PRESIDENT'S Column

A Magical Teaching Moment

Have you ever had one of those wonderful classroom experiences when everything just clicks? The students get really excited, start bouncing great ideas off each other, and everyone learns something they will remember? I had this experience a couple of weeks ago; not in a graduate cell biology class (alas), but with a group of 7th graders (12- to 13-year-olds), talking about cell division.

Tim Mitchison

Like many scientist-parents, I had visited my own children's classroom a few times. I fondly remember taking a microscope to my son's kindergarten class and looking at water from the class goldfish tank. The teacher had to drag me away after we found a spectacular amoeba in the gravel.

Mitosis as Muse

My slightly more serious engagement with K–12 education started a few years ago when I was visiting the Harvard Medical School (HMS) computer lab. I noticed a note on the board that read, "Mitosis projects must be finished by Friday." My immediate thought was: I need a note like that in my lab! The computer science teacher, David Youkilis, explained that he had developed an exercise for 7th graders. They research mitosis on the Internet and assemble presentations, mainly as an exercise in research and computer skills. The biology enrichment was a bonus. His choice of this topic reflected his own enthusiasm for biology.

We decided it would be interesting for these students to hear from a professional scientist who studies mitosis. Over the last few years this has evolved into a two-part process, where I and a couple of students or postdocs from my group listen to individual students' mitosis presentations at their school. We discuss what they learned. Then I, or my student or postdoc, tell the students what we are doing in our lab at HMS, and why. We talk about basic questions and my increasing interest in developing improved cancer drugs that target mitosis. Sometimes we vary it by bringing in some frog and fish embryos to look at; this is a challenge in the computer lab, but a lot of fun. This has become an annual event for my lab, something I, and others in my lab, look forward to doing.

This year, one of the mitosis discussions was especially memorable, to the point of being perhaps the most rewarding teaching experience of my career to date. I think it's helped that the science teacher has extended her 7th grade unit on cells, partly in response to the computer lab exercise. We were discussing cancer drugs that target cell division—I like to challenge the students to come up with ideas for better cancer treatments—and the class just took off on its own; students were asking questions and other students were answering them. They all participated, and I was thrilled to hear some of them use simple evolutionary concepts to try and explain the behavior of cells in the human body.

I could tell this discussion had a big impact on the students as well as on me. Still it was gratifying to have a parent I didn't know come up to me in a pizza place the following weekend and tell me her daughter had come home that day all excited about cells and mitosis. In fact, she lectured her parents on the topic over dinner. Cells are something even a fairly young child can get excited, and curious, about, especially if they see them moving in a video. Helping a child explore what I believe is an innate interest in science is one of the most satisfying experiences an educator or parent could have.

Engaging K–12 Students

Probably every ASCB member is concerned about science education, though our personal experience may focus our interests at different levels. As parents of an 11- and 13-year-old, my wife (Christine Field) and I are particularly interested in K–12 science at the moment. And I should say that my participation has been largely driven by her commitment. My message is, it's not so hard to get involved in some informal science enrichment at local schools, especially if you are a parent, and it's very rewarding. Even one classroom visit is enough for children to have met a real scientist, often for the first time. Bringing something (safe) from your lab that

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The *ASCB Newsletter* is published 11 times per year by The American Society for Cell Biology.

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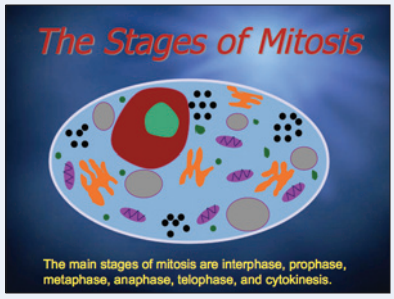
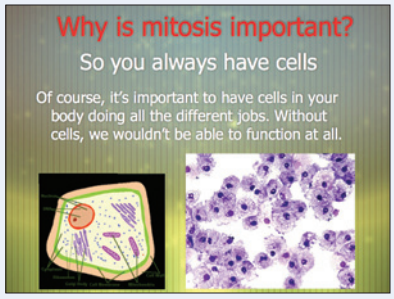
Deadlines for submission of articles and advertising materials:

Issue	Deadline
May	April 1
June	May 1
July	June 1

ASCB Newsletter
ISSN 1060-8982
Volume 33, Number 2
March 2010

Postmaster: Send change of address to:
ASCB Newsletter
The American Society for Cell Biology
8120 Woodmont Avenue, Suite 750
Bethesda, MD 20814-2762, USA





7th grade Mitosis Presentation Slides. Devotion School, Brookline, MA

Today's 7th graders will be deciding on careers in 10 years' time, or less, which isn't so far off.... [W]e need some of the brightest among them to choose research careers.

children can look at, and preferably touch, will help engage them. Those one-piece plastic Pasteur pipettes work great for younger children, for example. It's also been eye-opening for children to meet with students in my group, who have told personal stories of how they started on a science career track. This helps dispel the myth that scientists are all old and scary-looking.

There is a national consensus that K–12 science education in the U.S. needs improvement. While writing this column, I read a thoughtful article on science education reform by David Bower (Cal Tech) that we re-printed in the Oct 2009 *ASCB Newsletter*. Bower discussed the many ways professional scientists make mistakes when they try to contribute to science education in their local schools. Often it's by taking an elitist attitude, he noted, concluding his article with some practical advice. A lot of his points ring true to my own limited experience. In particular, my participation enhanced a curriculum that talented and committed teachers had already developed; I didn't come in as an "expert" telling them how to do their jobs.

ASCB is involved in promoting science education at all levels, and we are always looking for new ideas. (ASCB Executive Director Joan Goldberg noted ASCB efforts in science education in the October 2009 *ASCB Newsletter.*) Our Education Committee (EdComm) brings cell biology educators together and organizes events at the ASCB Annual Meeting, including extending complimentary invitations to local high school teachers and classes to attend the annual High School Program planned by the Committee. (See the January/February 2010 *ASCB Newsletter* for an overview of the 2009 program.) ASCB (with grant support from Howard Hughes Medical Institute) provides another educational resource through its highly respected education journal, *CBE—Life Sciences Education.* Under the able leadership of Editor-in-Chief Bill Wood and the Editorial Board, the free, online journal (www.lifescied.org) has published articles on K–12 science education partnerships (click on "Search," then type "K–12" or "K–12 partnership" in the text search box).

In addition there are two science-focused events planned for this year to increase outreach to children. National Lab Day (www.nationallabday.org) might offer one useful way to get your lab involved in outreach to local students. I'm also particularly excited about the educational impact of a new ASCB initiative, the National Institute for General Medical Sciences–funded The Cell: An Image Library. This project, now under development and led by EdComm Chair Caroline Kane in her role as grant PI, is aimed primarily at the needs of researchers. But it will be a great source of images and movies for Mr. Youkilis' 7th graders. And I can imagine high school classes using it in creative ways—especially if some of us get into their classrooms and encourage them! Another way to do that is at ASCB's booth this October at the National Science & Engineering Fair. This huge, family-oriented event will be held on the Washington, DC, National Mall October 23–24. ASCB plans to offer opportunities to see cells under microscopes and in videos, along with a hands-on exercise. This sounds like a great family activity if you live in the DC area, or plan to visit.

Inspiring the Brightest

Today's 7th graders will be deciding on careers in 10 years' time, or less, which isn't so far off. If we are to continue the rapid progress in biomedical research of the last decades, we need some of the brightest among them to choose research careers. Despite challenges I discussed in my last column, I believe this is still one of the most exciting and fulfilling directions a young person could take in life. I also believe that an appreciation of the approaches and lessons of science will enrich any career direction. Bringing some of your own science into a classroom is a lot of fun, and could make a real difference in opening young people's eyes to these possibilities. ■

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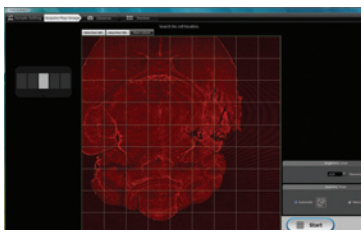

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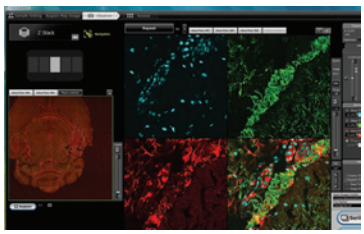

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Your Vision, Our Future

Herrmann, continued from page 1

The first was the Third Reich's governance, which treated the complexities of society as a simple system in which social discontinuities were considered irreconcilable.

The other two stemmed from his Copenhagen experience. In the 1920s and 1930s Niels Bohr's Institute of Theoretical Physics was the intellectual center of debates in which there was palpable tension between the discontinuities of the wave-particle duality and the innate human desire for unified theories.

Finally, his training was at the Carlsberg Biological Institute, where pioneering work on pH and protein characterization was being done. There Herrmann developed the confidence that one could tackle the overriding biological question of how to bridge the gap between the complexities of macromolecular structures and the complex functions that define life.

Fundamental Discoveries

His research career started in Copenhagen, where he carried out protein ionization experiments (approximately 1936–1939). Avoiding the Nazi occupation of Denmark, he moved to Johns Hopkins University Medical School. There he worked on lens development (and secretly for the defense department on antidotes to the effects of mustard gas on the lens). Initially at Hopkins, and later at Yale (in the 1940s), he developed a research program in embryonic development. His focus was on skeletal muscle.

He continued this work at the University of Colorado Medical School (approximately 1952–1959). He also established the Laboratory of Chemical Embryology there. He then joined the Institute for Cell Biology at the University of Connecticut in Storrs in 1959, became its Maude K. Irving American Cancer Society Professor of Biology in 1960, and was Institute Director for 10 years.

During his 20-year career in Connecticut he continuously expanded the boundaries of our understanding of macromolecular synthesis and structure. This was exemplified by his series of "Studies of Muscle Development" (1967–1971). In 1971 he was awarded a NATO visiting professorship at the University of Milan. He retired from active research in 1980, with over 100 journal articles and 150 technical reports.

Years of Intellectual Synthesis

After retirement from active research Herrmann concentrated first on synthesizing his understanding of the cell as the basic unit of life, one that distinguishes living from nonliving associations of macromolecules. His textbook, *Cell Biology: An Inquiry into the Nature of the Living State* (HarperCollins, 1989), organized the cell concept around three attributes of the living state: the cell surface as boundary and mediator, the cell as an information processing system, and the cell as an energy transduction system.

Herrmann's next work, *From Biology to Sociopolitics: Conceptual Continuity in Complex Systems* (Yale, 1998), brought him full circle to the major influences of his formative years in Vienna and Copenhagen; namely, the tension between the comfortable continuities of ideal systems and the need for resolution of the seeming discontinuities of complex societies. Here he used the successes of biology in finding the conceptual continuities between the complexities of macromolecular structures and those of life's biological functions as a paradigm. He applied that paradigm to finding conceptual continuities in complex sociopolitical systems that have seemingly discontinuous needs and concerns.

As with Herrmann's research endeavors pursuing continuity between macromolecular structure and function, he also actively pursued continuity at the sociopolitical level. In 2006 he and his wife Virginia endowed the Heinz and Virginia Herrmann Distinguished Lecture Series on Human Rights and the Life Sciences in connection with the Human Rights Institute at the University of Connecticut. Herrmann died October 18, 2009, at age 98. Donations in his name to continue support for the ASCB's Heinz Herrmann Symposium may be sent to the ASCB, Attn: Heinz Herrmann, ASCB, 8120 Woodmont Ave, Suite 750, Bethesda, MD 20814, USA, or made online at https://www.ascb.org/ascbsec/donation.cfm. ■

—Tom Doetschman, University of Arizona