

# Data: Discover, Investigate, Inform

*4th LIFE DISCOVERY—DOING SCIENCE*



**October 19-21, 2017**  
**Thurman J. White Forum**  
**Building**  
**University of Oklahoma**  
**NORMAN, OK**



A project of the  
**LifeDiscoveryEd Digital Library**



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In an effort to conserve resources, we have not printed session descriptions

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

[www.esa.org/l dc](http://www.esa.org/l dc)

**Twitterfeed:  
#LDC2017**

The Ecological Society of America is proud to be a lead organizer of the

**Life Discovery—Doing Science  
Biology Education Conference**



**Advancing Quality Ecology Education &  
Broadening Participation in Ecology**



[www.esa.org/education\\_diversity](http://www.esa.org/education_diversity)

# Conference Planning Committee

**Phil Gibson**, Associate Professor of Biology, University of Oklahoma (chair)

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

**Arietta Fleming-Davies**, University of San Diego, QUBES

**Juliet Noor**, Lecturer, Biology, Duke University

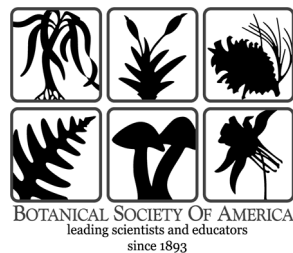
**Traci Richardson**, Science Teacher, Stillwater High School, Stillwater, OK

**Paul Strode**, Science Teacher, Fairview High School, Boulder CO

**Teresa Mourad**, Director, Education and Diversity Programs, Ecological Society of America

**ESA Education Interns:** Sayd Hussain, Yaneth Laffaurie

## Conference Partners



Society for the  
Study of Evolution



## Conference Collaborators

**Many thanks to our Conference Collaborators who promoted the conference to their professional networks:**

Advancing Integration of Museums into Undergraduate Programs (AIM-Up!)  
American Institute of Biological Sciences (AIBS)  
American Geophysical Union (AGU)  
American Society for Microbiology (ASM)  
Baltimore Ecosystem Study (BES)  
Bio-Link  
BioQuest  
Community College Undergraduate Research Initiative (CCURI)  
Data Nuggets

Ecological Research as Education Network (EREN)  
The Geological Society of America (GSA)  
Guiding Education through Novel Investigation (GENI)  
Integrated Digitized Biocollections (iDigBio)  
Long Term Ecological Research Network (LTER)  
Quantitative Undergraduate Biology Education and Synthesis (QUBES)  
USA National Phenology Network | Nature's Notebook (NPN)

# Meeting Code of Conduct

The Life Discovery – Doing Science Conference (LDC) Planning Committee is committed to providing a safe, productive and welcoming environment for all meeting participants. All participants including, but not limited to, attendees, speakers, committee members, staff and others associated with the meeting are expected to abide by this LDC Meeting Code of Conduct.

## Expected Behavior

- All participants are treated with respect and consideration, valuing a diversity of views and opinions.
- Be considerate, respectful, and collaborative.
- Communicate openly with respect for others, critiquing ideas rather than individuals.
- Avoid personal attacks directed toward other participants.
- Be mindful of your surroundings and of your fellow participants. Alert LDC staff if you notice a dangerous situation or someone in distress.
- Respect the rules and policies of the meeting venue, hotels, or any other venue associated with LDC.

## Unacceptable Behavior

- Harassment, intimidation or discrimination in any form will not be tolerated.
- Physical or verbal abuse of any participant or other meeting guests will not be tolerated.
- Examples of unacceptable behavior include, but are not limited to, verbal comments related to gender, gender identity and expression, sexual orientation, disability, physical appearance, body size, race, religion, national origin, as well as inappropriate use of nudity and/or sexual images in public spaces or in presentations, and threatening or stalking any participant or other meeting guest.
- Recording or taking photography of another individual's presentation without the explicit permission of the presenter is not allowed.
- Disruption of talks or organized by LDC at the meeting venue, hotels, or other facilities associated with the meeting is not allowed.

## Consequences

- Anyone requested to stop unacceptable behavior is expected to comply immediately.
- LDC staff (or their designee) or security may take any action deemed necessary and appropriate, including immediate removal from the meeting without warning or refund.
- LDC reserves the right to prohibit attendance at any future meeting.

## Reporting Unacceptable Behavior

- If you are the subject of unacceptable behavior or have witnessed any such behavior, please immediately notify Teresa Mourad, LDC staff [teresa@esa.org](mailto:teresa@esa.org) or Conference Chair Phil Gibson, [jpgibson@ou.edu](mailto:jpgibson@ou.edu) onsite or via email.
- You may also talk to any LDC Planning Committee member listed on p. 2.

## Thursday Preconference Activities

### Sam Noble Oklahoma Museum of Natural History

**FREE ADMISSION ON THURSDAY Oct 19, 2017 with name badge. Hours: 10:00 AM - 5:00PM**



The museum houses more than 10 million objects and specimens in 12 collections including biological tissue samples, mammals, invertebrates, and minerals.

### Preconference Workshop

**Bringing Lecture to Life: The Use of Modern Research Instrumentation in the Classroom and Lab**  
2:00 - 5:00 PM Fee: \$20

**Jason Hupp, LI-COR Biosciences; Kayla Kemp-Smith, LI-COR Biosciences**

The tools used to do modern science have a role beyond the research lab and can serve as valuable teaching tools in undergraduate education. Application of modern research instrumentation at the undergraduate level provides not only a means of exploring biological systems in a quantitative manner but exposes students to methods used in current scientific research and can better prepare them for a future in the sciences.

### Preconference Fieldtrip



**National Weather Center**  
3:00 - 4:30 PM Fee: \$15

The National Weather Center houses a unique confederation of The University of Oklahoma, National Oceanic and Atmospheric Administration and state organizations that work together in partnership to improve understanding of events occurring in Earth's

atmosphere over a wide range of time and space scales. Tours include visits to the McCasland Family Observation Deck, School of Meteorology, the NOAA/NWS Storm Prediction Center, the NWS Norman Weather Forecast Office, and the National Severe Storm Laboratory.



## Join Now! The Botanical Society of America



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...and engage with plant biologists and educators around the globe

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....your career by publishing your research in the *American Journal of Botany*, *Plant Science Bulletin* and *APPS*

### Enrich

...your life and lives of students worldwide through online mentoring in the award-winning *PlantingScience* program



planting science

[www.plantingscience.org](http://www.plantingscience.org)  
[www.botany.org](http://www.botany.org)

# Keynote Speaker

## Friday 5:15 PM

**Dr. Jeffrey Kelly** is the Director of the Oklahoma Biological Survey and a Professor of Biology at the University of Oklahoma. He received a BS in Wildlife Management from the University of Maine, an MS in Zoology from Oklahoma State University, and a Ph.D. in Biology from Colorado State University. Jeff is the PI of an NSF Research Training (NRT) program in Aeroecology, which tests a new model of interdisciplinary graduate student training focused on understanding ecological pattern and process in the lower atmosphere. He teaches interdisciplinary graduate courses in the Earth Observation Science for Society and Sustainability (EOS3) graduate certificate program as part of the NRT as well as courses in Conservation Biology and Population Ecology. His current research focuses on avian migration systems and interdisciplinary studies of emerging human-wildlife conflicts driven by increased use of the lower atmosphere for telecommunication, energy production, transportation, and commerce.



**NEWS: 10/12/2017** Dr. Kelly has just been named inaugural Director of the Corix Plains Institute, Corix Endowed Chair. Congratulations!

# Keynote Panel

## Saturday 8:00 AM



**Brad Goodner** is Professor of Biology and Edward J. Smerek Endowed Chair in Mathematics, the Sciences, & Technology at Hiram College. Over the last decade, he has worked

with colleagues to provide undergraduate research opportunities in genomics and bioinformatics on a national scale



**Wendy Gram** leads development of educational resources to facilitate use of freely available NEON (National Ecological Observatory Network) data, including environmental data from 81 sites across the US. Wendy holds a Ph.D. in

Ecology and Evolution from the University of Missouri and a B.A. in Biology from the University of Pennsylvania.



**Anna Monfils** is a Professor and Director of the CMU Herbarium. Anna will introduce the Biodiversity Literacy in Undergraduate Education (BLUE) Network. BLUE is a team of data scientists, biodiversity

researchers, and science educators working to define biodiversity data literacy standards and develop exemplar materials for implementation in the undergraduate core curriculum.



**Elizabeth H. Schultheis, PhD** is a postdoctoral researcher at Michigan State University, and co-founder of Data Nuggets. Data Nuggets are an innovative approach to bring contemporary research and authentic

data into K-16 classrooms, connecting students to real scientists and their passion for discovery.

# Short Presentations

## Friday 9:00 AM - 9:30 AM

### **Teaching Chi-Square Analysis using Wisconsin Fast Plants | Room A3**

**Ryan Reardon , Jefferson County International Baccalaureate**

*Audience:* Grades 9-12

Facilitating the analysis of student-generated data is essential for developing students' understanding of fundamental biological principles. Learn how a 48-hour experiment with Wisconsin fast plants can open a window to inferential statistics and fundamentals of eukaryotic genetic variability.

### **Authentic inquiries in large ecology classes using Christmas Bird Count and National Land Cover data | Room A5**

**X. Ben Wu, Texas A&M University**

**Xavier Jaime, Texas A&M University**

*Audience:* Undergraduate

Implement and assess web-based authentic inquiries in introductory ecology classes using large datasets across space and time to explore changes in spatial distributions of birds and land cover and their relationships, with collaborative learning, guiding rubric, and Calibrated Peer Review.

### **Digging Deeper with Data: Using an Online Mentoring Platform to Help Students Argue from Evidence | Room A6**

**Catrina Adams , Botanical Society of America**

*Audience:* Grades 9-12, Undergraduate: Lower Division

Learn how PlantingScience scaffolds middle- and high-school students through the process of collecting,

interpreting, and arguing from data. Come away with open-access resources---developed through the NSF-funded Digging Deeper teacher/scientist professional development project---that help students connect data to meaning.

## Friday 9:45 AM - 10:15 AM

### **Shannon's and Simpson's Diversity Indices | Room A3** **Paul Strode , Fairview High School**

*Audience:* Grades 9-12, Undergraduate: Lower Division

Learn how your students can use cheap and simple drop traps to generate arthropod diversity data and analyze them with the Shannon's and Simpson's Diversity Indices.

### **Cornerstone: student research and active learning from a Faculty perspective. | Room A5**

**Ingo Schlupp , University of Oklahoma**

*Audience:* Undergraduate

A Faculty team at OU created a class that is based on authentic, experiential learning based on faculty research.

### **Discovery and learning of everyday biodiversity using iNaturalist-driven bioblitzes and campus inventories | Room A6**

**Lena Struwe, Rutgers University**

**Natalie Howe, The College of New Jersey**

*Audience:* Grades 9-12, Undergraduate

We will present the use of student-driven inventories and discovery activities of everyday biodiversity employing the iNaturalist digital platform to develop bioblitzes, campus inventories, and student research projects that enhance learning and knowledge about ecology, evolution, and local biodiversity.

## Saturday 9:20AM - 9:50 AM

### **Harnessing the Power of Digitized Natural History Collections in the Classroom |Room A3**

**Molly Phillips , iDigBio/University of Florida**

**Anna K. Monfils, Central Michigan University**

*Audience:* Grades 9-12, Undergraduate

In this presentation we'll demonstrate how educators can access and use biodiversity data and citizen science in curricula. Best practices, open source resources, and ways to become engaged with the biodiversity community will be shared.

### **Attracting and Retaining Minority Students to Natural Resources Through Ethnobotany |Room A5**

**Sunshine Brosi , Frostburg State University**

**Erica Duda, Frostburg State University**

*Audience:* Undergraduate: Lower Division

Ethnobotany emphasizes people as part of the natural world with legacies of sustainable forestry and adaptive management incorporating local traditional ecological knowledge. Teaching natural resources using the lens of culture attracts and engages minority students in forestry, wildlife, and agriculture.

### **BIOMAAP: Biology Students Math Anxiety and Attitudes Program Room A6**

**Arietta Fleming-Davies, QUBES; Radford University**

*Audience:* Grades 9-12, Undergraduate

Student attitudes and confidence are often a barrier to effective teaching with research data. Participants will preview easily-adoptable materials, appropriate for a range of undergraduate and high school courses, that help students become more receptive to quantitative reasoning.



# Lunch with HHMI BioInteractive


**Lunch Date  
with HHMI's  
BioInteractive:**

**Seed Dispersal  
and Habitat  
Fragmentation**

Join us Friday October 20th, at 12 p.m.  
to view one of our latest short  
documentary films on evolution.

Watch this exciting story  
and learn about the  
free educational resources  
that support using the  
film in your courses.

**Lunch will be provided.**

**hhmi**  **BioInteractive**

# Thursday At-a-Glance

**9:45 AM - 4:00 PM** Registration Opens at Marriott Hotel Lobby

**3:00 PM – 4:30 PM** Field Trip to National Weather Center

**2:00 PM - 5:00PM** Preconference Workshop:  
Bringing Lecture to Life: The Use of Modern Research Instrumentation in the Classroom and Lab

# Friday At-a-Glance

**7:30 AM** Registration Opens at University of Oklahoma

**8:00 AM** Welcome - Conference room A; Publish in LifeDiscoveryEd Digital Library!

| Room            | Short Presentations<br>A3   | Short Presentations<br>A5  | Short Presentations<br>A6  |
|-----------------|---|--|--|
| <b>9:00 AM</b>  | Reardon: Teaching Chi-Square Analysis using Wisconsin Fast Plants                                     | Wu: Authentic Inquiries in large ecology classes using Christmas Bird Count and National Land Cover data | Adams: Digging Deeper with Data: Using an Online Mentoring Platform to Help Students Argue from Evidence           |
| <b>9:30 AM</b>  | Break   |  |  |
| <b>9:45 AM</b>  | Strode: Testing the Edge Effect with Drop Trap Data and the Shannon's and Simpson's Diversity Indices | Schlupp: Cornerstone: student research and active learning from a Faculty Perspective                    | Struwe: Discovery and learning of everyday biodiversity using iNaturalist-driven bioblitzes and campus inventories |
| <b>10:15 AM</b> | Break   |  |  |
| <b>10:30 AM</b> | Education Share Fair Roundtables Session 1  |  |  |
| <b>12:00 PM</b> | Movie and Lunch with HHMI BioInteractive SEEDS Dispersal and Habitat Fragmentation                    |  |  |



|                | Hands-on Workshop<br>Room A3   | Hands-on Workshop<br>Room A5   | Hands-on Workshop<br>Room A6  | Hands-on Workshop<br>Room A   |
|----------------|--|--|---|---|
| <b>1:30 PM</b> | Bonner: Are you sick? Introducing quantitative skills through hands-on infectious disease simulation games | Csikari: The Nuts and Bolts of Data Analysis using HHMI BioInteractive Resources | Monfils: Using Natural History Collections to Increase Biodiversity Literacy in Undergraduate Education | Schultheis: Best practices for using authentic research data to teach core concepts |
| <b>3:00 PM</b> | Break  |  |   |   |
| <b>3:15PM</b>  | Facilitated Networking Session   |  |   |   |
| <b>4:15 PM</b> | Developing Collaborations and Partnerships   |  |   |   |
| <b>5:15 PM</b> | Keynote Speaker: Dr. Jeffrey Kelly   |  |   |   |
| <b>6:15 PM</b> | Dinner   |  |   |   |
| <b>7:30 PM</b> | Adjourn  |  |   |   |

# Saturday At-a-Glance

**7:30 AM Registration Opens**

**8:00 AM Welcome and Keynote Panel**

|  | Short Presentations<br>Room A3 | Short Presentation<br>Room A5 | Short Presentations<br>Room A6 |
|--|--------------------------------|-------------------------------|--------------------------------|
|--|--------------------------------|-------------------------------|--------------------------------|

|                |  |  |  |
|----------------|--|--|--|
| <b>9:15 AM</b> | Phillips: Harnessing the Power of Digitized Natural History Collections in the Classroom | Brosi: Attracting and Retaining Minority Students to Natural Resources Through Ethnobotany | Fleming-Davies: BIOMAAP: Biology Students Math Anxiety and Attitudes Program |
|----------------|--|--|--|

**9:45 AM Break**

**10:00 AM Education Share Fair Roundtables Session 2**

|  | Hands-on Workshop<br>Room A3 | Hands-on Workshop<br>Room A5 | Hands-on Workshop<br>Room A |
|--|------------------------------|------------------------------|-----------------------------|
|--|------------------------------|------------------------------|-----------------------------|

|                 |  |   |  |
|-----------------|--|---|--|
| <b>11:10 AM</b> | Jenkins: Getting a Feel for Tree Thinking: Activities to Teach Phylogenetics | Goodner: Guiding Education through Novel Investigation (GENI) – Virtual and Wet Lab Explorations of Genomes | Jones: Using NEON Data and Educational Materials in Your Classroom |
|-----------------|--|---|--|

**12:40PM Lunch**

|  | Hands-on Workshop<br>Room A3 | Hands-on Workshop<br>Room A5 | Hands-on Workshop<br>Room A |
|--|------------------------------|------------------------------|-----------------------------|
|--|------------------------------|------------------------------|-----------------------------|

|                |  |  |   |
|----------------|--|--|---|
| <b>1:30 PM</b> | Grayson: Teaching Coral Bleaching with HHMI BioInteractive Tools and Research Data | Berkowitz: Exploring Data Literacy Using Local Environmental Data for NGSS-aligned Curricula | Hamerlinck: Infusing quantitative skills into the Biology classroom |
|----------------|--|--|---|

**3:00 PM Transition**

**3:10 PM Wrap Up**

**3:40 PM Adjourn**

**Thank you for your participation!**

**We want your feedback!**

Please complete the conference evaluation coming to your email inbox.

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

# 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. Authors describe their teaching idea for about 15 minutes and then facilitate feedback regarding the concepts addressed, methodology, misconceptions, assessment, educational extensions or implementation in various institutional settings and audiences. Each table is limited to 10 participants.*

## Friday Round 1 ~ 10:30 AM

### Table #A1

#### **Is Chocolate for the Birds?**

***Kathryn Bylsma, Sunlake High School / Pasco County Schools***

*Audience:* Grades 9-12

"Is chocolate for the birds?" This Data Nugget is an ideal way for students to implement their wildlife and systems management strategies.

### Table #A2

#### **Using Authentic Research Data of Dry Scrubs Guanica Forest Plot to Teach Ecological Concepts**

***Glenda Almodovar-Morales, Fine Arts Specialized School***

*Audience:* Grades 9-12

This activity promote the use of environmental variables data collected by students in Dry Scrub Guanica Forest Plot as part of a long term ecological research (LTER) in the Guanica State Forest.

### Table #A3

#### **Using the Michigan Natural Features Inventory to Observe Human Impact on Habitats, Plant and Animal Species**

***Leah Cook, Davenport University***

*Audience:* Grades 9-12, Undergraduate: Lower Division  
Michigan Natural Features Inventory is a resource that can be easily adapted to provide updated information on Michigan ecological habitats, plant and animal species. Coupling this resource with a population density map, the World Population resources, and US Climate Data will provide several opportunities to discuss how habitats and species can be impacted by humans.

### Table #A4

#### **Welcome to Pleistocene Park - A rewilding case study**

***April Conkey, Texas A&M University-Kingsville***

*Audience:* Undergraduate: Lower Division

Lesson: Students apply the rewilding concept to a Pleistocene Park scenario and propose management recommendations. Concepts: trophic cascades, apex predators, human-related extinctions, restoring endangered species populations, ecological niche and species requirements, ecosystem function and restoration, game ranches, and human-wildlife conflict.

### Table #A5

#### **Scaffolding CER for Differentiation**

***Jennifer Barnes, Marietta High School***

*Audience:* Grades 9-12

How to scaffold a CER for multi-level learners in an inclusion biology classroom using HHMI BioInteractive Evolution resources.

### Table #A6

#### **Surface area to volume ratios and their importance**

***Jennifer Buntz, Dine College***

*Audience:* Undergraduate: Lower Division

There are many examples of cells that do not conform to the circle or rectangle used to depict animal or plant cells in introductory biology classes. One reason for these modifications is to maximize diffusion and/or absorption. I will present calculations, graphing, simple labs and some human anatomy examples, that can be used to discuss surface area to volume ratios and their importance.

### Table #A7

#### **Ticks, climate and invasions**

***Andrea Davalos, SUNY Cortland***

*Audience:* Undergraduate: Upper Division

Human activity has resulted in loss of biodiversity and unintended negative results on human well-being. In this course, students will explore the relationship among biodiversity, climate change and human health through the design and implementation of a simple experiment evaluating black-legged tick survival.

### Table #A8

#### **The effects of DFTD on Tasmanian devil life history**

***Maria Stanko, New Jersey Institute of Technology***

*Audience:* Undergraduate: Lower Division

Researchers have been investigating changes in life history of Tasmanian devil populations as a result of the spread of DFTD. Students use examples from scientific literature to reinforce concepts about life history, create figures from data, and interpret graphical information.

### Table #A9

#### **The Tail of the Phage**

***John Starnes, Somerset Community College***

*Audience:* Undergraduate: Lower Division

Using student derived data, in a paper and computer based exercise, participants will learn about phage tails and one of the genes that determine their length.

## Friday Round 2

Table #B1

### **Unpacking Sources of Variability in Ecological Data**

*Michelle Forsythe, Texas State University*

*Audience:* Undergraduate: Lower Division

Use measurements of snail shells to help students 1) unpack how measurement, natural, sampling, and induced variability create differences in data and 2) develop heuristics for the degree of difference explained by random variation and that are indicative of causal factors.

Table #B2

### **Estimating carbon sequestration of forestland using field sampling and modeling**

*Matthew Fisher, Oregon Coast Community College*

*Audience:* Undergraduate: Lower Division

Students sample forest plots and obtain tree cores to estimate current and past biomass using mathematical models. Students use these data to determine carbon sequestration capacity of the forest and apply their results to discussions on mitigation of climate change.

Table #B3

### **CSU Chico Building Energy Use**

*Kristen Kaczynski, California State University, Chico*

*Audience:* Undergraduate: Lower Division

Human impacts on the carbon cycle is an important theme in introductory courses. In this lab, students use real-world CSU Chico building energy use data to examine scaling up and concepts such as sustainability and carbon offsetting.

Table #B4

### **Teaching evolution to non-majors biology students using real-life data**

*Kevin Bonney, New York University*

*Audience:* Undergraduate: Lower Division

This presentation explores the theme of *Discover Data* to teach Evolution in Action to non-majors undergraduate biology students. Discussion focuses on where datasets can be accessed and how they can be adapted for use in the classroom.

Table #B5

### **Incorporating group poster sessions into introductory biology courses using curated case studies.**

*Saroj Chirravuri, GateWay Community College, Phoenix, AZ*

*Audience:* Undergraduate: Lower Division

Incorporating group poster sessions using curated case studies may help instructors meet pedagogical goals of collaboration, team learning and integration of data analysis in the introductory biology curriculum. Case study analysis also allows students to connect content to context.

Table #B6

### **Investigating Progress of a Prairie Reconstruction to Teach Succession and Community Ecology**

*Andrew Ising, Baldwin High School*

*Audience:* Undergraduate: Lower Division

K-12 students investigate ecological succession using a local prairie reconstruction. Students try to determine reconstruction progress by comparing collected data to late successional remnant prairies and reconstructions. Some students will supplement ecological surveys with genetic comparisons of keystone species.

Table #B7

### **Case study: minimizing bias in study design**

*Ann Showalter, Clayton State University*

*Audience:* Undergraduate: Lower Division

I am developing a case study to (1) illustrate what non-random sampling and pseudoreplication are, (2) show students how these design issues impact statistical results, and (3) give students practice choosing appropriate statistical tests and running data analysis using RStudio.

Table #B8

### **Zoology Capstone Project**

*Erica Seubert, Los Angeles Mission College*

*Audience:* Undergraduate: Lower Division

A capstone project incorporating multiple course SLOs along with various types of biological evidence for students to evaluate was developed for a non-majors zoology course. One set of projects involved marine forensics, with students investigating the cause of death of different marine mammals. Students identify zoological specimens to species, revisit phyla and use various anatomical structures for the identification process.

# Education Share Fair Roundtables

## Saturday Round 1 ~ 10:00 AM

Table #A1

### **Is it a plant?**

**Elizabeth Martin, Lewis-Clark State College**

*Audience:* Undergraduate: Lower Division

This activity introduces students to the not-so-familiar plant, lichen, and fungal organisms. Students classify specimens into kingdom (plant or otherwise) and describe organismal characteristics they use to make their classification. For microscopic characteristics, students make slides to visualize identifiable characteristics.

Table #A2

### **Citizen Science Enhances Outreach and Research with Aedes Mosquitoes in El Paso**

**Reynaldo Leyva JR, Clint Independent School District/**

**The University of Texas at El Paso**

**Camilo Khatchikian, University of Texas at El Paso**

*Audience:* Grades 9-12

This project combines citizen science, outreach, and teaching with data components as a way to increase awareness and knowledge about how mosquitoes affect the public health. The project has a core program with multiple groups of high school seniors.

Table #A3

### **Using environmental case studies to inform with data**

**Matthew Opdyke, Point Park University**

*Audience:* Undergraduate: Lower Division

Case studies are useful tools for informing students with data. I will be presenting a case study on mark-and-recapture, which I have developed for undergraduate students to improve critical thinking and analytical application.

Table #A4

### **Using online tools to investigate phylogenetic relationships**

**Shamone Minzenmayer, San Angelo ISD/Central High**

*Audience:* Grades 9-12

Students will develop hypotheses of relationships among organisms they choose using online resources such as Genbank. They will learn about other types of data that are used in classification by visiting the Angelo State Natural History Collection.

Table #A5

### **Pesticides usage in the U.S**

**Daniel Elias, North Carolina Wesleyan College**

*Audience:* Undergraduate: Lower Division

Explore data and predict future trends of pesticides usage in the U.S from 1960 to present. Predictions would be used to determine what pesticides are likely to be present in the environment.

Table #A6

### **Teaching community ecology with a free and easy to use statistical software (PAST)**

**Brenda Witt, Redlands Community College**

*Audience:* Grades 9-12

This session will introduce participants to the free and easy to use software, PAST, and how students can use it to better understand community composition comparisons both at the spatial and temporal level.

Table #A7

### **The Impact of El Nino on Populations**

**Denice Robertson, Northern Kentucky University**

*Audience:* Undergraduate: Lower Division

The impact of El Nino can be difficult for students to understand so this activity involves students in data collection and analysis to determine its impact on populations. Students are provided data regarding populations of organisms from one of two locations, then use these to write a hypothesis regarding when the El Nino event may have occurred.

Table #A8

### **Building Ecological Databases for Citizen Science and Public Policy**

**Brian Shmaefsky, Lone Star College-Kingwood**

*Audience:* Undergraduate: Lower Division

Discussed is a student-led project for collecting environmental data used for citizen science activities, NGOs needs, and public policy decisions. It involves sustainable collaborations promoting the collection of qualitative and quantitative scientific data for use in policy and environmental justice.

Table #A9

### **How to Make a Cladogram: Bears and their relatives, an exercise in clade construction**

**Diane Livio, Los Angeles Mission College**

*Audience:* Grades 9-12 Undergraduate: Lower Division

Students work in small groups to create cladograms based on synapomorphies and sequences. The materials are focused towards lower-division undergraduate but can be modified as needed. Students develop the skills to interpret phylogenetic relationships and discuss the challenges behind systematics.

## Saturday Round 2

Table #B1

### **Teaching Urban Environment Diversity through Data**

**Barbara Musolf**, Clayton State University

*Audience:* Undergraduate: Lower Division

I am using data from the Data Nugget "City Parks: wildlife islands in a sea of cement" to give students practice in analyzing data sets, learn about the Shannon-Wiener Index, and inspire them to think biologically of their urban environments.

Table #B2

### **Bumble Bees vs Their World**

**Heidi Schuitema**, Cedar Springs Public Schools

*Audience:* Grades 9-12

This resource is a life science exploration where students encounter a stance establishing unit (NGSS, HS-LS2--6&7) for weighing impacts of human activities on the ecosystems of bumble bees. Students evaluate claims, evidence, and reasoning about complex interactions in ecosystems.

Table #B3

### **TIEEing together past and future climate change**

**Deborah Overath**, Texas Southmost College

*Audience:* Undergraduate: Lower Division

We present our lesson guide for adapting and linking two TIEE modules, one on phenology and one on global temperature change, to help introductory biology students experience "big data" and gain a better understanding of climate change and its consequences.

Table #B4

### **Experiencing the Nature of Life**

**Thomas Oviatt**, Fairview High School

*Audience:* Grades 9-12

Introduce the characteristics of living things through experiential learning designed to generate excitement and curiosity in your students through observation and exploration of the natural world.

Table #B5

### **One day research project: a rapid thinking, data analysis and communication activity**

**Concepcion Rodriguez-Fourquet**, University of Puerto Rico

*Audience:* Undergraduate: Upper Division

One day activity where students are exposed to a research oriented field experience where they observe, develop a hypothesis, design a study, gather and analyze data and present to their peers.

Table #B6

### **High School Students Become Environmental Educators** **Gina Smearsoll**, Cincinnati Christian Schools

*Audience:* Grades 9-12

Working with local organizations Groundwork Cincinnati - Mill Creek and Keep Cincinnati Beautiful, high school students became environmental educators to teach pre-schoolers about how water pollution affects the wildlife in the Mill Creek.

Table #B7

### **Using Rock Pools to Study Ecological Principles**

**Emily Betts**, Open High School

*Audience:* Grades 9-12

The James River's numerous rock pools are tiny "habitat islands" that offer an opportunity to test ecological principles - island biogeography and intermediate disturbance. Students explore relationships between pool size, river distance and biodiversity, making hypothesis about biodiversity differences.

Table #B8

### **The Push and Pull of Color Evolution in Male Guppies** **Dhana Rao**, East Carolina University

*Audience:* Grades 9-12

The case study based on the iconic work of Endler demonstrates the impact of natural and sexual selection on guppy populations. Students graph data, interpret figures, and summarize major findings.

Table #B9

### **Pollination Syndromes - predicting pollinators from flower characteristics**

**Suzanne Koptur**, Florida International University

*Audience:* Grades 9-12

This activity will celebrate flowers and pollinators, and recognize the important role they play in providing many foods need for a healthy diet. Pollination is important in the life cycle of flowering plants; we will examine how plants get animals to carry their pollen to their mates, and what floral traits work for different kinds of pollinators.

# Workshops

Participation in workshops is limited to 40. 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.

## Friday 1:30 - 3:00 PM

### **Best practices for using authentic research data to teach core concepts**

1:30 PM - 3:00 PM | Room: A

*Elizabeth Schultheis, Michigan State University*

*Kristine Grayson, University of Richmond*

*Audience:* Undergraduate

Workshop covers best practices for using authentic data in the classroom, including defining learning objectives and structuring investigations. We highlight Data Nuggets and other data-rich classroom resources, and review the process of accessing publicly available datasets and creating original lessons.

### **Are you sick? Introducing quantitative skills through hands-on infectious disease simulation games.**

| Room: A3

*Kaitlin Bonner, St. John Fisher College*

*Arietta Fleming-Davies, Radford University*

*Audience:* Undergraduate

This workshop includes two different hands-on activities simulating disease transmission through a classroom population. These activities introduce important quantitative skills (experimental design, collecting data, analyzing data, and drawing conclusions from results) and illustrate the importance of using models in biology.

### **The Nuts and Bolts of Data Analysis using HHMI BioInteractive Resources**

| Room: A5

*Melissa Csikari, Fairview High School*

*Ryan Reardon, Jefferson County International*

*Baccalaureate School*

*Audience:* Grades 9-12

This session will focus on NGSS Practice 4: *Analyzing and Interpreting Data*, using some of HHMI BioInteractive's free resources to reveal the nuts and bolts of two common statistical tests your students should be using in the classroom.

### **Using Natural History Collections to Increase Biodiversity Literacy in Undergraduate Education**

Room: A6

*Anna Monfils, Central Michigan University*

*Audience:* Undergraduate

In this hands-on workshop you'll work with a learning resource developed by Biodiversity Literacy in

Undergraduate Education (BLUE). Adaptability of the module for different audiences and settings will be demonstrated, and educators will be invited to join the BLUE community.

## Saturday 11:00 AM - 12:30 PM

### **Using NEON Data and Educational Materials in Your Classroom**

| Room: A

*Megan Jones, National Ecological Observatory Network*

*- Battelle Ecology*

*Audience:* Grades 9-12, Undergraduate: Lower Division,

Undergraduate: Upper Division

NEON collects data across the US and provides data for

free to scientists, educators, and policy makers. Learn to

access the NEON database to get the data you want and

explore curated teaching datasets and activities you can

immediately use.

### **Getting a Feel for Tree Thinking: Activities to teach phylogenetics**

| Room: A3

*Kristin Jenkins, BioQUEST*

*Phil Gibson, Andrew Hasley, University of Oklahoma,*

*University of Wisconsin-Madison*

*Audience:* Grades 9-12

Come explore a set of activities designed to address common student misconceptions around tree thinking. The activities have been adapted to be accessible to for visually impaired students, allowing universal access to a key skill for biology.

### **Guiding Education through Novel Investigation (GENI) - Virtual and Wet Lab Explorations of Genomes**

| Room: A5

*Brad Goodner, Hiram College*

*Derek Wood, Seattle Pacific University*

*Audience:* Undergraduate

GENI provides a framework and data storage/sharing functions for collaborative student research into a genome of interest. Genes are connected to cellular/organismal function virtually through deeper annotation of assigned genes and/or through wet lab experiments in functional genomics.



## Saturday 1:30 - 3:00PM

### Infusing quantitative skills into the biology classroom

1:30 PM - 3:00 PM Room: A

**Gabriela Hamerlinck, BioQUEST; QUBES**

**Kristin Jenkins, BioQUEST**

*Audience: Undergraduate: Lower Division*

Increasing quantitative reasoning skills of biology students is necessary, but can be difficult. Participants will explore resources to introduce students to quantitative skills. We will discuss how these skills and resources might be implemented to support biological understanding.

### Exploring Data Literacy Using Local Environmental Data for NGSS-aligned Curricula | Room: A5

**Alan Berkowitz, Cary Institute**

*Audience: Grades 9-12*

In this data literacy workshop participants will explore a case study of data on PCBs in fish from the Hudson River Superfund Site. We will analyze trends across time, space, and species in a student friendly, inquiry based format.

### Teaching Coral Bleaching with HHMI BioInteractive

**Tools and Research Data | Room: A3**

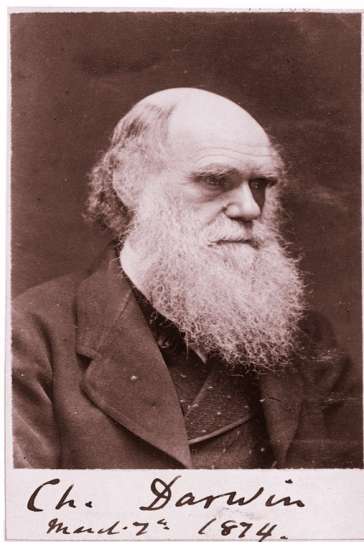
**Kristine Grayson, University of Richmond**

**Melissa Csikari, Science Education Dept., Howard Hughes Medical Institute (HHMI)**

*Audience: Grades 9-12*

Dive into coral bleaching and data analysis using resources from BioInteractive, NOAA's Coral Reef Watch, published research, and current events.

Participants will gain familiarity with these materials and how to effectively implement them. If possible, please bring a laptop.



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://www.evolutionsociety.org/>

# Networking Topics

Friday October 20, 10:30 AM

## 1. Essential data skills

What are the essential data collection and analysis skills students should develop through the course of a biology education? What is the appropriate scaffolding of teaching data skills to STEM students? Are there specific skills that should be established by certain points/years in school?

Can we develop a plan for scaffolding data skills? What would be reasonable skills and concepts for students to understand by different points along the way?

## 2. Prevent the “canned lab”

How do we prevent the use of data sets from becoming a modern version of the “canned” lab (keep datasets in active learning process)?

As data sets become more available, how can we promote development and use of activities that don't become ineffective over time? How do we keep these data focused activities based on active learning and inquiry?

## 3. Balance between data, theory and software

How do we strike a balance between students understanding data, appreciating the theory and learning the software to analyze them (how to understand what the model is doing vs plug and chug Math)?

What are effective strategies to promote deeper thinking about quantitative models and data analysis so that we are teaching more than just the skill of calculations and promoting understanding of biological principles?

## 4. Assess competencies in data literacy

What are some issues and effective ways to assess competencies in data literacy? What are common problems and misconceptions students encounter in data literacy? What are effective strategies for identifying and correcting these problems?

How can we assess student learning of data skills, identify and describes misconceptions, and then effectively correct any problems?

## 5. NGSS: Math & Computational thinking

The Next Generation Science Standards includes mathematics and computational thinking in its Science and Engineering Practices guidelines. How are K12 teachers expected to interpret wording like the following: “Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.”

What resources will teachers need to accomplish these objectives? How do these objectives that have been articulated for Grades 9-12 educators relate to needs and expectations for higher education courses? Further, how can higher education teachers then take students to a higher level of data skills to achieve outcomes articulated in the Vision & Change report?

## 6. Help students recognize pseudoscience

How can we use data to help students recognize pseudoscience (i.e. bad science) and differentiate it from valid science? How can students learn to evaluate data and determine if they support the claims they are being used to make? data that don't hold up against the claims they are being used to make? (particularly for non-majors – able to look at sources but may not be able to critically assess data).

How can we help students understand what data and results mean when presented with research? How can we promote stronger data skills to help students be more critical consumers of data they are presented with in daily life?





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