Contributions of a Scientific Society (*Society for Developmental Biology*) and Its Members to Science Education at All Levels

Ida Chow
www.sdbonline.org

Why should a scientific society be involved with science education?

- To help supply the pipeline of future scientists.
- To help improve the public's science literacy, in a society highly dependent on scientific and technical advances.
- To help educate legislators so relevant policies are made based on understanding of the underlying scientific concepts.

How can this be done?

- By recruiting members who are experts on particular topics to prepare appropriate educational materials.
- By providing a forum for members to exchange and share experiences to prevent the need to “reinvent the wheel.”
- By helping members translate technical jargon into daily language.

- By providing accurate explanations of important scientific issues discussed in the media and by the public, addressing misconceptions.
- By helping teachers achieve a better understanding of the major scientific concepts, as well as the scientific process and its endeavors, in order to facilitate their classroom teaching.

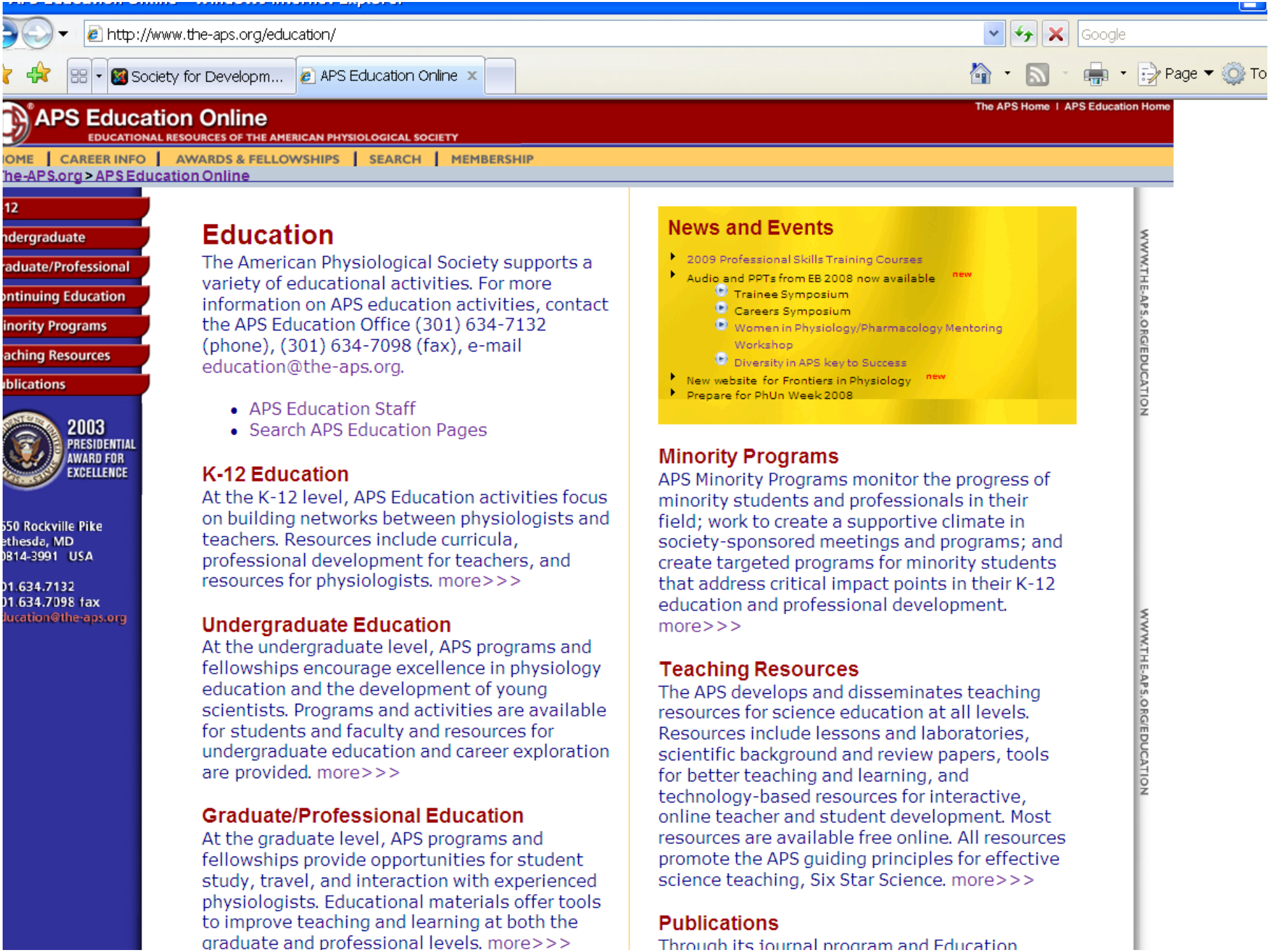
Why are societies uniquely positioned to achieve these goals?

- They have access to national, and sometimes international, experts from the society's membership.
- They can broadly disseminate information about successful programs, via their websites and meetings.
- They can facilitate "cloning" best practices.
- They may have staff available to maintain continuity of the programs.
- They may provide or help apply for funds (even limited) to support the programs.

What are the drawbacks to the society?

- Perception that funds are ***not*** being used ***directly*** for the members' benefit.
- Perception that the society should play no role in education.
- Perception that the task is too big.
- Perception of waste because effectiveness of programs is sometimes difficult to quantify.

Examples


http://www.the-aps.org/education/
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Society for Developm...
APS Education Online
Page
APS Education Online
EDUCATIONAL RESOURCES OF THE AMERICAN PHYSIOLOGICAL SOCIETY
The APS Home | APS Education Home
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12
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ublications
2003 PRESIDENTIAL AWARD FOR EXCELLENCE
550 Rockville Pike
ethesda, MD
0814-3991 USA
01.634.7132
01.634.7098 fax
ducation@the-aps.org
Education
The American Physiological Society supports a variety of educational activities. For more information on APS education activities, contact the APS Education Office (301) 634-7132 (phone), (301) 634-7098 (fax), e-mail education@the-aps.org.
APS Education Staff
Search APS Education Pages
K-12 Education
At the K-12 level, APS Education activities focus on building networks between physiologists and teachers. Resources include curricula, professional development for teachers, and resources for physiologists. more>>>
Undergraduate Education
At the undergraduate level, APS programs and fellowships encourage excellence in physiology education and the development of young scientists. Programs and activities are available for students and faculty and resources for undergraduate education and career exploration are provided. more>>>
Graduate/Professional Education
At the graduate level, APS programs and fellowships provide opportunities for student study, travel, and interaction with experienced physiologists. Educational materials offer tools to improve teaching and learning at both the graduate and professional levels. more>>>
News and Events
2009 Professional Skills Training Courses
Audio and PPTs from EB 2008 now available new
Trainee Symposium
Careers Symposium
Women in Physiology/Pharmacology Mentoring Workshop
Diversity in APS key to Success
New website for Frontiers in Physiology new
Prepare for PhUn Week 2008
Minority Programs
APS Minority Programs monitor the progress of minority students and professionals in their field; work to create a supportive climate in society-sponsored meetings and programs; and create targeted programs for minority students that address critical impact points in their K-12 education and professional development. more>>>
Teaching Resources
The APS develops and disseminates teaching resources for science education at all levels. Resources include lessons and laboratories, scientific background and review papers, tools for better teaching and learning, and technology-based resources for interactive, online teacher and student development. Most resources are available free online. All resources promote the APS guiding principles for effective science teaching, Six Star Science. more>>>
Publications
Through its journal program and Education
WWW.THE-APS.ORG/EDUCATION
WWW.THE-APS.ORG/EDUCATION

Public Education & Outreach

- News & Announcements
- Neuroscience Education Resources
- www.sfn.org/NERVE
- Neuroscientist Teacher Partner Program
- Science Olympiad

Brain Awareness Week

Government & Public Affairs

Animals in Research

Information for...

▶General Public
▶Media
▶Educators

Public Education & Outreach

printer-friendly version

Home » Education & Advocacy » Public Education & Outreach

Public Education & Outreach

SfN pursues initiatives to improve public understanding of basic scientific processes. Follow the links below to access educational resources and learn more about the Society's public education and outreach efforts.

News & Announcements
Get information about events and outreach opportunities for educators and neuroscientists.

Neuroscience Education Resources
Access a listing of educational resources published by SfN.

www.sfn.org/NERVE
A dynamic new online gateway to credible information and tools for teaching about the brain and nervous system in the K-12 classroom.

Brain Awareness Campaign
Join the campaign to promote brain awareness during Brain Awareness Week, an educational blitz demonstrating the importance of neuroscience research. Access useful resources and learn how to get started.

Neuroscientist-Teacher Partner Program
SfN helps partner teachers and neuroscientists in the classroom. Teachers and researchers are encouraged to contact a neuroscientist or volunteer time and expertise.

National Science Olympiad
Participate in National Science Olympiad, an annual event featuring regional competitions challenging students to excel in the sciences.

Public Education & Communication Committee
Learn about the mission and activities of SfN's education and communication committee charged with sharing the importance of neuroscience with the public.

http://www.ascb.org/index.php?option=com_wrapper&view=wrapper&Itemid=285

Brain Awareness Week | CBE-LSE

THE AMERICAN SOCIETY FOR CELL BIOLOGY

Members Only | Contact Us | FEEDBACK | Search...

Home | Membership | Meetings | Committees | Awards/Grants | Publications | Press/Public | Careers | About

CBE—Life Sciences Education

THE AMERICAN SOCIETY FOR CELL BIOLOGY

CBE Life Sciences Education

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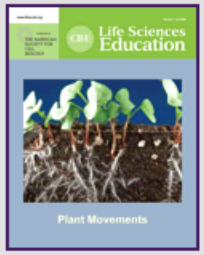
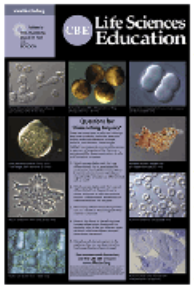
  2002 - 2008
- **Search for Articles**
  2002 - 2008
- **Resources for Educators**
  Collected Features
- **Cover Images**
  2002 - 2008
- **Email Alerts**
- **About CBE-LSE**

Current Issue:
Fall 2008



(Next: December 1)

EDITORS | INST. TO AUTHORS | HELP



CBE—Life Sciences Education is proud to present its new poster! The poster contains five questions to stimulate classroom discussion.
Answers are available online | View PDF of poster

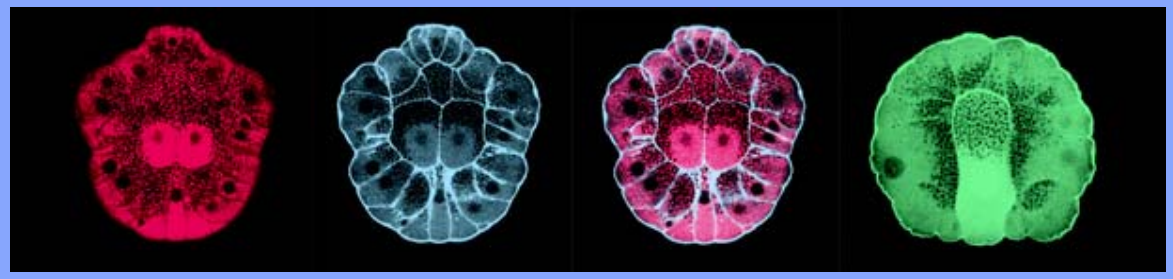
Free copies of the poster are available

American Association of Anatomists

www.anatomy.org

- "Ask the Expert"- Get anatomy answers by posting online questions to a select group of experts
- Exam Question Database
- Virtual Organ Image Library
- Career Center
- Education Resource Links
- Journals include *Anatomical Record, Developmental Dynamics,* and *Anatomical Sciences Education*

SOCIETY FOR DEVELOPMENTAL BIOLOGY



http://www.sdbonline.org

Who are we?

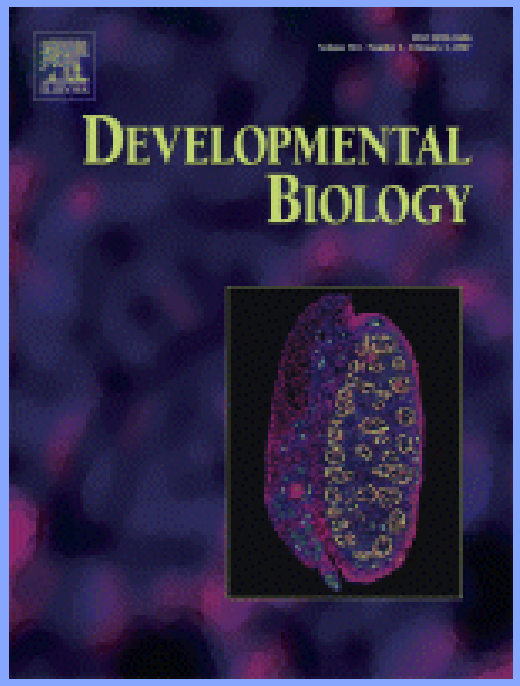
Founded in 1939, as the Society for the Study of Development and Growth, by the editors of the journal *Growth*, after the first symposium held in Cape Cod, Massachusetts.

Our Activities

- Website
- Annual meetings
- Regional meetings, 6-8 per year
- Short courses with LASDB
- Funding for member-organized meetings
- Travel awards for members and grants for Latin American scholars
- Official journal *Developmental Biology*
- 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



Educational Activities

- ***Professional Development and Education Committee***
- Postdoctoral fellows and junior faculty
- Graduate students
- Undergraduate students
- Outreach: Pre-college educators, teachers, public
- Issues: training, career, teaching tools, ethics, evolution/science
- Teaching digital library: ***L****ibrary of* ***E****ducational* ***A****nnotated* ***DE****velopmental biology* ***R****esources (****LEADER****)*

Home

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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 by SDB members
- Courses and Resources
- Funding opportunities

DEVELOPMENTAL BIOLOGY
Cinema
Digital video sequences of developing embryos.

Useful Readings:

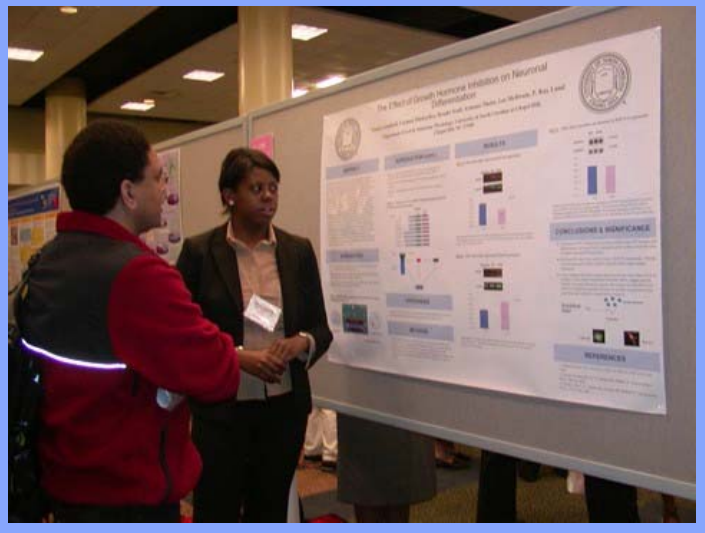
Education Section Archives

Contributions of a Scientific Society (Society for Developmental Biology) and its Members to Science Education at All Levles.
Presentation at the 5th International Conference on Hands-on Science (Formal and Informal Science Education), Oct 13-17, 2008, Olinda-Recife, Brazil.

1st Boot Camp for New Faculty 2006

2nd Boot Camp for New Faculty 2008

SDB at ABRCMS



Outreach Activities

- Workshops at SDB regional meetings
- Individual member's efforts
- Collaborative efforts
- LEADER – teaching digital library with peer-reviewed learning objects, for all levels, BEN partner

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.

Individual Member's Efforts

Women Serious About Science

A Science Outreach Program for High School Girls

Lissa Rotundo
Sally Kutzer
Baltimore Polytechnic Institute

and

Marnie Halpern
Carnegie Institution

established in 2001

Microscopy in Classroom Workshop

DC ACTS - November 29, 2001. 4-7 PM

Carnegie Administration Building, 1530 P St., NW

Instructors: Ida Chow, Ph.D., Julie Edmonds, Ph.D., Joanna Fox, B.A.

Objectives

- To examine different types of microscopes and their uses to see cell structures
- To use different stains for specific cell structures
- To visualize effect of water diffusion across cell membrane
- To develop appropriate activities for classroom
- To establish a routine for microscope maintenance

Concepts

- Microscopes
- Dimensions
- Staining Methods
- Diffusion

Activities

- Microscope care
- Preparation of plant (Elodea) and animal (human cheek, sheep blood) cell slides
- Observation using different microscopes and optics
- Staining methods and observation
- Measurement of cells and cellular structures sizes
- Diffusion across cell membranes

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.

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 for 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:

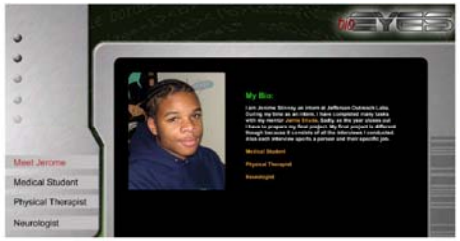
- to provide interactive tours of our zebrafish and Drosophila facilities
- to bring our live zebrafish unit into 4th/5th, 7th, and high school classrooms
- to train 4th-12th grade teachers
- to host high school interns in our laboratories and summer programs

Tours:

Educational Objectives

- Discover why zebrafish are used in science-related research and their function in our experiment
- 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 humans
- 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 scientific method in a fun way to foster interest in science careers

An Intern:



Since its inception in 2002, the Outreach Program has reached:

over 11,000 students and **400** teachers
and provided:
24 summer scholarships and 25 High School internship

	In 2006-2007:	
Students:	402	Elementry school students
	1973	Middle & High school students
Teachers:	46	

Visitors give students a closer look at science

Thomas Jefferson University program has reached thousands.

By Kristen A. Graham
Inquirer Staff Writer

Joey Southern wants to be a scientist, and he has a straightforward reason: "You get to figure out stuff first, before anyone else," Joey, a fourth grader at St. Peter Celestine School in Cherry Hill, said yesterday.

Chalk up his career choice to the Thomas Jefferson University Science Outreach Program, which largely targets schools throughout the region that have no advanced science curriculum. By the end of the school year, the program will have touched 3,000 elementary through high school students in its inception in 2002.

Table 1. High School Student Pre-I Implementation Item Results (n=2

Pre/Post Questions	*Per*
	Pre Program
Fish characteristics	28%
Recessive genes	34%
Vertebrate animals	56%
Petri dish	42%
Gregor Mendel	20%
Zebrafish embryo	28%

**p<.01, comparison of pre-post results, Mc
***p<.001, comparison of pre-post results, I

Table 2. Middle School Student Pr Implementation Item Results (n=2

Pre/Post Questions	*Per*
	Pre Program
Heredity	62%
Science instruments	44%
DNA location	64%
Fish anatomy	23%
Zebrafish research	47%
Dominant genes	41%
Cell development	59%

**p<.01, comparison of pre-post results, Mc

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 Brook J. Lenfest Foundation, The Christopher Ludwick Foundation, The Campbell Soup Foundation, GlaxoSmithKline, and The Teleflex Foundation

BIOEYES - Department of Biochemistry - Thomas Jefferson University - Windows Internet Explorer

http://www.jefferson.edu/bioeyes/

BioEyes

Society for Developm... | BIOEYES - Departm...

Page

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Jefferson | Kimmel Cancer Center NCI-designated

bioEYES

- Mission/History
- Initiatives
- Agent Debriefing
- Staff
- Contact

Micro Agent

Intermediate Agent

Advanced Agent

Teacher Entry

TOP SECRET

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, we cannot find the answers to our scientific questions...

without your help.

- If you are a 4th or 5th grade student click on Micro Agent
- If you are a 6th-8th 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 Eco-Systems, Inc.)

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

http://www.chance.psu.edu/

Society for Developm... | Connecting Human...

PENNSTATE

Connecting Humans and Nature
through Conservation Experiences

PDE PA Dept. of Education

CHANCE

- What is CHANCE?
- CHANCE Modules
- CHANCE Fellows
- CHANCE Sponsors
- Press
- Course Application
- 2009 Brochure
- CHANCE Idol

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

Developed and directed by Dr. Jacqueline S. McLaughlin

design by Jeffrey Stine

The Interactive Fly

A cyberspace guide to Drosophila development and metazoan evolution

Scout Report SELECTION

2002 SCI•TECH WEB AWARDS

Gene Index

Alphabetical:
Genes A - D
Genes E - K
Genes L - R
Genes S - Z

Genes grouped according to biochemical function
(examples: transcription factors, ligands and receptors, etc.)

Biochemical pathways:
Maternal genes
Zygotically transcribed genes

Study Aids

Developmental pathways conserved in evolution

All I Really Needed to Know I Learned During Gastrulation:
Concepts in developmental biology by Scott Gilbert

Drosophila Images

Tissue and Organ Development

Embryonic
Stages of development

Atlas of *Drosophila* Development by Volker Hartenstein

Gastrulation and other morphogenetic movements

Histogenesis: index of genes active in the formation of various germ layers and tissues (including ectoderm, endoderm and mesoderm)

Morphogenesis and organogenesis: index of genes active in the formation of various organs (including eyes, gut, heart, nervous system, and wing)

Expression patterns: 1, 2, 3, 4 and 5

Larval and Pupal stages
Imaginal Discs: The Genetic and Cellular Logic of Pattern Formation

A new book by Lewis Held Jr. Complete figures & legends

Adult

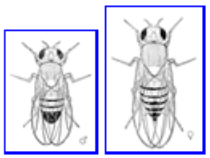
What's new this edition

The Inter*active* Fly [edition 53]

Meet The Inter*active* Fly
If you are new to developmental biology

If you are already involved in developmental biology

Inter*active* Fly:
Citations and awards



above: images of male and female *Drosophila melanogaster* from
THE PHYSICAL BASIS OF HEREDITY
Thomas Hunt Morgan
Philadelphia: J.B. Lippincott Company
1919

Collaborative Efforts


http://www.faseb.org/
Google
FASEB
Page
FEDERATION of AMERICAN SOCIETIES for EXPERIMENTAL BIOLOGY
FASEB
Quality Life Through Research
Constituent Societies
Public Affairs
Meetings
Publications
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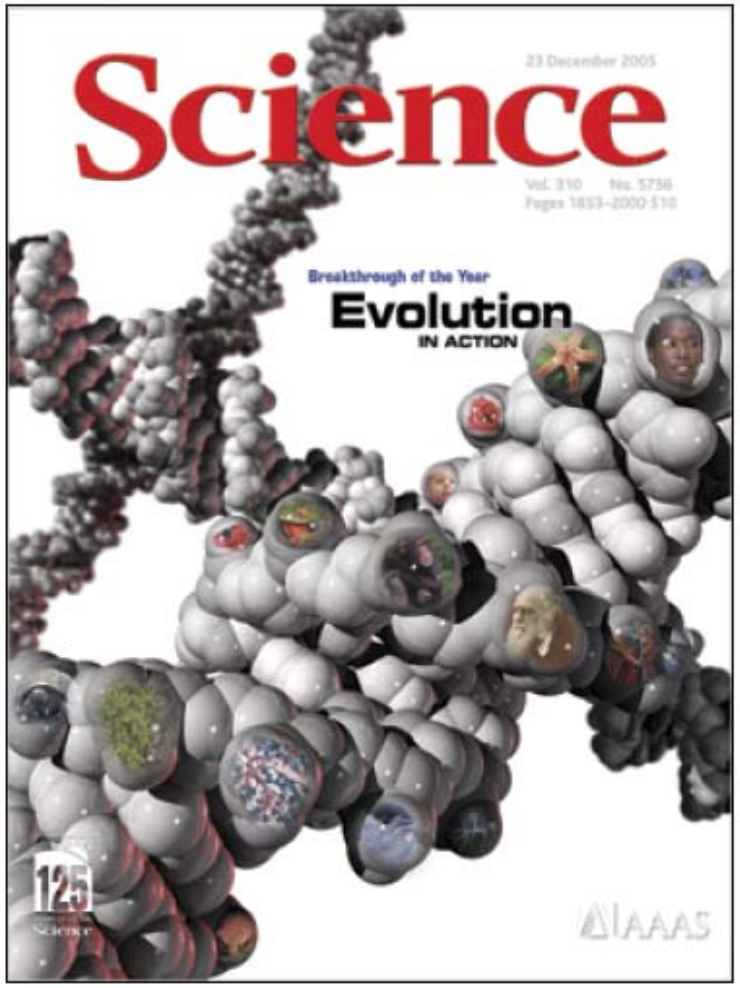
ScienceCures.org
Summer Research Conferences
FASEB Career Center
FASEB Washington Update
FASEB Evolution Resources
Excellence in Science
FASEB MARC
Diversity Award
The FASEB Journal
FASEB
9650 Rockville Pike
Bethesda, MD 20814
Phone: (301) 634-7000
Fax: (301) 634-7001
FASEB Tuesday September 30, 2008
FASEB News
Elias Zerhouni Announces His Resignation as NIH Director
FASEB MARC Travel Awards Announced for the 2008 SACNAS meeting
FASEB, Scientific Societies Bring Together Reps From Presidential Campaigns to Discuss Science & Health Policy
FASEB MARC Travel Awards Announced for the 2008 Environmental Mutagen Society (EMS) meeting
FASEB Applauds RNC, DNC Platform Committees for Support of Biomedical Research
FASEB Comments on Human Subjects Protection Training and Education Programs
New Article in The FASEB Journal Shows How Engineered Proteins "Bypass" the Genetic Defect in Cystic Fibrosis
Additional News Articles
Spotlight
FASEB Unveils NIH Advocacy Clearinghouse Website
New FASEB President, Richard Marchase, Describes Priorities for Upcoming Year
FASEB announces winner of the 2008 FASEB Diversity Award
FY2009 Federal Science Budget Information
FASEB announces Susan L. Lindquist, PhD as recipient of the 2009 Excellence in Science Award



NATIONAL ACADEMY OF SCIENCES

INSTITUTE OF MEDICINE

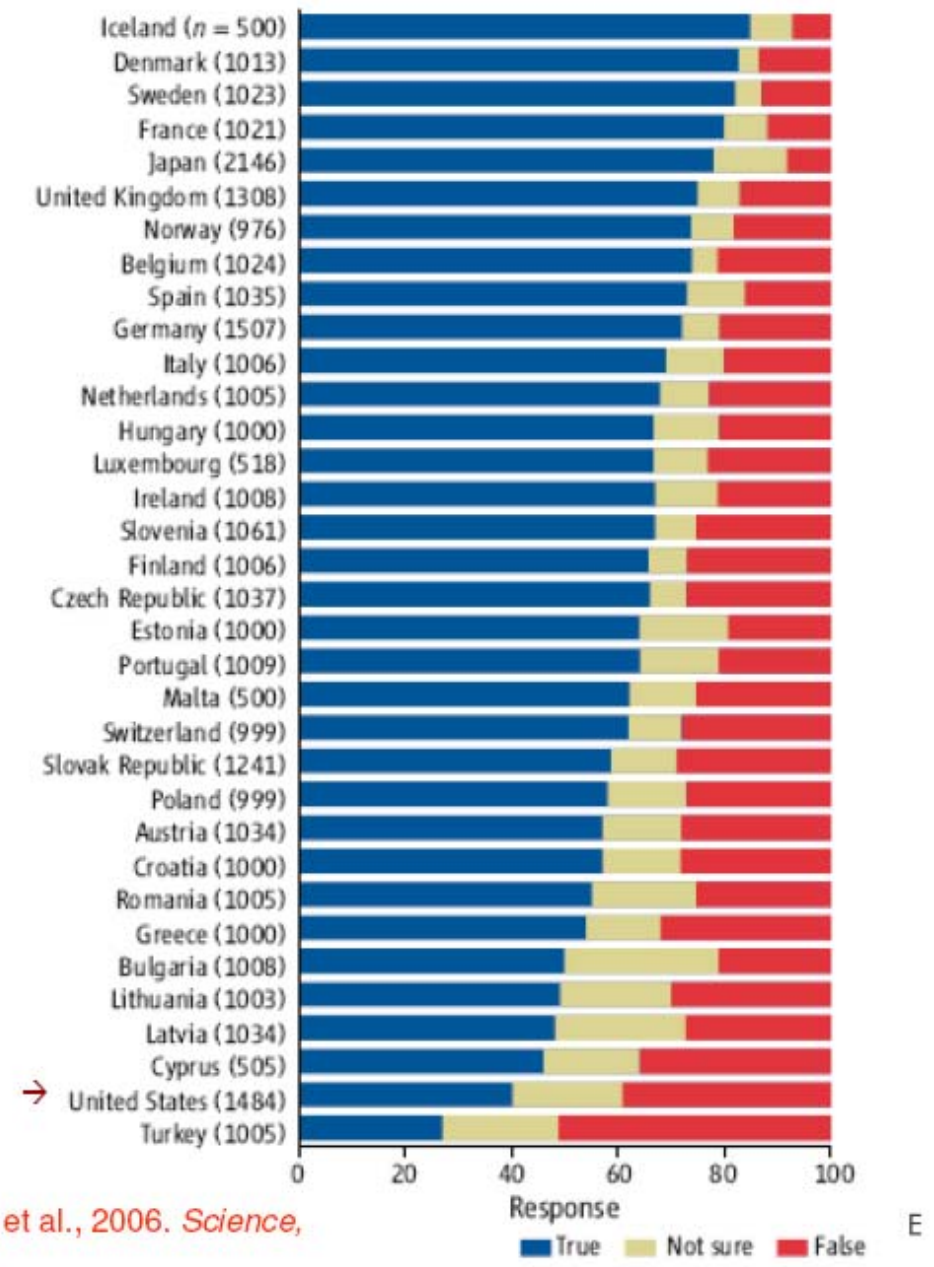
But Creationism (including Intelligent Design) is Alive and Well

- It continues to "evolve" with court decisions as the "selective" process.
  - Scientific Creationism
  - Intelligent Design
  - "Teach the Controversy"
  - "Academic Freedom"

Public Acceptance of Evolution in 34 Countries, from a 2005 Survey

Question:

"Human beings, as we know them, developed from earlier species of animals"



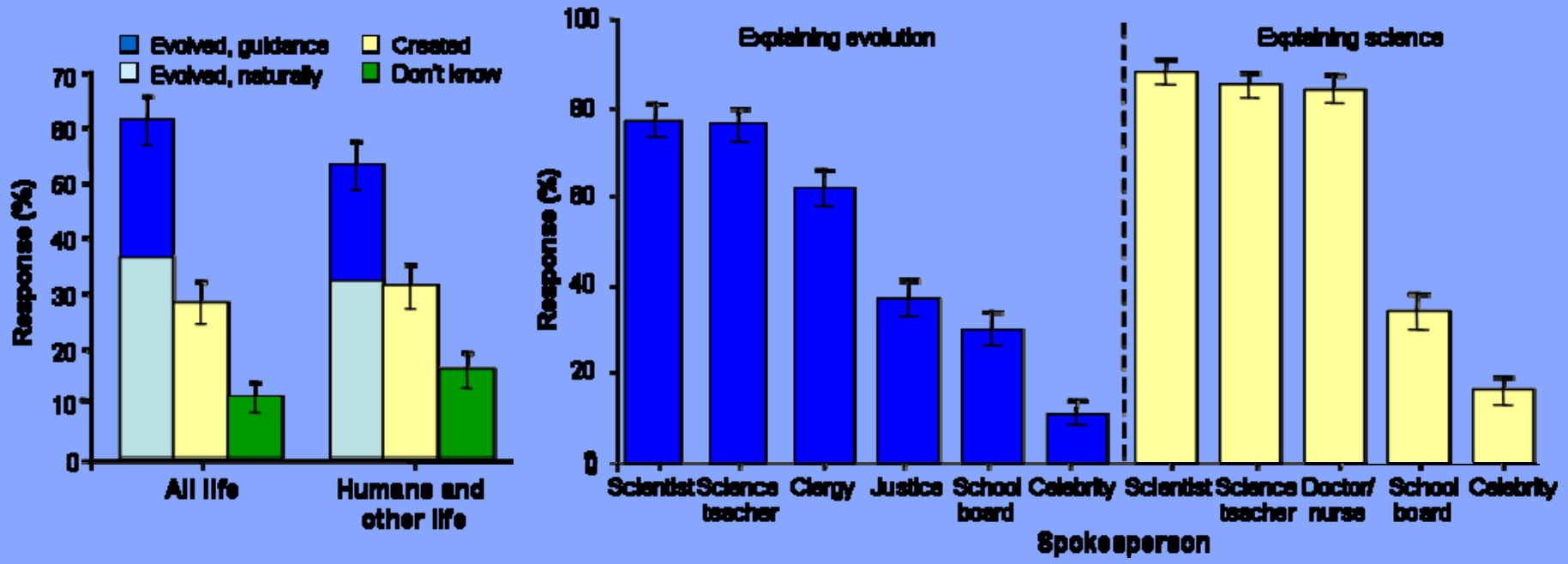
NATIONAL ACADEMY OF SCIENCES

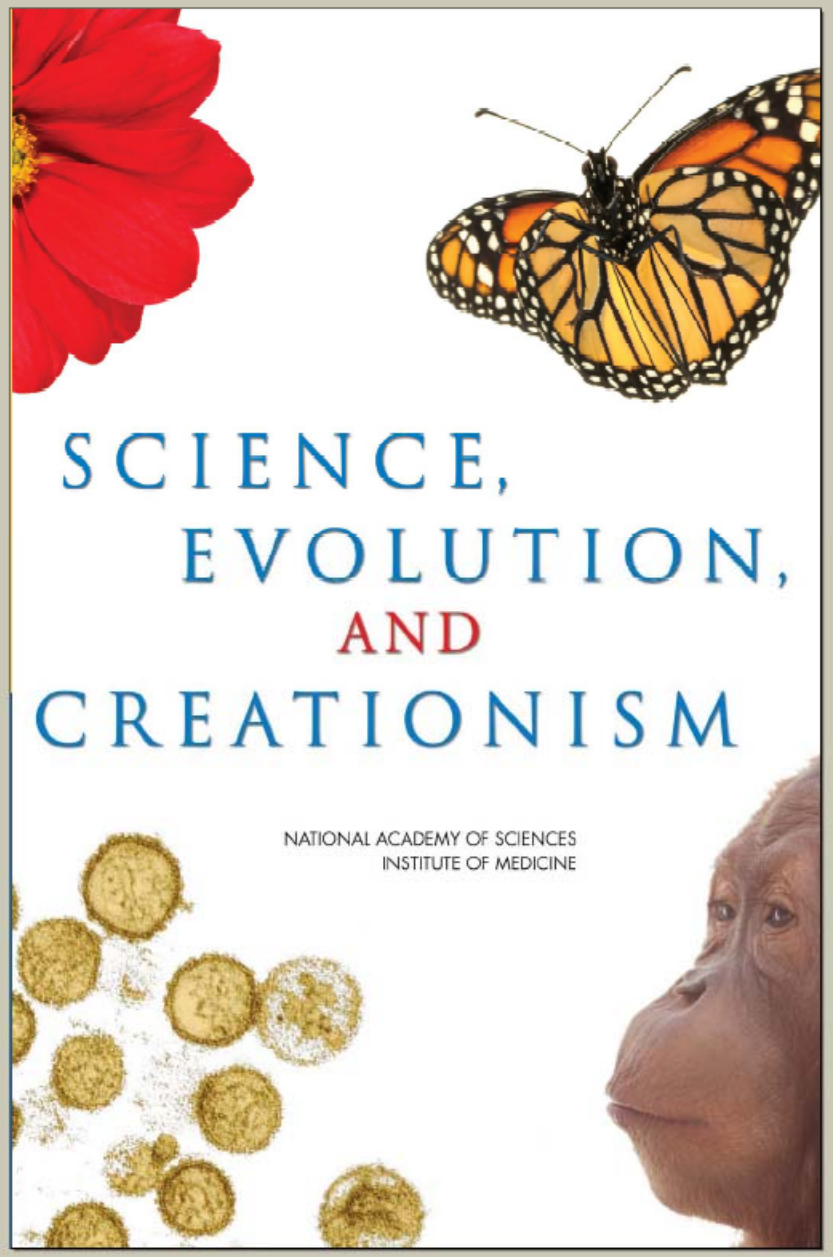
Source: Miller et al., 2006. *Science, 313:765-766.*

E

Coalition of Scientific Societies

Coalition of 39 scientific and civil associations,
and the National Academy of Science (USA)





www.nap.edu/sec

The FASEB Journal • Editorial

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

Coalition of Scientific Societies*[1]

*American Association of Physics Teachers, American Astronomical Society, American Chemical Society, American Institute of Biological Sciences, American Institute of Physics, American Physical Society, American Physiological Society, American Society for Investigative Pathology, American Society for Pharmacology and Experimental Therapeutics, American Society of Human Genetics, Biophysical Society, Consortium of Social Science Associations, Geological Society of America, Federation of American Societies for Experimental Biology, National Academy of Sciences, National Science Teachers Association, and Society for Developmental Biology

Young Charles Darwin from "Darwin" exhibition at American Museum of Natural History, November 2005 to May 2006. (Reproduced with permission of Michael Walker)

Frogs: Chordata, from Ernst Haeckel, Art Forms in Nature (1904), Courtesy of the MBL/WHOI Library

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 constitutes an appeal, based on the data obtained, for scientists to take the lead in communicating science to the general public. The early "Darwinists," like Ernst Haeckel and Thomas Huxley, were following the model of popular, eloquent communication set by Charles Darwin himself, as in his magisterial conclusion to *On the Origin of Species*, 1859:

> *It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, 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 complex a manner, have all been 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 cycling on 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.*

[1] Correspondence: Jennifer Hobin, Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, MD, 20814 USA. E-mail: jhobin@faseb.org

doi: 10.1096/fj.08-0101ufm

FASEB J.
Jan 2008

CBE—Life Sciences Education
Vol. 7, 279–283, Fall 2008

Feature
From the National Academies

Working Together to Address Challenges to the Teaching of Evolution

Ida Chow* and Jay B. Labov†

*Society for Developmental Biology, Bethesda, MD 20814-3998; and †National Academy of Sciences, Washington, DC 20001

INTRODUCTION

Evolution has been used by some to persuade people in this country that they must accept either science or their personal faith, creating false divisions. The supposed "controversy" surrounding evolution and related topics also has compelled a growing number of scientific and professional societies to begin working together to improve the public's understanding about this subject in particular and about the nature, processes, and limits of science more generally. These 39 associations represent all disciplines: physics, chemistry, earth and space sciences, biomedical sciences, biological sciences, anthropology, social sciences, and psychology. Some 2.5 years ago, representatives of several of these disciplinary organizations, together with others representing teachers, civic groups, industry, and the National Academy of Sciences (NAS), formed a coalition whose purpose is to collaborate on confronting challenges to the teaching of evolution and related issues (e.g., the Big Bang, the age of the ancient Earth). The coalition has jointly sponsored audience research to find out how best to dispel those divisions.

This coalition sees the situation with evolution as indicative of a larger problem with the public's perception of broad areas of science. Recently, bills have been introduced in the legislatures of at least five states calling for "critical analysis" of "controversial" topics such as evolution, global warming, and human cloning.[1] However, as with any scientific conjecture, data are required and the coalition worked with the same research organization in Washington, DC, that the NAS had commissioned for its audience research on *Science, Evolution,* and *Creationism* (National Academy of Sciences and Institute of Medicine, 2008; also see Labov and Pope, 2008). Together, the partners in this effort designed a survey and the research organization collected those data. Based on the results of this study, a paper was prepared and published simultaneously in the January 2008 issue of *FASEB Journal* and in some of the coalition societies' own journals and newsletters.[2]

Why is a description of these activities of the coalition worthy of space in this journal? Don't scientists collaborate all the time? Individually they usually do. But when it comes to scientific societies or associations, disciplinary boundaries can occur, especially when the disciplines are so diverse and funding is tight. However, many disciplines have long faced challenges related to the teaching of evolution. Topics under attack have included teaching about the Big Bang and scientific explanations for the origins of the universe, that the age of the Earth is billions rather than thousands of years old, and that the molecules of life could have arisen through natural chemical processes. There also have been increasingly strident calls from a highly organized and amply financed movement (e.g., Wilgoren, 2005) for including nonscientific "alternatives," such as intelligent design creationism in public school science classes. Collectively, these challenges convinced the organizations in this Coalition of Scientific Societies almost three years ago that more coordinated efforts and effective communication approaches were needed to address them. Furthermore, they felt that working together would be more effective than individual societies moving along nonintersecting, parallel paths. Thus, they agreed (not without some arguments and mild tension) upon strategies for designing and conducting surveys that would examine in greater detail what American voters understand about evolution specifically and about science more broadly. The results from this research prompted the coalition to jointly publish the results, to continue to meet regularly, and to agree to work together on collaborative activities in the future.

DOI: 10.1187/cbe.08–06–0030
Address correspondence to: Jay B. Labov (jlabov@nas.edu).

[1] For the latest update on these bills, see the website of the National Center for Science Education at http://ncseweb.org (accessed 9 June 2008).

[2] In addition to publication in *FASEB Journal*, the paper was also published simultaneously in the winter 2007 issues of *ACA RefleXions* (American Crystallographic Association), *The Pharmacologist* (American Society for Pharmacology and Experimental Therapeutics), and the 1 April 2008 issue of Society of Developmental Biology's official journal, *Developmental Biology*. For access to the paper, links to these other publications, and additional information, see http://opa.faseb.org/pages/PolicyIssues/sciencecoalition.htm (all accessed 9 June 2008).

CBE-Life Sci Ed
Fall 2008

http://www.copusproject.org/

COPUS: Coalition on the Public Understan...

COPUS

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."
- Margaret Mead, US anthropologist & popularizer of anthropology (1901 - 1978)

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Spread the news about COPUS

- Register your organization
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- Get involved in COPUS
- Year of Science 2009
- Teachers and Schools

The **Coalition on the Public Understanding of Science** (COPUS) is a grassroots effort whose goal is to engage sectors of the public in science to increase their understanding of the nature of science and its value to society. A key objective of COPUS is to create new forums for communication and to develop new opportunities for engaging the public with science.

We invite your organization to join this coalition and to work with others in your community to engage the general public in dynamic ways that will make science more accessible, personally meaningful, and locally relevant.

YEAR of SCIENCE 2009
Explore. Empower. Engage...

WHAT'S NEW IN THE NETWORK

Announcements

- 06 June: COUNTDOWN TO YEAR OF SCIENCE CONTINUES

COPUS Clarion

- Download newsletter (September, 100 KB, PDF)

Blog

- A Future Faces of Science Challenge
- Public engagement can be as difficult to describe as it is to do well
- Sigma Xi and Science Cafes

COPUS is sponsored by the American Institute of Biological Sciences, the Geological Society of America, the National Science Teachers Association, and the University of California Museum of Paleontology.

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PARTICIPANT NEWS

Meet the Newest Participants

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- Ilano River Field Station @ Texas Tech Universi...
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Featured Programs

- **Building a Presence - Minnesot...**

MSTA

Building a Presence is a program that originated with the National Science Teachers Assn. (N...

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Water has emerged as an issue of utmost global and national importance. Much has been written abo...

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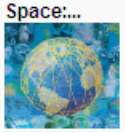


Observations from space over the past 50 years have fundamentally transformed the way people view...

COPUS

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."
- Margaret Mead, US anthropologist & popularizer of anthropology (1901 - 1978)

International Celebrations of Science occurring in 2009:

While COPUS is, at this time, localized to the US, we are excited to hear about and share what others in the world are doing to celebrate and promote the public understanding of science.

» To be listed as an international colleague, click here.

MORE ABOUT YEAR OF SCIENCE 2009

- Sign up for YoS '09 updates
- Register your organization
- Try the themed approach
- See what others are doing
- ADD THIS

The Royal Ontario Museum is commemorating the 100th anniversary of the discovery of the Burgess Shale by the paleontologist Charles D. Walcott.

The HMS Beagle Project will be celebrating the bicentenary of Charles Darwin's birth by launching a sailing replica of HMS Beagle. An icon of scientific progress, she will circumnavigate the globe in Darwin's wake, crewed by aspiring scientists and researchers.

In addition, visit the Web sites of our international colleagues listed below to learn more about their activities to promote the public understanding of science.

Browse by first letter of organization name:
B C D I N or Show All

Showing all **9** international organizations.

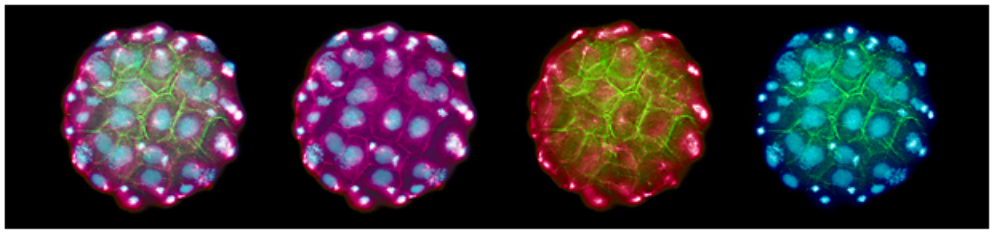
Brisbane Catholic Education
Organization Contact: Cath Grealy, (cgrealy [at] bne.catholic.edu.au)
Brisbane Catholic Education is a learning community of all involved in diocesan Catholic schools and the staff of the Brisbane Catholic Education Centre. This is focus area for BCE in 2009.

Centro de Investigaciones en Ecosistemas, Universidad Nacional Autonoma de Mexico campus
Organization Contact: Ana Claudia Nepote, (nepote [at] oikos.unam.mx)
The main objective for the Centro de Investigaciones en Ecosistemas (CIEco) is the study of ecological and social processes involved in ecosystems management, their natural resources and their services. Objectives are: - Generate knowledge, models and theories about ecosystem structure, processess and management, as well as about natural resources and ecosystem services - Develop new technologies that

LEADER

teaching digital library with peer-reviewed learning objects, for all levels

***L**ibrary of **E**ducational **A**nnotated **DE**velopmental biology **R**esources*



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Library of Educational Annotated DEvelopmental biology Resources (LEADER)

SDB is a partner of the BiosciEdNet (BEN) Collaborative, 31 scientific and professional societies and groups that have banded together to coordinate peer-reviewed educational resources for teachers and students online. Through BEN and the American Physiological Society (APS), SDB has established the **L**ibrary of **E**ducational **A**nnotated **DE**velopmental biology **R**esources (LEADER), a searchable database of educational resources in developmental biology and related topics at all levels.

Tutorial for educators who wish to submit learning objects for review and publication in LEADER is now available at "LEADER Tutorial". For questions please contact Diana Darnell, the LEADER curator and archivist, at darnell@email.arizona.edu. A wide variety of educational resources are desired, including active learning strategies, animations, assessment strategies, charts, dictionaries, exams, fieldtrip guides, lab exercises, lectures, lesson plans, movies, simulations, syllabi and many more.

Educators, researchers, students and the public can search and access teaching resources in the field of developmental biology by going to LEADER, to the APS Archive or to the BEN portal, and following the instructions. All users must read and accept the terms for authorized use of the Archive.

The American Physiological Society (APS) is the partner society that provides SDB with mentoring and technical assistance for LEADER. SDB uses the cataloguing, submission and review processes developed by APS. Our library and additional partner resources can also be found through the SDB link in the APS Archive of Teaching Resources. LEADER and the APS Archive are branches of the BEN portal, which provides access to our and other digital libraries for teaching and learning in the biological sciences, and is itself a branch of the National Science Digital Library (NSDL).

The LEADER Review Committee members are: Yolanda Cruz (chair), Mark Alliegro, Tom Brody, Jeff Brown, Judy Cebra-Thomas, Mark S. Cooper, Karen Crawford, Diana Darnell, Elizabeth Eldon,

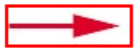
All materials are peer-reviewed

Collaborative of 31 scientific societies and growing

Major funding from the National Science Foundation

One of the BEN founding members
Dedicated staff

Select image to enlarge

What follows when you select the arrow,  is a lecture covering 20 concepts in Developmental Biology, given by Scott Gilbert at the 64th Annual Meeting of the Society for Developmental Biology, in San Francisco on July 29, 2005. His powerpoint presentation of 33 slides has been transferred to the web, with occasional notes included, and is used here with permission. Permission to use this work for personal non-commercial purposes is granted provided that the work is properly cited. All other use requires permission of Scott Gilbert.

Scott Gilbert is the author of the textbook, Developmental Biology.

SUE - CONTENTS - Windows Internet Explorer

http://www.stanford.edu/group/Urchin/contents.html

BioEyes

Society for ... | BEN | the-aps.or... | http://ww... | What Kind ... | SUE - C... | Visible Emb... | Page

Sea Urchin Embryology

Search

~ How to Use This Site ~

See also our sister site: Virtual Urchin

CORE LAB - 1 week
(Suggested for 1st lab experience)

PRIMARY LABS - 2 weeks +
Gametes, Fertilization, Development, Experiments, Sperm Experiments, PUSH lab

EXTENDED RESEARCH
Shaking, Ultaviolet Light Effects, Modified Seawater Formulations, Osmotic vs. Ionic, Artificial Activation, Carnoy's Fixative, Isolating the Mitotic Apparatus, Gamete Storage, Egyptian Project Page

SUPPORT LESSONS
Pre Tests, Microscope, Size Under the Microscope, Mixing the Gene Pool, Brooders vs. Spawners, Simple Dilution, Simple Dilution 2, Sperm Dilution, Drawing

SUPPORT MATERIALS
Overheads, Glossary, References, Skills Needed, Classis Lesson Plans, Safety, Path of Development, Camino Del Desarrollo, Urchins, Our sister site - Virtual Urchin and Download entire site as ZIP file.

Carnegie Stage 23 Samples

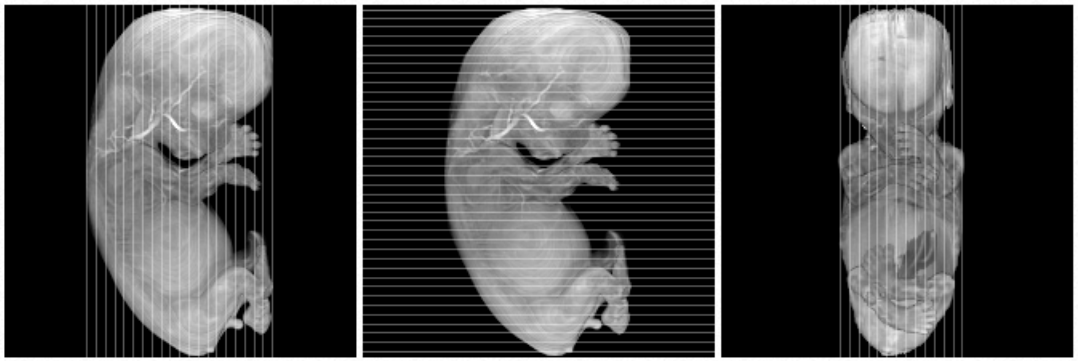
(56-57 postovulatory days)

The Multi-Dimensional Human Embryo

About Carnegie Stage 23

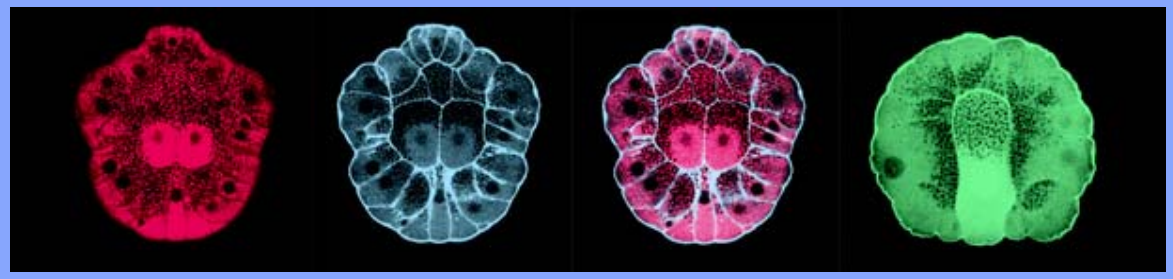
Most embryos at stage 23 are approximately 56-57 postovulatory days old and measure 23-32 mm in length. Distinguishing criteria for this stage include fusion of the eyelids at the medial and lateral margins, clear distinction of the subdivisions of the upper and lower limbs, the forearms appear at or above the level of the shoulders, the superficial vascular plexus of the head is very close to the vertex, and the external genitalia are well developed but not always sufficiently to distinguish the embryo's sex. N OTE: This specimen is late stage 23 or possibly an early fetus. An example representing stage 23 more accurately will replace this specimen when available.

MRI Slice Selector



Sample Animations

SOCIETY FOR DEVELOPMENTAL BIOLOGY



http://www.sdbonline.org

Referenced Websites

- http://www.the-aps.org/education
  The American Physiological Society, Education Section

- http://www.sfn.org/index.cfm?pagename=PublicEducationOutreach
  The Society for Neuroscience, Public Education & Outreach

- http://www.ascb.org/index.php?option=com_wrapper&view=wrapper&Itemid=285
  The American Society for Cell Biology, Life Sciences Education

- http://www.anatomy.org
  American Association of Anatomists

- http://www.sdbonline.org/index.php?option=com_content&task=section&id=6&Itemid=62
  Society for Developmental Biology, Education Section

- http://www.jefferson.edu/bioeyes
  Thomas Jefferson University, BIOEYES

- http://www.chance.psu.edu
  Penn State - **CHANCE**(**C**onnecting **H**umans And **N**ature through **C**onservation **E**xperiences)

- http://www.sdbonline.org/fly/aimain/1aahome.htm
  The Interactive Fly, Drosophila development and metazoan evolution

- http://www.faseb.org
  The Federation of American Societies for Experimental Biology (FASEB)

- http://www.nap.edu/catalog.php?record_id=11876
  National Academy of Sciences - Science, Evolution, and Creationism Journal

- http://www.fasebj.org/cgi/reprint/22/1/1

The Federation of American Societies for Experimental Biology (FASEB) Journal, January 2008

- http://www.lifescied.org/cgi/reprint/7/3/279
  CBE—Life Sciences Education

- http://www.copusproject.org
  The Coalition on the Public Understanding of Science (COPUS)

- http://www.sdbonline.org/index.php?option=content&task=view&id=24
  Library of **E**ducational **A**nnotated **DE**velopmental biology **R**esources(LEADER)

- http://www.biosciednet.org/portal
  BEN portal, the National Science Digital Library (NSDL) Pathway

- http://www.apsarchive.org/Main/index.asp
  The American Physiological Society, Archive

- http://www.sdbonline.org/fly/gilbert/gilbert01.htm
  Lecture covering 20 concepts in Developmental Biology, given by Scott Gilbert

- http://www.stanford.edu/group/Urchin/contents.html
  Stanford University, Sea Urchin Embryology

- http://embryo.soad.umich.edu/carnStages/stage23/stage23.html
  Specimen in late stage 23 or possibly an early fetus

Strawberry DNA Extraction websites

- http://carnegieinstitution.org/first_light_case/horn/DNA/dnaindex.html
  List of websites about DNA, extraction and related topics, for all levels

- http://carnegieinstitution.org/first_light_case/horn/DNA/berrydna.pdf
  Berry Full of DNA – by Diane Sweeney. Lesson and procedures

- http://carnegieinstitution.org/first_light_case/horn/DNA/BERRYteacDNA.pdf
  Set of questions and answers to accompany the lesson.