

Creating Connections

Biology in Action

3rd LIFE DISCOVERY — DOING SCIENCE
Biology Education Conference



A project of the

LifeDiscoveryEd
Digital Library

Conference Center
at the Maritime Institute - CCMIT
Linthicum Heights, MD
March 18-19, 2016

Organized by:
Ecological Society of America
Botanical Society of America
Society for the Study of Evolution
Society for Economic Botany

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NOTE: In an effort to conserve resources, we have not printed session descriptions as part of the program.

You can view full session descriptions at the registration desk or view them online

www.esa.org/ldc

Conference Planning Committee

Sunshine L. Brosi, *Assistant Professor, Frostburg State University, MD (chair)*

Catrina Adams, *Director of Education, Botanical Society of America*

Phil Gibson, *Associate Professor of Biology, University of Oklahoma*

Tom Meagher, *Professor, Biology, University of St. Andrews, Scotland*

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Conference Partners



Society for the
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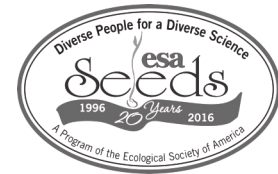
The Ecological Society of America is proud to be a lead organizer of the
Life Discovery—Doing Science Biology Education Conference

Office of Education and Diversity Programs

Advancing Quality Ecology Education &
Broadening Participation in Ecology

Strategies for Ecology Education, Diversity and Sustainability (SEEDS)

Mentoring diverse undergraduate students,
providing support and networking to promote
ecology careers.



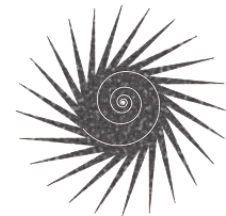
EcoEd Digital Library & Teaching Issues and Experiments in Ecology (TIEE)

Searchable peer-reviewed teaching resources for
undergraduate educators



Data-Intensive Ecology Education

Workshops and resources for faculty and students
Faculty Mentoring Network



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Keynote Panelists

Friday 8:30 AM, Building 3—Classroom 2



Andrew Martin, Professor, University of Colorado, is an evolutionary and conservation biologist with a strong interest in pedagogy and curriculum development that fosters student centered learning in large enrollment courses. He is also interested in promoting the development of faculty education groups with the goal of promoting integrated learning experiences across the major for undergraduates that stem from real-world relevant content and science process learning goals. This work was initially supported by a Science Education Initiative grant that supported Science Teaching Fellows that work closely with individual faculty in an effort generate sustained transformation of teaching practices. The effort led to the development of a faculty support group that meets weekly

for the purpose of developing and vetting curriculum that align with research-supported best practices. In addition, our current funded research involves testing the effectiveness of jigsaw lessons for promoting productive collaboration among students. Finally, these efforts are part of a more general movement towards developing an institutional mindset that values effective teaching and authentic assessment for productive and continuous revision of departmental and college-level science education.

Saturday 8:30 AM, Building 3—Classroom 2



Kevin Coyle, Vice President for Education and Training, National Wildlife Federation, has committed 35 years to U.S. river and watershed conservation and environmental education. An expert on wild rivers, watersheds, higher education sustainability, environmental literacy and community-based conservation, Kevin oversees NWF's Eco schools USA, habitat certification system, campus EcoLeaders and children and nature programs. He also guides the organization's education policy work for greener K-12 schools, environmental education and applied science education. Prior to NWF, Kevin was President and CEO of the National Environmental Education Foundation, CEO of American Rivers, Chair of the Natural Resource Council of America, and was an Assistant Regional Director

at the National Park Service overseeing the Land and Water Conservation Fund and wild river and national area resource studies in the Northeastern U.S. Kevin has a Juris Doctorate from Temple University. He is recipient of numerous awards including the Interior Department's Meritorious Service Award, The White House Reinventing Government Award and Paddler Magazine's Top Ten River Conservationists of All Time.

Friday Short Presentations

9:45AM – 10:15AM

Bringing climate change education to life | Deck A
Patricia Harcourt, Maryland Delaware Climate Change Education Assessment & Research

Audience: Grades 9-12, High school teachers and environmental educators

Climate change topics are a natural part of life science curricula, from lessons about photosynthesis, respiration, and the carbon cycle to tolerance ranges for species. We will share content, lessons, and resources to bring climate change into your classes.

REVISION: Building connections for undergraduate research at community colleges | Deck B

R Deborah Overath, Del Mar College

Audience: Grades 9-12; Undergraduate: Lower & Upper Division

The REVISION program at Del Mar College offers students opportunities to participate in authentic research experiences through both course-based research and summer internships. This presentation will discuss how to make connections to offer research opportunities and how they benefit students.

Baltimore Ecosystem Study – Young Environmental Scientists Program | Deck C

Bess Caplan, Cary Institute of Ecosystem Studies

Audience: Grades 9-12

The Baltimore Ecosystem Study - Young Environmental Scientists (BES YES) program engages underrepresented youth in field ecology knowledge, skills, and practices. Students conduct field campaigns using BES protocols and at BES field sites alongside scientists and educators.

Students in the field: Using a BioBlitz as an authentic research experience for undergraduates | Classroom 2

Kelly O'Donnell, Macaulay Honors College – CUNY, Lisa

Brundage, CUNY Advance

Audience: Grades 9-12; Undergraduate: Lower & Upper Division
Macaulay Honors College, CUNY uses a BioBlitz as a kickoff event for our required scientific literacy course. Students become more aware of the ecology of the city, have direct interaction with scientists in the field, and generate data for study.

10:25AM – 10:55AM

Contextualizing Climate Change: Linking a regional case study with citizen science research in the classroom | Deck A

Colleen Hitchcock, Brandeis University

Audience: Grades 9-12; Undergraduate: Lower Division

Participants will actively engage in small group facilitated discussions exploring climate change impacts on variations of Massachusetts species. We will also consider how to connect this case to a national citizen science campaign and additional presentation activities and assessments.

Making Biology Relevant to Careers: Maryland High School EANR (Environment, Agriculture, & Natural Resources) | Deck B

Sarah Haines, Towson University, Elena Takaki, National Geographic Society

Audience: Grades 9-12

Maryland's Career Technology Education (CTE) programs fall under ten career clusters, groupings of interrelated occupations that represent the full range of career opportunities in key economic sectors of Maryland's economy.

The career cluster system is used to develop programs that extend from high school to two- and four-year colleges/universities, apprenticeship programs and the workplace. This session will describe aspects of the EANR program: Environment, Agriculture, & Natural Resources.

PlantingScience: Digging Deeper Together | Deck C

Catrina Adams, Botanical Society of America

Audience: Grades 9-12

Learn how PlantingScience, connects students to biology careers through online professional mentorship, and how we connect learning across settings as we develop and evaluate a new blended learning model for collaborative teacher and early-career scientist professional development.

3:00 PM – 3:30 PM

Vernal Pool Study at Sandy Point State Park, Maryland: Anatomy of a Student-led, Long-term Research Project | Deck A

Susan Lamont, Anne Arundel Community College

Audience: Grades 9-12, Undergraduate: Lower Division and Upper Division

Students from Anne Arundel Community College are collaborating with the state environmental agency on long-term monitoring of vernal pool habitat in a local state park. Students from multiple biology courses are involved and data are used for park management.

Linking high schools and community college: New delivery models for dual credit biology | Deck B

David Grise, Del Mar College

Audience: Grades 9-12, Undergraduate: Lower Division

Financial incentives drive high school students to take dual-credit courses. I discuss new models for delivering dual-credit introductory biology in which community college faculty teach courses at a satellite location near several high schools and in area high schools.

An integrated approach for embedding environmental literacy into core curriculum | Deck C

Aleeza Oshry, Howard Hughes Medical Institute, Amy Green, Chesapeake Bay Foundation

Audience: Undergraduate: Grades 9-12

An innovative collaboration between Maryland school systems and nonprofits that has forged a method for integrating State Environmental Literacy Standards into school district curriculum. Using an inquiry-driven issues investigation Framework, the development pathway supports NGSS alignment, achieving meaningful connections to core ideas.

3:40 – 4:10 PM

Applying the Encyclopedia of Life's interactive education platform in place-based biodiversity education | Deck A

Amy Lorenz, Encyclopedia of Life/ Harvard University

Audience: Grades 9-12

The Encyclopedia of Life (EOL) has an educational online platform to visualize place-based biodiversity information through food webs, trait cards, and more. EOL is testing this platform with Okaloosa County School District and creating activities that can be applied anywhere.

Science Research Mentoring Program: Engaging high school youth in conservation through authentic research | Deck B

Mark Weckel, American Museum of Natural History

Audience: Grades 9-12

The Science Research Mentoring Program of the American Museum of Natural History allows 60 NYC high school students the opportunity to work alongside AMNH scientists to conduct authentic research on a range of topics including biodiversity, conservation, and evolutionary biology.

Connecting ecology to business applications: Creating an ecology course relevant for undergraduate business students | Deck C

Vikki Rodgers, Babson College

Audience: Undergraduate: Lower Division

Historically undergraduate business majors have been disconnected from science education. It is vital that future business leaders are engaged in scientific thinking and find relevance in understanding biological processes and ecological impacts.



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Saturday Short Presentations

This session format is designed for presentations that enhance understanding of key concepts, or project activities that feature effective ideas and approaches. Presentations are 20 minutes followed by 10 minutes of Q&A.

9:45AM – 10:15AM

**Wildcam Gorongosa (HHMI BioInteractive:
Connecting Students to Active Research | Deck A**

Bridget Conneely, Howard Hughes Medical Institute

Audience: Grades 9-12, Undergraduate: Lower & Upper Division
Researchers in Gorongosa National Park in Mozambique have captured hundreds of thousands of animal photos using trail cameras as part of a restoration project. Students can help scientists understand how the ecosystem is responding by identifying animals in the photos.

Surprises from the field: what students gained, valued and thought about using publicly available ecological data | Deck B

Tom Langen, Clarkson University

Audience: Undergraduate: Lower Division
Faculty from five colleges and staff from ESA, NCEAS and NEON Inc. collaboratively developed teaching modules using large public datasets. Students were introduced to ecoinformatics and engaged in the synthesis of ecological knowledge; with some worthwhile, and some surprising results.

Making life science accessible in urban schools | Deck C

Amanda Briody, Frederick Douglass High School; Sarah Sechrist, Carver Vocational-Technical High School

Audience: Grades 9-12

As teachers in low-income urban communities, we face unique challenges that require creative instruction to keep our students engaged in learning life science. The strategies we will share are a culmination of the many approaches we have used and refined in order to provide our students with an authentic and valuable life science education.

10:30 – 11:00AM

Using a biotechnology course to increase scientific literacy and promote scientific relevancy for business students | Deck A

David Blodgett, Babson College

Audience: Undergraduate: Lower Division
Biotechnology crosses multiple disciplines and represents the intersection between science and our students' daily lives. Highlighting this relevance by linking the science with how it will affect them in the next ten years highlights real applications.

Designing and monitoring discussions for safe learning | Deck B

Linden Higgins, University of Vermont

Audience: Grades 9-12, Undergraduate: Lower Division
Different kinds of questions are appropriate for different pedagogical goals. Following a brief presentation on cognitive development in young adults, participants will work on one discussion prompt and I will share a proficiency-based rubric for student argumentation.

Building future biologists by using feedback and self-reflection to connect students to learning and understanding | Deck C

Kristy Campbell, Fairview High School, Paul Strode, Fairview High School

Audience: Grades 9-12; Undergraduate: Lower & Upper Division
In order to prepare our students to be successful as biologists, we must deemphasize grades and connect students to the scientific practices and to learning and understanding biology through feedback and self-reflection.

11:10 – 11:40 AM

Young Scientists: A Different Outreach Approach | Deck A

Shannon Donovan, Scituate High School, Alison Roberts

Audience: Grades 9-12 Undergraduate: Lower & Upper Division
Our team piloted a very different approach - leading an after school enrichment club called the "Young Scientists" in carrying out a guided original research project in preparation for the state science and engineering fair.

Assessing the Impact of Citizen Science Project Participation on Science Attitude and Literacy | Deck B

Erin Janetski, Indiana University of Pennsylvania, Holly Travis, Indiana University of Pennsylvania,

Audience: Grades 9-12, Undergraduate: Lower Division

This project evaluated the impact of participation in a citizen science activity on attitude and engagement in pre-service elementary educators. The survey was given before and after participation to assess changes occurring as a result of involvement in science research.

Educating the Next Generation of Arborists | Deck C

Arielle Conti, Casey Trees

Audience: Other

Casey Trees and Davey Trees have created itreelessons.com which integrates tree data collected by students with NGSS. Using online software students incorporate Engineering Design Principles and learn about ecosystem benefits of urban trees.

What's it like to be a scientist? Exposing students to different types of scientists and thinking like a scientist. | Classroom 2

Melissa Csikari, Howard Hughes Medical Institute

Audience: Grades 9-12, Undergraduate: Lower Division

Enhance your biology units with HHMI Biointeractive's Scientist at Work videos and Data Points. Through the use of short video clips and data figures students will be exposed to careers in life science and connected to current research and practices.

3:40 – 4:10 PM

Exploring structure function relationships with molecular models | Deck A

Sandra Porter, Digital World Biology / Austin Community College / Bio-Link

Audience: Grades 9-12, Undergraduate: Lower & Upper Division

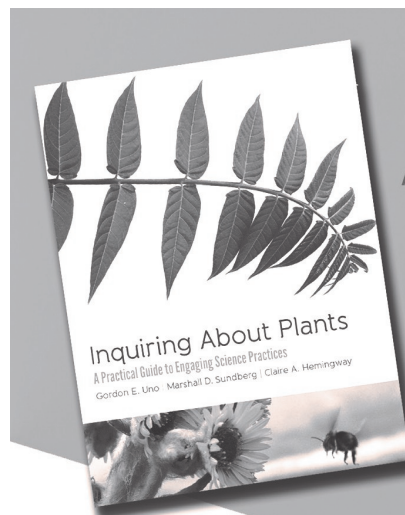
Molecular and chemical structure models are powerful tools for engaging students in discovery, introducing multiple scientific processes, and providing students with appealing methods for communicating information. Attendees will learn and practice strategies for using these resources in the classroom.

Engaging Minority Students and Incorporating Intercultural Proficiency in Biology Courses | Deck B

Sunshine L. Brosi, Frostburg State University and Laura G. Smith, Frostburg State University

Audience: Undergraduate: Lower & Upper Division

Ethnobiology incorporates cultural competency in biology courses engaging students while broadening their worldview. Highlighting the significance to students' own lives and the common ground between people of all cultures engages a broad range of students from the existing multicultural mosaic. Including elements of intercultural proficiency: sensitivity, communication skills, openness to cultural diversity, and global mindedness creates a comfortable and engaging learning environment for both minority and non-minority students.



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Friday At-a-Glance

- 7:00 AM **Registration - Building 3 Classroom 2**
- 8:00 AM **Welcome**
- 8:30 AM **Keynote I – Andrew Martin, Professor, University of Colorado**
- 9:30 AM **Break**

	Short Presentations Building 3 Classroom 2	Short Presentations Deck A	Short Presentations Deck B	Short Presentations Deck C			
9:45 AM	Students in the field: Using a BioBlitz as an authentic research experience for undergraduates	Bringing climate education to life Harcourt	REVISION: Building connections for undergraduate research at community colleges	Baltimore Ecosystem Study – Young Environmental Scientists Program Caplan;			
10:25 AM		Contextualizing Climate Change: Linking a regional case study with citizen science research in the classroom Hitchcock	Making Biology Relevant to Careers: Maryland High School EANR (Environment, Agriculture, & Natural Resources) Program	Planting Science: Digging Deeper Together Adams			
11:10 AM	Networking Sessions I						
12:00 PM	Lunch						
1:00 PM	<p>1:00—4:00 PM</p> <p><i>Workshop</i> Data-based inquiry in the classroom using authentic research data from the Dryad Digital Repository Fleming-Davies; Jenkins</p>						
1:15 PM					<i>Workshop: Nature’s Notebook Workshop: A modern spin on an age-old process designed to understand changes in nature</i> Barnett	<i>Workshop: Buildings, Rivers, & Roads: Environmental Barriers to Quail Movement</i> Ortiz	<i>Workshop: No soup for you: A hands-on shark fin DNA gel electrophoresis</i> Younkin; Romano
3:00 PM					Vernal Pool Study at Sandy Point State Park, Maryland: Anatomy of a student-led, long-term research project Lamont	Linking high schools and community college: New delivery models for dual credit biology Grise	An integrated approach for embedding environmental literacy into core curriculum Oshry; Green
3:40 PM					Applying the Encyclopedia of Life’s interactive education platform in place-based biodiversity education Lorenz	Science Research Mentoring Program: Engaging high school youth in conservation through authentic research Weckel	Connecting ecology to business applications: creating an ecology course relevant for undergraduate business students Rodgers
4:10 PM	Break						
4:30 PM	Education Share Fair						
6:00 PM	Dinner						
7:00 PM	Reception / Cash Bar and Movie Night <i>1st drink is complimentary</i> with Laura Bonetta, HHMI Director of Educational Media						

** Workshops are limited to 40 participants. Please check at the registration desk.*



Saturday At-a-Glance

- 7:30 AM **Registration Open - Building 3 Classroom 2**
- 8:00 AM **Opening**
- 8:30 AM **Keynote II- Kevin Coyle, Vice President for Education and Training, National Wildlife Federation**
- 9:30 AM **Break**

	Short Presentations Building 3 Classroom 2	Short Presentations Deck A	Short Presentations Deck B	Short Presentations Deck C
9:45 AM		Wildcam Gorongosa (HHMI BioInteractive: Connecting students to Active Research) Conneely	Surprises from the field: what students gained, valued and thought about using publicly available ecological data Langen	Making life science accessible in urban schools Briody; Sechrist
10:30 AM		Using a biotechnology course to increase scientific literacy and promote scientific relevancy for business students Blodgett	Designing and monitoring discussions for safe learning Higgins	Building future biologists by using feedback and self-reflection to connect students to learning and understanding Campbell; Strode
11:10 AM	What's it like to be a scientist? Exposing students to different types of scientists and thinking like a scientist Csikari	C3 Center's Young Scientists: A Different Outreach Approach Donovan; Roberts	Assessing the Impact of Citizen Science Project Participation on Science Attitude and Literacy Janetski; Davis; Travis	Educating the Next Generation of Arborist's Conti
11:50 PM	Lunch			
1:00 PM	Networking Sessions II			
2:00 PM	<i>Workshop: How To Use Tree Thinking To Teach Plant Diversity and Evolution</i> Gibson	<i>Workshop: I was told there would be no math involved: Introducing students to quantitative biology</i> Hamerlinck	<i>Workshop: Mini-cover Boards as a Tool for Environmental Education and Scientific Investigation</i> Travis; Janetski	<p>1:00 PM—4:00 PM</p> <p><i>Workshop</i> Statistics: Connecting a Tool of Science to Classroom and Lab</p>
3:40 PM		Exploring structure function relationships with molecular models Porter	Engaging Minority Students and Incorporating Intercultural Proficiency in Biology Courses Brosi; Smith	
4:10 PM	Break			
4:30 PM	Conference Roundup: What's in store for Biology education? Panel discussion			
6:00 PM	Dinner (only for those staying at CCMIT)			

Education Share Fair Roundtables

This session is designed for educators to share or gather feedback on teaching ideas and activities with a peer working group. Ideas or activities may be at any stage of development. Each roundtable is limited to 9 other participants. Authors describe their teaching idea for about 15 minutes and then facilitate feedback regarding the core concepts addressed, methodology, misconceptions, assessment, educational extensions or implementation in various institutional settings and audiences. There will be two rounds of 30 minutes each.

Friday, 4:30-6:30 PM Round 1

Table #A1

Beyond Four Walls: Community Partnerships in Biology Education

Sarah Haines, Towson University

Audience: Undergraduate: Lower & Upper Division

Teaching and learning can be greatly enhanced by involving students in activities that take place outside of the classroom in informal educational settings. This session will describe several undergraduate courses in which student learning and course exercises take place in informal institutions.

Table #A2

Substance or Just Flash? Assessing the Efficacy of a Mobile App for Genetics & Evolution Education

Juliet Noor, Duke University

Audience: Grades 9-12, Undergraduate: Lower Division

Our mobile device app provides vocabulary testing, modelling, and problem generation and solution of genetics and evolution topics. Does it improve student performance more than paper problems and are students more likely to use it? How to improve it to meet these goals for high school and college?

Table #A3

Implementation of the MUET Curriculum: Assessing Novices' Tree-Thinking Abilities

Yi Kong, The University of Texas at El Paso. Dr. Jeffrey Olimpo

Audience: Undergraduate: Lower Division

The curriculum described herein was developed based on the Model of the Use of Evolutionary Trees (MUET), a conceptual model that characterizes biologists' tree thinking. A MUET assessment is also presented that can be used to evaluate students' tree-thinking abilities.

Table #A4

Got Milkweed? Evaluating Our Response to the Monarch Population Decline

Emily Mohl, St. Olaf College

Audience: Grades 9-12, Undergraduate: Lower & Upper Division

In this distributed research project, participating schools conduct a field study that contributes to a larger dataset to address questions about local adaptation in milkweed plants, the food source for monarch butterflies. Students develop proposals responding to the monarch decline.

Table #A5

Effective Science Pedagogy for underrepresented minority populations

Brandon Noel, Bethune-Cookman University

Audience: Undergraduate: Lower Division

What is the best way to ensure minority population students in a general education science class are retaining information covered in lecture? Are digital platforms being used out of the classroom helpful, or can in-class exercises facilitate learning?

Table #A6

What is a species? Giraffe case study

April Conkey, Texas A&M University-Kingsville

Audience: Undergraduate: Lower & Upper Division

Students use the biological species concept to identify reproductive isolation events and genetic evidence from a journal article on the giraffe, and explain and justify if the giraffe should be split into multiple species to change their IUCN conservation status. science approach allows students to visualize themselves as part of a global community.

Table #A7

Using Citizen Science to Promote Biodiversity and Ecology Education through Innovative Teaching Practices

Melissa Caspary, Georgia Gwinnett College

Audience: Grades 9-12, Undergraduate: Lower & Upper Division

This session focuses on using citizen science platforms to reinforce concepts taught in biodiversity and ecology in undergraduate and high school education.

Table #A8

Antibiotic resistance in your backyard

Andrew Martin, University of Colorado

Audience: Grades 9-12 Undergraduate: Lower & Upper Division

Antibiotic resistant bacteria are ubiquitous but invisible. Students learn about the prevalence, biology, and evolution of antibiotic resistance at the same time they survey the aquatic environment near their homes or places they frequent. They then use their data for making an evidence-based claim in a letter to their state or national political representative.

Table #A9

Toxoplasma gondii: A case study for quickly modifying a lesson plan using current events

Shelley McCabe, Humber College

Audience: Undergraduate: Lower & Upper Division

Incorporating examples drawn from the headlines is one strategy to make concepts relevant to students. Using the headline about the 5000% increase in the price of Daraprim, a lesson plan on evolution was modified to include current events.

Round 2

Table #B1

Engaging different learning styles through creative curriculum design

Annissa Furr, Kaplan University, Erin Carr-Jordan, Kaplan University

Audience: Grades 9-12, Undergraduate: Lower & Upper Division
Students respond best to a variety of learning styles, which are as unique as the individual student. The Science Department at Kaplan University is designing assignments based on learning styles. This approach can be applied to traditional and online classrooms.

Table #B2

Encyclopedia of Life: Biodiversity, Interdependence, and Science Practices Activities for High School

Amy Lorenz, Encyclopedia of Life / Harvard University

Audience: Grades 9-12

The Encyclopedia of Life (EOL) has begun development of activities and resources that focus on interdependence, ecosystems, adaptations, classification, and science practices. We will share our current lessons and ask for feedback and modifications at a high school level.

Table #B3

BioBlitz as a way of understanding Biology

Concepcion Rodriguez-Fourquet, University of Puerto Rico Bayamon

Audience: Grades 9-12, Undergraduate: Lower & Upper Division, K-12

The BioBlitz is an event design to identify the biodiversity of a particular place with the objective of engaging students to be in contact with nature. The BioBlitz has helped students to recognize the diversity within Biology.

Table # B4

Applying Critical Thinking: Digital Herbaria as Tools for Bio-conservation Science

Denny Fernandez-del-Viso, University of Puerto Rico at Humacao

Audience: Undergraduate: Upper Division

Students will learn about herbaria and their potential use in conservation and ecological studies as well the challenge that emerge when using these important data repositories. They will also learn about invasive species, and their role in biodiversity loss worldwide.

Table #B5

Using an on-campus field facility (TSU-wetland) in ecology instruction

Dafeng Hui, Tennessee State University

Audience: Undergraduate: Lower Division & Upper Division

This presentation will discuss an idea of using an on-campus wetland in ecology and other courses to strengthening hands-on research experiences for undergraduate students in biological and environmental sciences.

Table #B6

K-12 & Community College Partnerships: Building Bridges from Education to Careers

Amrita Madabushi, Baltimore City Community College

Audience: Grades 9-12, Undergraduate: Lower & Upper Division

Advancing the cause of constantly changing biology education, Baltimore City Community College engaged in a unique K-12 partnership. We will highlight how our summer program is revolutionizing the learning experience of K-12 students while raising awareness of scientific careers.

Table #B7

Using Mathematical Models to Connect Mathematical and Biological Thinking Across Boundaries of Both

Douglas Norton, Villanova University

Audience: Undergraduate: Lower Division & Upper Division

We discuss the pedagogical uses of various mathematical models of various biological phenomena. The goal is to move students beyond thinking of mathematics as a tool for doing biology or biology as a source of examples for mathematics.

Table # B8

A K-5 outreach program bringing together future teachers and future scientists to make science accessible to all

Kerry Cresawn, James Madison University

Audience: Undergraduate: Lower & Upper Division,

This presentation describes a novel K-5 traveling science outreach model where teams of future scientists and future K-5 teacher undergraduates collaborate to engage under-represented students of science in hands-on/minds-on, foundations-based, science enrichment activities with emphasis on systems and structure/function relationships.

Table #B9

Teaching Scientific Method and Data Analysis Through Primary Literature and HHMI's The Biology of Skin Color

Melissa Csikari, Howard Hughes Medical Institute

Audience: Grades 9-12, Undergraduate: Lower Division

In this hands-on workshop participants will watch segments of the film The Biology of Skin Color then work in small groups to discuss what they watched, analyze data from the scientific literature, and draw evidence based conclusions on skin coloration.

Workshops

Participation in workshops is limited to a specific capacity. Signups were available during registration. If you are interested in participating in a workshop and have not pre-registered, please check availability at the registration area.

Thursday (Preconference)

Enhancing Culturally Relevant Mentoring

4:00 pm – 5:30 PM

Teresa Mourad and Fred Abbott-Torres, Ecological Society of America

Audience: Undergraduate

The challenge of retaining underrepresented minority students in science has been well-documented. Based on research on engaging racially and ethnically diverse students and the success of ESA's Presidential award-winning Strategies for Ecology Education, Diversity and Sustainability (SEEDS) program this workshop provides an opportunity for instructors, program leaders and other professionals to enhance their cultural awareness and expand their capacity for cultural competency in a non-judgmental environment. Cultural competency is the ability to "understand, communicate, operate, and provide effective services to people of another given culture". The mission of SEEDS is to diversify and advance the ecology profession through opportunities that stimulate and nurture the interest of underrepresented students to participate, and to lead in ecology.

FRIDAY

Nature's Notebook Workshop: A modern spin on an age-old process designed to understand changes in nature

1:15 - 2:45 PM

LoriAnne Barnett, University of Arizona

Audience: Grades 9-12, Undergraduate: Lower Division

A hands-on workshop designed to teach you how to implement a long-term phenology monitoring program, related to our current changing climate, that appeals to student interests and desires to be connected to the natural and cyber-world.

Buildings, Rivers, & Roads: Environmental Barriers to Quail Movement

1:15 - 2:45 PM

Janel Ortiz, Texas A&M University-Kingsville

Audience: Grades 9-12, Grades 4-8

Learn a function of Geographic Information Systems (GIS) using an aerial photo and markers to classify a quail's home range into different land cover types including residential, water, and roads. Classifying habitat allows you to identify barriers to quail movement.

No soup for you: A hands-on shark fin DNA gel electrophoresis

1:15PM - 2:45PM

Kerri Younkin, Towson University, Christina Romano, Towson University

Audience: Grades 9-12

Join Towson University's Bioscience Education and Outreach Program team using biotechnology to determine if confiscated shark fins are from protected great white sharks! This lab explores shark fining, conservation, and forensic application of DNA gel electrophoresis modeled after real cases.

Data-based inquiry in the classroom using authentic research data from the Dryad Digital Repository

1:00PM - 4:00PM

Arietta Fleming-Davies, QUBES; Radford University, Kristin Jenkins, BioQUEST

Audience: Grades 9-12, Undergraduate: Lower & Upper Division

DryadLab (<http://datadryad.org/pages/dryadlab>) modules are inquiry based, data-driven learning modules in which undergraduate and AP Biology students explore authentic ecological datasets. Workshop participants will walk through a DryadLab module and learn ways of adapting the module for different class settings.

We want your feedback!

Please complete the conference evaluation coming to your email inbox.

<http://www.esa.org/ldc/evaluations/>

SATURDAY

I was told there would be no math involved: Introducing students to quantitative biology

2:00PM - 3:30PM

Gabriela Hamerlinck, QUBES

Audience: Grades 9-12, Undergraduate: Lower Division

This is a participant-driven, active-learning workshop designed to allow participants to experience team-based learning, a form of active learning, and share practical ideas concerning how to implement team-based learning successfully in their classes.

Mini-cover Boards as a Tool for Environmental Education and Scientific Investigation

2:30PM - 3:30PM

Holly Travis, Indiana University of Pennsylvania, Erin Janetski, Indiana University of Pennsylvania

Audience: Grades 9-12, Undergraduate: Lower & Upper Division

The goal of this workshop is to outline the multiple ways in which the vast physical and digital resources associated with natural history collections can be used to promote the critical modifications to undergraduate education outlined in the AAAS Vision and Change document published in 2011.

How To Use Tree Thinking To Teach Plant Diversity and Evolution

2:00-3:30 PM

Phil Gibson, University of Oklahoma

Audience: Undergraduate: Lower Division

This workshop introduces a central module for introductory biology curriculum that uses tree-thinking as an organizing framework. The learning objectives are to help students learn the defining characteristics of major plant groups, develop skills to read trees, collect and analyze data, conduct phylogenetic analysis and, better understand how biologists study evolution and evolutionary relationships.

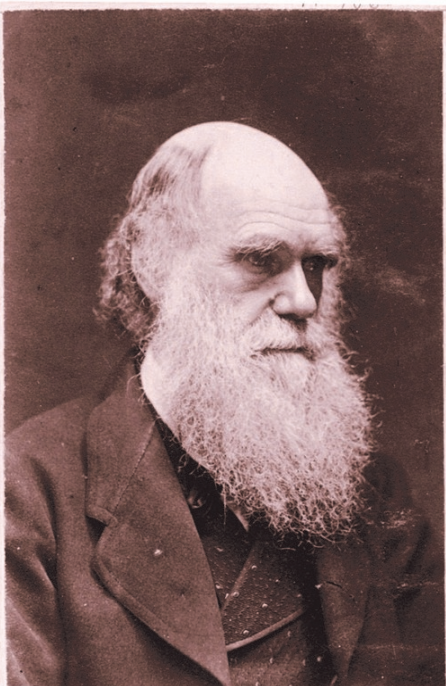
Statistics: Connecting a Tool of Science to Classroom and Lab Work

1:00 -4:00 PM

Paul Strode, Fairview High School; Ryan Reardon, Jefferson County International Baccalaureate School

Audience: Grades 9-12, Undergraduate: Lower Division

In this hands-on statistics overview, participants will review some of the most common mathematical and statistical tools that connect generating data to making conclusions and learn how to implement them into their biology courses.



*Ch. Darwin
Mad. 7th 1874.*

The **Society for the Study of Evolution** promotes advancement of scientific understanding of evolution and supports outreach and education at all levels.



SSE outreach targeting education include:

- EVO101, a satellite session for K-12 educators, Professional Development Workshop for undergraduate educators, and Education Symposium at the annual SSE meeting
- The annual Gould award lecture (see past lectures archived on our web site)
- The T.H. Huxley Award for an SSE member presentation at NABT
- Participation in the USA Science & Engineering Festivals, Washington, DC

You could be one of us! SSE membership includes a rate for K-12 educators with an interest in evolution.

Information about the SSE can be obtained at:

<http://cms.gogrid.evolutionssociety.org/>

Networking Topics

Networking I Friday March 18, 11:10 AM
Networking II Saturday March 19, 1:00 PM

N1) Career development

This topic is about enhancing awareness among educators of career trajectories following education in the life sciences. There is concern that educators tend to focus teaching towards career trajectories leading to academic science because that is what they did themselves. This trajectory is likely to be relevant to a small subset of students, so we need to engage more with a diversity of career options.

- What career options are likely to be available to students studying ecology and evolution or other related life science areas?
- How can we integrate examples or topics into teaching that provide insights into such career trajectories, building on existing topical coverage?
- Are there specific methods we might introduce to promote career opportunities (e.g. visiting lecturers from other sectors, career workshops, panels or tutorials, mock interview sessions, etc)?

N2) How to make connections with professional societies

Professional societies can be hubs for connecting learning across institutions and settings, linking individuals, and providing venues for sharing resources. Professional societies may represent its members on various issues impacting the field and also provide leadership in unchartered waters.

- How have professional societies helped you in your career as a science educator?
- What opportunities have you taken advantage of?
- Are there gaps that professional societies can help bridge?
- What tips do you have for biology educators looking to build connections?

N3) Inquiry – Directed/guided or open?

This topic is about the pedagogical strategy of inquiry-based learning in the science (specifically biology) classroom and whether directed/guided inquiry or open-ended inquiry (or a hybrid of the two) is most effective at increasing science literacy and future science engagement in students. With its roots in the ideas of John Dewey and the teaching of skepticism and critical thinking, different versions of inquiry-based learning have been practiced in science education for over a century. Most recently, inquiry-based learning proponents argue that teaching and learning must be thoughtful, problem-based, relevant and even globally critical, and action-oriented. Indeed, if science research is inherently an inquiry-based process, why shouldn't our students engage in the practice in our classrooms? While the benefits of inquiry-based learning are obvious (e.g. increased science literacy and future science engagement), the ability to implement the practice in the classroom depends heavily on the scientific skills of the teacher, the nature of the student population, and the content demands of the curriculum and time needed to cover them.

- Across the spectrum of inquiry strategies—directed/guided inquiry to open-ended inquiry—what are the benefits and challenges?
- What does an effective directed/guided inquiry look like in the classroom and what are some good examples from our classrooms?
- What does an effective open-ended inquiry look like in the classroom and what are some good examples from our classrooms?
- What are the obvious or subtle tensions in our classrooms that get in the way of using any kind of an inquiry-based approach?
- If critical thinking and thoughtful and constructive skepticism (i.e. how do you know what you know?) by our students are among our primary goals as science educators, how do we teach and reach them?

N4) Engaging Minority Students in Biology Courses

This topic is about engaging minority students in biology by developing connections and relevance to biological concepts. Intercultural proficiency, including an understanding of cross-cultural communication, global-mindedness, and intercultural sensitivity, is key to building an educational community which is open to diverse students. Educators often easily engage students who are like themselves leaving the others in the classroom feeling left out. How do we make biology interesting to a broad-range of students? What methods exist to engage minority students in biology?

- What methods can biology educators use to engage a broad range of students from the existing multicultural mosaic?
- How can we biology be made relevant to diverse audiences?
- How can intercultural understanding be incorporated in the biology classroom?

N5) Current events – strategies to rapidly turn around news items into genuine learning experience

This topic is about exploring strategies to take a news item and quickly turn it into a classroom activity so that it not only presents biology as a component of daily life, but also takes advantage of it being a current event. Daily, if not hourly, news stories present a number of biologically based events that could serve as excellent examples of biological concepts, processes, or principles. However, it can be challenging to take those and transform them into meaningful learning experiences.

- What is the nature of how science is presented in the media?
- What makes a good news item to use in class?
- What are the strategies for using current events effectively in a classroom?
- How can students be motivated to look at current events and critically evaluate their scientific content?

Reception and Movie Night with BioInteractive

Join us for HHMI BioInteractive's Night at the Movies

Two short film screenings

followed by Q&A with
Dr. Laura Bonetta, Director of Educational Media

Friday, March 18

7:00—8:00pm

Classroom 2, Bldg 3

hhmi | BioInteractive 

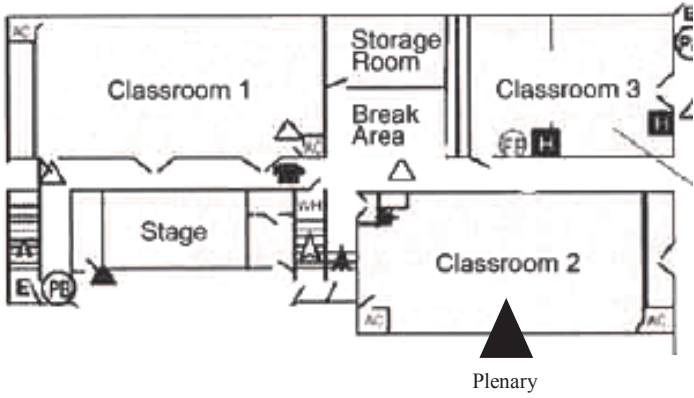
Popped Secret: The Mysterious Origin of Corn

Ten thousand years ago, corn didn't exist anywhere in the world, and until recently scientists argued vehemently about its origins. Today the crop is consumed voraciously by us, by our livestock, and as a major part of processed foods. So where did it come from? *Popped Secret: The Mysterious Origin of Corn* tells the story of the genetic changes involved in the transformation of a wild grass called teosinte into corn. Evidence from genetics supports archeological findings pinpointing corn's origins to a very particular time and place in Mexico.

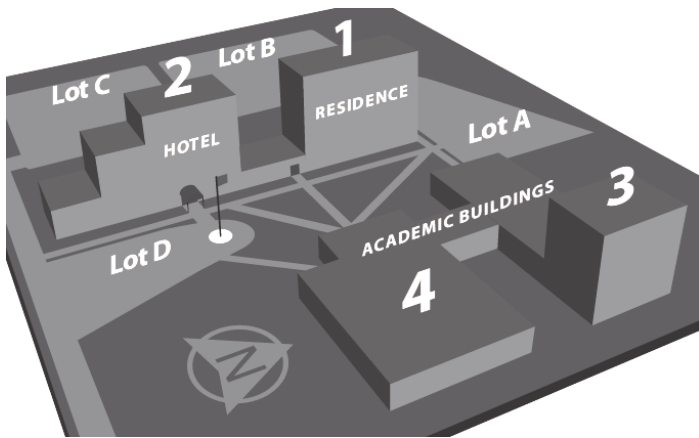
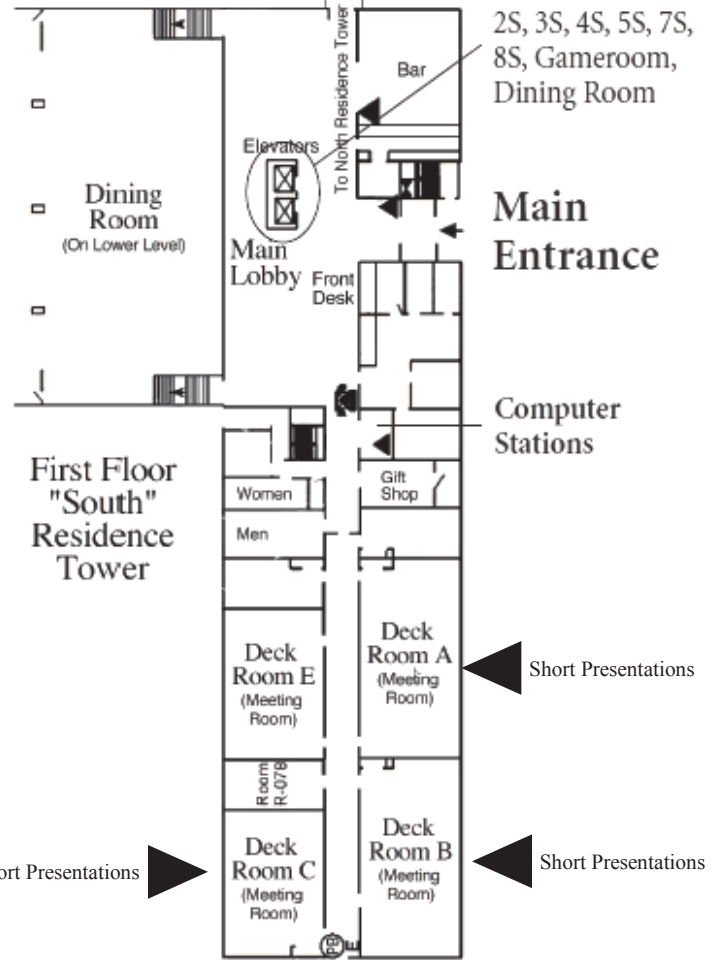


Animated Life: The Living Fossil Fish

In 1938, South African museum curator Marjorie Courtenay-Latimer came across a strange blue fin poking out of a pile of fish. With its fleshy, lobed fins and its tough armored scales, the coelacanth did not look like any other fish that exists today. The coelacanth belongs to a lineage that has remained virtually unchanged for hundreds of millions of years—earning it the description of a "living fossil."



Building 2



Join representatives of the Open Science Network (OSN) and get involved in this collaborative network of ethnobiology educators.

The learning community is open to all educators interested in the field of ethnobiology and the curriculum and practices endorsed by the *Vision and Change for Biology*.

Funded by the National Science Foundation, OSN uses open technology and an open culture to facilitate the exchange of educational techniques, materials, and experiences across institutional and international borders.

To join or learn more about OSN, visit the following website:

www.opensciencenetwork.net

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Acknowledgements

Many biology education professionals and experts have contributed to the planning and content of this conference. We would like to thank all of the presenters, speakers and attendees for their support of this inaugural education conference.

We thank the organizations in the Professional Societies Alliance for Life Science Education (PSALSE) and others for their support in promoting the conference:

***American Society of Plant Biologists
American Institute of Biological Sciences
American Society for Microbiology
Baltimore Ecosystem Study
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