not I was able to secure a full-time position, I wanted to employ the best high-impact practices. Second, I was interested in getting experience that would enable me to contribute to my colleagues in a meaningful way, and working with David and the PALM fellowship met these objectives. Community colleges are the key to diversifying higher education and STEM fields. Our students come from an array of backgrounds, and a lack of opportunities for them represents missed chances to support the next generation of STEM professionals.

> "I wrote a case study on sickle cell anemia that places the student in the role of a physician who has to describe sickle cell anemia while learning biochemistry."

What qualities did Marcey possess that made for a good experience?

SLB: David was the first person that encouraged me to work in a lab, gave me that opportunity, and engaged me in so many novel experiences, from taking my first molecular biology lab to creating an online exhibit for the Online Macromolecular Museum (OMM). The OMM is an online resource consisting of interactive exhibits, most of which are student-authored. When the opportunity to apply for the PALM fellowship arose, I knew I wanted to work with David. He's creative, dedicated, and pushes students to cultivate their critical and scientific thinking. David has fantastic purview of best-practice biology education, he's supremely innovative, and I knew firsthand that he was encouraging, supportive, and generous with his time and wisdom.

What did you gain from acting as a mentor?

DM: The PALM mentoring experience was valuable in multiple respects. It provided an opportunity to receive direct feedback and advice on active learning pedagogical approaches and to discuss the underlying rationale for these approaches with Stephanie, a motivated and talented young professor. It also afforded a chance to spread the word about national reform efforts such as PULSE, the Partnership for Undergraduate Life Sciences Education. Stephanie and I worked on a project that yielded a powerful, Web-based visualization of hemoglobin structure–function relationships and the structural basis of sickle cell disease. This, along

with a case study that Stephanie developed, provides an excellent active learning experience for students. Finally, it was wonderful to reconnect with a former undergraduate student who has now launched a promising career in academia.

What was a highlight of your mentoring experience?

SLB: Being able to see David teach was the highlight. David designed an amazing active learning classroom using an online program. Students spent the entire three-hour session working on complex genetics problems. Students engaged in modeling of biological phenomena and processes and had real, meaningful, and thoughtful discussions and group work. I've never seen a class with students who were that engaged!

Did everything go as planned?

SLB: For the most part, yes. Our project centered on sickle cell anemia. I taught sickle cell biochemistry in my introductory course and wanted to learn to write and work with case studies, so I attended the National Center for Case Study Teaching in Science summer institute. There, I wrote a case study on sickle cell anemia that places the student in the role of a physician who has to describe sickle cell anemia while learning biochemistry. The OMM exhibit about hemoglobin also turned into a product of the fellowship, which meshed very well with the case study.

How have you shared the skills you acquired from your PALM network experience with your colleagues at work?

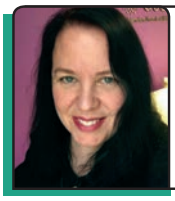
SLB: My experience has been infused in so many departmental initiatives, including revisions of our lab manuals, and teaching a genetics course in the fall. I think about assessment differently as well.

Would you recommend the PALM network experience to others and why?

SLB: What you take from it will elevate your teaching in significant ways. I don't believe that I would have secured a full-time, tenure-track position without this experience. It really sets you apart from other applicants. You have to be able to show that you can teach if you want to work at an institution like mine, and I can't think of a better way to innovate and creatively contribute to student learning at the levels of the institution and the field. The fellowship places you into a network of incredible leaders and colleagues in active learning and biology education, and that alone has been an amazing outcome of the fellowship. Being able to learn about resources, most of which I was not aware of, has also been useful. The ability to engage more deeply with ASCB and other professional societies has been a superb growth experience, too.

DM: I would encourage any colleague to volunteer to be a PALM mentor or fellow for the simple reason that the program can improve the teaching of both! Fellows bring fresh passion and outlooks to the collaboration, and mentors contribute perspectives on approaches that have been successful (or not). It is a privilege to be funded to work on such a pedagogical collaboration, which offers blocks of time devoted to thinking about teaching and to spreading effective teaching practices.

Applications for the PALM Network are accepted throughout the year with deadlines of February 28, April 30, July 30, and October 30. Visit the website at https://palm.ascb.org for details on how to apply.



About the Author
Mary Spiro is ASCB's Science Writer and Social Media Manager.

Spring Council Meeting Throws Spotlight on Career Development, Training Grants, and Future Science Trends

By Mary Spiro

Progress on the Society's strategic plan, new career enhancement programming, National Institutes of Health (NIH) training grants, and emerging areas in science were among the topics discussed on May 15 at the spring ASCB Council Meeting in Bethesda.

ASCB CEO Erika Shugart described recent progress toward the goals of the Society's five-year strategic plan. She noted a planned web redesign, more joint meetings with outside entities (such as the cancer cell imaging meeting held with the National Cancer Institute in April), future collaborations with EMBO, the popularity of the ASCB Public Engagement Grants funded by Science Sandbox, new career development webinars, and new white papers and on scientific topics of interest and relevance to membership. Shugart noted that some exciting projects aligned with the strategic plan arose from proposals submitted for the $50,000 program initiation fund that Council set aside for proposals from committees, tasks forces, and staff. The first round of applications resulted in funding for proposals from the Minorities Affairs Committee and the Committee for Postdocs and Students, and a joint proposal from the Women in Cell Biology and Education Committees. Details on those programs will be forthcoming. Decisions will be made in late summer on the second round of proposals.

Council members spent part of the morning in roundtable discussions to determine the Society's priorities for professional development. Following the discussions, each table reported its career enhancement ideas, and these ideas were put to a vote to rank interest in them. Favorites included the broad topics of "alternative careers" and "education" tying for first and "measures of scientific success" coming in second.

Joshua A. Gordon, director of the National Institute of Mental Health at NIH, gave a presentation on potential scientific opportunities for cell biologists in research related to neuronal-based mental health disorders. The agency seeks to understand the complexity of multiple interactions within the cell and how it impacts cell function, most notably in autism and schizophrenia. The contributions of cell biologists are also needed in characterizing the cell types in the atlases being constructed of the mouse and human brains.

Jon Lorsch and Alison Gammie led an interactive discussion about new criteria for NIH's MIRA (Maximizing Investigator's Research Award) and R01 training grants. Lorsch is the director of the National Institute of General Medical Sciences (NIGMS), and Gammie is director of the NIGMS Division of Training, Workforce Development, and Diversity. They also discussed some of the changes on the horizon for the T-32 training grant program and how they may affect cell biologists. (For a deeper discussion of this topic and more, refer to the June 2018 President's Column and the full-length interview that ASCB President Jodi Nunnari conducted with Lorsch, both online on the ASCB Post.[1])

Later in the afternoon, Councilors had a lengthy discussion about future trends in science. Some of the questions they considered included what are the most

critical emerging disciplines, what are some new technologies and how can cell biologists share them/use them, who or what entities can help ASCB achieve its strategic goals to address these trends, and what are some of the relevant "nonscientific" issues that the Society should focus on.

The Council approved the results of a financial audit that was conducted in 2017. The Council also heard updates about membership, the website, GDPR compliance efforts, the Society's journals, fundraising, and the scientific programming at the 2018 ASCB|EMBO Meeting in San Diego. On May 16, several Council members joined committee members and ASCB staff to participate in the annual Hill Day where they visited with members of Congress to discuss science and science policy (see p. 37).

Footnote

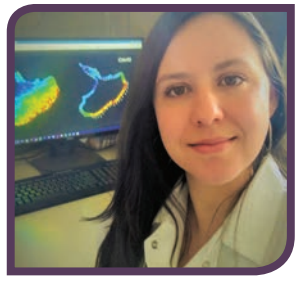
[1]Full interview: www.ascb.org/Lorsch_Interview; President's Column: www.ascb.org/ascb-post/careers/toward-a-miratocracy-interview-with-jon-lorsch.

ASCB Awards Seven Public Engagement Grants

By Mary Spiro

Quyen Aoh

Molly Gordon



Briana Gregg

Daniel Kramer

ASCB awarded its new Public Engagement Grants, supported by Science Sandbox, an initiative of the Simons Foundation, to seven finalists for the 2018 awards cycle. The grantees will receive from $10,000 to $35,000 to realize their bold ideas, with the mission of engaging their local communities in the process of science and increasing public scientific literacy.

This year's recipients are:

Quyen Aoh of Gannon University has started the Feeding Minds and Families program, which brings together Gannon University faculty, staff, and community partners to encourage interest in STEM and related careers in an after-school program at Strong Vincent Middle School in Erie, PA. Students will learn about STEM through interactive, hands-on activities followed by family meal gatherings with local leaders in the STEM fields.

Lorena Benedetti of Yale University will host the Flipped Science Fair in New Haven, CT, where middle school student judges will evaluate presentations from

graduate students and postdocs, thus "flipping" the traditional science fair concept. Middle school students will learn about research from real scientists in small groups and be able to ask questions or try hands-on demonstrations. The graduate students and postdocs will be coached to make their science accessible to a general audience while keeping the subject matter exciting, understandable, and relevant.

Third- and fourth-grade students in Baltimore, MD, will be able to participate in an after-school program that blends art and science called Science Outside the Lines (SOTL) created by **Molly Gordon** of the Johns Hopkins University School of Medicine. Gordon aims to use paints, ceramics, ink, and mixed media to reinforce concepts taught within the Baltimore City Public School STEM curriculum. SOTL will partner with a local nonprofit, Art With A Heart, to develop several interactive lessons executed by graduate students and postdocs from Johns Hopkins.

Briana Gregg of the University of California, Davis, will pilot a new extension of the university's K–12 Young Scientist Program called Stockton CAN (Close the Achievement gap Now). Stockton CAN's mission is to improve access to science enrichment activities for socioeconomically disadvantaged and minority students. Students will benefit from peer-mentorship and immersive, hands-on science activities while preparing for the 2019 San Joaquin County Science Olympiad.

Daniel Kramer from the University of California, Berkeley, has developed a program called the Berkeley Outreach Science Selection that pairs graduate students in the life sciences with a local school for a three-year period. During this time, grad student teams will create customized hands-on scientific demonstrations based on the state's Next Generation Science Standards and will train teachers on how to use them to support their science curriculum.

Larissa Vingilis-Jaremko of Toronto's York University will direct her prize to the Canadian Association for Girls In Science (CAGIS), a volunteer-run science club for girls aged 7–16 that she founded. Chapters hold monthly events where they bring girls to the workplaces of women and men in STEM fields to do fun, hands-on activities. The grant will be used to modernize and increase the organizational efficiency of CAGIS, create a new website and stronger online presence, and secure long-term funding.

Schools in a six-county region of rural Virginia will benefit from a student research network fostered by the Prince Edward County Environmental Molecular Biology Institute (PECEMBI), undergraduate students of Hampden-Sydney College and Longwood University, and life science high school students. The program, developed by **Michael Wolyniak** of Hampden-Sydney College, pairs undergraduates with faculty mentors who will help them create solutions to bring long-term authentic research experiences to these high schools comprised primarily of students from groups traditionally underrepresented in the STEM disciplines.

"These public engagement projects show the deep commitment of ASCB members to their communities and illustrate thoughtful, creative approaches to sharing science with a wide range of students," said ASCB CEO Erika Shugart. "Through the generous support of Science Sandbox, an initiative of the Simons Foundation, ASCB is thrilled to be able to provide funding to strengthen and expand these programs."

Projects chosen reflect the Science Sandbox mission to "bring science to the people" and were selected by a review committee that consisted of Jill Blackford, Senior Program Associate, Science Sandbox; Jeanne Garbarino, Director, RockEDU Science Outreach; Janet Iwasa, University of Utah School of Medicine and ASCB Public Information Committee; Lee Ligon, Rensselaer Polytechnic Institute and ASCB Public Information Committee Chair; Ashley Rowland, University of Colorado, Boulder, and ASCB Committee for Postdocs and Students; Erika Shugart, ASCB CEO; Sarah Weisberg, Chief Scientist, BioBus; and Scott Wilkinson, National Institutes of Health and ASCB Committee for Postdocs and Student.

Dolan Wins 2018 Bruce Alberts Award for Excellence in Science Education

By Mary Spiro

Erin Dolan, professor of biochemistry and molecular biology and Georgia Athletic Association Professor for Innovative Science Education at the University of Georgia (UGA), will receive the 2018 Bruce Alberts Award for Excellence in Science Education. Dolan is being recognized for her dedication as Editor-in-Chief of ASCB's education journal, *CBE—Life Sciences Education*, and for developing the Course-based Undergraduate Research Experiences (CURE) movement.

Erin Dolan

"I can attest to the fruits of Erin's labor myself," said committee chair Melanie Styers. "At a recent NSF Day in Alabama, faculty members from across the state were talking about CUREs as a result of a workshop Erin led at the University of West Alabama. I should also note that the nominating letters highlighted that not only is Erin a national player, but she also 'practices what she preaches' in her own classroom."

Through her research at UGA, Dolan elucidates factors influencing the social and psychological development of undergraduate researchers and the roles that research mentors play in undergraduate researchers' learning, development, and educational and career pursuits. Although much research has been done to determine how people learn and factors that cause them to remain in (or leave) STEM education, Dolan said that little is known "about how to incentivize and support faculty members at the undergraduate and graduate level in teaching and mentoring in ways that are consistent with this research."

Dolan's knowledge of learning research informs her instruction, as evidenced by this anecdote shared by her colleague at UGA, Paula Lemons. While sitting in on one of Dolan's classes, Lemons observed, "The students in my group engaged with the activity, asked each other questions, and clarified their understanding through discussion. At the end of the class period…one of the students in my group said, 'Wow! Is class over already?' …How could a teacher do any better job than to engage students so much in learning that students lose track of time?"

Dolan's interest in the underpinnings of good science education trace back to the University of California, San Francisco, where, while earning her PhD in neuroscience, she volunteered in K–12 schools. She notes, "The teachers we worked with were interested in learning the science in order to help their students learn, rather than just learning it to do well on a test. It was a whole different way of thinking about education for me, and it changed the course of my career."

Since then, Dolan has strived to understand research experiences as learning environments and to help others make use of evidence-based methods for teaching and mentoring students. From 2014 to 2016, she was founding executive director of the Texas Institute for Discovery Education in Sciences, a teaching innovation initiative at the University of Texas, Austin. She created and directed professional

development programming on active learning and research mentoring, including intensive sessions for faculty to develop CUREs. With National Science Foundation support, she founded CUREnet, a network of people and programs integrating research into undergraduate courses.

The ASCB Bruce Alberts Award for Excellence in Science Education is given each year to an individual who has demonstrated innovative and sustained contributions to science education, with particular emphasis on the broad local, regional, or national impact of the nominee's activities.

Dolan will formally receive her award and present the Bruce Alberts Award lecture on Monday, December 10, at 11:00 am during the 2018 ASCB|EMBO Meeting in San Diego.

ASCB Joins Effort to Transform DORA into a Tool for Change

By Anna Hatch, DORA Community Manager

The San Francisco Declaration on Research Assessment (DORA) originated at the 2012 ASCB Annual Meeting when a group of editors and publishers of scholarly journals recognized the need to reform research assessment, in particular the practice of using journal-based metrics to describe the quality of individual research articles. Now nine organizations, including ASCB, have committed funds and in-kind support for two years to transform DORA from a statement of intent into a tool for meaningful policy change. DORA has released a new website (www.sfdora.org) and is curating examples of good practices in research assessment that the community, especially funding agencies and academic institutions, can use as a resource to strengthen their own hiring, promotion, and funding policies.

At the time of its launch, DORA brought long-standing tensions to the surface and caused the community to think critically about how the outputs of scholarly research are judged. One obvious problem was that the Journal Impact Factor (JIF) was—and still is—frequently being used as a shortcut to evaluate scientists. The JIF, as implied by its name, speaks to the journal and not the merits of individual research articles. It was designed as a tool to help librarians make decisions about purchasing journal subscriptions. JIFs are easily skewed by review articles, which typically receive more citations, or by a small number of highly cited papers. None of this speaks to the quality of work published by an individual researcher, so the use of the JIF in that context is clearly inappropriate.

Inappropriately used metrics bear heavily on scientists' careers, especially when it comes time to apply for funding or faculty positions and during tenure decisions. The declaration calls on researchers, institutions, publishers, funding agencies, and metrics providers to reform practices by making specific recommendations to each community.

Over 12,000 individuals and nearly 500 organizations have signed DORA since its release more than five years

ago. The list of signatures continues to grow; recent influential signatories include the Bill & Melinda Gates Foundation and Nature Publishing. Other, complementary movements have materialized to help create change. The Leiden Manifesto, which was published in 2015, provides 10 guiding principles to reduce the misuse of metrics like the JIF in research evaluation.[1] The Metrics Toolkit (www.metrics-toolkit.org) is a resource that helps researchers and evaluators understand what a metric means, how it is calculated, and if it answers the intended question.

The JIF is not the only shortcut misused in research and researcher assessment. Personal biases compromise the integrity of research evaluation processes. Organizations need to be thoughtful about defining criteria to assess the outputs of scholarly research to ensure fair evaluation.

DORA has launched a series of live online interviews to hear from individuals who have created change in their organization and to facilitate conversations about good practices. The first interview was on May 14 with Sandra Schmid, Cecil H. Green Distinguished Professor in Cellular and Molecular Biology and chair of the Cell Biology Department at University of Texas Southwestern Medical Center, who is a former ASCB President and former Editor-in-Chief of *Molecular Biology of the Cell.* The interview focused on her forward-thinking approach to hiring junior faculty. More information about the interview series can be found on the website (www.sfdora.org/blog).

Reference

[1]Hicks D, Wouters P, Waltman L, de Rijcke S, Ismael Rafols I (2015). Bibliometrics: The Leiden Manifesto for research metrics. *Nature* 520, 429–431. doi:10.1038/520429a.

ECM Stiffness Modulates *Listeria* Infection of Endothelial Cells

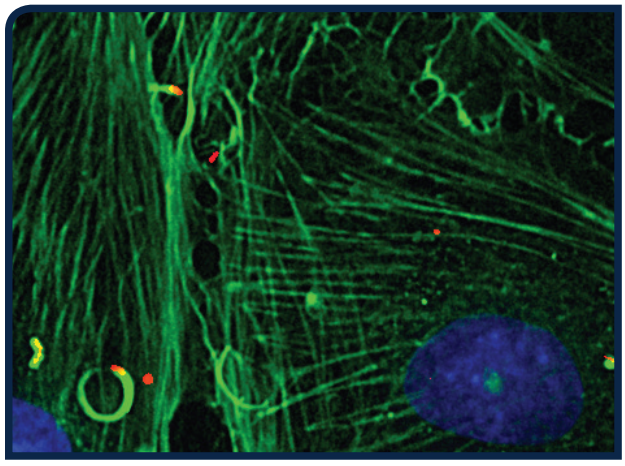
By Mary Spiro

The extracellular matrix (ECM) exerts great influence on cell function. New research from the Stanford University School of Medicine shows for the first time how the stiffness of the ECM impacts the ability for cells to become infected by the deadly *Listeria monocytogenes* bacteria.

Stanford professor of biochemistry, microbiology, and immunology and HHMI Investigator Julie Theriot led a team of researchers that included lead investigator Effie Bastounis from the university's Department of Biochemistry and Yi-Ting Yeh from the University of California, San Diego, Department of Bioengineering. The trio looked at how ECM stiffness affected the susceptibility of human microvascular endothelial cells (VEC) to become infected by *Listeria*.

"We provide the first evidence that ECM stiffness, through the concomitant changes it elicits to host cells, does indeed impact their susceptibility to *Listeria* infection," Theriot said. To discover this, the Theriot team fabricated hydrogels of varying degrees of stiffness to simulate different physiologically relevant ECM locations and matrix changes that can occur due to aging or disease. The VEC cells were then cultured in each environment.

"Previous studies have shown that the stiffness of the ECM surrounding blood vessels can vary significantly in space (location within the vascular tree), in time (aging), and with pathophysiological conditions (for example, arteriosclerosis, hypertension, cancer)," Bastounis explained. "Based on these studies we chose our substrates' stiffness to span a range from 0.6 (typical of brain tissue) to 70 kPa (typical of stiff atherosclerotic big vessels)."



Endothelial cells infected with *Listeria* shown in red. Host cell actin and bacterial actin comet tails are shown in green and nuclei in blue. Theriot Lab.

This new study gives insight into how a patient suffering disease-damaged ECM, for example, could be vulnerable to pathogens. "Studies have shown a positive correlation between atherogenesis and susceptibility to infection, yet it is unknown if bacterial infections lead to atherosclerosis or if stiff atherosclerotic regions are more prone to infection," Theriot said. "We have shown that endothelial cells residing on stiff matrices are more susceptible to infection, suggesting that potentially with aging and other diseases where vessel stiffness increases, bacterial dissemination might be favored."

Specifically, the team discovered that ECM stiffness

led to increased focal adhesion kinase activity, which in turn led to increased amounts of vimentin at the surface of VECs and then the accompanying infection. "That is, there were more VEC infected by *Listeria* on the more stiff gels," Bastounis said. "It is plausible that if stiffness is the only thing changing in older or scarred tissues, then those would be more susceptible to infection."

The research creates potential therapeutic targets. "One could envision the use of anti-vimentin antibodies or drugs targeting surface vimentin to decrease infection susceptibility," Theriot said. "Also, our work suggests that in cases where bacteria are used as drug delivery systems one should take into consideration the local ECM stiffness for optimal delivery."

"Matrix stiffness modulates infection of endothelial cells by *Listeria monocytogenes* via expression of cell surface vimentin" appeared in the July 1, 2018, issue of *Molecular Biology of the Cell.*

Member Benefit: Publicize Your Book

Are you publishing a book? If so, let ASCB know! Send the title, publisher, ISBN information, and a thumbnail (300 dpi) of the cover. We'll include it in the *ASCB Newsletter*. This publicity is available only to ASCB members. Please send submissions to Thea Clarke at tclarke@ascb.org.

ASCB Member Benefit: One-on-One CV Review

Need some help with a cover letter, CV, resume, statement of teaching philosophy, or other document for the next step in your career? Members of the ASCB are willing to help. Just fill out a short form (www.ascb.org/cvreview), and we'll put you in touch with a reviewer. Then the two of you can decide which digital collaboration tool to use (email, Google Docs, Skype, Wikispaces, etc.). You must be a current ASCB member to take advantage of this service.

Highlights from

MBoC

MOLECULAR BIOLOGY OF THE CELL

Some noteworthy Features from recent issues

Archaeal imaging: leading the hunt for new discoveries
Alexandre W. Bisson-Filho, Jenny Zheng, and Ethan Garner (July 15)

A beginner's guide to rigor and reproducibility in fluorescence imaging experiments
Jen-Yi Lee and Maiko Kitaoka (July 1)

Genetically encoded lipid biosensors
Rachel C. Wills, Brady D. Goulden, and Gerald R. V. Hammond (July 1)

In memoriam: George Oster, UC Berkeley, 1940–2018
Alexander Mogilner (June 15)

Here are just a few of the important recent papers that the MBoC *Editorial Board has selected for highlighting:*

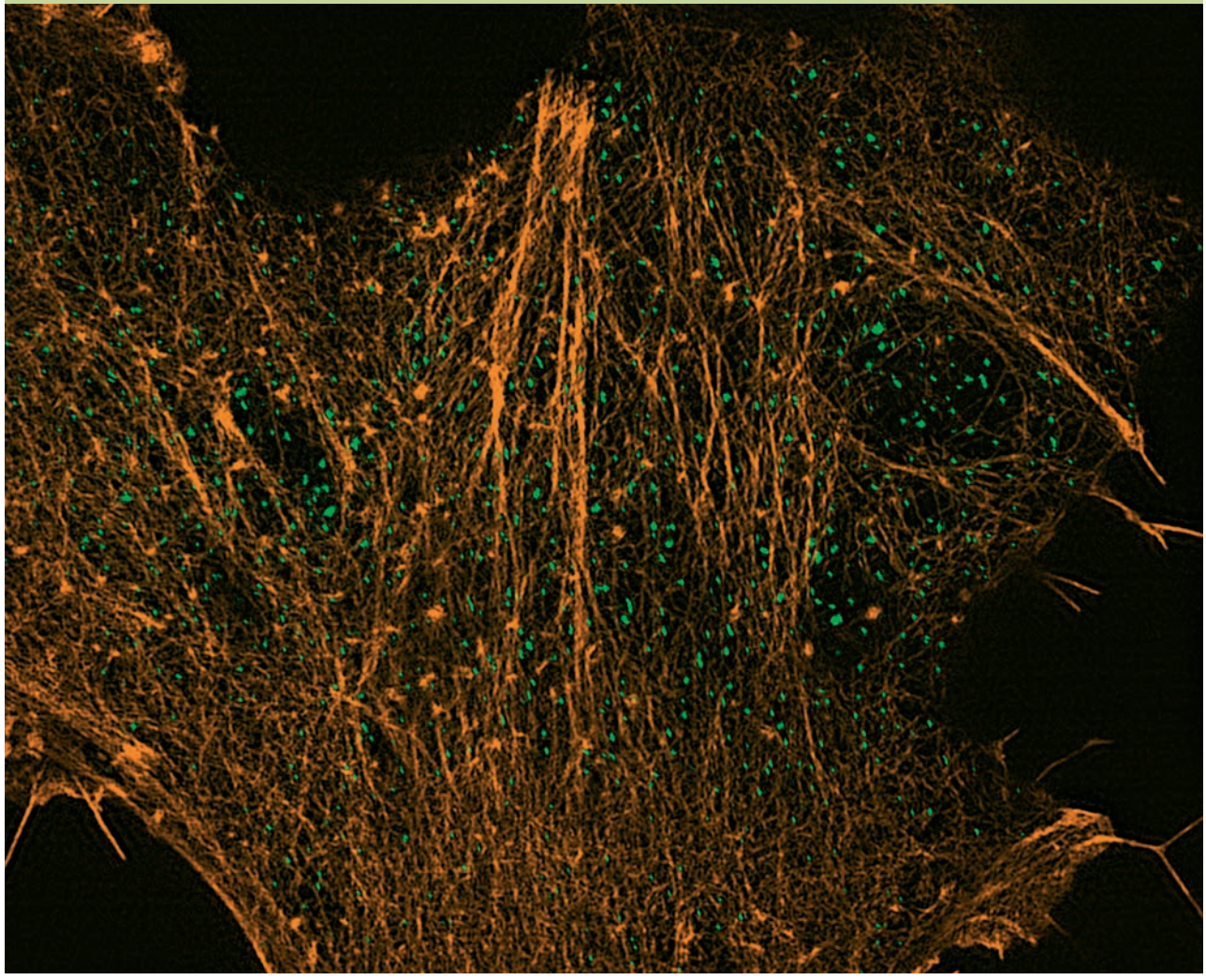
PI(3,5)P2 controls vacuole potassium transport to support cellular osmoregulation
Zachary N. Wilson, Amber L. Scott, Robin D. Dowell, and Greg Odorizzi (July 15)
PI(3,5)P2 is a lysosomal lipid crucial for cellular osmotic regulation. It is shown that PI(3,5)P2 aids cellular osmoregulation by controlling cation storage within the yeast vacuole, primarily by regulating the vacuolar transport of potassium, a critical osmolyte in cells.

Actin-dependent regulation of cilia length by the inverted formin FHDC1
Sarah J. Copeland, Andrea McRae, Giulia Guarguaglini, Laura Trinkle-Mulcahy, and John W. Copeland (July 1)
The primary cilium is a microtubule-based organelle that acts as a hub for a variety of signaling pathways. The formin FHDC1 regulates cilia assembly through interaction with the subdistal appendage protein Cep170. The effects of FHDC1 on cilia are F-actin–dependent and separate from FHDC1 effects on the Golgi.

A data-entrained computational model for testing the regulatory logic of the vertebrate unfolded protein response
Danilo R. Diedrichs, Javier A. Gomez, Chun-Sing Huang, D. Thomas Rutkowski, and Rodica Curtu (June 15)
The authors describe a computational model of the vertebrate UPR, entrained on and tested against experimental data. It explains previously unknown or unaccounted-for features of the response and reveals the logic underlying its complex wiring.

Phosphorylation of MCAD selectively rescues PINK1 deficiencies in behavior and metabolism
Meredith M. Course, Anna I. Scott, Carmen Schoor, Chung-Han Hsieh, Amanda M. Papakyrikos, Dominic Winter, Tina M. Cowan, and Xinnan Wang (May 15)
PINK1 is a mitochondria-targeted kinase whose mutations are a cause of Parkinson's disease. We found that PINK1 mediates the phosphorylation of MCAD, a mitochondrial matrix protein critical to fatty acid metabolism. Mimicking phosphorylation of this protein restores PINK1 deficiencies in behavior and metabolism in *Drosophila*.

under the microscope



About the Image

Total internal reflection fluorescence structured illumination microscopy (TIRF-SIM) reveals spatial coordination of endoplasmic reticulum (ER)–plasma membrane (PM) junctions and cortical actin. ER–PM junctions, the contact sites between the ER and the PM, mainly localize in the regions devoid of cortical actin. This image shows ER–PM junctions (green) and cortical actin (gold) at the adherent surface of a HeLa cell. Studies by Hsieh *et al.* (*Mol. Biol. Cell* 28, 3171–3180) characterize spatial organization of ER–PM junctions in the cell. (Image: Ting-Sung Hsieh, UT Southwestern Medical Center)

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KEYNOTE LECTURE

Sean J. Morrison
Director, Children's Medical Center Research Institute, University of Texas Southwestern Medical Center/HHMI

SYMPOSIA

SUNDAY, DECEMBER 9

Nuclear Organization **8:00–9:30 am**
Ibrahim I. Cissé, Massachusetts Institute of Technology
Ana Pombo, Berlin Institute for Medical Systems Biology
Arjun Raj, University of Pennsylvania

Cell Migration **9:45–10:45 am**
Anna Huttenlocher, University of Wisconsin, Madison
Michael Sixt, IST Austria

Neuronal Cell Biology **9:45–10:45 am**
Erika L.F. Holzbaur, University of Pennsylvania
J. Paul Taylor, St. Jude Children's Research Hospital/HHMI

MONDAY, DECEMBER 10

Cytoskeletal Dynamics **8:00–9:30 am**
Anna Akhmanova, Utrecht University, The Netherlands
Andrew Carter, MRC Laboratory of Molecular Biology, UK
Bruce Goode, Brandeis University

Metabolism **9:45–10:45 am**
Heather Christofk, David Geffen School of Medicine at UCLA
Robert Farese, Jr., Harvard School of Public Health and Harvard Medical School

Regeneration and Morphogenesis **9:45–10:45 am**
Hans Clevers, Hubrecht Institute, The Netherlands
Magdelena Zernicka-Goetz, University of Cambridge, UK

TUESDAY, DECEMBER 11

Organelle Communication **8:00–9:30 am**
Heidi McBride, McGill University
William Prinz, National Institute of Diabetes and Digestive and Kidney Diseases, NIH
David M. Sabatini, Whitehead Institute for Biomedical Research and Massachusetts Institute of Technology

WEDNESDAY, DECEMBER 12

Quality Control **11:20 am–12:20 pm**
Rachel Green, Johns Hopkins University School of Medicine
Peter Walter, University of California, San Francisco/HHMI

MINISYMPOSIUM/MICROSYMPOSIUM TOPICS

Autophagy and Proteostasis
Biology of Stem Cells
Cell Cycle, Cell Division, Cell Death
Cellular Stress Responses
Centrosomes, Cilia, and Flagella
Cytoskeletal, Motility, and Cell Mechanics
Evidence-Based Education: Promoting Excellence through an Inclusive Environment
Membrane Organization and Trafficking
Metabolism
Morphogenesis and Multicellular Interactions
Neurobiology/Neurodegeneration
Neuronal Cell Biology
Nucleus
Pathogens
Phase Transitions
Stem Cells and Organoids

IMPORTANT DATES AND DEADLINES

September 4 Abstract Submission Deadline (Poster Only)
September 4 Travel Award Deadline
October 4 Early Registration Deadline (rates go up on October 5)
October 10 Final Abstract Submission (Poster Only; higher fee)
November 16 Hotel Reservation Deadline. ASCB and EMBO's Official Housing Partner is onPeak. Be sure to book through onPeak and book early for the best rates!

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https://ascb-embo2018.ascb.org


Beyond Homeostasis:
Stem Cells Under Stress
2018 ascb doorstep meeting
december 8 • san diego, ca
Ballroom 6AB, San Diego Convention Center, San Diego, CA
Registration and abstract submission are now open at ascb-embo2018.ascb.org.
Abstract deadline is Wednesday, October 10. You must be registered to attend to submit an abstract.
* You must be an ASCB member to attend the doorstep meeting. Discounted registration is available to those who also register for the 2018 ASCB|EMBO Meeting. The doorstep meeting is limited to the first 200 registrants.


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Emerging Voices

A column by the
Committee for Postdocs and Students (COMPASS)

How to Get Started in STEM Outreach

By Sam Dundon

Public outreach is an essential piece of the scientific endeavor. Federal funding is a critical driving force for cell biology, and that funding must have taxpayer support. Unless the public has a basic understanding of the scientific process, that support is likely to decline. Recently, the scientific community has watched with growing concern as an increasingly vocal public distrust of science and academia has emerged. The good news is that there have been increased efforts among scientists to actively engage with their communities through public outreach. Among the most visible of these efforts was the March for Science, the second of which was held in April 2018.

If there is an ongoing event that fits your desired target audience and subject material, get involved with that program instead of duplicating efforts....

I frequently hear colleagues express an interest in getting involved in community outreach, but too often this is followed up with "I don't even know where to start." Here I hope to illuminate those first few steps, to provide a basic roadmap of how to get involved in activities already taking place, and to give you ideas to initiate your own outreach events.

Get the Lay of the Land and Identify Potential Allies

Just as your experimental design relies upon the advancements others have made before you, it is best to use preexisting programs and resources available at your institution for outreach. There may be dedicated outreach groups you can contact. Even if there are not, multiple institutional offices and groups will be able to give you information on who is doing outreach and what programs and community affiliations are already established. At your institution, check with the office of grants and projects, the office of community interaction/public communications, the office of the provost for fundraising, the education department, and graduate student and postdoc groups. In the community, contact libraries, museums, and youth groups. If there is an ongoing event that fits your desired target audience and subject material, get involved with that program instead of duplicating efforts and dividing the target audience.

Determine Your Activity

If you decide to initiate your own program, identify an unfulfilled need that fits logically with existing programs and has a reasonable budget given your resources. Perhaps there are activities for young children and for adults but nothing for young adults. Maybe graduate students visit local classrooms to discuss the scientific method, but there are no follow-up programs for students to engage in hands-on experimentation. Prioritize active learning techniques

(see https://ctl.yale.edu/ActiveLearning for resources on this topic) and limit the amount of content you want to share. Having extra discussion time for interaction between attendees and facilitators is preferable to squeezing in extra content. Participants will better remember a few, well-communicated points than a deluge of facts.

When determining the specific activity, consider the intersection between the specialties of interested allies and the target audience. Early on, investigate any special considerations necessitated by your target audience, such as required training for working with minors. This may complicate the planning process and affect which target audience(s) you work with. As early as possible, work on a budget and identify appropriate funding sources, because this will also impose limitations on what activities can be planned.

Participants will better remember a few, well-communicated points than a deluge of facts.

Organize Your Event

In my experience, one of the biggest challenges for planning outreach programs is the same as for any event with multiple collaborators: keeping track of what needs to be done and who is doing it, and keeping in frequent contact with involved parties. Meetings either in person or via teleconferencing are often more effective than long email chains for getting everyone on the same page and making sure progress is being made at an acceptable rate.

The more parties that are involved, the more complicated the tracking process will be. With that in mind, forge a small number of alliances with groups/departments/offices at your institution to help organize and run the event, as well as a community contact to help reach your target audience. Use these allies to identify and book an appropriate venue. Consider how the target audience and activities will affect this. A local bar may be a suitable place for holding a panel discussion for adults but is inappropriate for hands-on activities or young children.

When working with schools, it is best to work with your institution's outreach or education office and use preexisting partnerships. This not only allows you to tap into any training programs that already exist but improves the sustainability of your program by tapping the resources of multiple schools. Prior to the event, contact teachers to determine current topics and what you can expect students to already know.

Reach out for volunteer facilitators and speakers through targeted mailing lists (e.g., relevant departments, graduate students, postdoctoral researchers, and outreach groups) and implement a vetting process. Explicitly communicate expectations and remind volunteers that they will be serving as the face of their profession during the event. If there will be speakers, hold auditions and schedule rehearsals to get feedback from a lay audience. Encourage volunteers to invite questions from attendees and listen carefully to understand the scientific background of attendees and what they are interested in.

Plan All the Event Details

- Plan the date and time of your event with your institution and community calendar in mind. You do not want to compete for attendees with similar events.
- How, where, and to whom will you advertise?
- Are RSVPs or registrations required?
- How will you communicate logistical details to registrants prior to the event?
- Who will greet attendees at the door and provide logistical information/directions?
- Will people be hungry at the time of day you are planning your event? How will you feed them and how might this affect their attention (and your budget)?

- If students are being dropped off by parents, how will you monitor the pickup process at the end of your event?
- How will you monitor attendance?
- Where will you get any necessary materials, and how will these be paid for? ASCB's COMPASS offers Outreach Grants to help defray expenses (www.ascb.org/compass-outreach-grants). Plan your event far enough in advance and with sufficient detail that you can provide a budget when applying for funding. What can you get donated? Look into venues that will allow you to use the space free of charge, and contact local companies to sponsor activities.

[R]emind volunteers that they will be serving as the face of their profession during the event.

Make It Sustainable

When planning your event, start small and aim for sustainability. How will you keep the program going in the long term? How will you keep the material fresh for follow-up events? Ask speakers to reach out to their networks and recommend new speakers. They will have a good sense of others in their community who are interested in "sharing their gift" through public outreach.

Keep estimates of attendance, which is critical for securing funding for next events from granting agencies and support from your institution. If your institution has an outreach office with a mechanism for tracking attendance by school children (e.g., the Yale University Pathways to Science program), plug into this resource. Advertise your event at other outreach programs and advertise for these at your event to encourage repeat attendance.

There are two essential components to running a successful outreach program: Keep everything as organized as possible and enjoy yourself! These activities have the opportunity to benefit both sides. Outreach events can correct misconceptions that scientists and the public may have of each other. But they are also an amazing opportunity to renew your excitement about science and investment in your research while working to increase scientific literacy in your community.

The unbridled excitement in the face of a child who just saw something as mundane as an air bubble for the first time through a microscope reminds me just how amazing it is that my job is to push the bounds of human knowledge. With a bit of effort and enthusiasm, I can encourage that child to envision a future in STEM and help his or her parents understand why we spend their tax dollars on research.

Acknowledgments

The author gives special thanks to Ann Lavanway, Maria Parente, Claudia Merson, Valerie Grover, and Daniel Goduti.

About the Author

Sam Dundon is a postdoctoral fellow in the lab of Thomas Pollard at Yale University.

A column by the Minorities Affairs Committee

Diversity Matters

ABRCMS and SACNAS: Building a Bridge to Cell Biology through Mentorship and Community

By James A. Olzmann and Milton To

Achieving a diverse and inclusive scientific community is a goal shared by ASCB and many other organizations. Diversity-oriented Science, Technology, Engineering and Mathematics (STEM) conferences serve an important role in supporting aspiring minority scientists at critical times in their training. Two of the largest of these conferences are the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) conference and Annual Biomedical Research Conference for Minority Students (ABRCMS).

ABRCMS and SACNAS provide undergraduate and graduate students with opportunities to present research, hone professional development skills, discover new research fields, learn about graduate programs, and acquire new strategies for success in STEM careers. In addition to scientific presentations, shared meals, small group workshops, and social events promote network and community building. Indeed, following attendance, students report greater research confidence and a sense of belonging to a scientific community.[1]

Critical to the success of these conferences are the faculty who attend, present, and interact with students. A large number of faculty volunteers are also required to judge presentations and provide students with feedback. Personal interactions with students at this stage can have an enormous impact, and members of ASCB serve as important ambassadors of the cell biology community. Conversations with students at their posters and during social events may seem like small gestures, but they contribute to an overall impactful experience that increases student confidence and scientific identity. Ultimately, minority students' belief that their efforts are valuable, that they are part of a scientific community, and that they can succeed are important predictors of perseverance in academic science and the pursuit of a scientific career.[2]

ASCB takes an active role at these conferences and members of the ASCB Minorities Affairs Committee (MAC) often participate in an ASCB-sponsored booth, providing information to students about careers in cell biology and the many benefits of professional societies such as ASCB. The ASCB MAC also organizes scientific and professional development sessions to further introduce and expose students to the exciting world of cell biology research.

If you would like to learn more about these efforts and/or how you can get involved in ASCB efforts at ABRCMS and SACNAS, please contact James Olzmann (olzmann@berkeley.edu), Sydella Blatch (sblatch@ascb.org), or other members of the ASCB MAC.

References

[1]Casad BJ, Chang AL, Pribbenow CM (2016). The benefits of attending the annual biomedical research conference for minority students (ABRCMS): the role of research confidence. *CBE Life Sci Educ* 15, ar46.

[2]Estrada M, Woodcock A, Hernandez P, Schultz PW (2011). Toward a model of social influence that explains minority student integration into the scientific community. *J Educ Psychol* 103, 206–222.

SACNAS: San Antonio, TX; October 11–13, 2018
ABRCMS: Indianapolis, IN; November 14–17, 2018

About the Authors

James A. Olzmann is an assistant professor in the Department of Nutritional Science & Toxicology at the University of California, Berkeley, and is a member of the ASCB Minorities Affairs Committee. Milton To is a graduate student in the Comparative Biochemistry Program at the University of California, Berkeley.

Information from the Public Policy Committee

Science and Society

NIGMS Redefines Graduate Training

By Kevin Wilson

During his interview with ASCB President Jodi Nunnari,[1] Jon Lorsch, director of the National Institute of General Medical Sciences (NIGMS), gave her a hint of the upcoming changes to the NIGMS training program. In describing the changes, Lorsch said "We're focused on improving the diversity of training, both in terms of the people doing the science, and the trainees themselves. Changing the focus of the didactic portion of the curriculum away from a kind of fact-based teaching model to one in which we are focusing on the range of skills that are needed to be an outstanding scientist."

When NIGMS first published its proposal to make changes to the current training programs, the announcement said that the goal was to modernize the existing system and train future scientists for a completely different biomedical research enterprise in the United States.

The initial Funding Opportunity Announcement focused on five points:

- Emphasize the development of a diverse pool of exceptionally well-trained scientists;
- Focus on skills development, rigor and reproducibility, inclusive and supportive training environments, and responsible conduct;
- Address conflicts in the incentive structure of the research enterprise that adversely impact biomedical graduate education;
- Encourage the use and dissemination of evidence-based, innovative educational and mentoring practices;
- Emphasize improvements in career preparation (broadly defined), and dissemination of career outcomes on publicly available sites.

NIGMS is not looking for applications that only add additional activities to existing programs, Lorsch explained. Instead, the institute will be expecting transformational ideas. In Lorsch's interview with ASCB, he said, "We're not asking programs to just tack new stuff on in the way they might have done for some requirements in the past. We want them to relook at everything they're doing and rework it. If someone wants to teach skills instead of facts, don't just put a skills course in. Get rid of your facts course and replace it with a skills course or get rid of most of the facts courses."

Reference

[1]Nunnari J (2018). Toward a MIRAtocracy: An interview with NIGMS director Jon Lorsch. *ASCB Newsletter* 41(3), 7–11. The full interview can be seen at www.ascb.org/Lorsch_Interview.

A Good Bill with Bad Implications

By Kevin Wilson

Since 2011, Representative William Lacy Clay (D-MO) has introduced a bill in each Congress with a very noble goal: to require that appointments to federal agency advisory committees be made without consideration of political involvement or party membership. Unfortunately, the good intentions also could mean significantly more paperwork for those on U.S. National Institutes of Health (NIH) study sections and an added administrative burden for the NIH.

The ASCB has been working to educate Congress about the implications of this bill since first learning about it.

Unlike in previous years, Rep. Clay's bill, H.R.70, the Federal Advisory Committee Act Amendments of 2017, has been speeding through the halls of Congress. It was passed by the full House of Representatives one day after being introduced, an achievement that is almost unheard of, especially when the sponsor is a member of the minority party.

Only after being approved by the Senate Committee on Homeland Security and Governmental Affairs did the bill get the attention of the NIH advocacy community. If the bill were to become law, it would have significant inadvertent consequences for the peer review system at the NIH and the Food and Drug Administration. The bill is now one of a number of bills that could be passed by the full Senate at any time. The next step after Senate passage would be the White House to be signed into law by the president.

In letters to the Senate Majority Leader Mitch McConnell (R-KY) and Senate Minority Leader Chuck Schumer (D-NY), ASCB President Jodi Nunnari and CEO Erika Shugart outlined the implications of the bill. H.R.70 "would change a peer reviewer's status from 'consultant' to 'Special Government Employee.' It is estimated that this change in status would require each scientist who agrees to serve on a peer review study section to complete 13 forms, totaling 90 or more pages in length. Once completed, it would take the federal government from 6 months to even a year to review and approve the forms."

During the ASCB Leadership Hill Day after the May Council Meeting, Hill Day participants raised concerns about the bill with senators and Senate staff. In the weeks following the Hill Day, we have heard from the office of at least one senator who is concerned about the implications of the bill on research in his state.

ASCB Leadership on the Hill

By Kevin Wilson

The day after the spring ASCB Council Meeting, eight ASCB Council members were joined by five members of ASCB committees for a series of meetings on Capitol Hill. The Council members included ASCB President Jodi Nunnari, ASCB President-elect Andrew Murray, ASCB Treasurer Gary Gorbsky, ASCB Secretary Kerry Bloom, and Council members Bob Goldstein, Julie Theriot, Rebecca Heald, and Janet Iwasa. Also joining were Minorities Affairs Committee member Deepali Bhandari, Committee for Postdocs and

Members of the ASCB leadership on Hill Day. (L-R) Jodi Nunnari, Rocio Gomez, Kerry Bloom, Sadie Wignall, Andrew Ewald, Gary Gorbsky, Deepali Bhandari, Bob Goldstein, Julie Theriot, Andrew Murray, Erika Shugart, Rebecca Heald, Janet Iwasa, Sue Jaspersen.

Students member Rocio Gomez, Public Policy Committee member Sue Jaspersen, and Membership Committee members Sadie Wignall and Andrew Ewald.

The Council and committee members had meetings with 29 congressional offices from 10 states. During their meetings, ASCB members thanked the members of Congress and congressional staff for the $3 billion increase the U.S. National Institutes of Health (NIH) received in the FY18 federal budget and the 3.9% increase for the National Science Foundation. ASCB members did express concern about possible restrictions on certain areas of NIH-funded research that could be included in the FY19 NIH budget.

Members of Congress do not always understand how important an open U.S. immigration policy is to the American biomedical research community. ASCB's leadership took the opportunity to remind Congress of the importance of immigration.

Finally, in their meetings with Senate offices, ASCB members raised concerns about HR 70, Federal Advisory Committee Act Amendments of 2017, a bill with the aim of prohibiting politically motivated appointments to federal advisory committees. The bill, which could be approved by the Senate and signed into law by the president, has the unintended consequence of imposing significant administrative burdens on NIH study section participants. (See accompanying story.)

NIH Has a Data Plan

By Kevin Wilson

The volume of data produced by the biomedical research community continues to grow rapidly. However, there has been no widely adopted plan to make data more accessible and user friendly.

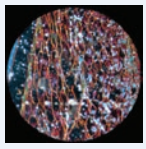
In March of this year, the U.S. National Institutes of Health (NIH) published a draft of its Strategic Plan for Data Science (https://bit.ly/2I9FmaH) and also published a Request for Information (RFI) (https://bit.ly/2I7VFVL) seeking input from stakeholders, including members of the scientific community. With the implementation of the plan, NIH hopes to accelerate the pace of biomedical research and related medical discoveries.

In response to the RFI, the ASCB submitted comments to the NIH. ASCB's comments included opposition to allowing the private sector to host any data and support for keeping data freely available and not restricted behind paywalls. ASCB also strongly supported efforts to encourage authors to make all supporting supplementary data available for any publication supported with federal funding.

The final report issued by the NIH in early June 2018 contains a number of the proposals included in the ASCB comments, among them the public hosting of data, the open sharing of all data sets, and the development of easy-to-use databases for depositing raw data.

The ASCB's complete set of comments are available at www.ascb.org/dataRFIresponse.

Highlights from



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If you are new to education research and wondering where to start, explore the **Anatomy of an Education Research Study** at http://www.ascb.org/annotations and learn about the design, conduct, interpretation, and presentation of education research.

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Career Navigator

A column by the Women in Cell Biology (WICB) Committee

The Science and Art of Mentoring

By Christine Pfund

We often do not seize the numerous opportunities we are afforded to shape the learning experiences of our mentees, let alone influence the environments in which those experiences transpire. We do not frequently enough embrace the art of mentoring.

Stretching beyond Best Practices

Contemplate the scenario of working with a new undergraduate or graduate student. Experienced mentors, using evidence-based practices, understand the importance of helping new mentees develop a research project, establishing and aligning clear expectations for the relationship, and communicating regularly and effectively. Some best practices toward achieving these aims include 1) thoughtful, intentional project design that takes into account the mentee's background and interests; 2) use of written mentoring compacts (examples can be found at https://bit.ly/2lFc2Qz); and 3) regular conversations using active listening strategies.

Yet even the most skilled mentors can stretch beyond these best practices. They can improve the learning experiences they are shaping by purposely providing opportunities for the mentees to network and engage with others, finding ways for mentees to immerse themselves in the discipline, fostering a sense of belonging within the research team and the department, and creating spaces for mentees to share their ideas.

Moreover, mentors can influence the environment, enriching both physical spaces and climate. For example, mentors can decide which images to hang on the walls, influence the topics and tenor of discussions around the lab, and model ways in which all team members are valued and celebrated. Importantly, culture informs and influences art and vice versa in amazing ways. If we are open to learning about diverse cultural perspectives, then that knowledge can help us shape experiences and environments in which mentees from diverse backgrounds can flourish, providing space for them to interpret the art in their own ways and demonstrating that we value their different perspectives.

[M]entors can decide which images to hang on the walls, influence the topics and tenor of discussions around the lab, and model ways in which all team members are valued and celebrated.

Art or Science?

A colleague recently asked me if the practice of mentoring was science or art. As a researcher who studies mentorship, my immediate response was "science." My colleagues and I have spent more than a decade studying mentoring and teaching mentoring skills. I supported my point by noting that the National Academies of Sciences, Engineering, and Medicine recently launched a consensus study entitled "The Science of Effective Mentoring in Science, Technology, Engineering, and Mathematics" (https://bit.ly/2yQLcOQ). Yet, over the following weeks, I found myself

contemplating the question more deeply and considering the art of mentoring and the role of mentor as artist.

My pondering motivated me to do a bit of research, which began with a quick Google search using three words: art, science, and mentoring. It turns out that the well-known scholar of mentoring, networking, and diversity, Joan Reede, Dean for Diversity and Community Partnership and associate professor of medicine at the Harvard Medical School, gave a talk entitled "The Art and Science of Mentoring" in 2015. During her lecture she encouraged faculty to find people and places that fostered their career growth. She noted the importance of identifying environments in which one's work is valued and mentoring for advancement is offered. Her comments furthered my thoughts on the ways in which mentors, like artists, shape and influence experiences and environments.

Much work has been done to define attributes for effective mentoring relationships and to develop evidence-based training for both mentors and mentees to gain competency in these domains.[1] Scientific investigations of mentorship are growing, and many research projects are underway to better identify critical factors in mentoring relationships across a range of variables. In fact, the National Institutes of Health will fund a second phase of its National Research Mentoring Network (www.nrmnet.net) with support for multiple research studies aimed at understanding why, for whom, and in what circumstances mentoring approaches are effective.

Clearly, the science of mentoring is advancing, but what about the art of mentoring? Is there room for both? Consider a faculty member with a decade of mentoring experience who has engaged in hours of mentor training. This mentor is likely to have a wealth of knowledge and a deep skill set with approaches for addressing a wide range of mentoring challenges. Some would argue that there is an art to deciding when to use specific approaches for optimal impact. In many ways, this scenario parallels that of a well-trained artist, who possesses all of the supplies needed (e.g., paints, brushes, canvases) and all of the skills required to paint. Despite all of this preparation, the artist must still decide what, where, and when to paint. I would argue that the role of mentor as artist stretches even beyond this analogy. Mentors have the opportunity and privilege of engaging in the interactive art of mentoring, shaping the learning experiences of their mentees and the environments in which those experiences take place and adjusting their approach as needed.

Mentors have the opportunity and privilege of engaging in the interactive art of mentoring....

The opportunity to take on the role of artist and shape an experience is an idea that has been discussed in teaching for a long time. In fact, many books have been written on the art of teaching. Consider this: Teachers create learning experiences. As teachers, we map out pathways (syllabi) to walk students through multifaceted learning experiences. We make decisions on how to engage students in learning, choosing to engage them actively or passively. We craft a range of activities to promote and support learning. In short, we provide a canvas, draw some sketches as a starting point, provide materials and direction, offer encouragement and resources along the way, and coach students toward success. Hopefully we also work to create safe, interactive, inclusive, and inspiring environments.

The recently released report entitled "Graduate STEM Education for the 21st Century" recommends that "faculty should cultivate their individual professional development skills to advance their abilities to improve educational culture and environments on behalf of students."[2] The science of mentoring demands that we consider evidence-based practices in our mentorship, but the art of mentoring invites us to explore the creative ways in which we can shape the learning

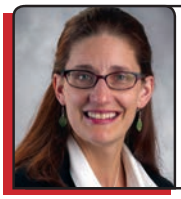
Career Navigator

experiences and environments of our diverse group of trainees in ways that instill a sense of belonging and support their development.

References

[1]Pfund C, Byars-Winston A, Branchaw J, Hurtado S, Eagan K (2016). Defining attributes and metrics of effective research mentoring relationships. *AIDS Behav* 20(Suppl 2), 238–248.

[2]National Academies of Sciences, Engineering, and Medicine (2018). *Graduate STEM Education for the 21st Century*. Washington, DC: The National Academies Press. https://doi.org/10.17226/25038.



About the Author
Christine Pfund is a scientist in the School of Education at the University of Wisconsin-Madison.

DEAR LABBY

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Predators and Prey in Publishing

DEAR LABBY: I'm a mid-career faculty member in a biology department at a large public university. Our department has been fortunate to recruit some really promising new assistant professors within the last few years. I try to check in on the new cell biologists on a fairly regular basis, to see how things are going, usually over lunch off campus.

At a recent meeting, one of the more anxious recent hires told me about the pressure he feels to publish, especially as his last annual review suggested he needed to step things up. He told me he'd just had a paper published, although I could tell from his body language that he wasn't very happy about the journal. I was surprised that I'd never heard of the journal, since we work in fairly similar areas, and when I looked it up I was shocked by the kind of work they were publishing. I've read a few stories about so-called "predatory journals," and I'm concerned that he seems to have fallen into this trap. What advice do you have to prevent this from happening to other colleagues?

—Alert Mentor

DEAR ALERT: You've raised an important issue. Several factors have created opportunities for the predatory journals you describe. About 2.5 million English-language articles are published every year, and that number increases by 3%–7% every year. Over 96% of journals in science and technology are now online. In addition, many new journals use the open access model, in which content is freely available and the costs of publication are supported in other ways, including the payment of a publication fee by the authors.

Open access publication has many benefits, but like most good things, it attracts bad actors who have found ways to profit from this new model. By one estimate there are about 8,000 predatory journals that publish more than 400,000 articles every year![1] These journals do not have any semblance of peer review, they sometimes list impressive but completely fake editorial boards, and they accept essentially everything sent to them, even submissions that fail to meet even minimal scientific standards.

It's easy to understand why scientific publishing has attracted bad actors ready to exploit scientists. Whereas the cost to set up one of these "journals" is minimal—all you need is a website and an email account—there is plenty of money to be made from authors' fees. There's no need to bother with expensive peer review.

Publishing real science in these venues is, simply put, a waste. Labby fears that your colleague is likely to find that funding agencies and tenure committees don't place any value on this publication and that he's lost the ability to include the data in a publication in a respectable journal.

So how can scientists guard against the predators? Labby's first rule of thumb is to send papers only to journals that Labby reads and finds to be reliable sources of good science (naturally, at this point, Labby's list includes quite a few online open access journals). Are people you know and respect on the editorial board of journals you are considering? If the journal is new to you, reach out to the editorial board member and ask about it. Is the journal indexed in Medline? If it is, that's a good indication that it's a bona fide publication. If it isn't, it may be a good new journal that just hasn't published long enough to be eligible for listing, but you'll probably want to do some more checking. A good resource is the Directory of Open Access Journals, which uses "Principles of Transparency in Scientific Publication" to review open access journals and lists those that adhere to these principles on its website.

Finally, Labby commends you for going out of your way to help mentor your junior colleagues and hopes they will follow your example.

—Labby

Reference

[1]Cenyu Shen C, Björk B-C (2015). 'Predatory' open access: a longitudinal study of article volumes and market characteristics. *BMC Medicine* 13, 230.

ASCB Member Benefit: One-on-One CV Review

Need some help with a cover letter, CV, resume, statement of teaching philosophy, or other document for the next step in your career? Members of the ASCB are willing to help. Just fill out a short form (www.ascb.org/cvreview), and we'll put you in touch with a reviewer. Then the two of you can decide which digital collaboration tool to use (email, Google Docs, Skype, Wikispaces, etc.). You must be a current ASCB member to take advantage of this service.

member profile

Omar Quintero

Omar Quintero, associate professor of biology at the University of Richmond, studies mechanisms that drive actin-based mitochondrial transport in mammalian cells. He enjoys helping his undergraduate-only research team build an understanding of actin-based intracellular transport. "One of the most exciting things that I get to experience is introducing students to modern microscopy and watching their amazement at seeing fluorescently labeled cells," Quintero said. "Each time I train a new student, it is like I get to experience seeing something under the microscope for the first time all over again."

Quintero was recently elected to serve on the ASCB Council, beginning in 2019. He hopes to challenge the Society to encourage members to become better science communicators. "Whether it is giving a Minisymposium talk at the Annual Meeting, chatting to your neighbor about GMOs, talking to your Congresswoman about NIH funding, or addressing a classroom of students about inheritance patterns in diploid organisms, the goal is the same—you are in a position to teach someone something valuable. As a professional society, I'd like ASCB to pay attention to helping our members become better teachers of their science, particularly in classroom settings."

An avid skateboarder in his youth, Quintero said the sport prepared him for academia. "Most of the time that we were skating we were failing at what we were trying. You'd try a trick, and most likely you'd fall. You'd brush yourself off, think about what went wrong, and try again. By the time I got to science, I was well prepared for the amount of time and troubleshooting that it takes to get something to work out. It has always been more about the journey than the result."

upcoming early career meetings

Rocky Mountain Membrane Trafficking Meeting
Aurora, CO
August 17, 2018

The Northeast Nuclear Envelope Meeting
New Haven, CT
September 14, 2018

Florida Translational Cell Biology
Gainesville, FL
September 21, 2018

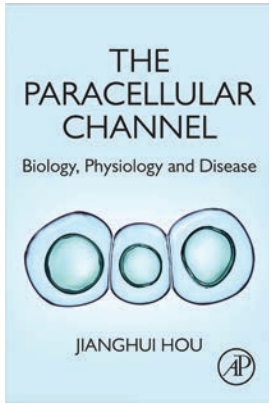
ASCB is pleased to provide Early Career Meeting Grants to graduate students and postdocs to organize one-day meetings. Such meetings usually involve two or more institutions (within the United States or international), and topics can range from basic science to career development as long as there is clear relevance to the broadly defined field of cell biology.

The next deadline to apply for funds will be in January 2019. Applicants must be or become members of the ASCB.

For more information visit www.ascb.org and click on "Meetings."

books by members

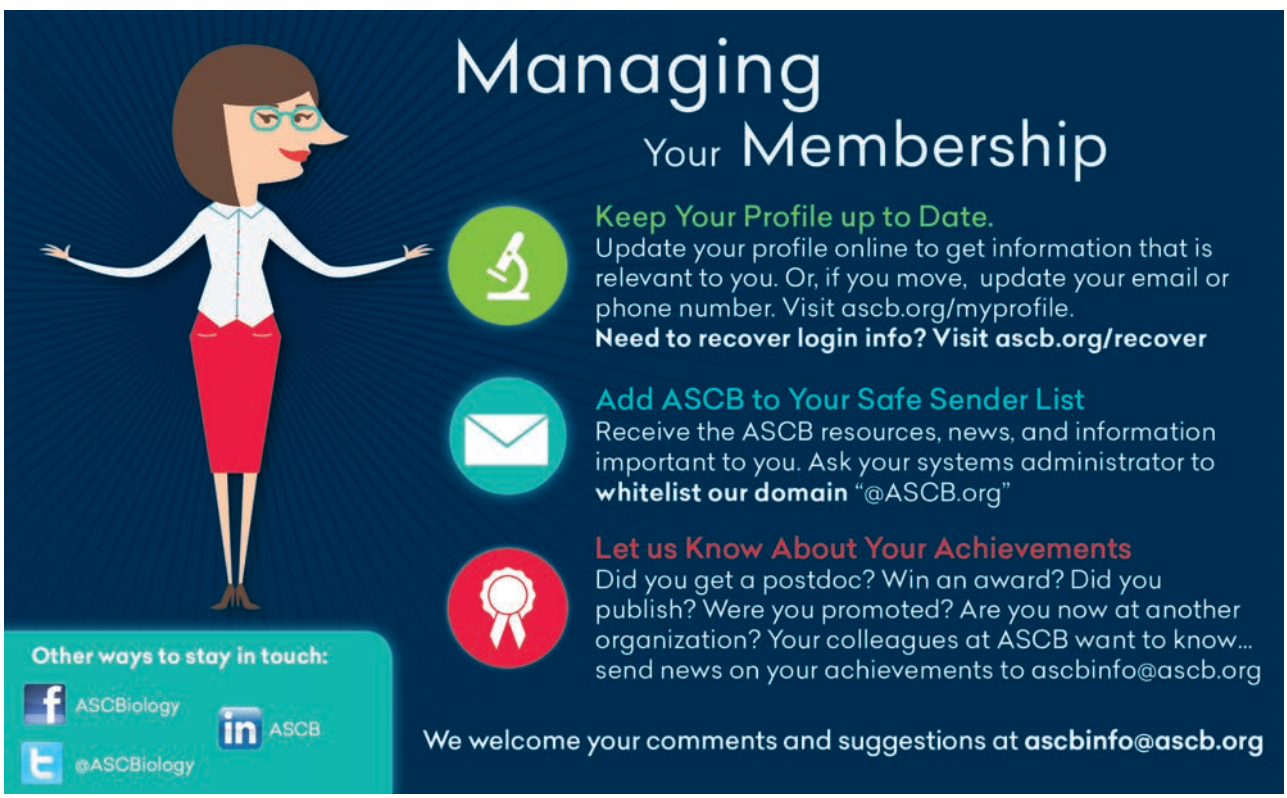
First in Fly: *Drosophila* Research and Biological Discovery by Stephanie Elizabeth Mohr, Harvard University Press, ISBN 9780674971011.



The Paracellular Channel: Biology, Physiology and Disease by Jianghui Hou, Academic Press, ISBN 978-0-12-814635-4

The *Newsletter* Welcomes Letters to the Editor

Have thoughts you'd like to share with your colleagues? We'd be happy to consider your Letter to the Editor for publication in the *ASCB Newsletter*. Write to the Editor at mleader@ascb.org.



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ASCB Launches New Partnership Initiative

The ASCB Partnership Initiative brings together ASCB members, as well as external stakeholders such as other organizations, in order to support priority programs of the Society that address the challenges and opportunities facing the field of cell biology including public support for science, workforce issues, and interdisciplinary science.

The Initiative supports programs in professional development and outreach as well as collaborative opportunities to learn, share ideas, and network among ASCB members. These programs are designed to move us beyond the status quo and to elevate our impact in meaningful ways.

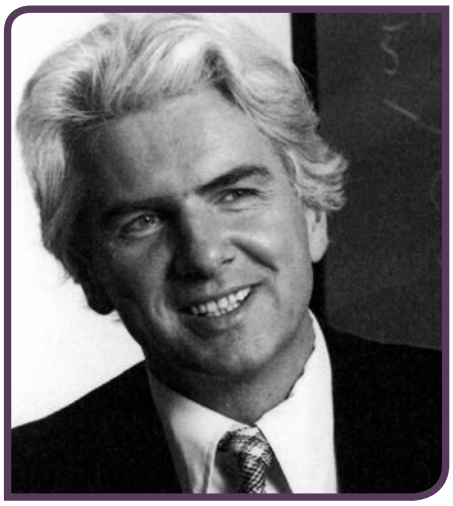
These efforts are supported by the hard work of the Development Committee.

- Thoru Pederson, University of Massachusetts (Chair)
- Robin Kleiman, Biogen
- Jennifer Lippincott-Schwartz, Howard Hughes Medical Institute
- Harvey Lodish, MIT
- Andrew Murray, Harvard University
- Jodi Nunnari, University of California, Davis
- Laura Pajak, Beckman Coulter
- Patrick Schnieder EMD Millipore
- Erika Shugart, ASCB CEO

ASCB has raised over $100,000 toward our goal of $300,000 in commitments from individuals, companies, and other organizations before the end of the 2018 calendar year. Will you help us reach this ambitious goal?

To learn more about the Partnership Initiative, or to get involved, contact Erika Shugart at eshugart@ascb.org.

in memoriam



Credit: Ingbert Grüttner/The Rockefeller University.

Günter Blobel: A Voyager of the Cell

By Thoru Pederson

It was with profound sadness that the cell biology community learned of the death of Günter Blobel on February 18, 2018, unanticipated by most outside his immediate circle. We can always envision "creators" in science but should be cautious in bouncing this term around too loosely. Günter Blobel, who served as ASCB president in 1990, was a true creator of the modern era of cell biology.

Günter Blobel was born in 1936 in a part of Germany then known as Silesia. He and his family fled west during World War II and on his exit the young boy went through Dresden, recently bombarded into near-oblivion by the Americans. As we shall see, this experience affected him deeply.

After completing medical school at Tübingen, Günter turned away from the clinic to biology and set his sights on America. He joined the University of Wisconsin lab of Van Potter, who was gaining prominence for trying to connect cancer with what today would be called cell biology. Günter received his PhD in 1967 and got a post with George Palade's group at Rockefeller University.

At Rockefeller, Keith Porter had discovered the endoplasmic reticulum (ER) and its studded ribosomes. The Palade group saw this structure as a clue to function that could give rise to actionable experiments. When Günter joined the Palade lab he soaked up this gestalt.

The notion that membrane proteins somehow slip into preexisting membranes as a simple ΔG and/or ΔS event in accord with the preexisting thermodynamics of that membrane (descended over billions of years of life on Earth) was one of the main features at the cell biology movie house in the mid-20th century. But the discovery of the ER gave rise to the idea that maybe there was something more. One clue that this explanation was incomplete was that although membrane proteins might indeed assemble into the ER membrane as a formal constituent, other proteins were headed elsewhere, namely outside of the cell.

In 1975 Günter and his associate Bernhard Dobberstein published two stunning papers in which they showed that an N-terminal sequence targets a nascent polypeptide to the ER. They erected the "signal peptide hypothesis" to capture these findings.

The subsequent arrival of Peter Walter and Reid Gilmore in the Blobel lab led to a second and powerfully transformative insight. They discovered a machine that propelled the translocation of signal peptide–bearing nascent polypeptides into the ER: the signal recognition particle (SRP) and its receptor in the ER membrane. In subsequent work Walter and others in the Blobel lab showed that the SRP is a RNA-protein complex that arrests translation after the N-terminal signal peptide is synthesized. Upon

docking with the ER-located SRP receptor, later discovered in the Blobel lab, this translational block is released, now topologically "forcing" the resumed translational elongation to place the nascent polypeptide into an ER channel, later dubbed the translocon.

These discoveries of protein secretion and the machine that accomplishes it are among the greatest exemplifications of biochemistry informing cell biology that either discipline has ever had. These advances later led to unanticipated new findings, such as the unfolded protein response pioneered by Peter Walter. The discovery of the SRP even reached back in cell biology to the ancient nucleolus, which my lab discovered to be the site of SRP assembly, a second function of this organelle beyond ribosome synthesis.

The Blobel lab later delved into how the nucleus manages its export and import. This led to major advances in this field, which had been moving a bit sluggishly before. Others had by then discovered nucleus localization signals in certain proteins but the mechanism lurked as an unresolved problem. Today, the definitive description of nuclear pore complexes stands as an accomplishment of Blobel and his lab members and other colleagues at Rockefeller.

Günter Blobel attracted legions of brilliant students and postdocs, as scientists of his charisma always do. He showed them the ropes and taught the skills needed to compete in the often tough forum of science, in which he had won wings, while always conveying his passion for wanting them to go on and do well. His trainees have written a powerful remembrance that captures their beloved mentor in perfect ways.[1]

In my nearly 50 years of knowing Günter Blobel I always saw an open mind and a generous demeanor. He kept his sense of humor close to his chest but on those occasions when it spontaneously broke forth, his hearty laugh almost made the walls rumble. His enthusiasm for discovery was as infectious as that of any scientist I have ever known, and his passionate desire to instill this in the next generation was a signature of his mentorship.

As many know, when Günter received the Nobel Prize (unshared) he donated the almost $1 million to the restoration of both the cathedral and synagogue in Dresden. The images of those structures in ruin that he saw as a young boy had never left him. We might reflect on this about our dear friend and colleague. It may say more about him than anything else. We shall not see the likes of Günter Blobel any time soon.

Reference

[1]Blobel Lab Trainees (2018). Günter Blobel: Pioneer of molecular cell biology. *J. Cell Biol.* 217, 1163–1167.

Note

This article is based on a more-detailed obituary published in *Molecular Biology of the Cell* (*Mol Biol Cell* 29, 1281–1283).

About the Author

Thoru Pederson is the Vitold Arnett Professor of Cell Biology in the Department of Biochemistry and Molecular Pharmacology at the University of Massachusetts Medical School.

in memoriam

Ian Gibbons

Ian R. Gibbons, Cell Biology Pioneer Who Discovered Dynein

By Peter Satir

With the death of Ian Gibbons on January 30, 2018, at the age of 86, cell biology and the ASCB have lost one of their most important early contributors. These early pioneers unraveled the structure–function relationships of cell organelles for which the fine structure had been defined by transmission electron microscopy (TEM) around mid-century. Then almost every image was novel and opened new vistas. Ian was a young Englishman, trained at Cambridge University first in physics and then in a zoology department with a long tradition of studies of cilia and flagella. It was with the electron microscopy of cilia that Ian first made his mark, with beautiful images of the 9+2 pattern in termite flagellates and mussel gill cilia, published in the then fledgling *Journal of Cell Biology* (the *Journal of Biophysical and Biochemical Cytology*).

As a rare electron microscopist in the 1950s, Ian obtained a service position at Harvard, with the proviso that he could do his own research half-time. During a lunchtime meeting of George Wald's group, Ian met Barbara Hollingworth, a research biochemist. In 1961, they married, forming a personal and professional team that lasted until Barbara's death in 2013. Barbara brought protein chemistry to their collaboration. Ian was normally the spokesperson for the team; he almost always understated the significance of their results, which were marvelously illustrated and impeccably presented. He was disinclined to speculate.

There was little to work with in cell biology 60 years ago. Even the nature of the cell membrane in relation to the cytoplasm was in dispute. Beginning in 1963, using high-resolution TEM to follow the effects of detergents on isolated *Tetrahymena* cilia, Ian demonstrated that the membrane enclosing the cilium could be solubilized, leaving the ciliary cytoskeleton (the axoneme). After demembranation, dialysis against EDTA solubilized almost all of the axonemal ATPase activity. Restoring Mg^{2+} resulted in restoration of about half of the protein and ATPase activity. TEM showed that the ATPase activity resided in the arms attached to the ciliary doublet microtubules. In 1965, Ian named this protein "dynein." Dynein, the first known microtubule motor protein, was the focus of Ian's major work for the rest of his career.

In 1967, Ian and Barbara were recruited by

Bob Kane to the Kewalo Marine Laboratory of the University of Hawaii. This proved to be the perfect place for their work. People who were trainees with them, including David Asai, Win Sale, and Jerry Chun, recall their time there as extremely pleasant and useful. It was in this setting, using readily available sea urchin sperm, that Ian made most of his groundbreaking discoveries.

First, Barbara and Ian found that after removal of the membrane, addition of ATP in the appropriate ionic solution would reactivate the sperm axoneme to copy the in vivo beat. Shortly thereafter, with Keith Summers, Ian showed that if trypsin was added before reactivation, the doublet microtubules of the axoneme would slide apart. Trypsin destroyed links and radial spokes that were necessary to convert unrestricted sliding into bending and motility. When Ian presented movies illustrating this work at an ASCB meeting, he received a standing ovation.

I first met Ian at Harvard while doing my thesis. I thought TEM could be used to discover how cilia moved. Ian's beautiful confirmation of axonemal sliding clinched the sliding microtubule model of ciliary motility that I had previously advocated based on evidence that seemed difficult for many to believe at the time. Ian and I became colleagues and friends, working as co-organizers on many projects together, notably two conferences held at Hakone, Japan. Several times, I visited Barbara and Ian in Hawaii with my wife Birgit and our children, and our children played with their children on the beach. I believe that this mutual appreciation helped the science move forward.

When the invention of PCR in 1985 led to gene cloning and sequencing, Ian adapted the procedure to the cloning of dynein—specifically the ca. 500-kDa heavy chain ATPase from sea urchin axonemes—a task few others would have attempted. This great feat opened up the detailed molecular biology of the dyneins, leading to a study defining phylogeny and expression of all dynein isoforms in sea urchin, including the multiple inner and outer arm axonemal dyneins, the single cytoplasmic dynein, and the dynein that turned out to be responsible for intraflagellar transport in primary cilia. Ian and Barbara were awarded the E.B. Wilson medal in 1994.

Ian was director of the Kewalo Laboratory from 1992–1996. In 1997 he and Barbara decided it was time to move back to the mainland. Barbara retired, but Ian was appointed a visiting researcher at University of California, Berkeley, with Beth Burnside. Later he worked at the University of California, San Francisco, with Ron Vale. In 2005, forty years after the discovery of dynein, Ian proposed a new mechanism for energy transmission in dynein from the coiled-coil stalk that changes configuration to produce the stepping of the molecule.

Ian was elected a Fellow of the Royal Society in 1983. He was awarded the International Prize of Biology by the Japan Society for the Promotion of Science in 1995 and the Shaw Prize in Life Science and Medicine with Ron Vale in 2017. Unfortunately he was too sick to travel to Hong Kong to accept this award.

Shortly after Ian's death, his children, Wendy and Peter Gibbons, organized an intimate memorial for him at his home in the Orinda hills with friends, family, and colleagues. The day was filled with personal and scientific reminiscence, music, and memories.

About the Author
Peter Satir is Distinguished University Professor Emeritus in the Department of Anatomy & Structural Biology, Albert Einstein College of Medicine.

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See pg. 30 for a list of scientific topics

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