Seminar on Sharing Strategies to Improve University Scientist Participation in K-12 Science Education

Bethesda, MD - The American Physiological Society (APS) hosted a seminar on Sharing Strategies in K-12 Science Education on June 29, 2009 on the campus of the Federation of American Societies for Experimental Biology (FASEB). As the second seminar in the Sharing Strategies Seminar Series, four national program directors from locally-based professional scientific organizations presented their efforts in improving university scientist participation in K-12 science education.

Jennifer Presley, Director of Science and Mathematics Education Policy at the Association for Public and Land-grant Universities (APLU), introduced the landscape of challenges addressed by the 2007 National Academies report, Rising Above the Gathering Storm. Presley described APLU’s Science and Mathematics Teacher Imperative to substantially increase the number and diversity of high quality mathematics and science teachers in middle and high schools. She identified key points in the academic pipeline where faculty can impact teachers.

Michael Dougherty, Director of Education for the American Society of Human Genetics (ASHG), provided an example of a National Science Foundation (NSF) Math and Science Partnership, the Geneticist-Educator Network of Alliances (GENA) in partnership with the National Science Resources Center. Dougherty summarized that the GENA Project has catalyzed several organizational and institutional changes, including the adoption of a society-based statement on the importance of member scientist participation in K-12 science education and formal ASHG recognition of efforts by member scientists to departmental and university administrators.

Katie Engen, a Program Associate with the American Society of Plant Biologists (ASPB) and the ASPB Education Foundation, presented an overview of her organization’s member-based volunteer and mentoring projects for students and the public, as well as workshops and exhibit booths at major science teacher conferences. Similarly, Ida Chow, Executive Officer for the Society for Developmental Biology (SDB), highlighted the availability of digital library resources for teaching, as well as outreach and workshop activities especially at SDB’ regional scientific meetings.

In attendance were other education program directors and/or executive directors and program officers from the American Society for Cell Biology, American Society for Biochemistry and Molecular Biology, the Howard Hughes Medical Institute, the NSF, and the American Physiological Society. Also represented were AAAS Science and Technology Policy Fellows in the Office of Science Education and the National Center for Research Resources (NCRR) Science Education Partnership Award (SEPA) program at the National Institutes of Health.

The seminar series is supported by an NIH NCRR SEPA (www.ncrrsepa.org) grant as part of the APS’ Six Star Science Frontiers in Physiology program (www.frontiersinphys.org). Programmatic information for the seminar series and presentations are available at: www.frontiersinphys.org/pages/page04g.shtml.

For further inquiries, email Mel Limson, APS K-12 Education Programs Coordinator: mlimson@the-aps.org.
SAVE THE DATE: Monday, June 29, 2009
SHARE YOUR STRATEGIES ON:
Improving University Scientist Participation in K-12 Education

Dear Colleagues in K-12 Science Education:

The next brown bag lunch event for the American Physiological Society’s Seminar Series on Sharing Strategies in K-12 Education is scheduled for Monday, June 29th on the FASEB campus. The theme will be on: Improving University Scientist Participation in K-12 Education.

You are invited to share your society’s or organization’s program of involving scientists in K-12 education at the June brown bag seminar. Consider the following questions in framing a brief presentation for the seminar:

- What are your organization’s objectives for encouraging scientist participation?
- How are your member scientists involved?
- What are your recruitment methods?
- What are the greatest challenges in improving scientist participation?
- What stakeholders are important in providing support?
- What is your program’s measure of effectiveness or impact?
- What resources are produced?
- What/who are your funding sources?

Join the following invited speakers to identify strategies that work:
- **Michael J. Dougherty, Ph.D.**, Director of Education
  The American Society of Human Genetics
- **Ida Chow, Ph.D.**, Executive Officer, Society for Developmental Biology
- **Jennifer B. Presley, Ph.D.**, Director, Science & Mathematics Education Policy
  Association of Public and Land-grant Universities

An interactive discussion will take place after the presentations. The participants and audience will collectively discuss issues related to scientist outreach/partnership programs for the K-12 population in order to capture best practices and innovative strategies. In this manner, a cross-cutting operational tool will be produced and shared for designing, improving, and evaluating how to encourage university scientist participation in K-12 education.

If you would like to present your scientist outreach/partnership program, please send a 1/2 - 1 page description (11 font, 1” margins, Word document preferred). Include your name, position, organization, title and website (if available) of your program. Four to five speakers will present, but all presentation submissions will be compiled and shared with the attendees at the meeting. Directly email your program description to Mel Limson in the APS Education Office: mlimson@the-aps.org by **no later than Thursday, May 28th**. Speakers will be notified around Tuesday, June 2nd, and publicity/free registration will begin shortly thereafter for the June 29th event.

Program information will be posted at:
http://www.frontiersinphys.org/pages/page04g.shtml
Brown Bag Seminar Series for Coordinators of Precollege Science Education Programs

Seminar Series: Sharing Strategies in K-12 Science Education

Title: Improving University Scientist Participation in K-12 Science Education

Speakers: Michael J. Dougherty, Ph.D., Director of Education
The American Society of Human Genetics
Ida Chow, Ph.D., Executive Officer
Society for Developmental Biology
Jennifer B. Presley, Ph.D., Director, Science & Mathematics Education Policy, Association of Public and Land-grant Universities
Katie Engen, American Society of Plant Biologists Education Foundation

Date: Monday, June 29, 2009
Time: 11:45 am - 1:00 pm
Location: Federation of American Societies for Experimental Biology (FASEB)
Conference Room 1502, 9650 Rockville Pike, Bethesda, MD 20814
http://www.faseb.org/faseb/fasebcampus.html

Host: American Physiological Society
Contacts: Mel Limson, Ph.D., APS K-12 Education Programs Coordinator
mlimson@the-aps.org, 301.634.7132
Marsha Lakes Matyas, Ph.D., APS Director of Education Programs

Join our speakers on Monday, June 29th to identify and share strategies that work in improving university scientist participation and engagement in K-12 science education. An interactive discussion will take place after the presentations. The participants and audience will collectively discuss issues related to scientist outreach/partnership programs for the K-12 population in order to capture best practices and innovative strategies. In this manner, a cross-cutting operational tool will be produced and shared for designing, improving, and evaluating how to encourage university scientist participation in K-12 education. Dessert and coffee will be provided.

Please RSVP no later than Monday, June 22nd by our Evite system (preferred) by clicking:
http://www.evite.com/app/publicUrl/NOELUNNBTC.PPDDG.XDFFVI/090629FrontiersSSSSeminar
or by directly emailing Mel Limson in the APS Education Office at mlimson@the-aps.org.

Program information is posted at: http://www.frontiersinphys.org/pages/page04q.shtml

Feel free to share this invitation with appropriate colleagues in the K-12 science education community within the metropolitan DC region.

Other questions? Email Mel: mlimson@the-aps.org
Geneticist-Educator Network of Alliances (GENA)

June 29, 2009
APS Brown-Bag Lunch Seminar Series
Project Partners

• American Society of Human Genetics
  - Mike Dougherty, Project PI, Director of Education
  - Angie Wong, Education Programs Associate

• National Science Resources Center
  - David Marsland, co-PI, Director of Professional Development
  - Juliet Crowell, Science Education Program Specialist

• The Study Group
  - Patti Bourexis, External evaluator
  - Joyce Kaser, External evaluator
CASHE Project Results

(Change and Sustainability in Higher Education, University of Maryland, Nancy Shapiro)

Examined MSP programs’ effects on IHEs vis-à-vis curriculum, faculty engagement, and sustainable change

- Curricular change is occurring but mostly at the K-12 level and locally, not systemically at IHE.

- Structures and reward systems at IHEs typically do not reward participation in K-12 education.

- Dean-level involvement is crucial to the success and sustainability of STEM faculty participation in schools.
**Professional devel. to improve UG biology teaching**

HHMI/NAS/UWisc: week-long summer institutes since 2004

- two years after SI, 72% have presented a seminar about teaching; 25% have submitted a teaching manuscript
- tracked anticipated challenges before (n=67) and one year after (n=101) SI

### Implementation Challenges - National Acad. Summer Institutes

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Before SI</th>
<th>After SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty cooperation</td>
<td>50%</td>
<td>20%</td>
</tr>
<tr>
<td>Time</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Recognition for teaching</td>
<td>10%</td>
<td>30%</td>
</tr>
</tbody>
</table>

![Implementation Challenges Chart](chart.png)
Putting GENA in Perspective

Request from NSF:

Sought proposals that build and sustain the capacity of the nation’s STEM disciplinary faculty for educational work by engaging the national disciplinary or professional societies to:

(a) assist STEM faculty and university administrators in preparing to work effectively in K-12 mathematics/science education; and/or

(b) leverage the influence of the societies in identifying and promoting the institutional changes in higher education that are critical for sustaining faculty engagement in K-12 STEM education

Geneticist-Educator pairing is GENA’s vehicle for change.
Putting GENA in Perspective

MSP Goals
- Improved training for pre-service educators
- Improved content knowledge for pre- and in-service educators
- Improved student achievement in STEM

Adapted from www.nsf.gov
GENA Project (NSF #0634296)

Ultimate Outcomes

At the conclusion of this project, participants will have:

- established a long-term collaboration to improve K-12 genetics instruction;
- developed a deeper understanding of genetics and pedagogy;
- begun the process of changing higher education’s view of faculty engagement with K-12 education; and
- demonstrated that a professional society can leverage its members to improve STEM education.

Total of 70 partnerships in 26 states
Locations of GENA Partnerships

Green – 2007 Workshop, Bethesda, MD
Light Blue – 2008 Workshop, Washington, DC
Blue – 2008 Workshop, Montclair, NJ
Pink – 2009 Workshop, Seattle, WA
## Results for GENA Cohort I Alliances

1. Alliance members generally viewed the quality of their Learning Plans as high.

2. Important Components of the GENA Alliances

<table>
<thead>
<tr>
<th>Partnership Component</th>
<th>Number (%) of Geneticists Viewing this Component as Important</th>
<th>Number (%) of Teachers Viewing this Component as Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication channels and abilities</td>
<td>12 (92%)</td>
<td>6 (55%)</td>
</tr>
<tr>
<td>Time available to prepare and carry out activities</td>
<td>11 (85%)</td>
<td>9 (82%)</td>
</tr>
<tr>
<td>Your partner’s knowledge and level of skill</td>
<td>11 (85%)</td>
<td>7 (64%)</td>
</tr>
<tr>
<td>Attitude and commitment</td>
<td>11 (85%)</td>
<td>7 (64%)</td>
</tr>
<tr>
<td>Your knowledge and level of skills</td>
<td>10 (77%)</td>
<td>7 (64%)</td>
</tr>
<tr>
<td>Working together from a distance</td>
<td>9 (69%)</td>
<td>6 (55%)</td>
</tr>
<tr>
<td>How individuals were paired to form the partnership (e.g., personality, style, or interest)</td>
<td>8 (62%)</td>
<td>6 (55%)</td>
</tr>
<tr>
<td>Distribution of work assignments (e.g., even or uneven)</td>
<td>5 (39%)</td>
<td>6 (55%)</td>
</tr>
<tr>
<td>The effect of unforeseen events (e.g., change in work assignments, illness, family responsibilities)</td>
<td>3 (23%)</td>
<td>7 (64%)</td>
</tr>
</tbody>
</table>
## 3. Immediate outcomes for GENA scientists

<table>
<thead>
<tr>
<th>Immediate Outcomes for GENA Scientists</th>
<th>Number (%) of Scientists Who Applied the Outcome to Themselves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadened understanding of the rewards and challenges of teaching genetics at the high school level</td>
<td>11 (85%)</td>
</tr>
<tr>
<td>Became more skillful in identifying and providing appropriate instruction to counter students' misconceptions</td>
<td>10 (77%)</td>
</tr>
<tr>
<td>Broadened repertoire of pedagogical approaches</td>
<td>10 (77%)</td>
</tr>
<tr>
<td>Strengthened level of confidence in participating in education outreach</td>
<td>10 (77%)</td>
</tr>
<tr>
<td>Recognized by peers for involvement in education outreach</td>
<td>4 (31%)</td>
</tr>
<tr>
<td>Deepened content understanding of Pol.</td>
<td>3 (23%)</td>
</tr>
</tbody>
</table>
### 4. Intended long-term outcomes for GENA scientists

<table>
<thead>
<tr>
<th>Intended Long-term Outcomes for GENA Scientists</th>
<th>Number (% of Scientists Who Applied the Outcome to Themselves)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will definitely (or probably) participate in another education outreach program in the near future</td>
<td>13 (100%)</td>
</tr>
<tr>
<td>Use GENA participation when documenting performance for tenure</td>
<td>9 (69%)</td>
</tr>
<tr>
<td>Encourage colleagues to participate in education outreach</td>
<td>9 (69%)</td>
</tr>
<tr>
<td>Promote the use of education outreach as a qualification for granting tenure</td>
<td>8 (62%)</td>
</tr>
<tr>
<td>Change teaching style to be more inquiry-based</td>
<td>6 (46%)</td>
</tr>
<tr>
<td>Volunteer for an educational activity with another public or private school science teacher</td>
<td>6 (46%)</td>
</tr>
<tr>
<td>Join (or increase participation in ) ASHG’s Genetics Education and Outreach Network (Mentor Network)</td>
<td>6 (46%)</td>
</tr>
<tr>
<td>Write and/or publish an article on GENA activities in a newspaper, peer-reviewed journal, or other publication</td>
<td>4 (31%)</td>
</tr>
<tr>
<td>Present a seminar or other briefing to colleagues on experiences in GENA</td>
<td>4 (31%)</td>
</tr>
<tr>
<td>Seek out more professional development related to teaching genetics</td>
<td>2 (15%)</td>
</tr>
</tbody>
</table>
Changes at ASHG Catalyzed by GENA Project

(a) the adoption of a Statement on the Importance of Participation of Scientists in K-12 Science Education, approved by the ASHG Board of Directors and posted on the Society’s Web site;

(b) the development of a Publications Opportunity resource on the Web to help alliances publish manuscripts on the scholarship of teaching and learning;

(c) writing letters (from the Society) to key administrators on behalf of geneticists and teachers to help gain recognition for professional involvement in GENA;

(d) acceptance by an ASHG Program Committee of a GENA-focused Invited Session abstract (two-hour panel session) at our 2009 Annual Meeting in Hawaii;

(e) the establishment of an ASHG Genetics Education Research Grants Program, approved in April 2009 by the BOD;

(f) the establishment of an ASHG Summer Interns Program for undergraduate students interested in gaining experience in science education; and

(g) plans to deploy members of ASHG’s Genetics Education Outreach Network (most of whom are academic scientists) to assist with the revision and improvement of K-12 state life standards, especially as they relate to genetics.
Statement on the Importance of Participation of Scientists in K-12 Science Education

The American Society of Human Genetics (ASHG) encourages administrators and leaders in institutions of higher education, including medical schools, to give appropriate credit to faculty who participate in formal outreach activities involving K-12 students and teachers. For example, during the appointment, tenure, and promotion process, participation in sustainable teaching activities and curriculum and materials development should be highly valued. Continued public support for genetics research and informed participation in an increasingly genetics-based healthcare system demand that consumers understand genetics and its importance in health and disease. ASHG will continue to leverage its expertise, in particular its membership, and provide leadership and organizational infrastructure to improve K-12 science education to achieve the goal of an informed public.
Evidence that Faculty Perceive Benefits to Recognition by their Professional Society

Faculty #1: I received a hand written note of congratulations from the Dean of Faculty Affairs. There was an announcement by one of the education deans in the Education Committee Meeting. My division chief felt that the GENA participation would be considered evidence of participation at a national level in education.

Faculty #2: Thanx for the letter to my boss, he read parts of it at a faculty meeting I missed and now everyone is telling me what a hero I am!!! I had to quickly point out I wasn’t but it got a lot of play here so that was cool.

Faculty #3: I did not go for tenure promotion yet. I still have 3 more years, however both the Dean and Vice-Dean congratulated me after receiving the letters regarding my GENA participation. They are the first level of review in my future tenure process; I can let you know if something else comes up.

Faculty #4: I received a very nice hand written note from my Dean, in response to the ASHG letter. I will save my Dean’s note for my P&T package.
ASHG’s GENA Project Overview

The American Society of Human Genetics (ASHG) and the National Science Resources Center (NSRC) are using the broad theme of genetics to build a framework of long-term collaborations between educators and scientists. With funding from the Math Science Partnership program at the National Science Foundation, the Geneticist-Educator Network of Alliances (GENA) project (grant #0634296) is establishing a sustainable infrastructure to support meaningful outreach by scientists in the high school science classroom and thereby help to improve STEM education. The project is also exploring how ASHG, as a professional society, can promote the value of outreach to higher education institutions, for example by playing a positive role in the career development of both junior (pre-tenure) and senior (post-tenure) genetics faculty.

The project is developing a national network of 70 alliances between university researchers and high school biology teachers that is designing and implementing teaching plans related to state standards and misconceptions in genetics. After implementation and testing in the classroom, these teaching plans are being made available for use by other geneticists and teachers, which should help decrease the time required for scientists to prepare for outreach and maximize meaningful interaction between the geneticists and students.

The geneticists and high school teachers begin their year-long partnerships by attending workshops to examine genetics content inherent in state science education standards, identify misconceptions in genetics education, evaluate a range of educational resources, develop a plan for assessment, and receive guidance on implementing inquiry-based lessons. Detailed teaching strategies and case studies are being disseminated nationally through current Math and Science Partnerships (via MSPnet) and a publicly accessible website sponsored by ASHG. Many partnerships are now in their second and third year.

The project is also providing support for the professional advancement of participants by sending certifications to participants and letters of recognition from ASHG to key administrators, such as department chairs, principals, and deans. Changes being made within ASHG as a result of the GENA project are deepening the Society’s commitment to K-16 genetics education and are beginning to serve as a model for other disciplinary scientific societies. For example, at ASHG, a Board-approved Statement on the Importance of Participation of Scientists in K-12 Education serves as a concrete indicator of the Society’s commitment to K-12 STEM outreach. This was followed by Board approval of an Undergraduate Summer Internship Program and money allocated for an ASHG Genetics Education Research Award program.
Who are we?

Founded in 1939, as the Society for the Study of Development and Growth, by the editors of the journal *Growth*, after the first symposium held in Cape Cod, Massachusetts.
Our Activities

- Website
- Official journal *Developmental Biology*
- Website
- Annual meetings
- Regional meetings, 6-8 per year
- Education
- Short courses with LASDB
- Funding for member-organized meetings
- Travel awards for members and grants for Latin American scholars
- Participation in US science policy and funding discussions
DEVELOPMENTAL BIOLOGY

- 2009 - 50th anniversary
- Owned and published by Elsevier
- Official SDB journal since 1966
- Royalty supports many SDB programs
Professional Development and Education Committee (PDEC)

- Chair: Bill Wood
- Co-chair: Karen Bennett
- Members: Yolanda Cruz, Steve Farber, Mary Montgomery
- LEADER Archivist: Diana Darnell (BEN/APS Archives partner)
- ex officio: Ida Chow (SDB executive officer)
Education Section

This Education Section is overseen by the Society for Developmental Biology’s Professional Development and Education Committee.

The mission of the Professional Development and Education Committee is to:

1. Support the goals of the Society for Developmental Biology.
2. Nurture the professional development of our membership and promote the range of employment opportunities available for developmental biologists at all stages of their careers; and
3. Facilitate and encourage teaching and learning within and between the academic community and the public about developmental biology.

Education subsections:

- K-12
- Undergraduate
- Boot Camp
- Topics
- Visuals
- Interactive Fly
- LEADER
- Virtual Library
- Books
- Courses
- Funding opportunities
- Publications
- Jobs
- Gallery

Useful Readings:

Education Section Archives

Contributions of a Scientific Society (Society for Developmental Biology) and its Members to Science Education at All Levels. Presentation at the 5th International Conference on Hands-on Science (Formal and Informal Science Education), Oct 13-17, 2003, Olinda-Recife, Brazil.
Outreach Activities

• LEADER – teaching digital library with peer-reviewed learning objects, for all levels, BEN/APS Archives partner
• Workshops at SDB regional meetings
• Individual member’s efforts
• Collaborative efforts
• College faculty
Science Education Outreach Sessions at SDB Regional Meetings
• **MidAtlantic, Carnegie Institution, DC**: Hands-on exercises on comparative embryology and regeneration. Audience: Washington, DC public school teachers, continuing education credit. Instructors: several SDB members in the region.

• **SW, U Utah, UT**: Hands-on developmental biology exercises and lab tours. Audience: Native American undergraduate science students from tribal colleges in NM and AZ. Instructors: Univ. of Utah faculty.

• **NW, Friday Harbor Labs, WA**: Hands-on exercises on comparative embryology using local organisms, lecture on embryonic stem cells. Audience: San Juan Islands teachers, district hours. Instructors: Univ. of Washington faculty.

• **NE, Marine Biological Lab, MA**: Workshop on scientists in classroom, with Boston Univ Sch of Med’s CityLab Academy. Audience: local teachers and students, meeting participants. Instructor: CityLab Academy director.
New Orleans Public Schools
Science Detectives
Sponsored by
Society for Developmental Biology
Southwest & Gulf Coast Region
2002
<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>AGENDA</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>1. Experimental Design Review</td>
<td>Whole Group</td>
</tr>
<tr>
<td>30</td>
<td>2. Science Misconceptions</td>
<td>Small Group</td>
</tr>
<tr>
<td>45</td>
<td>3. Computer Simulation Inquiry</td>
<td>Small Group</td>
</tr>
<tr>
<td>10</td>
<td>4. Evaluation</td>
<td>Whole Group</td>
</tr>
</tbody>
</table>
Individual Member’s Efforts
A Science Outreach Program
for High School Girls

Lissa Rotundo
Sally Kutzer
Baltimore Polytechnic Institute

and

Marnie Halpern
Carnegie Institution

established in 2001
Project BioEYES: Making a Difference in Science Education
Steven A. Farber, Jessica L. Steele & Jamie R. Shuda
Carnegie Institution, Department of Embryology, Baltimore, MD & Thomas Jefferson University, Philadelphia, PA

Founded in 2002, the mission of the Project BioEYES is to foster an enthusiasm for science education, promote interest in future participation in a biology-related field, and allow all students the opportunity to learn life science through a hands-on, student-centered approach to instruction.

Objectives:
- To provide interactive tours of our zebrafish and Drosophila facilities
- To bring our live zebrafish unit into 4th/5th, 7th, and high school classrooms
- To train 4th-12th grade teachers
- To host high school interns in our laboratories and summer programs

Tours:

Educational Objectives
- Discover why zebrafish are used in science-related research and their function in our experiments
- Perform an experiment with live fish where all students will be active learners and "Junior Scientists"
- Discuss and create the environment needed for the embryos to live
- Observe the zebrafish life cycle from the 1 cell stage to free-swimming larvae and compare to human
- Learn about the circulatory system by observing blood flow in the zebrafish
- Use a microscope and other scientific tools
- Be exposed to science and the scientists involved in a fun way to foster interest in science careers

An Intern:

Table 1: High School Student Project Implementation from Raw Data

Table 2: Middle School Student Project Implementation from Raw Data

Through our weeklong zebrafish experiments, Project BioEYES has made powerful education gains in students’ content knowledge.

Conclusion: Our innovative practices and materials excite and empower students about working in the science field.

Proudly Sponsored By: Thomas Jefferson University Medical School, Carnegie Institute of Washington, The Break'Em Foundation, The Christopher Ludwick Foundation, The Campbell Soup Foundation, GlaxoSmithKline, and The Telfies Foundation
Agent Briefing

Your mission, if you choose to accept it:

is to learn about the fields of science and medicine by becoming scientists in your own classrooms. This website will provide you, parents, and teachers with more information about our program and how you can become a future scientist, doctor, or health care professional. Remember, you cannot find the answers to our scientific questions... without your help.

- If you are a 6th or 7th grade student click on Micro Agent
- If you are a 8th-9th grade student click on Intermediate Agent
- If you are in high school click on Advanced Agent

BIOEYES is proudly sponsored by: Jefferson Medical College and the Kimmel Cancer Center at Thomas Jefferson University, The Teleflex Foundation, The Brook J. Lenfest Foundation, The Christopher Ludwick Foundation, GlaxoSmithKline, and The Pennsylvania Department of Education. Equipment has been generously donated by: Carl Zeiss MicroImaging, Inc. and Aquatic Habitats (A Division of Aquatic Ecosystems, Inc.)

* BIOEYES designed for & best viewed at a screen resolution of 800X600 or 1024X768

Developed by Application & Web Services, a division of Jefferson Information Technologies, Thomas Jefferson University. For technical issues, please contact webmaster@jefferson.edu.

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Please read our Privacy Statement.
**Cloning, DNA and You**

Francis Gregory Public Library, Washington, DC

A collaborative activity between SDB and the Carnegie Academy of Science Education (CASE) in a library in Washington, DC: short talk about cloning and hands-on activity to extract DNA from strawberry.
Connecting Humans and Nature through Conservation Experiences

What is CHANCE?

CHANCE Modules
CHANCE Fellows
CHANCE Sponsors
Press
Course Application
2009 Brochure
CHANCE Idol

Winner of the "2005 Bringing the World to Pennsylvania Award"

Developed and directed by Dr. Jacqueline S. McLaughlin
design by Jeffrey Sting

http://www.chance.psu.edu/
Collaborative Efforts
OPA What's New

Sunday June 28, 2009
> Patients, Scientists, Institutions and Associations Join to Oppose Mandatory Increase in SBIR Set-aside

> FASEB Expresses Concerns About SBIR Set-aside Increase

> FASEB Comments on NIH Conflict of Interest Regulations

> FASEB Joins Scientific Community in Concern Over Visa Delays

> More News Articles

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Evolution and Its Discontents: A Role for Scientists in Science Education

Coalition of Scientific Societies*


Young Charles Darwin from "Darwin" exhibition at American Museum of Natural History, November 2006 to May 2006. (Reproduced with permission of Howard Marks)

Editor's Note: This month's editorial reports the results of a public opinion survey on evolution and education. The report was prepared by a coalition of learned societies and contains an appeal, based on the data obtained, for scientists to take the lead in communicating science to the general public. The early "Darwinism" like Ernst Haeckel and Thomas Henry Huxley, were following the model of popular, eloquent communication set by Charles Darwin himself, as in his seminal conclusion on The Origin of Species (1859):

"It is interesting to contemplate a tangled bank, alive with蜜蜂, bees buzzing on the blossoms, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so simple a manner, how all have produced by laws acting around us... Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one, and that, whilst this planet has gone on developing according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.

*Correspondence: Jennifer Hahn, Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, MD 20814 USA. E-mail: jhahn@faseb.org. doi: 10.1096/fasebj.22.1.123
Lessons Learned
K-12 Teachers look for:

- Continuing education or seat hour credits
- Relevant topic/subject
- Hands-on/inquiry based approach
- Lesson matching with local standards and clearly indicated
- Inexpensive materials
- Local or online content support from scientists, including training in research labs
Volunteer Scientists look for:

- Help to communicate in an effective way
- Help to find/contact teachers
- Help to prepare the materials at the proper grade level
- Help to learn about local school science standard and connect to activities they develop
- Financial and/or administrative help
Professional Societies can:

• Be the liaison between teachers and scientists
• Provide resources for both parties, some may be produced by the society
• Provide tool-kits or templates for scientists
• Provide workshops and symposia at meetings or independently
• Offer grants to individual members or institutions in their relevant outreach activities
• Help to secure from local school districts teacher professional development credits
• Provide stipends for teachers to attend workshops if necessary
• Have dedicated staff for education activities
Outreach to College Faculty
First SDB Faculty Re-Boot Camp

your scientific and teaching responsibilities

directions

Explore and prioritize tasks

At SDB 68th Annual Meeting, San Francisco, July 22-23, 2009
Capacity limited to 20, current SDB membership required.
Application deadline: May 4, 2009

Perspective

Humor
The Science & Mathematics Teacher Imperative (SMTI) is a collaboration of public university leaders working to catalyze action across sectors—state and federal governments, the business community, the K-12 community, and others—to adequately prepare teachers to teach science and mathematics in the 21st century. A·P·L·U's 218-member institutions and university systems, with their heavy involvement in research and education in the science, technology, engineering and mathematics (STEM) disciplines, are ideally positioned to make significant contributions to the critical needs for highly qualified and diverse science and mathematics teachers.

Through the Science and Mathematics Teacher Imperative (SMTI), leaders of A·P·L·U-member institutions commit to:

- Substantially increase the number and diversity of high quality mathematics and science teachers in middle and high schools.
- Identify the immediate and longer term needs for science and math teachers in their states.
- Build partnerships among universities, community colleges, school systems, state government and other stakeholders to address statewide needs for teachers on a sustained basis.

SMTI will provide technical tools and support to produce high quality science and mathematics teachers, including the following resources:

**Promoting Institutional Change to Strengthen Science Teacher Preparation (Sci Teacher Prep)**

The Sci Teacher Prep project, funded by NSF and hosted on MSPnet, is a three-year partnership between A·P·L·U, 27 institutions of higher education, and two discipline-based organizations, the Physics Teacher Education Coalition (PhysTEC/PTEC, an effort of the American Physical Society and the American Association of Physics Teachers) and the American Chemical Society. The project seeks to assess the impact of creating a national network of universities on strengthening teacher preparation as well as to understand the necessary and optimal conditions for institutional change by collecting quantitative and qualitative data from the 27 institutions of higher education as they implement strategies to strengthen their science teacher preparation programs. Lessons learned from this project will be shared with the SMTI institutions for further implementation.

**Assessing the Need for Teachers**

The Needs Assessment project will assist state policymakers and education leaders to rigorously evaluate their states' needs for middle and high school science and mathematics teachers, and their ability to meet those needs. The project will help states identify best practices in developing and implementing data systems that provide institutions with the necessary information to establish numerical goals for science and mathematics teacher production and effectiveness.

**Identifying Leading Approaches**

The Analytic Framework will be a user-friendly online resource that summarizes major components of leading practices of science and mathematics teacher preparation programs across the country. The Analytic Framework will contain information about promising practices in science and mathematics teacher recruitment, preparation, mentoring and development across universities. It will be an important resource for institutions attempting to benchmark or launch new efforts.

For more information please contact:

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A·P·L·U’s Science & Mathematics Teacher Imperative

Jennifer B. Presley, Ph.D.
Director, Science & Mathematics Education Policy

Association for Public and Land-grant Universities

June 29, 2009
Who is A・P・L・U?

- 185 member institutions – all leading public/flagship/land-grant research universities in every state
- 27 leading university systems
- Largest, best prepared undergraduate cohorts in science, engineering and mathematics
- Largest and highly accomplished science, math and engineering faculties
Economic studies conducted even before the information-technology revolution have shown that as much as 85% of measured growth in US income per capita was due to technological change.

…(we are) deeply concerned that the scientific and technological building blocks critical to our economic leadership are eroding at a time when many other nations are gathering strength.

Improve K–12 science and mathematics education
Recommendation #1: Annually recruit 10,000 science and math teachers
APLU’s Science and Mathematics Teacher Imperative (SMTI)

Mission:
- Substantially increase the number and diversity of high quality mathematics and science teachers in middle and high schools

Strategic Plan:
- Collective action from national consensus by leading universities on direction and definition of effort
- University leadership in concert with key faculty, particularly from science disciplines
- National momentum based on some common metric and framing of approaches
- Extensive cross pollination across existing initiatives
- Partnerships with education, state governments, business
• 116 Universities have made the SMTI commitment, as have 11 university systems
• 27 institutions have been selected to participate in an NSF RETA (Research, Evaluation and Technical Assistance) grant entitled “Promoting Institutional Change to Support Science Teacher Preparation” with no direct funding to those institutions.
… Through the NSF grant we are building a set of opinion-leader research universities who not only have made the commitment to teacher preparation, but to collaboratively studying what works and why.

- Top leadership commitment
- Disciplinary society participation (APS & ACS)
- Cross-college teams
- Inter-institutional transparency
There are Several Points in the Pipeline that Faculty Impact Teachers

- Undergraduate and graduate majors
- Pre-service Teachers
- Professional Development for Teachers
Some of the hurdles faculty induce

- Poor undergraduate instruction discourages majors
- A chilly climate for majors interested in teaching
- Perpetuating myths regarding the profession of teaching
Reform introductory courses
(Florida International University)

- Utilize research-based curricula to improve student learning and model best teaching practices
- Implicit message that teaching is valued
- Interactive methods more engaging for students

Laird Kramer, Physics faculty member, instructs students in introductory mechanics using the ASU Modeling curriculum

PhysTEC institution. For more information visit www.phystec.org.
Active advising of majors produces more teachers (University of Arkansas - Fayetteville)

Active advising checklist
- Build relationships with students
- Present teaching as a career option
- Learn about certification programs
- Advocate for students
- Make professional connections for students

Dramatic increase in majors enabled a large increase in physics teachers

PhysTEC institution. For more information visit www.phystec.org.
PhysTEC: Physics departments expanding the pipeline

* Became a PhysTEC site 2003 or later
** Number of physics certifications averaged over institutions from 10 states
Reform the Chilly Climate for K-12 Teaching in Math and Science Departments

What would your professors in your major (math and science) department say if you told them you wanted to be a high school teacher?

Some of the student responses:

- Professors at our university don’t value teaching
- There is a lack of respect in departments for K-12 teaching
- It is not considered a “full blown career”
- Professors would be angry
- Professors would say, “You’re wasting your talent”
- Professors would say, “Don’t do it”

Encouragement from faculty to consider K-12 teaching was an important factor in students’ decisions to pursue certification.

Give early teaching experiences – even to those who have yet to commit to being a teacher (University of Colorado at Boulder)

Learning Assistants (LAs)
• Undergraduates facilitate group learning activities
• Concurrent pedagogy course
• 6 PhysTEC institutions adopted the CU Boulder LA program

Impact
• Teacher recruitment
• Class performance improved
• LA knowledge increased

Valerie Otero, Education faculty member and expert in physics education research, instructs LAs enrolled in a 1 credit pedagogy course

PhysTEC institution. For more information visit www.phystec.org.
Remove Myth of High Attrition

The Fact: **More than two-thirds stay in teaching**

<table>
<thead>
<tr>
<th>Field</th>
<th>Return-Adjusted Attrition Rate from the Profession (%)</th>
<th>Percent Who Leave and Return (%)</th>
<th>5-Year Attrition Rate Without Returns (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>27</td>
<td>13</td>
<td>40</td>
</tr>
<tr>
<td>English</td>
<td>32</td>
<td>14</td>
<td>46</td>
</tr>
<tr>
<td>Math</td>
<td>30</td>
<td>12</td>
<td>42</td>
</tr>
<tr>
<td>Science</td>
<td>31</td>
<td>12</td>
<td>43</td>
</tr>
<tr>
<td>Self-Contained Elementary</td>
<td>24</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>Social Science</td>
<td>28</td>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>Special Education</td>
<td>26</td>
<td>15</td>
<td>41</td>
</tr>
<tr>
<td>25 or younger</td>
<td>28</td>
<td>14</td>
<td>42</td>
</tr>
<tr>
<td>35 or older</td>
<td>23</td>
<td>12</td>
<td>35</td>
</tr>
</tbody>
</table>

Attrition from teaching is less severe than is typically believed when return rates are included.


College graduates who go into teaching are more likely to stay than those who enter most other professions requiring comparable education.
...And so today, I am calling on a new generation of Americans to step forward and serve our country ... If you want to make a difference in the life of the nation...join the teaching profession. America needs you.

-- President Obama, March 10, 2009

And university science & mathematics faculty can help to making this happen by improving what they already do.
Improving University Scientist Participation in K-12 Education – June 29, 2009

As outlined below, the American Society of Plant Biologists (ASPB) offers multi-tiered, adaptable resources for K-12 use. These resources are freely available to the general public, teachers, ASPB members, and other scientists via www.aspb.org/education. These web resources are available to the general public as well as our members. Most of our members are professional plant biology researchers; many have a keen interest in outreach and education. Members can serve on the Education Committee http://www.aspb.org/committees/education.cfm or the Education Foundation Board http://www.aspb.org/education/foundation/.

1. Annual Meeting
   a. During the Education Minisymposium and the Education Workshop presenters offer themes designed to inspire their peers to greater outreach activity. These events include practical tools for successful teaching.
   b. Winners of the Education Booth Competition http://www.aspb.org/meetings/pb-2009/educboothwinners.cfm share compelling outreach activities with meeting attendees at the ASPB booth in the main exhibit hall. This competition is an incubator for the best teaching and outreach ideas created by and useful to professional plant biologists and other educators.
   c. ASPB is considering granting plenary speakers 5 minutes of extra time to address education and outreach during their presentations. This is an effort to inspire peers to apply their research and expertise directly to educational outreach efforts.

2. ASPB sponsors exhibit booths at major national teacher conferences each year. Members from nearby institutions help staff the booth and interact directly with teachers. They do teaching demonstrations, offer free handouts and activities, and field questions all within the context of helping teachers to inspire K-12 learning and to prepare students for success in undergraduate biology. Per request, we also send materials to large regional events where we don't have a full booth. We also participate in the AAAS's Family Science Days each year.

3. The ASPB News (the society’s bi-monthly newsletter) carries a series of Teaching Tips designed to help our members improve their teaching skills. The newsletter also runs a column on grassroots ideas for bringing plant biology into the community. Many of these ideas include simple, direct methods for getting materials and techniques to local schools.

4. ASPB has participated in a variety of NSF-sponsored conversations on improving education. The meeting titles emphasize undergraduate education but the conversations often include adequate preparation of K-12 students for college studies.
   a. NSF & ASPB Annual Meeting July 2007 Session: Teaching Biology to Undergraduates - What is necessary to reshape undergraduate education in biology to reflect the 21st century approach to the discipline?
   b. NSF & HHMI November 2008: Vision and Change in Biology Undergraduate Education - A View for the 21st Century The Role of Disciplinary Societies

5. The ASPB Education Foundation sponsors the Grant Awards Program (GAP) http://www.aspb.org/education/foundation/gap.cfm. GAP is a professional level grant available for ASPB members to create education and outreach activities that reach a wide audience. Recent winners include a competition for new plant biology videos on YouTube www.ChloroFilms.org, a website for plant science news www.greenseedling.com, and an interactive plant genetics video game http://www.aspb.org/education/GDLProject.CFM.
Improving University Scientist Participation in K-12 Education

APS Seminar Series on Sharing Strategies
June 29, 2009

Katie Engen, M.Ed.
American Society of Plant Biologists
ASPB’s 12 Principles of Plant Biology

Science Education
Concepts aligned with the National Research Council’s Life Science Standards

http://www.aspb.org/education/foundation/principles.cfm

Also available in Spanish and Chinese translations
The Foundation collaborates with the Society and especially the Education Committee on mutually beneficial projects to:

• promote the role of plant science in affordable, high quality food, fiber, and renewable resources

• explain the plant biology of agriculture, medicine, cosmetics, clothing, building, environmental health & cleanup and more

• inform the public on the latest developments in GMO crops and biotechnology

**IMPROVE K-12 CURRICULUM BY CREATING INTERACTIVE PLANT SCIENCE LEARNING RESOURCES FOR CLASSROOM USE AND TEACHER DEVELOPMENT**

• encourage young scientists to pursue careers in the growing field of plant biology

• increase plant science activities in science museums and discovery centers
ASPB Education Foundation
2008 Grant Award Program Winners

Jeffrey S. Coker
Elon University

Jane P. Ellis
Presbyterian College

Mary Williams
Harvey Mudd College

"Twelve Activities to Accompany the Twelve Principles of Plant Biology"

Beth Judy
Montana Public Radio, Missoula, MT

"The Plant Detective"
Radio Show

Peggy Lemaux
University of California, Berkeley

“DNA for DINNER? GENES, GENOMES, GENETICS”

Dan Cosgrove
Pennsylvania State University

“A Competition for New Plant Biology Videos on YouTube"

Jennifer Moon
University of Texas, Austin

“greenseedling.com”

Roger Hangarter
Indiana University

“A Moment of Science (AMOS): Plant Science on the Radio”

Rodrigo Gutiérrez
Pontificia Universidad Católica de Chile

“Vegetalista: understanding the value of plant biology and biotechnology”

www.aspb.org/education/foundation/gap.cfm
Member Involvement

At ASPB’s Annual Meetings

– Education Booth + Exhibit Competition Winners
  • Education Committee members provide outreach & expertise
  • PB09 YouTube Plant Biology Video Competition
  • PB09 Real Plants, Real Tools, Real Science

– Education Workshop
  • PB09 Talking Science in Public

– Education Minisymposia
  • PB09 Evolution & Innovation in Plant Biology Outreach

– Excellence in Teaching Award (1988)
  • for excellence in teaching, leadership in curricular development, or
    authorship of effective plant science teaching materials

– Just 5 More Minutes!
  • Session Speakers’ Outreach Ideas (’09 pilot proposed)
VOLUNTEER
TIME & EXPERTISE

Education Committee

- Consult with teachers: *Fields of Interest: UE and/or K-12*
- Organize workshops & exhibit booths at AAAS, NSTA, NABT, and SEB/FESPB-Europe

Past ASPB President Rob McClung
Family Science Days Booth at AAAS

ASPB Workshop for teachers at NABT
ASPB: K12 Free & On-Line Resources

- Video Resources
- Radio Programs and Audio Resources
- Programs & Websites for Students & Teachers
- Classroom-Ready Teaching Materials

www.aspb.org/education/NEWK12.cfm

- Cool Plant Science News & Useful Research
- Testable Questions & Other Science Fair Survival Tips
12 Principles of Plant Biology

BOOKMARKS & ACTIVITIES

Designed by ASPB member Carol Reiss

www.aspb.org/education/bookmarks/bookmark.cfm
www.aspb.org/education/bookmarkactivities.pdf
Super Plant Biologist!

Sure, he might wear a lab coat...

...but he can do so much more!

*be curious*think critically*be accurate*communicate*follow up*
COMMITTEE NOMINATIONS & support

Volunteers Needed!

- register interest
- learn how to volunteer
  - www.aspb.org/education/volunteer.cfm
- donate

Ed Forum
booth highlights
homeWORK column
grant announcements
invitations to
volunteer
experts’ ideas

Please!

Thank you!
Staying Connected @ ASPB

Google Groups
* Annual Meeting
* Ambassadors

Facebook
* ASPB Group
* Ambassadors

SciVee

Linkedin

Twitter
* Plant Biology 2009
* ASPB

Research Gate
* PB 2009
* Plant Bio Discussion

GoDaddy
* Blogs
* Podcasts