Science Education: It Is Broken… Can We Fix It?

by Joan R. Goldberg

Today scientific education is like American healthcare, profoundly—but not irrevocably—broken. Of course, I’m no early bird or lonely voice in the wilderness making this claim. ASCB Past President Bruce Alberts’ voice has been heard loudly and clearly for quite some time, in these pages and that of Science, to name two of many venues. But despite the chorus of influential voices, and shining examples of proven approaches, progress has been slow. The average American high school and undergraduate student is more likely to be turned off science than turned on.

Why should we care? First: Love of science shouldn’t be limited to the privileged few. Second: An understanding of science is critical to making good choices, whether as a patient, consumer, activist, or voter. Third: It remains true that if we are not part of the solution, we are part of the problem. Last, and most practically, scientific learning is critical to prepare students for a host of jobs and challenges that we, as a society, need to fill and meet.

The Problem

Developing ideas, testing hypotheses, evaluating data: Not a bad way to select a medical procedure, buy a house, or choose a political candidate, is it? So why then do many students fail to see the

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value of scientific training? And why do many educators fail to teach science in an engaging way?

The answers are legion and often repeated:

- Because it’s always been done “this way.”
- Because large lecture classes and fact-based testing weed out the seriously interested from the casually curious.
- Because teaching biology as is typically done at large academic institutions is more cost-effective, and researcher-professors don’t care about teaching...or learning.

The last concerns me most because it offers the greatest opportunity for change, in attitude and action. I suspect that boring lectures and cookie-cutter lab exercises may be more a consequence of time-starved schedules, pedagogical uncertainty, and inertia than active resistance. After all, implementing inquiry-based education requires different curricula, teaching techniques, and testing mechanisms. Moreover, all should be assessed and proven effective, and teachers need to learn how to use them.

Interested? Educators can change their teaching by baby steps and giant steps. And institutions can improve their learning outcomes by change at the class, department, and school level. The ASCB Annual Meeting regularly spotlights individuals and approaches making a difference; this year's meeting in San Diego, CA, December 5–9, is no exception.

Considering Solutions

First, you need to understand the data. On December 5 at the ASCB Annual Meeting, Northwestern University researchers Gregory Light and Denise Drane will present a workshop based on data collected for the 10-year-old, carefully evaluated Gateway Science Workshop program. Beyond improving student performance, the program focuses on class experience and retention.

Is improvement possible? Learn from Light and Drane about how to promote peer mentoring, engage students in conceptual problem solving and collaborative group work, foster underrepresented students, and develop research training in introductory courses.

Introductory [undergraduate] biology courses can... demonstrate the relevance and excitement of scientific concepts and research. Transforming these courses from “bridges to nowhere” to means of engaging students by spotlighting what’s relevant to contemporary problems was the goal embraced by Karen Oates and Wm. David Burns. The two were honored by ASCB last year for their program, Science Education for New Civic Engagements and Responsibilities (SENCER).

SENCER courses may be aimed at nonmajors or offered as electives, but majors can be transformed too. One way to do this is to transform freshman chemistry, physics, mathematics, and biology courses as gateways to various majors. At this year’s ASCB Annual Meeting (December 9), David Botstein will discuss Princeton University’s curricula integrating the computational with the biological, while Malcolm Campbell will present Davidson College’s model, and Robert Lue Harvard’s.

A recent Science editorial by physicist and Nobel laureate Carl Wieman, points to still more exciting, tested approaches...at the course and department level. Both University of British Columbia and the University of Colorado, Boulder, have incorporated evidence-based teaching methods into most of their undergraduate science courses. These include setting explicit learning goals related to demonstrated student capabilities, using collaborative activities, and implementing pre- and postcourse testing to assess learning.

Innovation in High Schools

How can you engage high school students? What can you do when your department won’t discuss the problem, and your principal points to financial woes? Don’t give up!

High school biology fans the initial flame...or extinguishes it. A recent report notes that without high levels of math and science learning for all students, the U.S.—like other countries—won’t prepare our students for future demands. The report, The Opportunity Equation: Transforming Mathematics and Science Education for Citizenship and the Global Economy, calls for a few clear, high, common standards across the U.S. The standards must be matched by high-quality assessment; schools must be redesigned to deliver needed education effectively and equitably. Moreover, teachers...
must be recruited and prepared differently for the task. The Carnegie Corporation of New York (funder of ASCB’s African workshops) and the Institute for Advanced Study (IAS) Commission on Mathematics and Science Education released the report.

Academically rigorous math and science learning needs to focus on “re-engaging our most disconnected students,” the report noted. At the same time we need to provide “opportunities for the most successful students in math and science to accelerate beyond what is traditionally available in high school.”

For the first goal, the report recommends increasing partnerships between higher education and K–12 systems. The second goal may be furthered by individual partnerships.

Improving K–12 education—and the related efforts of well-meaning scientists—was the focus of a 2006 ASCB Annual Meeting Education Initiative Workshop. Patricia Caldera and Jean MacCormack presented their Science and Health Education Partnership (SEP) workshop to train scientists in effective K–12 outreach. Scientists need to be appropriately ambitious, assess their audience, involve all students, consider students’ development level, formulate learning goals, and form a partnership with the teacher, the presenters stressed.

Partnership, not condescension, is critical. (See page 7.) The National Science Resources Center (NSRC), an organization of the National Academies and The Smithsonian Institution, advocates for partnership as well. Focusing on establishing effective, research-based science programs for all students, NSRC offers workshops and supporting materials. When working scientists share their passion for science, lab exercises that inspire and teach, and a close-up view of what they do, high school teachers can follow through in the classroom.

Research experience in a lab…for students and their teachers, many argue, including ASCB member Sam Silverstein, is critical too. Jennifer Roecklein-Canfield will discuss how to incorporate research experience for undergraduates on December 9. Her Education Minisymposium will take place in San Diego.

Challenging curriculum is also important. Educational reform requires curricula that are pilot-tested, refined, and proven effective.

Before schools will focus on reforming math and science education, however, communities need to believe in the goal. That’s why the Carnegie-IAS report calls for public campaigns to preach the centrality of math and science to revitalizing the economy.

**Improving Undergraduate Education**

The ASCB, National Academies, Carnegie, and IAS are only a few of the many organizations intent on improving science education. The National Science Foundation (NSF) has played a critical role and continues to do so. In 2006 it began an initiative to improve introductory biology courses. In July 2009 the NSF brought together 500 researchers, educators, and policymakers to assess progress on this front. Their conclusion: More needs to be done.

The NSF is now offering $50,000 “incubator grants” to help researchers and educators develop proposals focused on improving mentoring, developing curricula, providing student research experiences, and developing faculty. NSF expects to fund even more programs aimed at improving undergraduate science education and retaining and improving graduation rates for science majors, particularly underrepresented minorities.

Why do academic scientists need help in meeting these goals? As provost of the University of North Carolina, Charlotte, Joan Lorden stated in *Science*, “We hire new faculty with big start-up packages and expect them to set up their labs and get going on their research. Then we say, ‘Here’s your course load. And by the way, we’d like you to be an innovative instructor.’ But rarely do we give them the support they need to succeed.”

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offers workshops aimed at improving educators' classroom skills and assessment of effective student interventions. Other professional societies offer some sessions focused on education at their meetings as well.

**Has a New Day Begun?**

If articles, reports, workshops, U.S. Secretary of Education Arne Duncan, and other influential voices—like that of Bruce Alberts and last year's Public Policy Awardee Maxine Singer—strike the same note regarding goals and strategies, are we closer to a turning point? Has the time finally come for broad-scale science education reform?

*CBE*-LSE Editor-in-Chief Bill Wood continues to spotlight inquiry-based approaches with measurable positive outcomes. He'll present at a Saturday Subgroup on December 5. For other education-focused sessions, visit www.ascb.org/meetings. *CBE*-LSE's popular Approaches to Biology Teaching and Learning columns by ASCB members Kimberly Tanner and Deborah Allen are being collected. *Transformations: Approaches to College Science Teaching*, a volume in the W.H. Freeman Scientific Teaching series, will be published in 2009.

Though scientists crave data, it is a dirty secret that scientists who teach often ignore data about teaching and avoid critical assessment. One needn't become a science education expert though to renovate one's lecture, swap a lab exercise, set learning goals, use clickers to assess learning before an exam, or try another institution's tested curriculum to add relevance without pandering.

As observed by Jo Handelsman at the 2006 ASCB Annual Meeting, scientific teaching is creating a classroom that reflects on the process of science, capturing its rigor, iterative nature, and spirit of discovery. Isn't that the classroom you want to be in? ■

**References**

Various constructs of genetically engineered CHO cells, BHK cells, and a hybridoma were grown in suspension in serum-free or protein-free medium. Representative cell aliquots were treated with an equal volume of PBS or ACCUMAX and incubated for 5 minutes at 37°C. Cell number was then determined with a Coulter Counter.

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Scientists and Science Education Reform: Myths, Methods, and Madness

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Over the last several years, the deplorable state of public science education and the perceived consequences for our nation’s economic and intellectual vitality has attracted not only the attention of educators and politicians, but also an increasing number of professional scientists and engineers. As a consequence a remarkable number of science professionals are becoming or are already involved in attempts to improve public science education. While, in principle, this increased involvement of the scientific community is encouraging, it is also the case that scientific training often includes little or no focus on science education itself. Instead, it is simply assumed that a Ph.D. in experimental science is adequate preparation for one’s eventual educational responsibilities. Based on 10 years of involvement in elementary science education reform, I can assure you that this is not the case.

For the last 11 years, myself and my Caltech colleague Dr. Jerry Pine have been involved in a close collaborative partnership with the Pasadena Unified School District in an attempt to introduce and support high quality inquiry based “hands-on” science teaching for all children. As of the fall of 1993, all 650 K–6 teachers in this large urban school district teach four, 10–12 week science units each year. These units emphasize an open-ended experiment-based approach to understanding science. We have also developed a substantial professional development program in science for all teachers in the district as well as an extensive materials support system. Program extensions are now being made into middle and high school classrooms as well as preschool teacher training. Over the last five years, we have also transplanted this project into two additional school districts, one in California and one on the island of Maui. As a result of these successes, in the fall of 1994, the National Science Foundation established a center at Caltech intended to transfer our model for systemic reform to 14 new school districts in the state of California. At present we are working with nine new school districts located throughout Central and Southern California.

“Myths” of science education reform

While I believe that our efforts to change science teaching in public schools have met with some success, this success absolutely required that I, as a scientist, reexamine many of the most basic educational assumptions I had developed as a result of my own science education. While I started these projects 10 years ago with enthusiasm and a sense of great need, I realize in retrospect that I knew essentially nothing about education in general, or science education in particular. Many of the assumptions I had made about the change process, as well as what good science education looked like, were flat wrong. I also had little or no real understanding of the structure of school districts, teacher capabilities, or the effort really required to produce lasting change in public science education. Ten years later I continue to learn important lessons regularly, guided by our school district collaborators.

Nevertheless, based on the initial success of the Pasadena projects, I am increasingly asked to evaluate other science reform efforts involving scientists. From this exposure it has become clear that many of the incorrect assumptions I initially made are often evident in the plans of other science education reform efforts involving scientists and scientific organizations. In fact, these assumptions appear to be strong enough that scientists often invent nearly identical science education reform programs often with limited success. The purpose of this article is to explicitly identify some of these “common myths of science education reform.” While several of the points made will probably be regarded as controversial, at a minimum this listing will expose potential reform advocates to several important program design issues. After all whatever the final structure of a particular program, no program, just as no research project, should be created or run in a vacuum.

Myth 1. The problem with public science education is that a large percentage of teachers are incompetent.

It is remarkable how widespread the view is that teachers, especially in early grades, are minimally functioning human beings. It is also remarkable how rapidly this notion disappears when one becomes seriously involved with teachers and the worlds they live in. Teachers in California public schools are now expected to manage the learning of 30–40 students per classroom with almost no outside help, and almost no budget. It is absolutely remarkable that more of them do not quit outright. The reason they do not, in our experience, is that almost all of them have a deep personal commitment to student learning. With such a commitment, and a rational approach to science education reform, we have found that the vast majority of teachers enthusiastically participate in improving the quality of science education.

Myth 2. Teachers are undermotivated to teach science because they do not understand how exciting it is.

When surveyed teachers actually report that they already consider science to be one of the most exciting contemporary fields of study. However, attempts to transfer the excitement of science through lectures never give teachers the opportunity to experience the thrill of doing science themselves. Instead, science is presented as the purview of the elite. Even programs that combine “science excitement lectures” with later “hands-on” experiments usually reinforce unproductive attitudes. For example, in most cases, the “hands-on” activities are do-it-yourself “cook-book” demonstrations of the sort professors design for their own undergraduates. These are usually primarily intended to assure that everyone gets the same, right answer. This type of lab is in sharp contrast to inquiries which give teachers opportunities for real open-ended scientific discovery. Obviously, they also reflect
that fact that in “real science” the answer is often not simple, singular, stable, or in many cases even known.

**Myth 3. The primary reason teachers do not teach science well is a lack of science content knowledge.**

It is perhaps not surprising that many programs run by scientists focus on increasing the scientific content knowledge of teachers. In my view this directly reflects the structure of undergraduate and graduate level science education which is most often predicated on the assumption that a strong understanding of science content is a necessary prerequisite for eventual success in research. While I personally doubt that this is true even in higher education, in the context of K–12 science education reform, there is no question that an inordinate upfront focus on science content only reinforces the inadequacy many teachers already feel about their own science content knowledge. This, in turn, reduces the likelihood, especially in younger grades, that teachers will actually teach science.

When the focus of science education is changed from science content to science process, the hesitation of teachers to teach science greatly diminishes. As teachers understand that the skills they need to teach science are not substantially different from those necessary to teach other subjects, their willingness to engage their students in real scientific inquiry increases dramatically.

**Myth 4. Supplemental teacher training is necessary because too few teachers, especially in the early grades, have been required to take science classes in college.**

We have found that a teacher with adequate materials, enough time, and good classroom and science experiment management skills can actually provide their students with an excellent science education with remarkably little science content knowledge. In fact, in general, the more college science courses a teacher has taken, the more likely they are to model their teaching on the lecture-based approach of most university science professors. Accordingly, teachers with fewer college lecture-based science courses are often more amenable to fundamental change to inquiry teaching methods than are those whose examples for science teaching come from college and university professors. In our experience, as these teachers become involved in real science experiments in their classrooms, they inevitably seek additional science content knowledge. However, in this case the information they seek is directly related to their own needs as science teachers, not to lists of “what all teachers (or students) should know” generated by others.

**Myth 5. The key to scientist involvement with teacher training is to provide complex information in as digestible a form as possible.**

It follows from my previous statements that distributing simplified scientific information is about the last thing that a scientist should do. Watered down lectures only serve to reinforce in teachers the sense that they are not really capable of understanding scientific principles, reinforcing the insecurity that many teachers already feel about science. As I have also stated, scientific information in this form is almost worthless to teachers in any event. Young students, unlike those in college and graduate school, have not yet learned what questions not to ask, and therefore will rapidly expose holes in the knowledge of a teacher trained to be a “mini-expert.” In fact, these students regularly expose holes in my own scientific knowledge. On the other hand, if the role of the teacher is as a guide to students in their own scientific investigations, then the lack of detailed knowledge of the teacher is a source of motivation and ownership by students. Of course, this change also substantially alters the role of the scientist in educational reform. The “classroom management” skills now required to organize time and materials or help students work in cooperative groups are not something that most scientists know anything about. However, what scientists do know about is how to conduct investigations. Accordingly, in our programs the primary role of the scientist is to model inquiry, not to fill in teacher backgrounds. Just as we are comfortable guiding our graduate students to explore subjects for which we do not yet know the answer, teachers should be comfortable guiding their students’ explorations.

**Myth 6. The problem with science education is a lack of a good curriculum and therefore we must develop it.**

If the emphasis of the reform project is on grades K–6, this statement is absolutely wrong. Over the last several years, numerous companies have begun marketing excellent early science curricula. In fact, I believe that, at this point, there is almost no need for further curriculum development in K–6. Instead, reform programs should focus on how to implement and support the use of this existing curriculum.

Beyond the elementary school level, however, there is as yet almost no good, readily available inquiry-based curriculum. This is one of the many reasons that I believe reform efforts should begin in elementary school. The vast majority of what is available in higher grades is either fundamentally lecture based, or based on “cook book” hands-on activities intended (as in our undergraduate laboratories) to assure that every student gets the “right” answer. As I have stated, enforced “correct” answers should have no place in real science education.

This said, however, the answer to this problem is NOT to have reform efforts develop their own curriculum. Curriculum development is a much more costly and time consuming process than most scientists believe, requiring long-term revision, field testing and evaluation by a highly talented, motivated, and educated development team. A reasonable estimate of the cost of developing a real 12-week curriculum module for elementary school, for example, is $400,000 and three years. Curriculum developed in the context of reform efforts is often mostly of the demonstration variety that does not support good inquiry teaching. Further, an emphasis on curriculum development tends to underestimate the far more difficult problem of curriculum support and implementation. Many millions of education dollars spent on “grass-roots” curriculum development programs have not corrected the perilous state of science education in our schools.
**Myth 7. One reason to develop new curricula is to introduce modern scientific techniques derived from current laboratory experiments.**

It is my view that the drive to make curricula “modern” is misplaced. While understanding the political and social implications of modern science is clearly important, a specific focus on this objective often indicates a hidden agenda. For example, a teacher training program in modern biology might be intended to directly counteract the effectiveness of animal rights activists. Such political considerations, when they are primary, often directly undermine the open inquiry process that is supposed to define scientific methods. It also places science training programs at risk of using the same tactics as those they are attempting to counteract. Further, modern experiments and experimental techniques are often not accessible to deep process knowledge or active exploration; instead, they infrequently come across as being more magical than scientific. Classroom activities developed from research laboratory experiments, in particular, are very often only simple demonstrations of previously presented science facts. Such activities bear little resemblance to real experimental science and seldom support inquiry-based learning.

In my view, any subject considered as a base for science curricula should be evaluated for its value in teaching and learning, not solely for its degree of contemporary content. While questions of relevance are often important to teachers and students, especially in higher grades, we have found that any real scientific investigation, correctly conceived and supported, is regarded as a valuable experience.

**Myth 8. Training a few highly motivated teachers will produce “trickle down” reform when they return to their schools.**

Regardless of the emphasis on content or process, the most common form of educational reform project is one that assumes that a small number of highly trained teachers will transfer their abilities and enthusiasm to other teachers in a school or district. Again, this approach to educational reform reflects the hierarchical structure of science education in universities. In fact, there is little evidence that individual training courses have much effect outside the classroom of the trained teacher. Teachers that have elected to take these courses are often regarded as “special teachers” by other teachers, in effect isolating them from their colleagues, and reducing their effectiveness as reformers. Further, real teachers seldom have the means or time to support or transform the teaching techniques of their colleagues.

If systemic change is the objective, then it must be the specific target not an assumed side benefit. In Pasadena, our initial focus on all teachers, not just the recognized mentor teachers, in a single school produced the local proof of concept necessary to convince the rest of the district to make the change. The fact that the majority of teachers in the initial school were enthusiastic about the program, in effect, certified for the other teachers in the district that this was something that they too could do. As we now move into other school districts, the primary problem is slowing down the implementation, not convincing other teachers to try it.

**Myth 9. If teachers are motivated enough during training, they will find a way to obtain the material necessary to teach science in their classrooms.**

Over the last several years, there has been a clear migration away from lecture-based instruction towards more hands-on approaches. Unfortunately, however, most programs supporting this change still do not take into account the need to provide material support to teachers back in their own school districts. In fact, far too many university-based programs seem to assume that participation in a summer workshop will provide the necessary teacher motivation to change classroom instruction. There is little evidence that this is true. Instead, to be effective a program needs to take into account, at the outset, that in-district support and follow-up will be necessary for success. This is particularly true with respect to science instruction materials. Very few public schools in the 1990s have budgets that can support the materials necessary to teach science well. Teachers often do not have the political clout necessary to obtain what minimal money is available. For most of our teachers today, teaching is a lonely and personally expensive occupation. If a program intends to maintain a lasting commitment from the teachers it has trained, direct and continuing school district support is essential. The lessons of the last 30 years make this absolutely clear. The wonderful hands-on materials developed in the 60’s remained completely unused without support for the material and professional development needs of teachers. Unfortunately, this means that school districts as well as project coordinators have to deal with the nuts and bolts issues involved in supporting real experimental science at the beginning and throughout a project. Without this support it is well known that good science teaching cannot be sustained.

**Myth 10. Reform can be accomplished with existing resources if they are simply allocated more efficiently.**

In my view, this is perhaps the greatest myth of education reform. While it may be the case that 30 years ago resource allocation could fuel reform efforts, it is no longer the case today. Public school districts, especially those serving poor children (i.e., districts that cannot rely on direct parental financial support) have been cut so close to the bone that there is little money left to support even the existing curriculum. With cuts in social services, these school districts are rapidly becoming social service agencies, rather than educational institutions. The basic health and safety of their students inevitably takes priority over something as relatively esoteric as science education, let alone its reform.

For this reason, no matter what else happens, if public schools continue to be denied the resources they need, no reform effort will be sustainable, and the cultural, educational, and political spiral we find ourselves in now will continue. As an advocate for science education reform, I now also spend considerable time evaluating educational projects in third world countries. It is becoming increasingly difficult to distinguish schools in these regions of the world from our own public schools. As the richest and most economically vital country in the world, there is no excuse for this situation.
What can I do as a scientist?
While the above list of “don’ts” might be daunting, in fact, I believe that scientists should be encouraged to get involved in science education reform. Scientists can play a critical role in the process of reform, even if the role they actually play is somewhat different from the role they imagine they should play. The following partial list is based on our experience with several school districts and the many scientists involved in our programs.

Program validation: Perhaps surprisingly I believe that the largest contribution the scientific community can make to science education reform is related to the popular perception of scientists rather than their scientific knowledge directly. Through involvement in a reform program, scientists can certify the validity of a program. For teachers, parents, administrators, students, and even funding agencies, the involvement of real working scientists in a science education program can lend essential political support for a project. While this political clout may be a result of what, in my opinion, is the mistaken public impression that professional science content knowledge is a critical component of any science education reform effort, it provides scientists a tremendous opportunity not available to many other sectors of society (or members of the traditional educational community). Of course, this makes it especially important that we use the opportunity wisely.

Teacher support: The involvement of working scientists can have a profound effect on teacher optimism. Changing teaching style and/or adopting a new curriculum requires tremendous energy and commitment on the part of the teachers involved. Through supportive participation in the process, scientists can provide crucial emotional support for teachers and also advocate for teachers within a program, school district, and/or community.

Resource acquisition: To be a professional scientist in today’s world, it is necessary to have exemplary grant-writing and communication skills. Such skills, or the time to use them, are often lacking in school systems. As the current financial conditions of most public schools make the need for outside funding of reform projects critical, scientists can provide an extremely valuable service as grant writers and administrators. Without outside funding, today’s reality in public education virtually assures that innovative programs cannot exist.

Modeling the scientific process: While scientists must be very careful in the use of their content knowledge, real science, whether in the laboratory or the classroom, depends substantially on the application of good scientific process. By scientific process I do not mean the famous four steps in the scientific method that are drilled into the heads of children from grade 3. Instead I mean the real scientific skills of investigation, critical thinking, imagination, intuition, playfulness, and thinking on your feet and with your hands that are essential to success in scientific research. We have found that trained scientists, properly prepared and with attitudes adjusted, can easily apply these skills independent of their particular area of expertise. In fact, in our programs we intentionally assign scientists to teacher training groups outside their area of expertise to reduce the likelihood that fun and exploration are replaced by a quickly offered factual answer. In our experience, when scientists and teachers are mixed together in inquiry teams where no one has the answer (or better yet, where a “correct” answer does not even exist), the result can be extremely valuable for teachers. There is no more effective means to convey the excitement of science than to let teachers and their students really do science where doing is dependent on involvement in an open-ended, inquiry-based, student-driven exploration of almost any subject.

In conclusion
All teachers, all children: The myths I have considered in the previous sections are obvious and understandable given the type of science education most scientists themselves have encountered. However, there is another myth that is perhaps more sinister and deeply buried than these and that is that only a select subset of our society can really be involved in scientific exploration. In this view the rest of our society simply become consumers of scientific facts. Those programs that focus on exceptional teachers or on the so-called gifted reinforce elitist views of who can and cannot do science. Our experience in the elementary school grades of the urban and predominantly minority Pasadena Unified School District suggests that every teacher and every child can benefit from high-quality science instruction when given the opportunity. For these reasons, I believe that effective reform of precollege science education in our nation depends on supporting the professional development of all teachers in service to all students. To do this, it is necessary to explicitly design programs that involve entire school systems, all teachers, and all students. Any other approach effectively reinforces science as an elite subject for elite teachers and special students. We are already living with the educational and political consequences of this attitude.

Educate and reform thyself: While most of the above discussion concerns scientist involvement in the public schools, perhaps the most important personal consequence of my involvement with science education reform has been a growing awareness of how poorly I have taught my own students (c.f., Bower, JM. [1995].) Systemic reform from the inside out: Look who’s changing now. The Catalyst #3, NRC Press, Washington, DC). Prior to involvement in this project, I knew remarkably little about good science education. After 10 years of involvement with precollege science, I have become profoundly aware of the negative effect the poor teaching of science in colleges and universities has on the rest of the educational system. In many ways, colleges and universities set the standards for the entire educational system. So, while I wish to encourage scientists to contribute to the public schools, the most significant consequence for students of this involvement may very well be fundamental reform in the way we educate our own students. After all, the curriculum we ourselves control should be the easiest to change.

Visit www.capsi.caltech.edu for more information on the Pasadena Capsi Project.

—James M. Bower
California Institute of Technology
White House Issues Science Funding Directive

It’s normal for the White House to tell federal agencies how to use their budgets. During the Bush Administration, the Office of Management and Budget (OMB) annually issued memoranda that mentioned specific funding amounts for specific federal agencies.

This year, Peter Orszag, Director of the OMB, and Presidential Science Advisor John Holdren have issued a similar memo to guide federal agencies in the preparation of their FY11 budgets. Unlike previous years, however, there is no mention of specific agencies or levels of funding.

Instead of specifics, the memo outlines general guidelines federal agencies should follow when preparing their individual FY11 budget proposals. The memorandum directs agencies to build on the scientific priorities included in the American Recovery and Reinvestment Act.

The Orszag-Holdren memo directs agency heads to redirect resources from other activities to “science and technology activities that address four practical challenges and strengthen four cross-cutting areas that underlie success in addressing all of them.”

The four challenges are:

- Promoting energy technologies to reduce dependence on foreign energy sources and reduce the impact of climate change
- Using biomedical science and information technology to improve public health while reducing healthcare costs
- Using technology to protect military personnel and the nation
- Agency leaders were also urged to improve the internal evaluation of agency programs, include in the agency budget proposal the expected outcomes of the research they fund, and develop publicly available documentation of federal investments in science and technology.

The OMB memo concludes with the following exhortation, “Finally, agencies are expected to conduct programs in accordance with the highest standards of ethical and scientific integrity and to have clear principles, guidelines and policies on issues such as scientific openness, scientific misconduct, conflicts of interest, protection of privacy, and the appropriate treatment of human subjects.”

To read the complete OMB memo, go to www.whitehouse.gov/omb/assets/memoranda_fy2009/m09-27.pdf.

—Kevin M. Wilson

Harkin to Lead Health Panel

U.S. Senator Tom Harkin (D-IA) has been selected by the U.S. Senate Democratic Caucus to succeed the late U.S. Senator Edward Kennedy (D-MA) as Chair of the Senate Health, Education, Labor, and Pensions (HELP) Committee. Kennedy passed away August 25, 2009, 18 months after being diagnosed with a malignant brain tumor.

Harkin, already Chair of the U.S. Senate Appropriations Subcommittee on Labor, Health & Human Services, and Education, the committee responsible for funding the National Institutes of Health (NIH), has been a long-time supporter of biomedical research and the NIH.

—Kevin M. Wilson
Kennedy Left His Mark on Science

In his August 29, 2009, eulogy of U.S. Senator Edward M. Kennedy, U.S. President Barack Obama said Senator Kennedy had sponsored over 1,000 bills that had become law and authored over 300 himself.

The breadth of the late Senator Kennedy’s legislative impact is well known by now. However, few may have an appreciation for the depth of his contributions to the American biomedical research enterprise and the National Institutes of Health (NIH).

In 1971, Kennedy authored legislation to quadruple the amount of funding available to the National Cancer Institute through an independently funded program. In 1993, Kennedy was the sponsor of the National Institutes of Health Revitalization Act. That Act provided the NIH with the legislative authority to conduct research on a wide variety of diseases, with a particular focus on research into various cancers. In fact, cancer-related research was a major focus of his efforts on behalf of the NIH.

During congressional debate on the FY89 National Science Foundation Reauthorization Act, the Senator also developed a program to provide funding for the repair, renovation, or replacement of obsolete laboratories and research facilities. During the five years of the program, individual awards provided as much as $7 million to help modernize academic research facilities.

For 13 years, Kennedy also worked to pass legislation protecting the privacy of genetic information and preventing employment and health insurance coverage discrimination based on genetic information.

Ted Kennedy also played a significant role in the efforts to overturn President George Bush’s policy limiting federal funding of human embryonic stem cell research. While he was not the main sponsor of pro-research legislation, he played a critical role in the development of legislative strategies, the vital behind-the-scenes cajoling of members of Congress, and debates in Senate committees and on the Senate floor.

—Kevin M. Wilson

Senator Kennedy spoke at a press conference with Christopher Reeve, who was an ASCB Citizen member, following a 2002 Senate hearing on stem cell research and cloning. Reeve and former ASCB Public Policy Chair Paul Berg testified at the hearing.

Goldstein to Receive 2009 ASCB Public Service Award

Long-time public policy advocate and former Public Policy Committee Chair Larry Goldstein will receive the 2009 ASCB Public Service Award at the ASCB’s Annual Meeting in December.

Goldstein, who served as chair of the Public Policy Committee from 2004–2007, has been a leading voice on behalf of funding for biomedical research and research policy issues in the halls of Congress and at statehouses around the U.S.

For much of this past decade, Goldstein has devoted large amounts of his time to explaining why government funding of stem cell research is important. Along with his efforts in Washington, DC, Goldstein also devoted time to California’s Proposition 71 Stem Cell Research Funding voter initiative in 2004.

When Members of Congress, their staff, or members of the press want to understand the complicated science behind a piece of legislation, they call Goldstein.

The award will be presented at the ASCB Annual Meeting on December 6 at 7:00 pm in the San Diego Convention Center.

—Kevin M. Wilson
Cold Spring Harbor Perspectives in Biology
The Authoritative View

A New Type of Review Journal

Cold Spring Harbor Laboratory Press announces the launch of a new monthly online publication, *Cold Spring Harbor Perspectives in Biology*. Spanning the complete spectrum of the molecular life sciences, the journal offers article collections that comprehensively survey topics in molecular, cell, and developmental biology, genetics, neuroscience, immunology, cancer biology, and molecular pathology. Written by leading researchers and commissioned by an eminent board of editors, subject collections grow with every issue of the journal. *Cold Spring Harbor Perspectives in Biology* is thus unmatched in its depth of coverage and represents an essential source for informed surveys and critical discussion of advances in emerging areas of biology.

Scope: Molecular Biology, Cell Biology, Developmental Biology, Genetics, Neurobiology, Molecular Pathology

Monthly, online  ISSN: 1943-0264

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### 49th ASCB Annual Meeting Program

**December 5–9, 2009 ■ San Diego Convention Center**  
Brigid Hogan, President ■ Vann Bennett, Program Chair

#### New Meeting Format!

Two concurrent symposia will be held each afternoon, Sunday through Tuesday, December 6–8, from 4:00 pm–5:30 pm, and a special closing symposium will be held on Wednesday, December 9, from 11:00 am–12:30 pm. Seven minisymposia and one working group will be scheduled each morning, Sunday through Wednesday, December 6–9, 2009, during the ASCB Annual Meeting. Co-chairs will select up to six speakers for each minisymposium from regular abstracts submitted by July 30, 2009. Co-chairs are encouraged to present.

### Member-Organized Special Interest Subgroups

| Saturday, December 5  
| 12:30 pm–5:00 pm  
| Session titles, speakers, and times are available at www.ascb.org/meetings. |

### Symposia  
**Sunday, December 6, 4:00 pm**

| The Human Model: Genetics as Two-Way Information  
| Under the Hood of the Cell: Dynamic Organelles |
| --- | --- |
| Christine Petit  
-Collegio de France and Institut Pasteur  
Val Sheffield  
-University of Iowa/HHMI  
Christopher Walsh  
-Harvard Medical School/Children’s Hospital Boston/HHMI |
| Jennifer Lippincott-Schwartz  
-National Institute of Child Health and Human Development, NIH  
Jodi Nunnari  
-University of California, San Francisco/HHMI  
Jonathan S. Weissman  
-University of California, San Francisco/HHMI |

### Monday, December 7, 4:00 pm

| All You Can Be—The Biology of Multipotency  
| In a Pinch: Cell Division from Prokaryotes to Sex Cells |
| --- | --- |
| Ruth Lehmann  
-Skirball Institute, New York University  
Marja Timmermans  
-Cold Spring Harbor Laboratory  
Amy Wagers  
-Joslin Diabetes Center and Harvard Stem Cell Institute  
Abby Dernburg  
-University of California, Berkeley/HHMI  
Jan Lowe  
-Medical Research Council, Laboratory of Molecular Biology  
Andrea Musacchio  
-European Institute of Oncology |

### Tuesday, December 8, 4:00 pm

| Cellular Sociology: Working Together in Morphogenesis  
| Movers and Shapers: Nuclear Dynamics and Gene Regulation |
| --- | --- |
| Suzanne Eaton  
-Max Planck Institute of Molecular Cell Biology and Genetics  
Mark Krasnow  
-Stanford University School of Medicine/HHMI  
Olivier Pourquié  
-Stowers Institute for Medical Research/HHMI  
Robert D. Goldman  
-Northwestern University  
Bas van Steensel  
-Netherlands Cancer Institute  
Wim Vermeulen  
-Erasmus Medical Center |

### Wednesday, December 9, 11:00 am

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| Toshio Ando  
-Kanazawa University  
Stefan Hell  
-Max Planck Institute for Biophysical Chemistry  
Xiaowei Zhuang  
-Harvard University/HHMI |

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Keynote Symposium

**Saturday, December 5, 6:00 pm**

**Stem Cells, Pluripotency, and Nuclear Reprogramming**

Rudolf Jaenisch  
-Whitehead Institute for Biomedical Research and Massachusetts Institute of Technology

**Member-Organized Special Interest Subgroups**

| Saturday, December 5  
| 12:30 pm–5:00 pm  
| Session titles, speakers, and times are available at www.ascb.org/meetings. |
Minisymposia

Autophagy and Organelle Turnover
Judith Klumperman, University Medical Center, Utrecht
Beth Levine, University of Texas Southwestern Medical Center/HHMI

Cancer Cells
Erik Sahai, Cancer Research UK London Research Institute
Charles J. Sherr, St. Jude Children’s Research Hospital/HHMI

Cell and Tissue Mechanics
Dan Klehert, Duke University
Ellen A. Lumpkin, Baylor College of Medicine

Cell Cortex and Membrane Dynamics
Buzz Baum, MRC Laboratory for Molecular Cell Biology, University College London
Doug Robinson, Johns Hopkins University School of Medicine

Cell Matrix Interactions and Signaling
Mark Ginsberg, University of California, San Diego
Erica A. Golemis, Fox Chase Cancer Center

Cell Migration
Alissa Weaver, Vanderbilt University Medical Center
Jochen Wittbrodt, University of Heidelberg and Forschungszentrum Karlsruhe

Cell Polarity
Julie Krnjić, University of Cambridge
Jeremy Nance, Skirball Institute of Biomolecular Medicine, New York University School of Medicine

Cell Senescence and Cell Death
Laura Attardi, Stanford University School of Medicine
Nika N. Daniel, Dana-Farber Cancer Institute, Harvard Medical School

Cell–Cell Interaction
W. James Nelson, Stanford University
Erich Schuman, California Institute of Technology/HHMI, Max Planck Institute for Brain Research

Cellular Basis of Morphogenesis
Gail Martin, University of California, San Francisco
John Wallingford, University of Texas, Austin

Chromatin Organization and Dynamics
Asifa Akhtar, European Molecular Biology Laboratory, Heidelberg
Andy Belmont, University of Illinois at Urbana-Champaign

Cilia and Centrosomes
Monica Betancourt-Dias, Instituto Gulbenkian de Ciência
Maxence Nachury, Stanford University School of Medicine

Clocks
Carl H. Johnson, Vanderbilt University
Amita Sehgal, University of Pennsylvania School of Medicine/HHMI

ES Cells, iPS Cells, and Germ Cells
Lawrence S.B. Goldstein, University of California, San Diego
School of Medicine/HHMI
Renée A. Reijo Pera, Stanford University

Functional Organization of Plasma Membranes
Benedicte Dargent, Université de la Méditerranée
Matthew Rasband, Baylor College of Medicine

Host-Pathogen Interactions
Kasturi Haldar, University of Notre Dame
Roger Innes, Indiana University

Intracellular Trafficking
Elizabeth Miller, Columbia University
Joachim Seemann, University of Texas Southwestern Medical Center at Dallas

Lipid Dynamics
Benjamin Podbilewicz, Technion–Israel Institute of Technology
Petra Schwille, Biotechnology Center (BIOTEC), Technische Universität Dresden

Mitosis and Meiosis
Jennifer DeLuca, Colorado State University
Arshad Desai, University of California, San Diego

Molecular Motors
Samara Reck-Peterson, Harvard Medical School
Linda Wordeman, University of Washington School of Medicine

Nuclear Structure
A. Gregory Matera, University of North Carolina at Chapel Hill
Lindsay Shopland, The Jackson Laboratory

Organization and Dynamics of the Cytoskeleton
James Bear, University of North Carolina at Chapel Hill
Gero Steinberg, University of Exeter

Regulation of Cell Growth
Duojia Pan, Johns Hopkins University School of Medicine/HHMI
David Sabatini, Whitehead Institute for Biomedical Research and Massachusetts Institute of Technology/HHMI

RNA Biology
Brenda Bass, University of Utah
James Eberwine, University of Pennsylvania School of Medicine/PENN Genome Frontiers Institute

Stress Responses
Richard Morimoto, Northwestern University
David Ron, Skirball Institute of Biomedical Medicine, New York University

Systems Biology
Aimée Dudley, Institute for Systems Biology
Peter K. Sorg, Harvard Medical School

The Nuclear Envelope and Nuclear Pore Complex
Beatriz Fontoura, University of Texas Southwestern Medical Center
Dirk Görlich, Max Planck Institute for Biophysical Chemistry

Undergraduate Biology Curriculum in the 21st Century
Caroline Kane, University of California, Berkeley
Mark Rose, Princeton University

As an alternative to minisymposia, these sessions provide a more interactive experience for meeting attendees.

Cancer Stem Cells
Peter Dirks, Hospital for Sick Children
Franziska Michor, Memorial Sloan-Kettering Cancer Center
Sean Morrison, University of Michigan/HHMI

Cell Biology of Disease
Kevin Campbell, University of Iowa/HHMI
Michael Caplan, Yale University School of Medicine
Christine Seidman, Harvard Medical School

What Is Life?
Zac Cande, University of California, Berkeley
Nicoletta Daida, University of California, Berkeley
Norman R. Pace, University of Colorado at Boulder

What Is the Golgi?
Benjamin Glick, University of Chicago
Kathryn E. Howell, University of Colorado School of Medicine
Sean Munro, Medical Research Council Laboratory of Molecular Biology
Graham Warren, Max F. Perutz Labs

Important Dates
The ASCB 2009 Annual Meeting registration, abstract submission, and housing sites are active.

Deadlines
October 15 Late Abstract Submission
November 10 Hotel Reservations

www.ascb.org/meetings
Brioude, Stalder Honored as Young French Cell Biologists

The French Society for Cell Biology recently chose two young scientists to receive student travel awards. Estelle Brioude and Danièle Stalder will receive expense-paid trips (compliments of the French Society for Cell Biology) and meeting registration (compliments of ASCB) to attend the ASCB’s 2009 Annual Meeting. They both will present their posters, and will report on their meeting experiences for the ASCB Newsletter.

Brioude is a Ph.D. student at the CRBM/CNRS, University of Montpellier, France. Brioude is researching the role of the Greatwall kinase in cell cycle entry. She is using both *Xenopus* oocytes and human cells to discover the mechanisms responsible for Greatwall activation. Brioude’s poster is entitled “Mechanism of Activation of the Greatwall Kinase in Cell Cycle.”

Stalder is a Ph.D. student at IPMC/CNRS, University of Nice Sophia-Antipolis, France. Using biophysical, biochemical, and cell biology approaches, Stalder studies the molecular mechanisms involved in the newly discovered cascade by which Arf6-GTP recruits ARNO at the plasma membrane and in turn activates Arf1. Her poster is entitled “Activation Mechanisms of the Nucleotide Exchange Factor ARNO.”

—Thea Clarke

Bernfield, Gilula Awardees Named

The ASCB has selected postdoctoral fellow Chad G. Pearson of the University of Colorado, Boulder, to receive the 9th annual ASCB Merton Bernfield Memorial Award. Rodney E. Infante of the University of Texas Southwestern Medical Center will receive the 9th annual ASCB Norton B. Gilula Memorial Award. Infante completed his Ph.D. studies as an M.D./Ph.D. student.

The Bernfield Award honors a postdoctoral fellow or graduate student who has excelled in research. Pearson will speak at the Cilia and Centrosomes Minisymposium on Monday, December 7, at the 49th ASCB Annual Meeting in San Diego.

The Gilula Award was made possible by the Rockefeller University Press and recognizes an outstanding graduate or undergraduate student who has excelled in research. Infante will speak at the Intracellular Trafficking Minisymposium on Sunday, December 6.

—Cheryl Lehr

MAC Poster Session Judges Wanted

Can you help? The ASCB Minorities Affairs Committee (MAC) is looking for judges for its poster session competition that will be held during the ASCB Annual Meeting in San Diego on December 5, 2009, from 2:00 pm–4:00 pm. There will be 50–60 posters to judge.

If you are interested in judging, please complete the information requested at this link: www.ascb.org/meetings/MAC_Poster/mac.cfm.

If you have any questions, please contact Deborah McCall at dmccall@ascb.org.
Vale Named Porter Lecturer

Hooked on understanding biological motion since his graduate school days, Ronald Vale will showcase his interest—shared with Keith Porter—at the 2009 ASCB Annual Meeting Porter Lecture. Vale, University of California, San Francisco, will present the Porter Lecture on Sunday, December 6. In his lecture, Vale will provide a scientific tour of the past 20 years in molecular motor research before focusing on several questions of current personal interest regarding the dynein motion. His scientific “journey” will feature such landmarks as the once unanticipated tools of single molecule measurements, genomic sequencing, and protein expression.

Don’t expect a dry lecture from Vale. He will address the tools that have helped researchers, including those in Vale’s lab, probe and understand how molecular motors work with extraordinary precision. But he’ll also impart some of the lessons he’s learned from other scientists and mentors.

Interested in Getting More Involved Globally?

The ASCB International Affairs Committee (IAC) is looking for members to help the Committee’s programs, promote international scientific exchange, and contribute to building capacity in cell biology worldwide. To fulfill this mission, IAC seeks volunteers willing to:

- Serve as a “host” to help one or more international students or postdocs to network at their first ASCB Annual Meeting
- Help with ASCB’s Courses in Africa Project
- Enhance the IAC website
- Develop engaging questions for, and participate in, our U.S./international graduate student roundtable discussions at the Annual Meeting

We hope you’ll be intrigued by this invitation. If so, please send an email explaining your specific interest, current position, and international experience, if any, to IAC Staff Liaison Cheryl Lehr (clehr@ascb.org).

Poster Printing Service

ScholarOne is offering a poster printing service for accepted poster presenters at the ASCB 2009 Annual Meeting. Presenters will receive details on how to access this service in their acceptance notices, which were emailed in late September 2009. The poster service costs $75 and includes gloss printing, packaging, and shipping directly to the San Diego Convention Center. Posters will be available for pick-up at a designated counter in the Registration area of Lobby D beginning at 8:00 am on Saturday, December 5, 2009.

The deadline to upload files and receive the $75 rate is November 25, 2009. Presenters will still be able to use this service as a rush job after the deadline, but the cost will be $150 (includes gloss printing, packaging, and shipping).

For questions, contact:

Wendy B. Passerell
Director, Composition Services
Thomson Reuters (ScholarOne)
Phone: (434) 964-4048
Fax: (434) 817-2039
Email: wendy.passerell@thomsonreuters.com
2009 Awards Schedule

**British Young Cell Biologist of the Year Awardee**
*Miriam Essid*, University of Geneva
Poster (Board B671), Monday, December 7
11:00 am–12:30 pm

**Bruce Alberts Awardees**
*Manuel P. Berriozaabal*, University of Texas at San Antonio
*Toby M. Horn*, Carnegie Institution of Washington
Sunday, December 6
3:15 pm–3:45 pm, Room 32B

**Merton Bernfield Memorial Awardee**
*Chad G. Pearson*, University of Colorado, Boulder
Monday, December 7, Minisymposium 10
8:30 am–10:35 am, Ballroom 20A

**Early Career Life Scientist Award**
*Martin W. Hetzer*, The Salk Institute
Minisymposium 23, Tuesday, December 8
8:30 am–10:35 am, Room 30C

**Norton B. Gilula Memorial Award**
*Rodney Infante*, University of Texas Southwestern Medical Center
Minisymposium 6, Sunday, December 6
8:30 am–10:35 am, Ballroom 20D

**French Society for Cell Biology Awardees**
*Estelle Brioudes*, CRBM/CNRS, University of Montpellier, France
Poster (Board B519), Tuesday, December 8
11:00 am–12:30 pm

*Danièle Stalder*, IPMC/CNRS, University of Nice Sophia-Antipolis, France
Poster (Board B682), Sunday, December 6
12:30 pm–2:00 pm

**E.B. Wilson Lecture**
*Peter Walter*, University of California, San Francisco, School of Medicine/HHMI
Tuesday, December 8
6:00 pm–7:00 pm, Ballroom 20B/C

**E.E. Just Lecturer**
*Jerrel Louis Yakel*, National Institute of Environmental Health Sciences
Sunday, December 6
2:00 pm–3:00 pm, Room 29C

**Keith R. Porter Lecturer**
*Ronald Vale*, University of California, San Francisco
Sunday, December 6
6:00 pm–7:00 pm, Ballroom 20B/C

**MBC Paper of the Year Awardees**
*Xue Li Guan*, National University of Singapore
(Cowinner with Cleiton M. Souza and Harald Pichler)
Minisymposium 12, Monday, December 7
8:00 am–10:35 am, Room 29C

**Public Service Awardee**
*Lawrence S.B. Goldstein*, University of California, San Diego
Sunday, December 6
7:00 pm–8:00 pm, Room 32B

**WICB Junior Awardee**
*Yukiko M. Yamashita*, University of Michigan, Ann Arbor
Minisymposium 28, Wednesday, December 9
8:30 am–10:35 am, Room 20A
Presentation of Award, Tuesday, December 8
2:00 pm–3:30 pm, Room 32A

**WICB Senior Awardee**
*Janet Rossant*, The Hospital for Sick Children
Presentation of Award, Tuesday, December 8
2:00 pm–3:30 pm, Room 32A
WOMEN in Cell Biology

The Art of Science, the Science of Art

"I am among those who think that science has great beauty."
—Marie Curie

There are many congruencies between the rigorous logic and the aesthetic of science. Here we explore the thesis that creative as well as analytical insights and processes are essential to success in cell biology research.

Order from Chaos
Here is an actual scenario from the mid-1970s:
A scientist and a sculptor are having coffee, and the scientist says, “I so admire your work. While I have to think very technically, I know that your creativity must far surpass my own.” The sculptor retorts, “On the contrary! I have to think about all the technical details of my medium in order to generate anything beyond a lumpy mass. Your science requires the height of creativity in order to organize thinking around the chaos that is life.”

In fact, both have mastered materials and methods and both are masters at creating order from chaos. More recently, a clinical immunologist, when asked to distinguish between a scientist and an artist, concluded, “A scientist is someone who uses creativity to discover; an artist is someone who uses discovery to create.” Those trained in science and those trained in the arts both use logic and representation in their work.

Cell Biologists as Artists
Cell biology is one of the most visually striking areas of scientific research. Not only have images provided exciting insights into biomedical science, they have also revealed the spectacular beauty of the microscopic world of cellular structures and interactions. Beautiful microscopic images of cells have elicited universal enthusiasm and appreciation. So it seems surprising that some people still perceive a divide between art and science. This is particularly strange when brain research has documented that in both pursuits, left brain and right brain are fully engaged, attending to the open-ended combination of imagination and knowledge required to interpret an image or provide an explanation. Balancing rigor with imagination is a constant activity in all creative disciplines, including science. “Daydreaming” is a term not often encountered in scientific training, but daydreaming—free association—is imagination at work and is likely to generate that new connection, that new model, that new explanation for the way some piece of the biological world works.

That a significant number of senior cell biologists are well known for their artistic projects is thus not a surprise. There are numerous examples of writers, painters, poets, photographers, and cinematographers among “hardcore” scientists. They report that doing science enhances doing art, and doing art enhances doing science. This phenomenon is, of course, not a recent one: Think Leonardo da Vinci, for example. A long-standing namesake organization, Leonardo (www.leonardo.info/isast/isastinfo.html), “serves the international arts community by promoting and documenting work at the intersection of the arts, sciences, and technology, and by encouraging and stimulating collaboration between artists, scientists, and technologists.”

Careers in Art, Art in Careers
Several career trajectories entail tangible combinations of creative and analytical skill sets. Some cell biologists choose to make a living in biological illustration or graphic design. The Association of Medical Illustrators, founded over 60 years ago, serves as a professional society for women and men engaged in representing biology as images for education and art. Many
artists find inspiration in biology (think Georgia O’Keeffe!). The consulting group SciCult (www.scicult.com), started in 2002 in the UK, serves as a network for art practitioners who either use or are inspired by science and technology.

Other scientists choose to make a living writing fiction or nonfiction, often with a scientist as the protagonist (the popular television series Bones is based on a series of books written by a forensic anthropologist). Another outlet for verbal artistic expression about science is the Human Genre Project (www.humangenreproject.com), which encourages spreading the word about human genomics through short stories, reflections, and poems. Creative expressions about the genome project and many other scientific areas are also found in Wikimedia Commons and even on YouTube.

In addition to scientists who are also renowned for their art, and to scientists who choose careers that combine art and science, there are the rest of us. Perhaps we think of our artistic passion as a hobby, as a way to relax, as a pleasurable dimension of our lives out of the laboratory, or as an aesthetic that we neglect when the next grant application is due. Neglect of this aspect of our talents is unlikely to improve our scientific output, however. Instead, nurturing creative outlets that demand their own attention to technical detail reinforces the types of thinking required to advance scientific knowledge, and may even deepen it.

Recognizing the Connection between Art and Science
The connection between the artistic and scientific is not lost on funding agencies, medical practitioners, professional societies, and some departments in traditional institutions. For example:
- The Wellcome Foundation in the UK promotes biomedical science to the public through the arts, funding interdisciplinary practice and collaborative partnerships in the arts, science, and/or education.
- The research program in music and medicine at Paracelsus Private Medical University in Salzburg, Austria, dispenses “medication in the form of music.”2,3 Indeed, the effects of music on brain function are well established.4,5
- The American Society for Cell Biology hosts an annual Celldance competition with focus on the artistic nature of cells themselves. (See the 2008 winners at http://tiny.cc/celldance_winners.)
- Harvard University has a program in molecular visualization (https://iwasa.hms.harvard.edu) designed to assist researchers in using animations that enhance understanding of cell function.
- Princeton University has an annual Art of Science competition (www.princeton.edu/~artofsci/2009) that encompasses the biological and physical sciences.

What emerges from these observations about the connection between science and art is that we should not dismiss one or the other “side” as hard or soft, intellectual or intuitive. People combine creative and analytical attributes and talents in different proportions and use them to different degrees in what they do. The art of science, the science of art...we welcome hearing from ASCB members who blend the rigor and the aesthetics in their science. Sharing your thoughts and your efforts in future articles may encourage more of us to “daydream.”

—Caroline Kane and Inke Näthke, for the Women in Cell Biology Committee

References

Balancing rigor with imagination is a constant activity in all creative disciplines, including science.
IMPORTANT
MBC presents conceptual advances of broad interest within all areas of cell biology, genetics, and developmental biology.

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DEAR Labby

Dear Labby,
My husband and I are faculty members in different departments at an East Coast medical school. We are in different fields of research and have not collaborated in the past. But we now are planning to collaborate in a clinical study, and our Institutional Review Board (IRB) has asked us to clarify our respective roles, apparently because we are married.

This query has been sent with tact. Nevertheless, we are a bit miffed. We read the nepotism policy of our institution and see that it forbids an employee from having a direct reporting relationship with a spouse (upward or downward). The IRB recognizes that we are not in such a position as regards our regular duties but has asked if this might be the case in our planned collaboration in a clinical study. Strictly speaking, my husband will be “reporting” to me because I will be the study’s PI and he the study’s biostatistician. The IRB is also asking whether our married status would impair our objectivity.

Of course, when human subjects are concerned, it is more than appropriate to exercise extreme caution about investigator bias. And I should emphasize that the IRB is not indicating at this stage it will rule against our collaborative study. Rather the IRB is simply pondering this issue, as are my husband and I. We are not ASCB members, nor cell biologists, but a colleague down the hall suggested we contact you in any case. What are your thoughts?

—Two Docs Who Walked Down the Aisle

Dear Two Docs Who Walked Down the Aisle,
The good communication and respect between the two of you on the one hand and the IRB on the other are all to the good and a welcome indication that your institution has a faculty-friendly approach to such issues. Nepotism rules at universities and academic medical centers are important to prevent abuses. The question in your case is, first and foremost, whether your relationship could constitute abuse and even remotely threaten the subjects’ safety and well-being. Interestingly, the nepotism rules suggest that the problem may not be your collaboration but your technically unequal collaboration.

One argument the IRB might be considering is based on the assumption that you and your husband likely share life goals in common, such as career advancement; the fear would be that this could create a greater temptation to commit misconduct than two unmarried/uninvolved collaborators might experience. Similarly, your husband, as biostatistician, might be more likely than an uninvolved, “junior” collaborator to see things as you do.

Labby has seen cases where a married couple—or two scientists sharing a personal relationship—have been able to leverage their knowledge sharing, commitment, drive, and ambition into greater career success. Such couples may be more successful in promulgating a particular doctrine or unorthodox theory. They may be less likely to disagree or criticize. In fact, such couples sometimes achieve a degree of success that might have proved elusive to either alone. On the other hand, most couples who collaborate do so with the same, sober objectivity that typifies teams who have no personal relationship.

Given the possibility of heightened temptation, the IRB was right to flag your relationship in its review of your application. The IRB should consult with your institution’s Research Integrity Officer and may have already. One routine way to manage these issues is to appoint a Study Monitoring Board. This Board would have access to all the protocols, enrolled subject details, and clinical data to provide another layer of monitoring and safety assurance.

Of course, the key point is whether a married couple is, as a rule, more “conflicted” as collaborators than two investigators who, although not married or personally involved, have passionate career aspirations. I suspect there are no data on this. However, to disapprove your application, the IRB would have to convince itself that a married couple is conflicted to a significantly greater degree; thus, the risk to patients would be correspondingly greater. Labby does not find such an argument compelling. However, requiring a Study Monitoring Board would be appropriate to ensure an extra layer of review. Some readers, especially those doing basic (preclinical) research, may think Labby’s view is too draconian. However, when human subjects are involved, extreme caution is warranted.

—Labby

Direct your questions to labby@ascb.org. Authors of questions chosen for publication may indicate whether or not they wish to be identified. Submissions may be edited for space and style.
Yukiko Yamashita

Supposedly Archimedes cried “Eureka!” at the moment of discovery, but Yukiko Yamashita remembers saying nothing so coherent. “I literally screamed,” Yamashita recalls. Fortunately, Yamashita was by herself, closeted in a blacked-out microscope room, when she had her eureka experience. She had been manipulating a green fluorescent protein (GFP) construct to label the asymmetrical division of centrosomes in dividing fruit fly stem cells. When the construct finally worked, “It was one of the best moments of my life,” says Yamashita.

It was also an important moment in recent stem cell science, say the ASCB members who nominated Yamashita for the 2009 Women in Cell Biology (WICB) Junior Career Recognition Award. Yamashita, who is now at the University of Michigan Medical School in Ann Arbor, will receive the “Junior WICB Award” this December at the ASCB Annual Meeting in San Diego.

How stem cells manage the tricky business of duplicating while sending daughter cells to asymmetrical fates—one to differentiate and one to preserve the stem cell line—has been intensely investigated in recent years. According to Fuller, Yamashita first demonstrated that the stem cell sticks close to the niche, maintaining a stereotypical position with its centrosome at right angles to the hub. In the G1 phase of the cell cycle, the centrosome duplicates itself, creating two daughter centrosomes. One centrosome copy stays in the niche and remains within a stem cell. The other copy migrates to the opposite pole of the soon-to-divide cell. As Fuller puts it, “The other daughter is going to be sent out of the Garden of Eden to differentiate.”

But no one knew which centrosome was which. Was the “mother” centrosome that started in the stem cell niche the same centrosome that ended up there after division? Finding a way to mark mother from daughter became Yamashita’s quest, says Fuller. Yamashita zeroed in on the centrioles, the pair of barrel-shaped organelles that are the motive center of the centrosome. If she could label the centrioles at the moment in the G1 phase when new copies assemble, perhaps Yamashita could follow their role in deciding stem cell fate.

As Yamashita tells the story, her first GFP attempts failed. But before she could figure out a solution, mother-daughter issues of another kind intervened. In December 2004, Yamashita gave birth to her daughter, Haruka. “I came back to the lab after two months,” she recalls. “My mind had been quite empty in a good sense, and I thought, ‘Why don’t I try heat shock-inducible promoters?’”

Yamashita tagged a centrosomal protein with GFP in such a way that she could switch on...
ASCB NEWSLETTER OCTOBER 2009

expression with a heat-shock pulse, indelibly marking daughter centrosome from mother centrosome. That’s what provoked Yamashita’s eureka scream in the blacked-out microscope room—she saw the original mother centrosome back home in its niche.

Stay in the Garden
Yamashita’s discoveries have shaken up the field, according to Fuller. “No one suspected how the centrosome would be anchored (by orientation to the niche). It was a complete surprise. The other unexpected thing was that it was always the mother centrosome that stays. The centrosome, which contains the centrioles, was made way back in embryogenesis. It’s got Eve there. Eve stays in the Garden.”

Fuller’s description of “centrosomal Eve” is an intriguing echo of “mitochondrial Eve,” the nonnuclear genes passed down through maternal descent. But Yamashita offers a critical caveat. “I have to say this is not as old as mitochondrial Eve. An ‘Eve’ centrosome is only as old as each individual.” It’s also far too early to know how widely conserved a centrosomal Eve might be beyond Drosophila germline cells.

Yamashita’s discoveries are significant, says Allan Spradling, a Howard Hughes Medical Institute investigator and Director of the Department of Embryology at the Carnegie Institute for Science. “Her creativity and ability to make new connections even in a field like this that’s been pretty heavily studied for 10 years is really impressive in my opinion.” Moreover, Yamashita has gotten off to an impressive start since opening her own lab at Michigan in 2007, according to Spradling. She has followed up on her observation of the stereotypical positioning of germline stem cell centrosomes, using orientation as a way of assessing dysfunction in aging stem cells. Yamashita demonstrated that without proper orientation, the GSCs arrest in the cell cycle. The older the fly, the more GSCs are misoriented. This is one of the first direct explanations of how stem cell aging could affect an organism’s fitness.

Spradling expects more surprises from Yamashita. “I just heard Yukiko give a talk at a stem cell meeting in Canada. She had a number of other new things that I found extremely interesting and creative.”

By the Inland Sea
Yamashita is from Akashi, a town just west of Kobe on Japan’s Inland Sea. Her father works in the Japanese patent office. With his training in physics, he raised Yukiko and her three younger siblings with a passion for all sciences.

Yamashita did undergraduate biology at Kyoto University and, as is traditional in Japan, stayed at Kyoto for her graduate work. There she entered the cell cycle lab of Mitsuhiro Yanagida. Earning her doctorate in 1999, she moved to a postdoc, also at Kyoto, with Shunichi Takeda.

In 2001, her husband, Kentaro Nabeshima, broached the idea of doing postdocs in the U.S., and she jumped at the suggestion. Nabeshima soon had a fellowship offer in the developmental biology lab of Anne Villeneuve at Stanford, while Yamashita began scouring the Internet for interesting labs in the Bay Area. She found Minx Fuller’s lab, which turned out to be just down the hall from Villeneuve’s.

“I was so lucky to get her,” Fuller declares. Yamashita’s credentials were fabulous. The Yanagida lab is a world leader in mitotic control, and Takeda’s is at the cutting edge in DNA repair research, Fuller explains. “In both labs, she did great work and got really good papers.” Having someone from such a rigorous background walk into her lab was a gift. Besides, Fuller found Yamashita “an utter delight” to have around. “Yukiko seems quiet but once you get through that, there’s this mischievous sense of humor underneath.”

For her part, Yamashita found the visual element of cell biology immediately engaging. “For me, understanding means knowing enough to draw it,” she explains, tracing this to her early fascination with nature and art. “When I started my postdoc with Minx Fuller and did my first micrograph with GFP, I felt on fire. I thought, ‘This is it.’ It all comes from my childhood. I love to see things and only when I can see them do I become convinced.”
Visualizing Science
Coming to a cell biology lab in America was liberating in other ways, Yamashita reports. Beyond the appeal of cell imaging, Yamashita felt freed from traditional social expectations. She could throw herself into her scientific life without anyone thinking it unnatural for a woman. “All my free time now became time for me to think about my science. In the first week here, I thought, ‘This country is my place.’”

When the couple went on the job market in 2006, their best double offer was from the University of Michigan Medical School where Nabeshima’s lab now studies chromosome dynamics in meiosis. Yamashita holds a joint appointment in the medical school and the freestanding Life Sciences Institute’s Center for Stem Cell Biology.

Having survived two Michigan winters, Yamashita claims they are not so bad. “I’m enjoying the change of seasons, but I have to say that I’m not shoveling. My husband is.” Their daughter, who is now approaching five, loves to sing and dance, her mother reports, adding, “This is certainly not from me.” Haruka is bilingual, although her English is much better than her Japanese, says Yamashita. “Her Japanese is kind of funny/cute. She is okay to communicate with her relatives, but can she be polite enough in Japanese to communicate with strangers? I’d say no. But the grandma, the grandpa, and the aunts and uncles are fine with this, so it’s okay.”

Parenting usually takes whatever time Yamashita and Nabeshima can spare from their respective labs, but this is the second summer that the whole family has gardened in their Ann Arbor backyard. Yamashita reports that their strawberry beds overwintered in good shape and, as of late June, were promising a bumper crop.

Margaret Fuller predicts a bumper scientific harvest from the Junior WICB winner. It’s not just her brains, her background, or her track record, according to Fuller. Yamashita has a wider perspective than many scientists, junior or senior. “Yukiko reads the scientific literature more than anyone I’ve ever known,” says Fuller. “She really thinks about science. That gives her a lot of power.”

—John Fleischman

“When I started my postdoc with Minx Fuller and did my first micrograph with GFP, I felt on fire. I thought, ‘This is it.’ It all comes from my childhood. I love to see things and only when I can see them do I become convinced.”

Textbooks for Africa

Science textbooks, courtesy of the ASCB and scientific textbook publishers, were donated to Maseno University, Nairobi, Kenya. Left to right: Science Librarian Alice Agoch and Librarian Peter Omondi Otieno accepted the donations from Sheila Weir, Information Resource Officer at the U.S. Embassy.
The Function of the Intermediate Compartment in Pre-Golgi Trafficking Involves Its Stable Connection with the Centrosome
Michaël Marie, Hege A. Dale, Ragna Sannerud, and Jaakko Saraste

The intermediate compartment (IC) is thought to consist of pleiomorphic transport carriers that form at endoplasmic reticulum (ER) exit sites, move along microtubules to the cell center, and transfer ER-derived cargo to the Golgi apparatus by fusing with or transforming into cis-Golgi cisternae. Using live cell imaging the authors show that a pericentrosomal domain of IC elements (pcIC), defined by the GTPase Rab1, is stably anchored next to the centrosome. Together with the Rab11-containing endocytic recycling compartment (ERC), the pcIC establishes a pericentrosomal membrane system. Separation of the pcIC and ERC from the Golgi due to centrosome motility revealed that they communicate not only with the Golgi stacks, but also with each other, operating as way stations in unconventional trafficking of the cystic fibrosis transmembrane regulator to the cell surface. These results suggest that the biosynthetic-secretory pathway bifurcates at the level of the IC, allowing certain plasma membrane– destined cargo to bypass the Golgi apparatus.

Function and Assembly of DNA Looping, Clustering, and Microtubule Attachment Complexes within a Eukaryotic Kinetochore
Marybeth Anderson, Julian Haase, Elaine Yeh, and Kerry Bloom

The kinetochore is the protein-DNA complex that mediates chromosome attachment to dynamic microtubules. How the kinetochore is physically connected to the centromere DNA and the mechanism by which the centromere is displayed on the outer surface of the chromosome are poorly understood. Using an inverse PCR assay to capture chromosome conformation, these authors demonstrate that kinetochore proteins proximal to the DNA (inner kinetochore) promote bending of centromere DNA. Kinetochore proteins bound to microtubule plus-ends (outer kinetochore) are required for the geometric organization of pericentric DNA loops and kinetochore clustering around the spindle microtubules. Analyses of the dependency relationships support the idea that the kinetochore comprises three autonomous complexes that mediate DNA looping, clustering, and microtubule binding. The linkage of microtubule-binding to centromere DNA-looping complexes positions the pericentric chromatin loops and stabilizes the dynamic properties of individual kinetochore complexes in mitosis. DNA loops are integral to the function of the mitotic segregation apparatus.

Mice Lacking Mannose 6-Phosphate Uncovering Enzyme Activity Have a Milder Phenotype than Mice Deficient for GlcNAc-1-Phosphotransferase Activity
Marielle Boonen, Peter Vogel, Kenneth A. Platt, Nancy Dahms, and Stuart Kornfeld

Acid hydrolases acquire mannose 6-phosphate (Man-6-P) residue(s) that serve as lysosomal targeting signals. These residues are synthesized by the sequential action of GlcNAc-phosphotransferase, which transfers GlcNAc-P from UDP-GlcNAc onto mannoses of the N-glycans, and “uncovering enzyme” (UCE), which removes the GlcNAc to expose the Man-6-P signal. Mutations in the two genes that encode GlcNAc-phosphotransferase underlie two lysosomal storage diseases (mucolipidosis type II and III), while no pathologic disorders have been attributed to UCE deficiency. Using insertional mutagenesis, the authors disrupt UCE and show that it accounts for virtually all of the uncovering activity in the mouse. Unlike mice with mucolipidosis type II, mice lacking UCE do not exhibit tissue abnormalities that result from acid hydrolase mistargeting because the acid hydrolases produced by the UCE-deficient cells still bind to the cation-independent Man-6-P receptor via Man-6-P-GlcNAc diesters, albeit with decreased affinity. Although this weak binding results in some acid hydrolase hypersecretion, sufficient sorting to the lysosome occurs to prevent the pathologic alterations seen with GlcNAc-phosphotransferase deficiency.

Pob1 Participates in the Cdc42 Regulation of Fission Yeast Actin Cytoskeleton
Sergio A. Rincón, Yanfang Ye, M. Antonia Villar-Tajadura, Beatriz Santos, Sophie G Martin, and Pilar Pérez

Cdc42 plays an essential role in establishing polarized cell growth, in part through controlling actin cytoskeleton organization. Schizosaccharomyces pombe For3 formin, which nucleates assembly of linear actin filaments, is localized to cell tips and activated in a Cdc42-dependent manner. The authors identified Pob1 in a screen for multicopy suppressors of the thermosensitivity of cdc42-879, a mutant strain defective in For3 localization and actin cable assembly. Cdc42 directly binds to Pob1 and regulates its localization and/or stability. Pob1 overexpression partially restores For3 localization and the actin cables that are nearly absent in the cdc42-879 strain. For3 docking at cell tips relies on two independent localization domains, at its N- and C-termini. While For3 C-terminal domain localization depends on Bud6, this study identifies Pob1 as the cortical tether that localizes the For3 N-terminal region to the cell tips and facilitates Cdc42-mediated relief of For3 autoinhibition to stimulate actin cable formation.

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Members Praise MBC But Endorse Some Changes

Papers published in Molecular Biology of the Cell (MBC) are generally of high quality according to 84% of respondents to a recent online survey of ASCB members. Seventy-one percent regard MBC as a prestigious journal.

ASCB staff conducted the survey at the request of MBC Editor-in-Chief Sandy Schmid and incoming Editor-in-Chief David Drubin. Drubin asked members to share their thoughts about MBC, “what it’s doing right, what could be improved, and how the journal can serve you as a scientist and ASCB member.”

Some possible changes to the journal were popular with survey respondents. They indicated that they would be more likely or much more likely to read or browse MBC if it had:

- Retrospectives, Essays, and additional “frontmatter” (61%)
- An enhanced homepage (57%)
- A system by which Editorial Board members can flag papers of interest (57%)

In contrast, there was little support among members for a new journal name or for the addition of podcasts and social networking features.

Members also answered questions about their experiences with MBC’s submission, review, and production processes. Importantly, 82% were satisfied or very satisfied regarding the MBC peer review process overall. Respondents were also satisfied or very satisfied with specific aspects of the process:

- Helpfulness / constructiveness of reviewers’ comments (79%)
- Helpfulness / constructiveness of editor’s comments (79%)
- Length of time for review and editorial decision-making (80%)

When asked about factors that are important in deciding where to submit a manuscript, 88% of respondents indicated that the fairness of the review process is very important.

Members were also asked how they access the journal. Eighty-one percent of respondents very often or always arrive at a journal article directly from PubMed. According to Schmid, that means that MBC’s rapid online posting of papers ensures their high visibility.

A total of 825 ASCB members responded to the survey, for a response rate of 12.7%. Questions calling for written comments elicited 433 responses. The numerical survey results are available online at www.ascb.org/files/Member_Survey_MBC_Results.pdf.

Drubin, who will take over as Editor-in-Chief in January 2010, expressed his gratitude to those who responded. “These data will be very valuable as we look for ways to enhance an already excellent journal. I look forward to working with the Editorial Board and the ASCB Council to implement some changes that will take MBC to the next level.”

—W. Mark Leader

Arrive Early for Saturday Annual Meeting Sessions

If you’ve ever attended an ASCB Annual Meeting before, you may have wondered about the Special Interest Subgroup sessions featured on Saturday, before the Keynote. These member-organized sessions provide more reasons to arrive early for the meeting. Whether focused on physical and chemical feedback in cellular function, building the cell, or actin cytoskeleton and signaling in tumor invasion and metastasis, the sessions feature scientific experts presenting extensively on the given topic. Unlike Minisymposia presentations, the talks are not selected from abstracts by Minisymposia co-chairs. Instead the individual session co-chairs present a proposal to the ASCB, and the ASCB Program Chair reviews and approves the year’s Special Interest Subgroup offerings.

“I was impressed by the diversity, high level of organization, and exciting topics and speakers in these proposals,” 2009 ASCB Program Chair Vann Bennett observed. “These sessions really augment the ‘official’ ASCB Annual Meeting program nicely, complementing the sessions planned by the Program Committee and the Minisymposia co-chairs.” For more information, visit www.ascb.org/meetings/Docs/Subgroups_for_Program.pdf.
Teaching in Africa: Interactive Teaching of Experimental Design and Data Analysis


Originally designed for a series of ASCB-organized workshops on molecular cell biology and bioinformatics for young biomedical scientists in Africa, the virtual practicals are for small group teaching. A “lab,” consisting of five students guided by one or two tutors, works together to design, perform, and analyze a series of experiments that answer a specific scientific question.

In the African workshops on the “Cell Biology of Protozoan Pathogens,” the theme was the phenotyping of mutant parasites; however, the virtual practical format could be adapted to any topic. This format is specifically designed to provide portable modular teaching units that foster critical thinking and data analysis skills, and to complement other teaching activities, such as journal clubs and wet-bench practicals.

Each virtual practical consists of a set of data in raw form. During the practical, students first design an experiment themselves. Then they are provided with raw data from the experiment (bioinformatics, DNA cloning, western blot, northern blot, immunofluorescence, electron microscopy, etc.), which they interpret and then use to plan the next stage. At the end of the practical, two independent student groups are asked to present their results to each other, encouraging skills in informal presentation of data. Each virtual practical takes one to two days, depending on the scope of the work and depth of analysis that the tutors deem appropriate.

This approach was used with great success in two ASCB workshops on cell biology, one each in Tanzania and Ghana. The organizers of the African workshops, including ASCB members Dick McIntosh, Keith Gull, and Gluenz, as well as Bill Wickstead, envisage development of additional modules to expand the range of topics and activities covered in virtual practicals.

Look for an article about the July 2009 Ghana workshop by Dick McIntosh in an upcoming issue of the ASCB Newsletter. ■

—Thea Clarke
MEMBERS in the News

Jennifer DeLuca, of Colorado State University, an ASCB member since 2001; Melissa Rolls, of Pennsylvania State University, who first became an ASCB member in 1997; and Joshua Shaevitz, of Princeton University, an ASCB member since 2005, were among the 17 scientists selected for the 2009 Pew Scholars Program in the Biomedical Sciences.

Mary Hendrix, of Children’s Memorial Research Center, an ASCB member since 1978, was appointed to serve on the National Cancer Institute Board of Scientific Advisors for a second term beginning in July 2009. Hendrix was first appointed to the Board in December 2004.

Gottfried Schatz, professor emeritus at the University of Basel, an ASCB member since 1970, was recently awarded the European Culture Foundation’s annual Award for Science Culture. In May he was presented with the Austrian Decoration of Honour for Science and Art in Vienna.

Hotel Reservations

Have you made your hotel reservation for the ASCB Annual Meeting? Hurry, a limited number of rooms are still available. The reservation deadline is November 10. To book your room, go to www.ascb.org/meetings. Why is it important to book within the block? Go to www.ascb.org/meetings/housing_block.cfm for the answer.

Fun for Less in San Diego!

Looking for ways to cut costs but have fun in San Diego? Check out cost-cutting ideas at www.ascb.org/meetings/Docs/Cost Cutting in San Diego.pdf.

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The ASCB is grateful to the following donors whose contributions support Society activities:

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The list of 2008 Half-Century Fund donors is posted on the ASCB website at www.ascb.org. Click on “About.”

MEMBER Gift

The ASCB is grateful to the following member who has recently given a gift to support Society activities:

Barbara M. Vertel
Educational Opportunity Administrative Supplements. NIH announced that $21 million of American Recovery and Reinvestment Act funding for administrative supplements to existing NIH grants over two years has been allocated for educational opportunities in NIH-funded laboratories for summer students and science educators. Applications may be submitted throughout FY09 and FY10, but some NIH institutes and centers may have specific deadlines. http://grants.nih.gov/grants-guide/notice-files/NOT-OD-09-060.html.

Mentored Quantitative Research Development Award. The purpose of the NIH Mentored Quantitative Research Career Development Award (K25) is to attract to NIH-relevant research those investigators whose quantitative science and engineering research has thus far not been focused primarily on questions of health and disease. Expiration: January 8, 2012. http://grants.nih.gov/grants-guide/pa-files/PA-09-039.html.

The National Academies’ Research Associateship Programs administer postdoctoral (within five years of the doctorate) and senior (normally five years or more beyond the doctorate) research awards sponsored by federal laboratories at over 100 locations in the U.S. and overseas. Quarterly application deadlines. www7.nationalacademies.org/rap.

National Centers for Biomedical Computing (R01). This funding opportunity is for projects from individual investigators or small groups to collaborate with the NIH Roadmap for Medical Research National Centers for Biomedical Computing (NCBCs). Collaborating projects are intended to engage researchers in building an excellent biomedical computing environment, using the computational tools and biological and behavioral application drivers of the funded NCBCs as foundation stones. Expiration: September 8, 2011. http://grants.nih.gov/grants-guide/pa-files/PAR-08-184.html.

NIGMS Grants. The National Institute of General Medical Sciences is accepting applications for funding research in which several interdependent projects offer significant advantages over support of these same projects as individual research. Standard NIH application dates apply. http://grants.nih.gov/grants-guide/pa-files/PA-07-030.html.

NIGMS Grants for Research to Understand and Inform Interventions that Promote the Research Careers of Students in Biomedical and Behavioral Sciences (R01). The National Institute of General Medical Sciences (NIGMS) solicits applications that propose research designed to test assumptions and hypotheses regarding social and behavioral factors with the aim of advising and guiding the design of potential interventions intended to increase interest, motivation, and preparedness for careers in biomedical and behavioral research. NIGMS is particularly interested in those interventions that are specifically designed to increase the number of students from underrepresented groups entering careers in these disciplines, but the proposed research need not be restricted to underrepresented minority students. Application deadline is October 22, 2009. http://grants.nih.gov/grants-guide/rfa-files/RFA-GM-10-008.html.

NIGMS Supplements for Functional Studies Based on High-resolution Structures Obtained in the Protein Structure Initiative. The National Institute of General Medical Sciences (NIGMS) announces the availability of administrative supplements to provide funds to enable investigators interested in protein function to capitalize on the information and material products of the Protein Structure Initiative (PSI). These supplements are available for 1) NIGMS-funded research grants (R01, R37, and P01) as well as 2) investigators with peer-reviewed research grants not funded by NIGMS, through the PSI research centers. www.nigms.nih.gov/initiatives/PSI/supplements.


Pathway to Independence Award. The primary purpose of the NIH Pathway to Independence Award (K99/R00) program is to increase and maintain a strong cohort of new and talented NIH-supported independent investigators. The program is designed to facilitate a timely transition from a mentored postdoctoral research position to a stable independent research position with independent NIH or other independent research support at an earlier stage than is currently the norm. Expiration: January 8, 2012. http://grants.nih.gov/grants-guide/pa-files/PA-09-036.html.
Research Supplements to Promote Diversity in Health-related Research. NIH and the Centers for Disease Control and Prevention (CDC) have announced to PIs holding specific types of NIH research grants that funds are available for administrative supplements to improve the diversity of the research workforce by supporting and recruiting students, postdoctoral researchers, and eligible investigators from groups that have been shown to be underrepresented. http://grants.nih.gov/grants/guide/pa-files/PA-08-190.html.

Research Supplements to Promote Re-entry into Biomedical and Behavioral Research Careers. These supplements are intended to encourage individuals to re-enter research careers within the missions of all NIH program areas. This program will provide administrative supplements to existing NIH research grants to support full-time or part-time research by individuals in a program geared to bring their existing research skills and knowledge up-to-date. Expiration: September 30, 2011. http://grants.nih.gov/grants/guide/pa-files/PA-08-191.html.

Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral Fellows in Pharm.D./Ph.D Programs. The objective of this NIH funding opportunity announcement is to help ensure that highly trained Pharm.D./Ph.D graduates will be available in adequate numbers and in appropriate research areas to carry out the U.S. biomedical, behavioral, and clinical research agenda. Expiration: January 8, 2012. http://grants.nih.gov/grants/guide/pa-files/PA-09-029.html.

SCORE Awards. The National Institute of General Medical Sciences is accepting applications for its Support of Competitive Research (SCORE) developmental awards designed to increase faculty research competitiveness at minority-serving institutions. Multiple deadlines through May 18, 2010. The program announcement, as well as three other program announcements (PAR-06-491, PAR-06-492, PAR-06-493), can be found at http://grants1.nih.gov/grants/guide/pa-files/PAR-06-490.html#PartI.

MEETINGS Calendar

A complete list of upcoming meetings can be found at http://ascb.org/othermeetings.psp. The following meetings have been added since the last issue of the Newsletter:

November 13–14, 2009. Atlanta, GA


March 10–13, 2010. Washington, DC

March 11–12, 2010. Bethesda, MD


June 3–5, 2010. Ann Arbor, MI

ASCB Annual Meetings

December 5–9, 2009. San Diego
December 3–7, 2011. Denver
December 15–19, 2012. San Francisco
December 14–18, 2013. New Orleans
December 6–10, 2014. Philadelphia
Do you believe that sustained, real growth in federal support for the NIH will fuel the discoveries of tomorrow?

Do you believe that the next generation of researchers need to be mentored and encouraged to stay in the scientific field?

Do you believe in making a difference in your community?

Then join the Congressional Liaison Committee (CLC) of the Coalition for the Life Sciences.

The CLC offers:
• Simple effective ways to reach out to your elected officials in Congress
• Opportunities to meet your federal representation in Washington, DC
• Tools and tips on ensuring your success as an advocate for biomedical research

To Join the CLC ►►► www.coalitionforlifesciences.org/be-an-advocate