

Saturday

Abbreviation Key

E: Elementary School

MS: Middle School

HS: High School

2Y: Two-Year College

4Y: Four-Year College

GA: General Audience

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SAT

7:30 AM – 8:45 AM**BioClub Breakfast****Harbor Island 1 • Meal Function (Tickets Required) • GA**

The NABT BioClub continues to grow, and both current and future BioClub Advisors are invited to share favorite resources and stories about their chapters. Join the club (BioClub that is)!

The BioClub Breakfast is made possible through the generous support of

**NABT Volunteer “Thank You” Breakfast****Harbor Island 3 • Invitation Only • GA****8:15 AM – 10:15 AM****NABT Biology Education Poster Session & Coffee Break****Harbor Island 2 • Poster Session (120 min) • HS, 2Y, 4Y, GA**

The poster session highlights research, practices, and programs in three distinct categories: general strategies for teaching biology, the scholarship of teaching and learning, and mentored student research. Posters presented by undergraduate and graduate level students will also be entered into two competitions.

➔ Complete listing starts on page 52.

9:00 AM – 10:15 AM**391 • Zoo Genetics Plus: Real World Data-Driven Activities for the Classroom****Executive Conference 1 • General Biology • Hands-on Workshop (75 min) • HS, GA**

Zoo Genetics Plus is a free curriculum based on the partnership between teacher and scientist. The teacher authors will showcase this data-driven curriculum written with wildlife geneticist Dr. Jean Dubach.

Jason Crean, Lyons Township High School/Saint Xavier University, Western Springs, IL; Kathy Van Hoeck, York Community High School, Elmhurst, IL; Michele Koehler, Riverside-Brookfield High School, Brookfield, IL

1450 • Learn How the Teacher Institute for Evolutionary Science (TIES) Gives Teachers the Confidence and Resources They Need to Teach Evolution Successfully**Executive Conference 2A • Instructional Strategies • Demonstration (75 min) • MS, HS**

The Teacher Institute for Evolutionary Science is a free, teacher-run project to help middle school teachers. We provide evolution content and ready-to-use resources, including presentations, online games, and hands-on labs.

Cheryl Ann Hollinger, The Teacher Institute for Evolutionary Science, Portland, OR

1571 • Playing with Fire? How We Perpetuate Biological Beliefs About Race in the Classroom and How to Avoid It**Executive Conference 3A • Genetics • Hands-on Workshop (75 min) • MS, HS, 4Y**

Come discuss how teachers unintentionally promote misconceptions about the biological basis of race during genetics instruction and learn the results of research on interventions that work to disrupt those misconceptions.

Paul Strode, Fairview High School, Boulder, CO and Brian Donovan, BSCS Science Learning, Colorado Springs, CO

SPECIAL PROGRAMMING PRESENTED BY**The MiniOne Systems****1728 • Snip Snip! Using Molecular Scissors to Cut and Analyze DNA Made Quick and Easy****Executive Conference 2B • AP Biology • Hands-on Workshop (75 min) • HS**

Looking for an easy hands-on restriction digest lab that delivers immediate, clear-cut, reliable results with minimal prep? Come experience how you can cover restriction enzyme concepts and analysis using electrophoresis.

Jody Saxton West

380 • Evolutionary Medicine: Medicine Without Evolution Is Like Engineering Without Physics**Executive Conference 3B • Anatomy & Physiology • Symposium (75 min) • HS, 2Y, 4Y**

Evolutionary medicine or Darwinian medicine is the application of modern evolutionary theory to understanding health and disease. Integrate into your Physio-anatomy, Biology or AP Biology course.

Mark Friedman, International Society for Evolutionary Medicine and Public Health, Redondo Beach, CA and Magdalena Hurtado Arenas, International Society for Evolutionary Medicine and Public Health, Tempe, AZ

10:15 AM – 4:00 PM

SPECIAL PROGRAMMING PRESENTED BY
Illumina

All sessions in Marina 3

10:15 AM – 11:00 AM

1736 • Unlocking the Code to Cancer: Case Study & Lesson Plan Workshop

Instructional Strategies, Genetics • Symposium (45 min) • MS, HS

Come explore the impact genomics will make on how we diagnose and treat cancer. During this session, we will review a case study of how genomics can be applied to cancer along with some of the careers your students can pursue. You will then be able to take this case study and create a lesson plan to bring back to your classroom.

11:15 AM – 12:30 PM

1737 • Ask Me Anything: Careers in Genomics

Genetics • Symposium (75 min) • MS, HS

Join this live Q&A discussion with a group of employees from Illumina to get an inside look at what it takes to pursue some of the exciting careers in genomics. Our diverse panel of employees will share their career journeys and give you insights to bring back to your students.

2:00 PM – 3:00 PM

1738 • What's in Your Food: Case Study & Lesson Plan Workshop

Genetics • Symposium (60 min) • MS, HS

Explore the ways that genomics can be applied to the food you eat—from crop selection to food safety. We will review examples of different applications in food and talk about careers students can pursue in this area. You will then be able to take this information and create a lesson plan to bring back to your classroom.

3:15 PM – 4:00 PM

1739 • How to Get Hired: Practical Tips for Students on the Job Hunt

Instructional Strategies • Symposium (45 min) • MS, HS

Hear from members of Illumina's Talent Acquisition team about what they look for when they are hiring. Outside of job-specific skills, what other attributes do they look for? Find out from our team of experts and get the inside scoop on how you can prepare your students for the workplace.

9:00 AM – 10:15 AM cont.

1556 • Bring the Science of Yellowstone National Park Into Your Classroom

Executive Conference 4 • Instructional Strategies • Hands-on Workshop (75 min) • E, MS, HS

Science abounds in Yellowstone National Park. Come learn how Yellowstone's historical past has led to a wonderland of relevant learning opportunities for your students.

Julie Angle, Oklahoma State University, Stillwater, OK

1593 • Unlocking the Mysteries of Biology: Using Breakout 'Escape' Boxes to Engage Students in Problem Solving in the Sciences

Marina 1 • Instructional Strategies • Hands-on Workshop (75 min) • E, MS, HS

No better way to stimulate curiosity than a locked box mystery, especially when clues to the lock combinations are about SCIENCE! Participate in a mini-breakout using this exciting classroom strategy.

Pam Close and Noelle Gilzow, David H. Hickman High School, Columbia, MO

1530 • Bacterial Transformation Lab – How to Do It Effectively and How to Use It to Teach Multiple Concepts

Marina 2 • AP Biology • Demonstration (75 min) • HS, 2Y, 4Y

Participants will learn how to achieve successful results with bacterial transformation exercises every time and how to use the lab and some extension activities to teach multiple concepts in Biology.

Dessislava Dimova, Barnegat High School, Barnegat, NJ

9:00 AM – 10:15 AM *continued***1537 • Our Wet Footprint: Teaching About Human Impacts on the Ocean****Marina 4 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • MS, HS**

Explore how human activities and technology have affected marine ecosystems since the Industrial Revolution. Engage in simulations, labs and discussion supporting NGSS.

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

402 • Learn, Create, Revise, Repeat: A Session on How to Build Quality Clicker Questions for Biology Courses Using Evidence-Based Best Practices**Marina 5 • Instructional Strategies • Demonstration (75 min) • 2Y, 4Y, GA**

Learn how to construct clicker questions using evidence-based best practices. Our objective is to provide attendees with the time, tools, and feedback necessary to construct quality biology-based clicker question sets.

Michael Moore, Baylor University, Waco, TX; John Moore, Taylor University, Upland, IN; and Donald French, Oklahoma State University, Stillwater, OK

1682 • Biology Rocks!: Using HHMI Resources as Earth Science Phenomena in Life Science Classes**Nautilus 2 • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, 4Y**

Struggling to find the crosswalk between Earth and life sciences? Come learn how to use HHMI resources as authentic Earth science phenomena that will drive your life science lessons!

Jim Clark, Next Gen Science Innovations, Pleasanton, CA; Samantha Johnson, San Lorenzo USD, San Lorenzo, CA; and Mark Nielsen, HHMI BioInteractive, Chevy Chase, MD

INVITED SPEAKER: SCOTT WILLIAMSON SPEAKER SERIES**Maria E. Orive**

➔ See page 10 for biography.

Mathematical Models in Evolutionary Research**Nautilus 5 • Evolution • Special Speaker • GA**

Mathematical models provide powerful tools for investigating the incredibly diverse range of life histories displayed by living organisms and how these life history complexities shape populations and species. Importantly, the form and frequency of reproduction, the manner of dispersal across space and time, and the type of within-population structure all strongly impact evolutionary patterns and processes. Mathematical models are useful abstractions of important population processes, and Dr. Orive will discuss how developing a model can help clarify the important aspects of a biological process, for both teaching and in basic research. She will also present an example from her own research, where two different types of mathematical models are combined (a quantitative genetics model and a matrix model of population demography) to consider how different types of reproduction affect a population's ability to respond to environmental change.

We are proud to feature Dr. Orive as part of the Scott Williamson Speaker Series.

The series was established in 2017 by Brad and Carol Williamson to honor their son Scott, a gifted biologist who loved the challenge of the big questions in biology.

397 • Establishing a 2020 Vision for Genomics: Society, Education, and Engagement**Nautilus 3 • Genetics • Hands-on Workshop (75 min) • MS, HS, 2Y**

The Genome Institute (NHGRI) launched a strategic planning process to establish a 2020 vision for genomics research. We seek input from diverse education communities to ensure relevance of the plan.

Carla Easter and Rosann Wise, National Human Genome Research Institute, Bethesda, MD

1511 • Planet Power Presentations: A Sustainability-Themed Share-a-Thon**Nautilus 4 • Ecology / Environmental Science / Sustainability • Demonstration (75 min) • GA**

Strut your sustainability stuff during this interactive session featuring "Planet Power Presentations." These 10-minute presentations will highlight ready-to-use teaching resources for your classroom. Resources will also be shared on the NABT website.

Teddie Phillipson-Mower, Indiana University - Bloomington, Bloomington, IN

9:00 AM – 10:15 AM continued

SPECIAL PROGRAMMING
PRESENTED BYAC-2 BioLink Regional
Center1699 • Bio-Link at 20:
Building the Education
Ecosystem to Help Instruc-
tors Help Students to
Biotech CareersSeabreeze 2 • Biotechnology •
Symposium (75 min) • HS, 2Y, 4Y

Biotechnology careers allow students to pursue meaningful work in a wide range of companies. We will discuss resources for biotechnology workforce education and getting involved with the Bio-Link community.

NABT Committee Meeting:
Global Outreach CommitteeRoom 514 • Committee Meeting
(75 min) • GA

Committee Chair for 2019 TBD

1528 • Mystery Traits: What
Genetic Mutant Fast Plant Do
You Have?Seabreeze 1 • Genetics • Hands-on
Workshop (75 min) • HS, 2Y, 4Y

Come try a brand new, inquiry-based genetics investigation that we co-developed to connect easily-observable traits with underlying genetic mutations in 6 varieties of Wisconsin Fast Plants.

Hedi Lauffer, Wisconsin Fast Plant, Larkspur, CO and Bob Kuhn, Centennial High School, Rosewell, GA

1651 • Student-Centered
Active Learning for College
and High School Biology:
Strategies for Transforming
Your Course Using a Construc-
tivist ApproachSpinnaker 1 • Instructional Strategies
• Hands-on Workshop (75 min) •
HS, 2Y, 4Y

Join college and high school teachers and use our high-rigor toolkit of non-lecture instructional strategies to reimagine your biology instruction based on national standards and authentic science practices.

Kirstin Milks, Bloomington South High School, Bloomington, IN; Stephen Traphagen, Oak Park and River Forest High School, Oak Park, IL; Julie Minbiole, Columbia College Chicago, Chicago, IL; and Jim Lane, Mahtomedi High School, Mahtomedi, MN

NABT Committee Meeting:
Equity CommitteeRoom 511 • Committee Meeting
(75 min) • GA

Committee Chair for 2019 TBD

10:30 AM – 11:00 AM

394 • *C. elegans* as a Genetic
Model in the ClassroomExecutive Conference 1 • Genetics •
Hands-on Workshop (30 min) • MS,
HS, 2Y, 4Y

You are welcome to a hands-on introduction to the model organism *Caenorhabditis elegans*, a nematode (roundworm) research model for genetics that is well-suited to the classroom.

Keith Choe, University of Florida, Gainesville, FL and Kathy Savage, Oviedo High School, Oviedo, FL

1554 • Teaching a Tough One:
Natural SelectionExecutive Conference 2A • Evolution •
Hands-on Workshop (30 min) • MS, HS

Natural selection is a notoriously difficult subject for students to learn because students (and teachers) often start the class with unscientific conceptions. Let's look at strategies to tackle these conceptions.

Kristin Griffith, Colton High School, Colton, CA

9:00 AM – 12:30 PM

SPECIAL PROGRAMMING PRESENTED BY

Edvotek

All sessions in Spinnaker 2

All sessions: Maria Dayton, Edvotek, Washington, DC

9:00 AM – 10:15 AM

1696 • Left at the Scene of the Crime:
An Introduction to Forensic Science

Biotechnology • Hands-on Workshop (75 min) • MS, HS, 2Y, 4Y

Explore forensic science at this hands-on workshop where you'll be analyzing crime scene DNA using PCR and agarose gel electrophoresis.

11:15 AM – 12:30 PM

1695 • Teaching the Polymerase Chain Reaction (PCR)
in One Class Period

Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Think PCR is too much to run in one class period? Think again! Come explore your options for classroom PCR with this hands-on workshop.

10:30 AM – 11:00 AM *continued***1617 • When Active Learning Fails: How Faculty Beliefs Inform Their Teaching and Influence Student Outcomes****Executive Conference 3A • Instructional Strategies • Paper (30 min) • 2Y, 4Y, GA**

Learn about how and why different faculty members implement active learning in similar but distinct ways, and what beliefs about teaching correlate with student outcomes.

Stanley Lo, University of California San Diego, La Jolla, CA

1497 • Student Ancestry and the Re-design of Non-majors Biology Courses**Executive Conference 3B • Curriculum Development • Paper (30 min) • 2Y, 4Y**

Student ancestry data was used to link topics within courses. The presenter discusses the development of materials, logistics, and impact. This project was funded by 23andMe and Perimeter College (GSU).

Susan Finazzo, Perimeter College - Georgia State University, Covington, GA

1621 • A Model for Undergraduate Research at the Community College**Executive Conference 4 • Genetics • Demonstration (30 min) • HS, 2Y, 4Y**

Learn about a molecular genetics undergraduate research model suitable

for community college students and resources.

David Wollert, Chattanooga State Community College, Chattanooga, TN

1513 • Teaching Introductory Biology as Part of an Integrated General Education Curriculum**Marina 1 • Instructional Strategies • Paper (30 min) • 2Y, 4Y**

Southern Utah University has undertaken a bold experiment, teaching all university general education courses (including introductory biology) as part of a single year-long integrated course. Come hear our story.

William Heyborne, Southern Utah University, Cedar City, UT

illumina® FOUNDATION

The Illumina Foundation believes that educating students and sparking their interest in genomics is a critical first step to realizing our vision of improving human health around the world.

We encourage teachers to bring genomics into the classroom in dynamic ways to ensure the next generation has the knowledge, skills, and abilities to pursue purposeful careers in this field and help us unlock the power of the genome.

www.illumina.com/stem

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SAT

10:30 AM – 11:00 AM continued

1542 • Autopsy Center of Chicago in the Classroom

Marina 2 • Anatomy & Physiology • Demonstration (30 min) • HS, 2Y, 4Y

Learn about the Autopsy Center of Chicago's educational resources: *Autopsy.Online*, our video and streaming platform; and *Live from the Morgue*, our online (or in-person) autopsy field trip.

Ben Margolis, Autopsy Center of Chicago, Chicago, IL

1460 • Formative Assessment Strategies: High Tech to Low Tech

Marina 5 • Instructional Strategies • Demonstration (30 min) • 2Y, 4Y, GA

How do you know if students understand the concepts you are teaching? Our session will give you some quick and fun ways to assess learning in your classroom.

Kathy Kresge and Sharon Lee-Bond, Northampton Community College, Bethlehem, PA

376 • The Emergent Properties from Teaching Biology

Nautilus 1 • Instructional Strategies • Paper (30 min) • HS, 2Y, 4Y

When I began at Davidson College in 1994, I thought my job was to teach. Now I understand my job is to maximize student learning. I will share some of my newest efforts to help students learn.

A. Malcolm Campbell, Davidson College, Davidson, NC

This is a special presentation by the recipient of the 2018 NABT Four-Year Section Biology Teaching Award

1676 • Bringing Lessons to Life with HHMI BioInteractive's Phenomenal Images

Nautilus 2 • Instructional Strategies • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Looking for phenomena to engage your students in life and Earth science topics? Come explore BioInteractive's collection of "Phenomenal Images" and leave with instructional strategies ready for your classroom.

Bernice O'Brien, Bainbridge High School, Bainbridge Island, WA and Sydney Bergman, HHMI BioInteractive, Chevy Chase, MD

1731 • E.O. Wilson Biodiversity Foundation: Half-Earth Ambassadors for Future Generations

Seabreeze 1 • Ecology / Environmental Science / Sustainability • Demonstration (30 min) • MS, HS, GA

Learn about an exciting new interactive mapping tool and hands on activity that brings saving the world's biodiversity to your students. Learn about the Half-Earth Educator Ambassador Program.

Dennis Liu, E.O. Wilson Biodiversity Foundation, Durham, NC and Amanda Briody, Baltimore City Public School, Baltimore, MD

1572 • A Network Approach to Vertical Transfer and Articulation for Student Success in Biology: A Fourth Workshop hosted by the Northwest Biosciences Consortium RCN-UBE

Spinnaker 1 • Curriculum Development • Paper (30 min) • HS, 2Y, 4Y

We report on a regional workshop where faculty from two-year and four-year colleges and universities developed Course Learning Outcomes for Introductory Biology courses.

Stacey Kiser, Lane Community College, Eugene, OR and Erin Baumgartner, Western Oregon University, Monmouth, OR

NABT Committee Meeting: Conference Committee

Room 511 • Committee Meeting (30 min) • GA

Committee Chair for 2019 TBD

NABT Committee Meeting: Professional Development Committee

Room 514 • Committee Meeting (30 min) • GA

Kristina Nicosia, Committee Chair

11:15 AM – 12:30 PM

SPECIAL PROGRAMMING PRESENTED BY Vernier Software & Technology

1741 • Simplify Your Lab Setup with Vernier

Executive Conference 2B • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

In this hands-on workshop, you will use our new Go Direct sensors with our free Graphical Analysis 4 app to do popular biology laboratory activities such as "Enzyme Action" and "Photosynthesis and Respiration". Go Direct sensors connect directly to computers, Chromebooks, and mobile devices—no interface necessary—making set up simple and cost effective. Bring your own device or borrow one of ours. Download Graphical Analysis 4 and see how simple setting up an experiment can be.

Colleen McDaniel and Sara Tallarovic, Beaverton, OR

11:15 AM – 12:30 PM cont.**1691 • Elephant Reproduction – Hormones, Sex, and Conservation, Oh My!**

Executive Conference 1 • Ecology / Environmental Science / Sustainability
 • Hands-on Workshop (75 min) • MS, HS, GA

Join San Diego Zoo educators to explore the science of hormones in elephant conservation. Leave with curricula to bring the science of saving species into your classroom!

Kimberly Kutina and Victoria Dunch, San Diego Zoo Institute for Conservation Research, Escondido, CA

1595 • Course-Based Research Experience: Transforming Biology Class Into a Yeast Experimental Evolution Lab

Executive Conference 2A • Evolution
 • Hands-on Workshop (75 min) • HS, GA

This session describes a year-long research experience integrated into a biology curriculum. Participants will work with data from the project as well as learn implementation strategies for their classrooms.

Ryan Skophammer, Westridge School, Pasadena, CA

1594 • BIOMAAP: Biology Students Math Anxiety and Attitudes Program

Executive Conference 3A • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, 4Y

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, reducing a barrier to effective teaching.

Arietta Fleming-Davies, University of San Diego, San Diego, CA

11:15 AM – 4:00 PM**SPECIAL PROGRAMMING PRESENTED BY
3D Molecular Designs****All sessions in Seabreeze 2**

All sessions: Rachel Mosey, 3D Molecular Designs, Milwaukee, WI

11:15 AM – 12:30 PM**1702 • Under the Influence: Proteins, Enzymes and How Water Drives Structure and Function**

General Biology • Hands-on Workshop (75 min) • MS, HS, 2Y, 4Y

Investigate enzyme structure/function and how water drives protein folding. Engage students with molecular phenomena using manipulatives to explore and explain water/proteins/enzymes. Elaborate and evaluate with an insecticide enzyme inhibition model.

2:00 PM – 3:15 PM**1701 • Dynamic DNA: More Than Just As, Ts, Gs and Cs**

General Biology • Hands-on Workshop (75 min) • MS, HS, 2Y, 4Y

DNA is a double-stranded helix – but it is so much more! Use a variety of hands-on models in a series of student-centered activities to explore DNA structure and function.

3:30 PM – 4:00 PM**1700 • A Visual Journey through the Human Cell Using Watercolor Landscapes**

AP Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Engage your students in a thoughtful exploration of the invisible molecular world using vibrant, accurate watercolor landscapes that explore cell structure/function and illustrate where protein synthesis and other processes occur.

11:15 AM – 12:30 PM continued**1622 • Type 2 Diabetes: A Complex Phenomenon That Provides Context for Biological Ideas**

Executive Conference 3B • General Biology • Hands-on Workshop (75 min) • MS, HS, 2Y

Type 2 diabetes anchors core ideas about feedback mechanisms, population traits, solutions to complex problems, and more. Come ask questions about the phenomenon, analyze CDC data, and model glucose homeostasis.

Joan Griswold, University of Washington, Seattle, WA

1439 • Citizen Science – A Hands-on Interactive Forum

Executive Conference 4 • Instructional Strategies • Symposium (75 min) • HS, 2Y, 4Y

In this forum, participants will share ideas about using student-led citizen science to instill biology content and workforce skills. The forum leaders will provide hands-on experience with their teaching efforts.

Brian Shmaefsky, Lone Star College - Kingwood, Kingwood, TX and Mark Friedman, L.A. Maritime Institute, San Pedro, CA

NABT Biology Education Poster Session • Harbor Island 3 • 8:15–10:15 AM

**GENERAL
(NON-COMPETITION)
CATEGORY**
1. A Case Study Investigating the Impact of a Summer MS to PhD Bridge Program on the Science Identities of Underrepresented Minority Students

Carrie Bucklin, Southern Utah University, Cedar City, UT; Kristin Grimes, University of the Virgin Islands, Charlotte Amalie, USVI; Marilyn Brandy, University of the Virgin Islands, Charlotte Amalie, USVI; Monica Medina, Penn State University, Centre County, PA; Nasstasia Jones; Mark Albrecht

2. A SENCER-Based Biology Teaching Manual With Application for Secondary and Higher Education

Karel Jacobs, Chicago State University, Chicago, IL; Robert Seiser, Roosevelt University, Chicago, IL

3. A Student Modeling Project to Teach Cell Signaling in AP Biology

Emily Schmidt, The Bronx High School of Science, Bronx, NY

4. Active Learning in AP and Intro Biology Textbooks

A. Malcolm Campbell, Davidson College, Davidson, NC; Brooks Finby, Charlotte Latin High School, Charlotte, NC; Laurie Heyer, Davidson College, Davidson, NC; Christopher Paradise, Davidson College, Davidson, NC

5. An Integrated Curriculum: Using Sustainable Development to Teach Natural and Social Science

Tammy d'Artenay, Penn State Shenango, Sharon, PA

6. Analyzing Student Learning Data and Efforts to Improve Learning Outcomes in Introductory Biology Courses

Karel Jacobs, Chicago State University, Chicago, IL; Joyce Ache Gana, Chicago State University, Chicago, IL; Kevin Swier, Chicago State University, Chicago, IL

7. Authentic Inquiry Through Modeling in Biology (AIM-Bio): A New Curriculum for the Undergraduate Biology Laboratory

Jennifer Katcher, Pima Community College, Tucson, AZ; Susan Hester, University of Arizona, Tucson, AZ; Emily Dykstra, University of Arizona, Tucson, AZ; Lisa Rezende, University of Arizona, Tucson, AZ; Lisa Elfring, University of Arizona, Tucson, AZ; Molly Bolger, University of Arizona, Tucson, AZ

8. Backwards Design, Ecology, and Weaving a Course with HHMI BioInteractive Resources

Tara Jo Holmberg, Northwestern Connecticut Community College, Winsted, CT

9. Breaking Out of the Classroom Routine: Using 'Escape' Boxes to Engage Students in Problem Solving

Pamela Close, AP Biology Consultant, Columbia, MO

10. Body of Work: OER in an Integrated Human Biology and First-Year Writing

Lindsey Roper, Southern Utah University, Cedar City, UT; John Belk, Southern Utah University, Cedar City, UT

11. Cats Teach Stats: Purrfect Tools to Reduce Statistics Anxiety

Jenny Hazlehurst, University of California, Riverside, Riverside, CA; Darcy Taniguchi, California State University San Marcos, San Marcos, CA; Suann Yang, SUNY Geneseo, Geneseo, NY

12. ConnectedBio Curriculum: Three-Dimensional Learning from Molecules to Populations

Alexa Warwick, Michigan State University, East Lansing, MI; Peter White, Michigan State University, East Lansing, MI; Frieda Reichsman, The Concord Consortium, Concord, MA; Louise Mead, Michigan State University, East Lansing, MI; Paul Horwitz, The Concord Consortium, Concord, MA; Jim Smith, Michigan State University, East Lansing, MI

13. Connecting Teachers and Researchers in the Science Classroom: Integrating Real Time Data Into the Classroom in Order to Improve Student Learning

Dina DiSantis, Montgomery County Community College, Pottstown, PA

14. Course-Based Undergraduate Research Experience in Genetics: Using Next-Generation Sequencing to Study Ecosystems

Karl Jarvis, Southern Utah University, Cedar City, UT; Jacqueline Grant, Southern Utah University, Cedar City, UT; Carrie Bucklin, Southern Utah University, Cedar City, UT

15. Course-Based Research in an Introductory Biology Laboratory: Exploring the Biology of Invertebrates

John Drummond, Lafayette College, Easton, PA

16. DIY Models for Teaching About Eyes and Lungs

Victor Lau, Chinese University of Hong Kong, Hong Kong, China

17. DNA Barcoding a Campus Arboretum

Tami Imbierowicz, Harford Community College, Bel Air, MD; Jaclyn Madden, Harford Community College, Bel Air, MD; Tamara Biegas, Harford Community College, Bel Air, MD

18. Drawing to Learn Biology: Combining Content, Application, and Assessment

Kim Sadler, Middle Tennessee State University, Murfreesboro, TN; Rachel Lytle, Brentwood High School, Brentwood, TN

19. Environmental Inquiry by Science Students: Use of Digital Microscopy as a Tool in Teaching Biology

Nabarun Ghosh, West Texas A&M University, Canyon, TX; Aubrey Howard, West Texas A&M University, Canyon, TX

20. Exploring the Effects of a Historical Narrative Approach to Teach Nature of Science Within a Flipped Classroom on Student Motivation

Allison Witucki, Western Michigan University, Kalamazoo, MI; David Rudge, Western Michigan University, Kalamazoo, MI

21. FABUS: Measuring and Improving How Students Engage with Formative Assessments

Kathleen Brazeal, University of Nebraska Lincoln, Lincoln, NE; Chad Brassil, University of Nebraska Lincoln, Lincoln, NE; Brian Couch, University of Nebraska Lincoln, Lincoln, NE

22. Hands-on Microbes and Biotechnology: Colored Microbial Protein

Yu Shan Chen, Taichung Municipal Taichung Girls' Senior High School, Taichung, Taiwan

23. Hands On, Minds On: How to Create Effective, Student-Driven Learning Without Becoming Overwhelmed

Kara Lukin, Western Governors University, Denver, CO; Katja Aviszus, National Jewish Health, Denver, CO

24. Historical Interpretation as a Teaching Strategy

Larry Corpus, Misericordia University, Dallas, PA

25. Implementing a CURE to Investigate the Impacts on Student Attitudes Towards Nature and Science

Carrie Bucklin, Southern Utah University, Cedar City, UT; Laurie Mauger, Duke University, Durham, NC

26. Implementing an Integrative Framework for Undergraduates: The Ecological Society of America's Four Dimensional Ecology Education (4DEE) Initiative

Diane Ebert-May, Michigan State University, East Lansing, MI; Carmen Cid, Eastern Connecticut State University, Willimantic, CT; Kenneth Klemow, Wilkes University, Wilkes-Barre, PA; Alan Berkowitz, Cary Institute of Ecosystem Studies, Millbrook, NY; George Middendorf, Howard University, Washington, DC; Bob Pohlad, Ferrum College, Ferrum VA; Teresa Mourad, Ecological Society of America, Washington, DC

27. Incentives and Barriers for Community College Instructors to Teaching Quantitative Biology

Stacey Kiser, Lane Community College, Eugene, OR; Lisa Corwin, University of Colorado Boulder, Boulder, CO; Melissa Aikens, University of New Hampshire, Durham, NH; Sondra LoRe, University of Tennessee/NISER, Knoxville, TN; Jillian Miller, Roane State Community College, Harriman, TN

28. Knowing Is Half the Battle: Positive Learning Gains and Student Attitudes Don't Always Lead to Successful Curricular Transformation

Tarren Shaw, University of Oklahoma, Norman, OK; Suann Yang, SUNY Geneseo, Geneseo, NY; Troy Nash, Mercer University, Macon, GA; Rachel Pigg, Presbyterian College, Clinton, SC; Jeffrey Grim, University of Tampa, Tampa, FL

29. Learning Gains in a Flipped Non-Majors Undergraduate Biology Course

Kathy Gallucci, Elon University, Elon, NC

30. Linking Lecture and Lab in a Classroom-Based Undergraduate Research Experience (CURE)

Michaeleen Gerken Golay, Wartburg College, Waverly IA; Samantha Larimer Bousquet, Wartburg College, Waverly, IA; Stephanie Toering Peters, Wartburg College, Waverly, IA; Jay Garaycochea, Wartburg College, Waverly, IA

31. Microbiology Grades Are Partly Explained by Prior Performance

William Kroen, Wesley College, Dover, DE; Kelly Miller, Wesley College, Dover, DE

32. Plants Genes and People: Shaping Food as We Know It

Elizabeth Rice, Franklin & Marshall College, Lancaster, PA

33. Personalized Learning in a Large Introductory Biology Class for Non-Biology Majors

Tamar Goulet, University of Mississippi, University, MS

34. Phenotypic Investigation of Seed Shattering in *Setaria Viridis* Mutant Lines

Sue Fleming, Oklahoma State University, Stillwater, OK; Kyle Goebel, Oklahoma State University, Stillwater, OK; Hao Hu, Oklahoma State University, Stillwater, OK; Julie Angle, Oklahoma State University, Stillwater, OK; Andrew Doust, Oklahoma State University, Stillwater, OK

35. Putting the Pieces Together: Jigsaw Activities Lead to Student Learning Gains

Troy Nash, Mercer University, Macon, GA; Michael K. Moore, Mercer University, Macon, GA; Suann Yang, SUNY Geneseo, Geneseo, NY

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NABT Biology Education Poster Session • Harbor Island 3 • 8:15–10:15 AM

36. Reducing Barriers in the Open Educational Resources (OER) Lifecycle for Data-Driven Inquiry in the Biology Classroom

Kaitlin Bonner, St. John Fisher College, Rochester, NY; Arietta Fleming-Davies, University of San Diego, San Diego, CA; Kristine Grayson, University of Richmond, Richmond, VA; X. Ben Wu, Texas A&M University, College Station, TX; Raisa Hernandez Pacheco, University of Richmond, Richmond, VA

37. Speed Science: Teaching Students How to Learn from Failure

Fredric Govedich, Southern Utah University, Cedar City, UT; Paul Spruell, Eastern Washington University, Cheney, WA; Bonnie Bain, Southern Utah University, Cedar City, UT

38. Student-Generated Concept Models as Evidence of Systems Thinking in Introductory Biology

Jenni Momsen, North Dakota State University, Fargo, ND; Sara Wyse, Bethel University, St. Paul, MN

39. Student Sentiment in the Wake of Curriculum Change

Suann Yang, SUNY Geneseo, Geneseo, NY; Renee Weinstein, SUNY Geneseo, Geneseo, NY

40. Teaching Critical Thinking in Science Through Modern Agriculture

Valerie Bates, Monsanto Company, St. Louis, MO; Jason Peake, University of Georgia, Athens, GA; Don Lee, University of Nebraska Lincoln, Lincoln, NE

41. Teaching Environmental Sustainability: Model My Watershed

Kelly Kluthe, Olathe West High School, Olathe, KS; Carolyn Stroud, Concord Consortium, Concord, MA; Steve Kerlin, Stroud Water Research Center, Avondale, PA

42. The Genomics Salon: Translating Across Disciplines

Bryce Taylor, The Genomics Salon at the University of Washington, Seattle, WA

43. Use of Community Service Projects in an Introductory Non-Majors Biology Class

Fran Norflus, Clayton State University, Morrow, GA; Antoinette Miller, Clayton State University, Morrow, GA

44. Using a Guided Inquiry Approach to an Introductory Majors General Biology Lab

Jeanette Gore, University of Tampa, Tampa, FL; Sarah Cuccinello, University of Tampa, Tampa, FL

45. Using Novel Research on Wolves as a Powerful Teaching Tool

Scott Danneman, Anoka Ramsey Community College, Coon Rapids, MN; Jennifer Braid, Anoka Ramsey Community College, Coon Rapids, MN; Paula Croonquist, Anoka Ramsey Community College, Coon Rapids, MN

46. Using Scratch-Off Cards in Biology Classrooms

Lynn Swafford, Wayne Community College, Goldsboro, NC; Sondi Hoffman, Wayne Community College, Goldsboro, NC

47. The Utility and Results of an Online Professional Development Collaboration Between QUBES and ESA Using Faculty Mentoring Networks

Nicole Chodkowski, Radford University, Radford, VA; Gabriela Hamerlinck, BioQUEST Curriculum Consortium, Madison, WI; Kristin Jenkins, BioQUEST Curriculum Consortium, Madison, WI; Sam Donovan, University of Pittsburgh, Pittsburgh, PA; Jeremy Wojdak, Radford University, Radford, VA

48. Yes, You Can! Providing an Authentic Undergraduate Research Experience as Teaching Intensive Faculty

Jessica Habashi, Utah State University-Brigham City, Brigham City, UT

BIOLOGY EDUCATION RESEARCH POSTER COMPETITION**49. 3R: A Tool to Generate Individualized Feedback About Natural Selection in Large-Enrollment Courses**

Rachel Salter, North Dakota State University, Fargo, ND; Kurt Williams, North Dakota State University, Fargo, ND; Jenni Momsen, North Dakota State University, Fargo, ND

50. A Mixed-Methods Evaluation of Plant Blindness and Botanical Literacy in Undergraduate Botany Students

Kathryn Parsley, University of Memphis, Memphis, TN; Jaime Sabel, University of Memphis, Memphis, TN; Laura Zangori, University of Missouri, Columbia, MO; Jason Koontz, Augustana College, Rock Island, IL

51. A Unique Research Experience for Biology Teachers: A Year-Long Collaborative

Tanner Bryan, Oklahoma State University, Stillwater, OK; Cara Stephens, Oklahoma State University, Stillwater, OK; Julie Angle, Oklahoma State University, Stillwater, OK; Andrew Doust, Oklahoma State University, Stillwater, OK; Rob Burnap, Oklahoma State University, Stillwater, OK

52. An Analysis of High Performing Students Within a Cooperative Learning & Testing Community

Cooper Breed, SUNY Geneseo, Geneseo, NY; Suann Yang, SUNY Geneseo, Geneseo, NY; Allena Jamison, SUNY Geneseo, Geneseo, NY

53. Assessing the Effectiveness of a Freshman Research Program Using Comparable Peer Nonparticipants

Austin Leone, Oklahoma State University, Stillwater, OK; Donald French, Oklahoma State University, Stillwater, OK; John Stewart, Oklahoma State University, Stillwater, OK

54. Determining How Biology-Based Student Organizations Meet Affinity Group Criteria

Zachary Nolen, Texas State University, San Marcos, TX; Kristy Daniel, Texas State University, San Marcos, TX

55. Do Biology Students Hate Chemistry? Assessing College Students' Values Regarding Learning Chemistry in Their Biology Class

Kurt Williams, North Dakota State University, Fargo, ND; Jenni Momsen, North Dakota State University, Fargo, ND

56. Evolutionary Reasoning Affected by Interactions Between Natural Selection and Sexual Selection

Sarah Spier, University of Nebraska Lincoln, Lincoln, NE; Joe Dauer, University of Nebraska Lincoln, Lincoln, NE

57. Examining Study Methods Among Undergraduate Biology Students to Enhance Self-Regulated Learning

Rand Alqireem, University of Memphis, Memphis, TN; Jaime Sabel, University of Memphis, Memphis, TN

58. Exploring the Intersection of Attitudes and Knowledge: A Longitudinal Analysis of Student Attitudes and Knowledge in College Biology Courses

Glen Martin, California State University, Fresno, CA; Allyssa Gomez, California State University, Fresno, CA; Ivan Ceballos-Madrigal, California State University, Fresno, CA; Emily Walter, California State University, Fresno, CA

59. Impact of Policy on 3-D Learning in Undergraduate Introductory Biology: A Qualitative Study

Elizabeth Byrnes, University of Nebraska Lincoln, Lincoln, NE; Anna Hiatt, University of Nebraska Lincoln, Lincoln, NE

60. In the Midst of Variability: Small Changes to Foreground the Quantitative Nature of Biology

Joshua Reid, Middle Tennessee State University, Murfreesboro, TN; Anna Grinath, Middle Tennessee State University, Murfreesboro, TN; Seth Jones, Middle Tennessee State University, Murfreesboro, TN; Candice Quinn, Middle Tennessee State University, Murfreesboro, TN; Zhigang Jia, Middle Tennessee State University, Murfreesboro, TN

61. Investigating the Impact of Community Engagement Projects on Project Leaders

Elizabeth Obray, Southern Utah University, Cedar City, UT; Carrie Bucklin, Southern Utah University, Cedar City, UT; Kristin Grimes, University of the Virgin Islands, Charlotte Amalie, USVI

62. Performance, Prediction, and Preparedness: Do Biology-Major-Specific Courses Provide an Advantage?

Juanita Pardo Sanchez, Georgia Institute of Technology, Atlanta, GA; Emily Weigel, Georgia Institute of Technology, Atlanta, GA

63. Preservice Teacher Engagement During Outdoor Learning Experiences

Sara Salisbury, Middle Tennessee State University, Murfreesboro, TN; Kristy Daniel, Texas State University, San Marcos, TX

64. Structured Supplemental Instruction Leads to Increased Student Learning in Introductory Biology

Sarah Rogers, Mercer University, Macon, GA; Hana Hollis, Mercer University, Macon, GA; Troy Nash, Mercer University, Macon, GA; Suann Yang, SUNY Geneseo, Geneseo, NY

65. Translation, Cultural Adaptation and Validation of a Science Identity Questionnaire

Liz Hernandez Matias, University of Puerto Rico, San Juan, PR; Michelle Borrero, University of Puerto Rico, San Juan, PR; Pablo Ilerandi, University of Puerto Rico, San Juan, PR; A. Valance Washington, University of Puerto Rico, San Juan, PR

66. Using a Comparison Across the Spectrum of High School and Undergraduate Introductory Biology Courses to Inform Curriculum Changes

Jessica Sucheck, Heidelberg University, Tiffin, OH; Justin Pruneski, Heidelberg University, Tiffin, OH

67. Using Drawing as an Active Learning Activity in Undergraduate Human Anatomy

Nizhoni Marasco, Southern Utah University, Cedar City, UT; Jay Forshee, Southern Utah University, Cedar City, UT

68. What Aids Grades? Examining Student-Generated Questions

Allie Osgood, Lewis & Clark College, Portland, OR; Skyylar Muehleisen, Auburn University, Auburn, AL; Jenni Momsen, North Dakota State University, Fargo, ND; Kimberly Booth, North Dakota State University, Fargo, ND

69. What, When, and How Much Is Enough? Implementing Authentic Plant-Based Research in Undergraduate Biology

Liane Ventura, East Tennessee State University, Johnson City, TN; Anna Hiatt, University of Nebraska Lincoln, Lincoln, NE

continued on next page

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MENTORED UNDERGRADUATE RESEARCH POSTER COMPETITION
70. A Population Survey and Biodiversity Assessment of Reptiles in Southern Utah

Sierra Ball, Southern Utah University, Cedar City, UT; Laurie Mauger, Duke University, Durham, NC; Carrie Bucklin, Southern Utah University, Cedar City, UT

71. A Screen for Cryptic Epigenetic Variation in Natural Populations of *Drosophila melanogaster*

Dagem Getahun, Lauren McCalister, Makena Wolfrom, and David Marcey, California Lutheran University, Thousand Oaks, CA

72. Assessing the Ecological Services Provided by *Hirundo rustica erythrogastrer*

Sarah McCune, Lipscomb University, Nashville, TN; John Lewis, Lipscomb University, Nashville, TN; Laura Cook, Warner Park Nature Center, Nashville, TN; Sandy Bivens, Warner Park Nature Center, Nashville, TN

73. Body Size of Native Bees and Foraging Distances Within Canola Fields

Heidi McIntyre, Oklahoma State University, Stillwater, OK; Matthew Newman, Oklahoma State University, Stillwater, OK; Sarah Elzay, Oklahoma State University, Stillwater, OK; Julie Angle, Oklahoma State University, Stillwater, OK

74. Brian Head Fire Aftermath: Investigating Plant Re-Growth Rates and Area Use by Wildlife

Diana Villicana, Southern Utah University, Cedar City, UT; Kaitlin Veylupek, Southern Utah University, Cedar City, UT; Carrie Bucklin, Southern Utah University, Cedar City, UT; Frederic Govedich, Southern Utah University, Cedar City, UT

75. Cloning a Novel GAPC Gene in *Foeniculum Vulgare* (Fennel)

Caden Doll, Grand View University, Des Moines, IA; Dillon Kane, Grand View University, Des Moines, IA; Nicholas Little, Grand View University, Des Moines, IA; Tabor Nunez, Grand View University, Des Moines, IA; Rylee Voss, Grand View University, Des Moines, IA; Idit Hazan, Grand View University, Des Moines, IA

76. Cloning and Sequencing of a Novel GAPC Gene in *Nasturtium*

Kendall Antle, Grand View University, Des Moines, IA; Bethany Bentley, Grand View University, Des Moines, IA; Kyle Boulanger, Grand View University, Des Moines, IA; Jordan Donels, Grand View University, Des Moines, IA; Amanda Duplan, Grand View University, Des Moines, IA; Idit Hazan, Grand View University, Des Moines, IA

77. Comparison of the Microbial Binding Efficiency of Probiotics Isolated from Commercial Yogurts

Lucie Leblanc, Brookhaven Academy, Brookhaven, MS; Janet Donaldson, University of Southern Mississippi, Hattiesburg, MS

78. Effects of Land Use and Management on Ground Dwelling Spider Communities

Shannon Hester, Loyola University New Orleans, New Orleans, LA; Aimée Thomas, Loyola University New Orleans, New Orleans, LA

79. Light-Harvesting Antenna Size Affects Photosynthetic Charge

Cassandra Nichole Jones, Oklahoma State University, Stillwater, OK; Jessica Sigle, Cushing High School, Cushing, OK; Julie Angle, Oklahoma State University, Stillwater, OK; Rob Burnap, Oklahoma State University, Stillwater, OK

80. Morphological Characterization of a Reduced Seed Shattering Mutant of *Setaria viridis*

Kyle Goebel, Oklahoma State University, Stillwater, OK

81. Survey of Bird Window Collisions at Utah State University–Brigham City Regional Campus

Mikayla Austin, Utah State University–Brigham City, Brigham City, UT; Adam Berry, Utah State University–Brigham City, Brigham City, UT; Spencer Smith, Utah State University–Brigham City, Brigham City, UT; Jessica Habashi, Utah State University–Brigham City, Brigham City, UT

82. The Effect of Microgravity on the Growth and Function of Neural Cells

Benjamin Rumrill, Eastern Connecticut State University, Willamantic, CT; Barbara Murdoch, Eastern Connecticut State University, Willamantic, CT

83. Urban Lagoon Maintenance Effect on Odonate Naiads

Andrew Harper, Loyola University New Orleans, New Orleans, LA; Aimée Thomas, Loyola University New Orleans, New Orleans, LA

84. Using Bioacoustics Data to Determine the Effects of Water Depth and Salinity on Anuran Communities Along Coastal Southern Louisiana

Arden Lagrone, Loyola University New Orleans, New Orleans, LA; Aimée Thomas, Loyola University New Orleans, New Orleans, LA

11:15 AM – 12:30 PM *continued***1480 • Turning Misconceptions About Climate Science into Teaching Opportunities****Marina 1 • Curriculum Development • Hands-on Workshop (75 min) • MS, HS**

Learn how to develop interactive lessons that engage students with real-world data so that they can construct their understanding of climate science in a way that inoculates them against misconceptions.

Brad Hoge, National Center for Science Education, Oakland, CA

388 • Cancer Medicine Focus Connects Students to Real-Life STEM Applications of Cryopreservation and Biomaterials Technologies**Marina 2 • Anatomy & Physiology • Hands-on Workshop (75 min) • HS, 2Y, 4Y, GA**

Explore free NGSS-aligned biology activities that integrate concepts in cancer biology with preserving fertility in cancer patients through real-life medical examples and cutting-edge cryopreservation and biomaterials technology.

Mary Zelinski and Diana Gordon, Oregon National Primate Research Center / Oregon Health & Science University, Beaverton, OR

1551 • Using the Complexity of the Lyme Ecosystem to Engage Students in the Practice of Developing and Using Models to Make Predictions About the Prevalence of Infectious Disease**Marina 4 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y**

Participate in NGSS aligned high school activities focused on developing and using ecosystem models using real data to predict how ecosystem shifts and human interaction can change Lyme disease prevalence.

Tanya Josek and Barbara Hug, University of Illinois Urbana-Champaign, Urbana, IL and Natasha Capell, Academy High, Champaign, IL

1613 • NGSS Assessments: Creating 3-Dimensional Performance Tasks**Marina 5 • Curriculum Development • Hands-on Workshop (75 min) • MS, HS, 2Y**

Assessing NGSS performance expectations will require that students have multiple, rigorous assessment opportunities to demonstrate their understanding of the content, but also how they engage with SEPs and CCCs.

Jim Clark, Next Gen Science Innovations, Pleasanton, CA and Samantha Johnson, San Lorenzo Unified School District, San Lorenzo, CA

1686 • Using Data to Explore Ecological Pyramids and Energy Flow with HHMI BioInteractive Resources**Nautilus 2 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y, 4Y**

Participants will explore new HHMI BioInteractive resources that engage students with ecological research in Panama. Students collect data to generate claims about productivity, biomass, energy flow, and trophic levels.

Tim Guilfoyle, Phillip O. Berry Academy of Technology, Charlotte, NC; Scott Sowell, Darnell-Cookman Middle/High School, Jacksonville, FL; and Bridget Conneely, HHMI BioInteractive, Chevy Chase, MD

387 • Integrating Reading, for Real: Literacy and Close-Reading Strategies That Support Student Science Practice**Nautilus 3 • Instructional Strategies • Hands-on Workshop (75 min) • MS, HS, 2Y**

Want more literacy in your classroom, but find it hard to “fit everything in”? Come see a protocol for selecting, sequencing, and teaching reading passages that deepen students’ science practice.

Faith Nelson, Kara Bohne, Kelsey Kaiser, and Amy McGrail, Oak Park and River Forest High School, Oak Park, IL

1653 • Integrating Earth and Global Change Science into Biology Curricula**Nautilus 4 • Instructional Strategies • Hands-on Workshop (75 min) • MS, HS, GA**

Join us for an interactive workshop to learn how to incorporate Earth system resources into biology curricular learning progressions using the Understanding Global Change framework and system models.

Jessica Bean, UC Berkeley, Berkeley, CA and Aleeza Oshry, UC Museum of Paleontology/HHMI BioInteractive, Baltimore, MD

1599 • From CRISPR to Three-Parent Babies and Back Again: The Coming Revolution in Human Biology**Nautilus 5 • General Biology • Hands-on Workshop (75 min) • HS**

New techniques have dramatically changed the landscape of human biology. I will suggest a new approach that explores the promise and peril of the brave new world of human genetic modification.

Ken Miller, Brown University, Providence, RI

1507 • The Anthropocene Era – Using Data Analysis, Claims, Evidence and Reasoning (CER) to Explore Human Impacts on Our Planet**Seabreeze 1 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • MS, HS**

How are human activities impacting and altering our planet? Explore hands-on activities that emphasize CER and data analysis. Get FREE resources that will help your students understand these challenging concepts.

Dana Navarro, Thousand Oaks High School, Thousand Oaks, CA

2018 NABT FOUR-YEAR COLLEGE AND UNIVERSITY SECTION

Undergraduate Biology Summit

Merging Theory and Practice: Forging New Roads in Professional Development

2:00 PM – 4:00 PM • Nautilus

2:00 PM – 2:10 PM

Introduction and Welcome

Emily Walter, Ph.D.

California State University – Fresno, Fresno, CA

2:10 PM – 2:50 PM

Invited Speaker

Building a Change Ecosystem: Leveraging Stakeholders from the Institution to the Individual to Improve STEM Education

Brian Sato, Ph.D.

University of California – Irvine, Irvine, CA

2:50 PM – 3:15 PM

Research Presentation

Investigating Contextual Factors that Impact Early-Career Faculty Teaching Practice

Diane Ebert-May, Ph.D.

Michigan State University, East Lansing, MI

3:15 PM – 3:40 PM

Research Presentation

An Instructor's Duty to Foster Skill Development: Rural Community College Science Instruction and Practice

Julie A. Birt

University of Missouri, Columbia, MO

3:40 PM – 4:00 PM

Round Table Discussions

11:15 AM – 12:30 PM cont.

1531 • Level Up Lab Reports and Bring Them into the 21st Century

Spinnaker 1 • Technology in the Classroom • Hands-on Workshop (75 min) • MS, HS, GA

Experience ways to augment a lab report by integrating video into your science classroom, while meeting the requirements of NGSS/CCSS. We'll explore the process and tools to make it happen!

Franz Ruiz, Grossmont Union High School District, El Cajon, CA

11:30 AM – 2:00 PM

2018 NABT Honors Luncheon

Catalina Ballroom • Special Event (Tickets Required) • GA

Join us as we recognize the 2018 NABT Award recipients, including the Outstanding Biology Teacher Award (OBTA) honorees. This celebration honors exceptional biology teaching, and everyone is welcome to help us applaud these remarkable individuals.

The 2018 NABT Honors Luncheon will be held in the Bay Tower, which is a short walk or shuttle ride to the other side of the hotel property.

12:45 PM – 1:45 PM

Lunch Break

SAT

2:00 PM – 4:00 PM**1694 • 2018 Undergraduate Biology Summit: Merging Theory and Practice — Forging New Roads in Professional Development****Nautilus 1 • Instructional Strategies • Symposium (120 min) • 2Y, 4Y**

The theme for this year's summit is *Merging Theory and Practice: Forging New Roads in Professional Development*. Presenters will highlight projects with strong ties to theoretical frameworks and relevant evidence-based literature, including implementation of professional development initiatives or research on professional development initiatives.

➔ A complete list of presentations is found on page 58.

2:00 PM – 4:00 PM**SPECIAL PROGRAMMING PRESENTED BY Fisher Science****Sessions in Spinnaker 2****2:00 PM – 3:15 PM****1674 • Faster, Better Biotech for Biology Classes - DNA Spooling with a Twist Workshop****Biotechnology • Hands-on Workshop (75 min) • MS, HS, 2Y**

DNA Spooling is a popular activity that stimulates student interest in genetics and biotechnology. But don't throw away the spooled samples. Learn how to extend the activity in several ways.

Colin Heath

3:30 PM – 4:00 PM**1675 • Increase Student Interest in Molecular Biology using “Biotechnology Basics by Ellyn Daugherty” Kits****Biotechnology • Demonstration (30 min) • MS, HS, 2Y**

Teachers new learn of a new program called “Biotechnology Basics by Ellyn Daugherty,” a 3-week unit of kitted, introductory biotech activities designed specifically for biology courses at any grade level.

2:00 PM – 3:15 PM**1619 • The Fascinating and Controversial New Science of CRISPR****Executive Conference 1 • Biotechnology • Demonstration (75 min) • HS, 2Y, 4Y**

Learn how CRISPR was discovered and how it is being used in a wide variety of applications. A lab activity will also be presented that allows students to perform CRISPR.

David Wollert, Chattanooga State Community College, Chattanooga, TN

1538 • Going Beyond ‘Just-So’ Stories: Data Analysis of Elaborate Male Traits**Executive Conference 2A • Evolution • Hands-on Workshop (75 min) • MS, HS, 2Y, 4Y**

Elaborate male traits (e.g., peacock tails) are fascinating. We present an NGSS-aligned storyline and activities where students form hypotheses and analyze

real data to probe fundamental questions concerning evolution.

Rebecca Fuller and Rachel Moran, University of Illinois, Champaign, IL

1565 • Introductory Biology Can Teach Your Students to Think and Communicate Like Scientists**Executive Conference 3A • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, 4Y**

Session participants will learn how to use published data in conjunction with active teaching methods to accomplish goals promoted by Vision & Change and AP Biology redesign.

A. Malcolm Campbell, Laurie J. Heyer, and Christopher J. Paradise, Davidson College, Davidson, NC and Elizabeth Forrester, Baylor School, Chattanooga, TN

2:00 PM – 3:15 PM cont.

1610 • 5 New Genomics Educational Resources from NHGRI

Executive Conference 3B • General Biology • Hands-on Workshop (75 min) • MS, HS, 2Y

The Genome Institute (NHGRI) will demo several of our recently developed educational resources, including a curriculum on Henrietta Lacks, new video and digital resources, and more.

Carla Easter and Rosann Wise, National Human Genome Research Institute, Bethesda, MD

1462 • Exploring Relationships Among Bat Foraging Behaviors, Adaptations, and Environmental Factors

Executive Conference 4 • General Biology • Hands-on Workshop (75 min) • GA

A guided inquiry, scalable lesson comparing a suite of adaptations among bats utilizing different echolocation frequencies. Gain access and explore acoustical bat monitoring and USGS data from Yosemite Valley.

Erin Naegle and Lisa Murphy, Columbia College, Sonora, CA

1536 • Exploring Data Literacy Using Local Environmental Data for NGSS-Aligned Curricula

Marina 1 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • MS, HS, 2Y, 4Y

Participants will explore a case study of PCB fish data from the Hudson River Superfund Site, involving analyzing trends across time, space, and species using student-friendly, inquiry-based formats.

Rhea M Esposito, Cary Institute of Ecosystem Studies, Millbrook, NY

1581 • The Exposome: Making Chemical Exposures Relevant to Biology Instruction

Marina 2 • AP Biology • Demonstration (75 min) • HS, 2Y, 4Y

Conduct a data interpretation/graphing activity that introduces the concept of the exposome while reinforcing learning about DNA damage, repair and cancer formation in response to exposure to cancer causing chemicals.

Dana Haine, University of North Carolina - Chapel Hill, Chapel Hill, NC

1591 • Tiny Bubbles, Popcorn, and More: Modeling Population Demographics

Marina 4 • AP Biology • Hands-on Workshop (75 min) • HS, 2Y

Participants will actively model student learning activities which explore the concepts of logistic and exponential growth, carrying capacity, survivorship curves, and related ecological concepts.

Pamela Close and Noelle Gilzow, David H. Hickman High School, Columbia, MO

399 • Practicing Science with Computational Models and Simulations

Marina 5 • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y, GA

Simulations can simplify complex dynamic systems for students by constraining parameters. Learn how to effectively use simulations to have students discover relationships and practice science by exploring computational models.

Jon Darkow, Seneca East High School, Attica, OH

1685 • BioInteractive's Storyline Viewer – A Teacher Resource for Phenomena-Based Lesson Planning

Nautilus 2 • Curriculum Development • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Using HHMI BioInteractive's Storyline Viewer, teachers are led through a phenomenon-based storyline integrating several BioInteractive resources. Cohesive sequences of activities allow students to gain lasting conceptual understanding of biology concepts.

Amanda Briody, Frederick Douglass High School, Baltimore, MD; Valerie May, Woodstock Academy, Woodstock, CT; and Paul Beardsley and Sydney Bergman, HHMI BioInteractive, Chevy Chase, MD

1563 • The Anatomy of Great Lessons

Nautilus 3 • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Work with me to unpack three of my favorite biology activities. Leverage your creativity to generate authentic student engagement in ecology and evolution concepts. Participants will receive classroom materials.

Ryan Reardon, Jefferson County International Baccalaureate, Irondale, AL

1584 • Engaging Students as Scientists: Citizen Science in the Biology Classroom

Nautilus 4 • Instructional Strategies • Demonstration (75 min) • HS, 2Y, 4Y

Come explore the role that citizen science, an ever-growing field, can play in your lab or classroom. Students contribute to scientific knowledge while learning content and the nature of biology!

Tara Jo Holmberg, Northwestern Connecticut Community College, Winsted, CT

2:00 PM – 3:15 PM cont.**1501 • How Can Biotech...?**

Nautilus 5 • General Biology • Partner Presentations (75 min): Reserved for Non-Profit Organizations Highlighting Free Teaching Resources • MS, HS, 2Y, GA

Create designer babies? Predict my death? Help colonize Mars? Dr. Lamb dives into how modern tools are used to answer such impactful questions. Be ready when students ask, how can biotech...?

Neil Lamb, HudsonAlpha Institute for Biotechnology, Huntsville, AL

1420 • Creating Escape Room Scenarios in the Biology Classroom

Seabreeze 1 • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Add hands-on activities and technology into your biology classroom by creating escape room scenarios to present material. Examples will include plant and animal diversity.

Kelly Moore, Elesha Goodfriend, and Lynnette Wick, Walters State Community College, Morristown, TN

1688 • Teaching the Science Practices

Spinnaker 1 • AP Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

This will be an interactive workshop that will focus on how we can best create meaning and understanding to the College Board's AP Science Practices.

Robert Benedetto, Central Catholic High School/The College Board, Lawrence, MA

NABT Committee Meeting: OBTA Directors

Room 511 • Committee Meeting (75 min) • GA

Mark Little, National Program Coordinator

4:30 PM – 5:30 PM**GENERAL SESSION SPEAKER****Ed Yong**

➔ See page 9 for biography.

I Contain Multitudes: Telling Stories About Microbes and the People Who Study Them

Grand Ballroom • Special Speaker • GA

The microbial world is endlessly fascinating to those who study it, but a source of fear and disgust to most people. Ed Yong, author of the *New York Times* bestselling book "I Contain Multitudes" will show how to bridge that gap by telling stories about the microbiome, providing an insider's look at how science writers craft their pieces, and examining why storytelling is crucial to science.

NABT is proud to recognize Mr. Ed Yong by naming him the recipient of the 2018 Distinguished Service Award for Enhancing Education through Biological Research.

2:00 PM – 3:15 PM cont.**NABT Committee Meeting: Citizen Science Committee**

Room 514 • Committee Meeting (75 min) • GA

Committee Chair for 2019 TBD

3:00 PM – 4:00 PM**Book Signing with Ed Yong**

Grand Foyer • Special Event • GA

3:30 PM – 4:00 PM**404 • Integrating Personal Genetics into a Biotechnology Curriculum**

Executive Conference 1 • Biotechnology • Demonstration (30 min) • HS, 2Y

The session will outline how to effectively integrate personal genetics, and associated ethical considerations, into a conventional biotechnology course. Course material from the Personal Genetics Education Project will be highlighted.

Julie Boehm, Kenneth Bateman, and Carolyn Spangler, Wellesley High School, Wellesley, MA

3:30 PM – 4:00 PM cont.**1548 • The Anatomy of Lab: Factors Affecting, Causes of, and Student Motivations for Leaving Anatomy Lab Courses Early**

Executive Conference 2A • Anatomy & Physiology • Paper (30 min) • 2Y, 4Y, GA

Come listen to our progress in identifying the factors and motivations causing students to leave open, standalone, anatomy labs early.

Lance Forshee and Sarah Monson, Southern Utah University, Cedar City, UT

3:30 PM – 4:00 PM continued

1597 • Sour to Sweet? Join a Flavor-Tripping Party for a Lesson on Cell Communication

Executive Conference 3B • Instructional Strategies • Hands-on Workshop (30 min) • MS, HS, GA

Experience the magical properties of miracle berries firsthand and learn how to throw a flavor-tripping party for an engaging lab experience and lesson on cell communication, sensation, and perception.

Chris Chou, Longmont High School, Longmont, CO

1474 • The Willamette Promise: Proficiency-Based Accelerating Learning in Biology

Executive Conference 4 • Instructional Strategies • Paper (30 min) • HS, 2Y, 4Y

Willamette Promise students demonstrate proficiency in Biology learning outcomes to earn college credit in high school. The Professional Learning Community provides support for teachers at rural and underserved schools.

Erin Baumgartner, Western Oregon University, Monmouth, OR

1520 • OsMotion: A Kinesthetic Exercise to Enhance Novices' Comprehension of Osmosis and Diffusion in an Introductory Biology Course

Marina 1 • Curriculum Development • Hands-on Workshop (30 min) • HS, 2Y, 4Y

This interactive session on osmosis and diffusion will engage participants in a kinesthetic exercise designed to illustrate the movement of water and solutes under conditions of varying tonicity.

David Esparza and Jeffrey Olimpo, University of Texas at El Paso, El Paso, TX

1555 • Engaging Community Partners in a High School Bioscience Course to Increase Students' Interest in STEM Careers

Marina 2 • Biotechnology • Demonstration (30 min) • HS

I will describe the integration of local community partners into a high school bioscience course designed to find solutions to a community-based problem: tracking infectious disease.

Robert Woodruff, Northern Arizona University, Flagstaff, AZ

1447 • From Soil to Sun... Engaging At-Risk Students With Plants in an Introductory Biology Class

Marina 4 • General Biology • Hands-on Workshop (30 min) • HS

A compilation of classroom strategies, labs, hands-on activities, technology, and media to enhance engagement and performance of at-risk students in the introductory-level biology classroom, with a focus on plants.

Lisa Pavic and Madeline Thomas, Glenbrook South High School, Glenview, IL

1525 • Developing Open Educational Resources (OER) for the Non-Majors Biology Lab

Marina 5 • Curriculum Development • Paper (30 min) • 2Y, 4Y

OER were developed that implement the recommendations of Vision and Change. The challenges encountered and outcomes are discussed. This project was supported by Affordable Learning Georgia.

Susan Finazzo and Amy Rollins, Perimeter College - Georgia State University, Covington, GA

1679 • Using the New Understanding Science Interactive from HHMI and UCMP for Instruction and Student Projects

Nautilus 2 • Nature of Science • Hands-on Workshop (30 min) • MS, HS, GA

Come learn about the Understanding Science Interactive: a tool students can use to understand how science works and to help them plan, organize, and document their own inquiry-based activities.

Paul Strode, Fairview High School, Boulder, CO and Mark Nielsen, HHMI BioInteractive, Chevy Chase, MD

1579 • Electronic Cigarettes: Connections for the Biology Classroom

Seabreeze 1 • General Biology • Demonstration (30 min) • HS, 2Y

Session participants will receive an overview of electronic-cigarettes and will gain ideas for incorporating the science of e-cigarettes into their life science instruction.

Dana Haine, University of North Carolina - Chapel Hill, Chapel Hill, NC

1640 • How Do Students Study in STEM Courses? Findings from a Light-Touch Intervention and Its Impact on Underrepresented Students

Spinnaker 1 • Instructional Strategies • Paper (30 min) • 2Y, 4Y

This work identifies how undergraduates in an introductory biology course study, highlighting differences for underrepresented students. We report on an intervention that aids in the adoption of spacing and self-testing.

Brian Sato, University of California - Irvine, Irvine, CA

4:15 PM – 4:30 PM

Announcement of Poster Competition Winners

Grand Ballroom • Special Event • GA

6:00 PM – 8:30 PM

After Hours Adventure at the San Diego Zoo**Meet in the Lobby for Bus • Special Event (Tickets Required) • GA (SOLD OUT)**

Celebrate another fantastic NABT Conference with an evening under the stars at the iconic San Diego Zoo. Join us for drinks & appetizers in the outdoor Sydney Grill, where you will have late night access to view giraffes, rhinos, and the largest colony of koala bears outside of Australia!

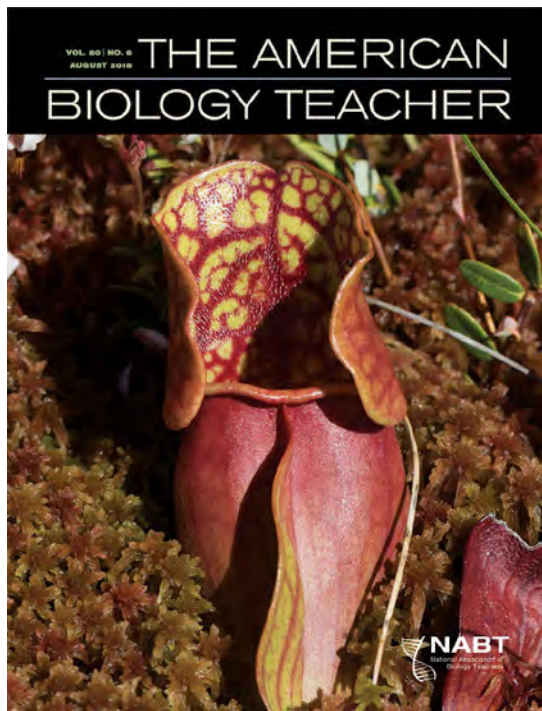
Research Coordinator Kirstie Ruppert will also highlight how San Diego Zoo Global is collaborating with pastoralist communities on giraffe and leopard conservation and how education efforts are transforming the way that people and wildlife coexist in Kenya.

The evening will also feature a unique encounter with the Zoo's animal ambassadors.

Educational programming support has been provided by

BIO-RAD

Buses will begin to depart from the main entrance of the Sheraton starting at 5:45 PM. They will continue to run back and forth between the Zoo and the Sheraton throughout the evening. The final buses depart the zoo by 8:45 PM.



University of California Press is proud to publish the official journal of the National Association of Biology Teachers

The American Biology Teacher is an award-winning, peer-refereed professional journal for K-16 biology teachers. Topics covered in the journal include modern biology content, teaching strategies for the classroom and laboratory, field activities, applications, professional development, social and ethical implications of biology and ways to incorporate such concerns into instructional programs, as well as reviews of books and classroom technology products.

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