7:30AM – 8:45AM  
**First Timers’ Breakfast**  
Plaza Ballroom E • Meal Function (Tickets Required) • GA  
NABT Conference “first timers” are invited to learn more about NABT and the Professional Development Conference over a complimentary breakfast. Each table will have an NABT leader available to answer your questions and help you make the most of your time in Denver.

The NABT First Timers’ Breakfast in made possible through the generous support of [HHMI BioInteractive](https://BioInteractive.org).

10:30AM – 11:45AM  
**NABT Committee Meeting: Global Perspectives Committee**  
Director’s Row F • Committee Meeting • GA  
Jacqueline McLaughlin, Committee Chair

11:30AM – 11:45AM  
**1118 | Graduate Student Networking and Mentoring Workshop**  
Governor’s Square 9 • Instructional Strategies & Technologies • Symposium (75 minutes) • 4Y  
Are you interested in networking, receiving tips from experienced mentors, or having professionals review your CV? Come to the graduate student mentoring and networking workshop!

NABT Graduate Student Committee

11:45AM – 12:15PM  
**GENERAL SESSION SPEAKER**  
David McConnell  
See Page 8 for biography.

**What Research Tells Us About Effective Strategies That We Will Actually Use**  
Plaza Ballroom ABC • Special Speaker • GA  
Over the last three decades, discipline-based education research (DBER) in a variety of STEM fields has revealed a variety of empirically validated instructional practices that contribute to improvements in student learning and a reduction in attrition. Classes that support these teaching practices are often termed “active learning environments” and are characterized by small group work, ongoing monitoring of student learning, and lessons that challenge students to apply higher level thinking skills. Even the most dedicated instructor may be challenged to identify which combination of active learning strategies would be best suited to their class setting. Dr. McConnell will share what his research group observed when they visited more than two hundred college geoscience classes and the implications for instructors seeking to adopt or increase their use of active learning strategies. He will make the case that we should consider what research in educational psychology tells us about student learning processes when we make decisions about pedagogical changes. He will also demonstrate how instructors can foster an adaptable teaching approach that blends a mix of in-class and out-of-class activities that support student learning and can be readily applied regardless of situational factors such as class size, instructional support and course content.
FRIDAY, NOVEMBER 4

10:30AM – 4:00PM

Special Programming Presented by Bio-Rad Laboratories

All sessions in Plaza Court 1
Damon Tighe

8:00AM – 9:15AM
Enzymes: Technology Inspired by Nature
AP Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y
With rising greenhouse gases, scientists look to nature for a biofuel solution. In this hands-on workshop extract a mushroom enzyme used for biofuel processing and design experiments to quantify its properties. Aligns with AP Biology Big Ideas 2, 4.

10:30AM – 11:45AM continued
1014 | SMART (Students Modeling a Research Topic) and MAPS (Modeling a Protein Story) Teams: Taking Teaching Protein Structure and Function to the Next Level
Governor’s Square 12 • General Biology • Symposium (75 minutes) • HS
SMART and MAPS teams are groups of students and teachers, that explore protein structure-function relationships and their relevance to current research by developing 3D physical protein models that allow them to present their “molecular story”.

Chris Chou, Longmont High School, Longmont, CO; and Diane Munzenmaier, Milwaukee School of Engineering, Milwaukee, WI

1004 | Genes, Genomes and Personalized Medicine: An NIH-SEPA Project
Governor’s Square 14 • Genetics • Hands-on Workshop (75 min) • HS, 2Y, MS
This workshop introduces new instructional tools that go beyond teaching the fundamentals of DNA structure and the flow of genetic information to teaching DNA as information. Materials will include DNA models, gene maps, and a genomic story.

Tim Herman and Gina Vogt, MSOE Center for BioMolecular Modeling, Milwaukee, WI

1127 | DNA Detectives: Applications of DNA Profiling
Governor’s Square 15 • Biotechnology • Hands-on Workshop (75 min) • MS, HS, 2Y
Have fun working through our new online interactive and hands-on activity that teach the science behind DNA profiling. Learn how this technique is being used to help stop the ivory trade and to solve crimes and mistaken paternity cases.

Mark Eberhard, Helen Snodgrass, and Laura Bonetta, HHMI BioInteractive, Chevy Chase, MD
**997 | Discussion-Based Classrooms - Teaching Biology Without Direct Instruction**
Governor’s Square 16 • Instructional Strategies & Technologies • Hands-on Workshop (75 min) • HS
This session will follow the style of discussion-based teaching we use in our classrooms. The session will focus on modeling talk skills, giving feedback, and teaching students to hold each other accountable for using evidence to make arguments.

Rafael Quizon and Ivy McDaniel, Noble Street Charter Schools, Chicago, IL

**1076 | Exploring and Teaching with Mathematical Models in the Biology Classroom - Meeting the Challenge**
Governor’s Square 17 • AP Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y
An important part of The AP Biology Curriculum Framework is the development and use of mathematical models. This workshop will explore models and strategies to incorporate models from each of the Big Ideas in your classroom and lab.

Brad Williamson, University of Kansas, Lawrence, KS

**1053 | Improving Science Practices Through Evaluating Scientific Journal Articles**
Plaza Court 5 • AP Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y
Experimental design is at the forefront of the AP Science Practices. Reading and evaluating journal articles is one method to help students understand experimental design. This workshop provides a concrete, scaffolded method to teach this skill.

Christina Palffy, Adlai E. Stevenson High School, Arlington Heights, IL; and Karen O’Connor, Stevenson High School, Lincolnshire, IL

**942 | It’s Statistics, Not Sadistics: Simply and Effectively Utilize Statistics in Science Classes to Teach the Scientific Method**
Plaza Court 7 • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y
The AAAS Vision and Change suggest we teach science the way scientists do science and to use statistics to test hypothesis. This session will equip teachers to use Student’s t-test and Chi Squared test in their home classrooms to test inquiry labs.

Matthew Craig, Gillette College, Gillette, WY; and Dan Porter, Amarillo College, Amarillo, TX

**10:30AM – 1:15PM**

**Special Programming Presented by Fisher Science Education/G-Biosciences**

**All sessions in Plaza Court 3**

**Ellyn Daugherty**

**10:30AM – 11:45AM**

**Proteins are the Cash of Biotech - The rAmylase Project**
Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y
Proteins are usually colorless and always submicroscopic. How can scientists recognize and measure protein presence and activity? In this BS4NM hands-on workshop, participants conduct and study amylase with three protein assays (tests).

**12:00PM – 1:15PM**

**Biotech is STEM - Molecular Modeling with Your Students**
Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y
Biotechnology is STEM and easy to implement. In this workshop, teachers will learn how to use a free web-based molecular modeling program to study DNA and protein structure. STEM biotech curriculum implementation strategies will also be presented.

**Special Programming Presented by University of Nebraska at Kearney**

**10:30AM – 11:45AM**

**and 12:00PM – 1:15PM**

**Online Education for Biology and Science Teachers**
Plaza Court 4 • General Biology • Symposium (75 min) • MS, HS, 2Y, 4Y
Join this session to learn about the University of Nebraska at Kearney’s online Master of Science in Biology and Master of Science in Education Science/Math Education programs. UNK offers over 400+ online courses geared toward advancing teachers.

Brian Peterson

**976 | Melanin: A Model NGSS Storyline**
Plaza Court 6 • General Biology • Demonstration (75 min) • MS, HS
Using melanin and albinism as the driving phenomenon, this three-dimensional unit serves to integrate multiple concepts in a cohesive storyline. Concepts integrated into this storyline include genetics and evolution in a single unit.

Jason Crean, Lyons Township High School, Western Springs, IL; Kathy van Hoeck, York Community High School, Elmhurst, IL; and Michele Koehler, Riverside-Brookfield High School, Brookfield, IL
10:30AM – 12:30PM

NABT AP BIOLOGY SYMPOSIUM

All sessions in Plaza Ballroom F

10:30AM – 11:30AM
1089 | EK + SP = LO: Remodeling Legacy AP Biology Questions to Align with the Redesigned Exam
AP Biology • Symposium (60 min) • HS
Participants will investigate strategies for modifying legacy AP Biology questions that specifically align with objectives from the revised AP Biology curriculum and will use the Curriculum Framework to construct a full-length summative exam.

Jennifer Pfannerstill, North Shore Country Day School, Winnetka, IL; and Bob Kuhn, Centennial High School, Roswell, GA

11:30AM – 12:00PM
1006 | Measuring Learning Outcomes with Good Multiple-Choice Questions
AP Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y
Join ETS Test Developers to practice writing formative and summative questions to measure defined learning outcomes. Emphasis will be given to reverse-engineering questions to specifically align with instructional objectives and assessment goals.

Mitch Price and Chris Gentile, Educational Testing Services, Princeton, NJ

12:00PM – 12:30PM
1141 | 2016 Evolution Symposium: Emerging Research in Evolutionary Biology
Plaza Ballroom D • Evolution • Symposium (120 min) • HS, 2Y, 4Y
Join us for a talk featuring new research in evolutionary biology and a workshop on using authentic data from this new research in your classroom! See page 33 for complete details.

Sponsored by the BEACON Center for the Study of Evolution and the American Society of Naturalists.

10:30AM – 11:45AM continued
1036 | Identifying Strengths and Problems: Using College Board Learning Objectives to Improve Assessment and Metacognition in AP Biology
Plaza Court 8 • AP Biology • Hands-on Workshop (75 min) • HS, GA
AP Biology requires both conceptual understanding and application of science practices. Come see how spiraling assessments aligned to the Curricular Framework support student growth and self-assessment while preparing them for success on the AP exam!

Kate Ingemunson and Stephen Traphagen, Rolling Meadows High School, Rolling Meadows, IL
With this online interactive game, your students work together to ensure the health and safety of a deep space crew while learning the genomics of common disease. Touching Triton teaches the complexity of common disease risks from family history, environment and individual genomic profiles. Students begin to understand how genetics and lifestyle choices affect their health. Learn more at bit.ly/touching-triton.

Made possible by:

Want to enhance the way your students learn about the genetics of disease?

FREE Digital Activity

Visit us at Booth #406

Touching Triton engages students in a longterm space flight storyline while helping them build an understanding of common complex disease risk.

triton.hudsonalpha.org
12:00PM – 12:30PM continued

1092 | Having a BLAST with Plants: Using Rubisco to Explore Evolutionary Relationships
Governor’s Square 10 • Evolution • Paper (30 min) • HS, 2Y, 4Y
The evolution of Rubisco, the enzyme which fixes carbon dioxide, is illustrated by comparing the sequences of the small subunit. We shall review a new BLAST activity using online data and discuss the evolution of plants and photosynthesis.
Elizabeth Cowles, Eastern Connecticut State University, Willimantic, CT

1094 | Developing Student Thinking in the Biology Classroom Without Recreating Your Entire Year: Analysis of the Rigor of Your Lessons
Governor’s Square 11 • General Biology • Hands-on Workshop (30 min) • ES, MS, HS
Learn what increasing rigor means, how to quantify rigor in lessons, and how to incorporate strategies to develop student thinking. Quality time will be allotted for collaboration among participants. Bring your lessons to adapt!
Rachel Lytle, Brentwood High School, Brentwood, TN; and Kim Sadler, Middle Tennessee State University, Murfreesboro, TN

1092 | Foolproof Gel Electrophoresis for Pennies Per Student
Governor’s Square 12 • General Biology • Paper (30 min) • HS, 2Y
Unable to purchase expensive DNA kits and micro-pipettes? Learn how to create samples containing a mixture of dyes of different molecular weights which result in interesting banding patterns that can be used in fragment and variation analysis.
Teresa Fulcher, Pellissippi State Community College, Knoxville, TN

1015 | Investigating a Rare Disease through Hands-on and Blended Settings
Governor’s Square 14 • General Biology • Hands-on Workshop (30 min) • HS, GA
Explore a rare disease (Pompe disease) through face-to-face collaborative learning groups and hands-on activities as well as through virtual environments. Pilot results and lessons will be shared. BYOD to try out the web-based WISE version!
Julie Bokor, University of Florida, Gainesville, FL

1133 | Engaging Students with Authentic Scientific Literature
Governor’s Square 15 • Instructional Strategies & Technologies • Hands-on Workshop (75 min) • HS, 2Y, 4Y
Learn how to effectively introduce primary literature in your classroom by packaging an annotated science paper, HHMI BioInteractive multimedia, and an active learning piece to provide the necessary scaffolding while maintaining student engagement.
Chi Klein, Scott Sowell, and Melissa Csikari, HHMI BioInteractive, Chevy Chase, MD

1098 | Lessons Learned from a Flipped Classroom
Plaza Court 5 • Science Practices • Paper (30 min) • 2Y, 4Y, GA
The flipped class depends on the efficiency and quality of content-delivery materials and diverse and engaging student-centered learning activities to apply and assess understanding of that content. Failures and successes of flipping will be discussed.
Kathy Gallucci, Elon University, Elon, NC

1093 | Engaging Graduate Teaching Assistants in Lesson Study to Improve Instruction in an Introductory Biology Laboratory Course
Plaza Court 6 • General Biology • Paper (30 min) • 4Y
This session will discuss how lesson study, a type of professional development, advanced graduate teaching assistants’ pedagogical content knowledge (PCK) in order to improve the quality of instruction in an introductory biology laboratory course.
Sandra Lampley, University of Alabama in Huntsville, Huntsville, AL; and Grant Gardner, Middle Tennessee State University, Murfreesboro, TN

1019 | Improving Student Success in Introductory Biology: The Use of Summative Assessment as an Inclusive Practice
Governor’s Square 16 • Curriculum Development • Paper (30 min) • 2Y, 4Y
The effect of the use of summative assessment on underrepresented minorities in Introductory Biology.
Oluwaseun Agboola and Anna Hiatt, East Tennessee State University, Johnson City, TN
Why be blue in a swamp? The evolution of color patterns and color vision in killifish

Dr. Rebecca (Becky) Fuller
Department of Animal Biology
School of Integrative Biology
University of Illinois

Data Nugget Workshop
The Determinants of Male Color Pattern: Nature, Nurture, and their Interaction
Drs. Rebecca Fuller, Melissa Kjelvik, Elizabeth Schultheis, Alexa Warwick, and Louise Mead
University of Illinois and BEACON Center for the Study of Evolution in Action at Michigan State University

NABT 2016 Evolution Symposium: Emerging Research in Evolutionary Biology

Why Be Blue in a Swamp? The Evolution of Color Patterns and Color Vision in Killifish
Animal communication happens when one organism emits a signal, which then travels through the environment and is detected by the sensory system of another. The environment in which signaling occurs can dramatically alter signal transmission and result in selection where different signals are favored in different environments. The bluefin killifish provide a compelling example. Some populations are found in crystal clear springs (where UV and blue light are highly abundant) and others are found in tannin-stained swamps (where UV/blue light is depauperate). Paradoxically, males with blue color patterns are abundant in swamps and are rare in springs. The resolution to this paradox requires a consideration of how genetics and the environment influence trait expression, as well as the direction of natural and sexual selection in different habitat types, and the manner in which animals with different visual systems perceive the same color pattern.

Rebecca Fuller, University of Illinois at Urbana-Champaign, Champaign, IL

Data Nugget Workshop: The Determinants of Male Color Pattern: Nature, Nurture, and their Interaction
Data Nuggets are hands-on activities designed to improve the scientific and quantitative skills of students by having them graph and interpret scientific data gathered by practicing scientists. This workshop will provide an overview of Data Nuggets and present a Data Nugget featuring data on the genetic and environmental basis of color pattern expression in killifish. This Data Nugget will allow students to determine whether color pattern expression is due to ‘nature’ (e.g., genetics), ‘nurture’ (e.g., environment), or the interaction of the two.

Rebecca Fuller, University of Illinois at Urbana-Champaign, Champaign, IL; and Melissa Kjelvik, Elizabeth Schultheis, Alexa Warwick, and Louise S. Mead, BEACON Center for the Study of Evolution in Action, Michigan State University, East Lansing, MI
12:00PM – 12:30PM continued

986 | Ecological Service Learning: Connecting Natural and Human Communities
Plaza Court 7 • Ecology/Environmental Science/Sustainability • Paper (30 min) • HS, 2Y, 4Y
We will explore NCCC’s ecological service-learning projects in life-science laboratory courses! Students’ reflections and outcomes will be included, and opportunities for funding and partnership building for similar projects will also be discussed.

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

954 | Introductory Biology Students’ Use of Rubrics and Reflection Questions as Scaffolds to Engage in Metacognition and Enhance Understanding
Plaza Court 8 • General Biology • Paper (30 min) • 2Y, 4Y
Learn about the design and use of scoring rubrics, reflection questions, and instruction on their use to support introductory biology students as they learn to engage in metacognition and consider their own understanding of biological concepts.

Jaime Sabel, University of Nebraska-Lincoln, Lincoln, NE

12:45PM – 3:15PM

Special Programming Presented by BIOZONE

12:45PM – 2:00PM
BIOZONE’s AP Biology: From Content Coverage to Understanding
AP Biology • Demonstration (75 min) • HS
BIOZONE presents innovative approaches for teaching AP Biology within the thematic framework of the four big ideas. Find out how BIOZONE’s pedagogical approach can improve student achievement in the current environment. Attendees receive free samples.

2:00PM – 3:15PM
Biology for NGSS: A New Approach for a New Program
General Biology • Demonstration (75 min) • HS
Successfully implement the high school life science component of the NGSS program with BIOZONE’s newest series. Strongly focused on student inquiry and written from first principles to address all aspects of NGSS. Attendees receive free review copy.

2:00PM – 3:15PM

NABT Committee Meeting: Nominating Committee
Director’s Row F • Committee Meeting • GA
Donald French, Committee Chair

Four-Year Section Luncheon
Director’s Row I • Meal Function (Tickets Required) • 4Y
Join faculty, education researchers, graduate students, and others who make four-year colleges and universities their professional home. Network with colleagues and friends (and make new ones) at this event. The lunch will include a special presentation of the Four-Year College and University Section Awards.

Two-Year Section Luncheon
Director’s Row J • Meal Function (Tickets Required) • 2Y
Students at two-year colleges are as diverse as their instructors. Share your challenges, epiphanies, and best practices with other two-year and community college educators who “get it.” The winners of the Two-Year College Biology Teaching and Prof. Chan Teaching Award will also be announced.

12:45PM – 1:45PM

AP Biology Section Luncheon
Director’s Row E • AP Biology • Meal Function (Tickets Required) • HS
You have the big ideas and enduring understandings covered. But what about the science practices and the labs? And that exam? Meet other AP Biology teachers in a friendly informal setting to share questions and insight. You may even finally get to meet some of your favorite fellow AP teachers in person.

12:00PM – 12:30PM continued
DISCOVER RESOURCES and OPPORTUNITIES with ASM

WHICH MICROBE ARE YOU?
Find out by taking our quick quiz, and receive a free microbe button! Check out our classroom resources and discover educator opportunities! Come to Booth #415 to find out more.

ASM Presents: Vectors of Disease
featuring Dr. Brian Foy of Colorado State University, the first researcher to document sexual transmission of the Zika virus.

Friday, Nov. 4, 2:00 – 4:00 pm, Plaza Ballroom D

Engage Your Students in Citizen Science
Do you want your students involved in science and to understand the role it plays in everyday life? The latest themed JMBE issue focuses on the interdisciplinary topic of scientific citizenship.

For more information, visit http://bit.ly/2bchLq4

Visit us at Booth #415!
asm.org
2:00PM – 3:15PM
1066 | The Exposome: Making Chemical Exposures Relevant to Biology Instruction
Governor’s Square 9 • AP Biology • Demonstration (75 min) • HS, 2Y, 4Y
Conduct a graphing/data interpretation activity that introduces the concept of the exposome while reinforcing learning about DNA damage and repair and cancer formation in response to exposure to cancer-causing chemicals such as vinyl chloride.

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

1002 | Simple, Inexpensive Ways to Develop Understanding of the Most Difficult Biological Concepts
Governor’s Square 10 • General Biology • Hands-on Workshop (75 min) • MS, HS, 2Y
Addressing crowd-sourced feedback on the most difficult biological concepts to teach, participants will explore active, non-lecture content delivery with cheap materials. Student learning will focus on models, representations, and data analysis.

Chi Klein, Saint Stephen’s Episcopal School, Bradenton, FL

1096 | Now You See It, Now You Don’t - Patterns in Ecology
Governor’s Square 11 • Ecology/Environmental Science/Sustainability • Hands-on Workshop (75 min) • MS, HS, GA
The natural world presents an unlimited variety of patterns to explore. Participants will engage in activities that will bring to life the CCC of patterns and the role patterns play in biology. All participants will leave with goodie bags and lessons.

Jim Clark, San Lorenzo Unified School District, San Lorenzo, CA; and Jesse Stonewood, Armadillo Technical Institute, Phoenix, AZ

1105 | Simulating Genetic Drift with EXCEL
Governor’s Square 14 • Evolution • Hands-on Workshop (75 min) • HS, 2Y, 4Y
This workshop provides the necessary tools for a class to build a simulation of evolution with genetic drift and natural selection on more realistic spatial and temporal scales and learn as actual evolutionary biologists do.

Ryan Langendorf, University of Colorado, Boulder, CO; and Paul Strode, Fairview High School, Boulder, CO

979 | Using the SE Instructional Model to Teach Life Science: An Immersive Learner Experience
Governor’s Square 16 • Science Practices • Hands-on Workshop (75 min) • MS, HS
Why do we sweat? Why do we shiver? These questions and more will be covered in our session, which will introduce participants to the New Visions Living Environment (Biology) Curriculum and its immersive, engaging 5E model of teaching.

Andrea Robinson, New Visions, New York City, NY

1018 | Modeling in the Pre-AP Biology Classroom
Governor’s Square 17 • Instructional Strategies & Technologies • Hands-on Workshop (75 min) • HS
Giving students opportunities to engage in “sense-making” through modeling is a core practice for AP and NGSS. Join the fun as we engage in modeling tasks and explore rubrics for assessing students’ modeling practices. We will also share best practices.

Jason Crean, Lyons Township High School, LaGrange, IL; and Karen Lionberger, College Board, AP Program, New York, NY

1094 | The AP Curriculum Meets Vision and Change: Incorporating Active Learning in Small Classrooms and in Large Lecture Halls
Plaza Ballroom F • AP Biology • Hands-On Workshop • HS, 2Y, 4Y
AP teachers and college professors will jointly learn how to transition from traditional lectures towards active classrooms that empower learners. Participants will design activities that meet the expectations of both AP and Vision and Change.

Jennifer Pfannerstill, North Shore Country Day School, Winnetka, IL; Brian Lazzaro, Cornell University, Ithaca, NY; and Nancy Morvillo, Florida Southern University, Lakeland, FL

1071 | Temperature Conversions: Explaining y=mx+b
Plaza Court 5 • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y
This activity is designed for teachers to learn how to explain and make sense of the linear equation to students. Participants will collect data, draw a graph, and identify each part of the slope equation to seamlessly integrate math and science.

Umadevi Garimella, University of Central Arkansas, Conway, AR

934 | Visualizing Student Thinking Using the NGSS Approach
Plaza Court 6 • Instructional Strategies & Technologies • Hands-on Workshop (75 min) • HS, MS
Get students to think beyond the story line to explaining "why". The goal of this workshop is to provide teachers with examples of student work and rubrics in applying the Cross Cutting Concepts within the NGSS curriculum using visual modeling.

Elizabeth Gonzalez, Montclair High School, Montclair, CA; and Christine Yang, Chaffey High School, Ontario, CA
990 | GMO Detection Without PCR
Plaza Court 7 • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y
Explore hands-on, PCR-free ways to simulate GMO detection that mimic real life technology, including microarrays and immunochromatographic tests. Supplement your curriculum with relevant yet time and budget friendly activities. Lesson plans provided!
Summer Cortinas, BioNetwork, Asheville, NC

957 | Not Just Blowing Bubbles: Modeling Population Demographics
Plaza Court 8 • AP Biology • Hands-on Workshop (75 min) • HS, 2Y
Ecology is all about energy and relationships. In this encore workshop, participants will actively model ecological concepts such as logistic and exponential growth, carrying capacity, and survivorship curves and explore data analysis possibilities.
Pamela Close, Hickman High School, Columbia, MO; and Lee Ferguson, Allen High School, Allen, TX

2:00PM – 3:15PM
APS INVITED SPEAKER
W. Larry Kenney
See page 10 for biography.
Aging in a Changing Climate: Physiology in Context
Director’s Row H • Anatomy & Physiology • Special Speaker • GA
If current conditions continue, mean global temperature is projected to rise 1-2°C over the next 50 years. The effects of climate change on the environment are well known, but what does that mean for human health? Humans are tropical animals, evolved from tropical climates and well adapted to tolerate even extremely hot environmental conditions. This presentation will focus on the physiology of human aging in an ever-warming climate, how and why older men and women are at risk during episodic heat waves, and (potentially) what we can do about it.

2:00PM – 4:00PM
1043 | ASM Presents: Vectors of Disease
Plaza Ballroom D • Microbiology & Cell Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y
New and emerging infectious diseases are filling the news headlines. Many of these diseases are associated with animal or insect vectors. Come hear what we know about vector-borne disease and transmission from the first researcher to report sexual transmission of Zika virus. This session will also feature a demonstration of a new classroom activity developed to help students understand human immune defenses and pathogen virulence strategies.
Brian Foy, Colorado State University, Fort Collins, CO; Katherine Lontok, American Society for Microbiology, Washington, D.C.; and Dave Westenberg, Missouri S&T, Rolla, MO

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Rainforest and reef
18 anniversary
2:00PM — 4:00PM continued
NABT Biology Education Research Symposium
Governor’s Square 12 • Symposium • GA

NABT is proud to present the 8th Annual Biology Education Symposium. Presentations were accepted through a double-blind review process that was open to biology instructors and researchers at all levels.

Full abstracts are available on page 40 and proceedings will be posted at www.NABT.org

1132 | Inquiry-based Ecology Using a Citizen Science Trail Camera Project
Governor’s Square 15 • Ecology/Environmental Science/Sustainability • Hands-on Workshop (120 min) • HS
HHMI BioInteractive presents a citizen science platform to identify animals in trail camera images from Gorongosa National Park, Mozambique. Participants will explore trail camera data, investigate ecological questions, and analyze data on computers.

Amy Fassler, David Hong, Takisha Reece, and Bridget Conneely, HHMI BioInteractive, Chevy Chase, MD

1056 | Phylocard - A Plant Evolution Card Game
Governor’s Square 11 • Evolution • Hands-on Workshop (30 min) • MS, HS, 4Y
Plant diversification can be a challenging subject to teach, particularly if live plants are not available. Through a simple game-based approach called Phylocard, we put a new twist on teaching plant evolution that uses phylogenetic tree-thinking.

J. Phil Gibson, University of Oklahoma, Norman, OK

3:30PM — 4:00PM
NABT Committee Meeting: Professional Development Committee
Director’s Row F • Committee Meeting • GA

Catherine Ambos, Chair

967 | From Folklore to Herbal Medicines to Science
Governor’s Square 9 • General Biology • Demonstration (30 min) • HS, 2Y, 4Y
Many cultures have herbal medicines and some are related to folklore. Come learn how the effectiveness of these remedies can be tested in the lab using readily available supplies and organisms such as bacteria, yeast, C. elegans and brine shrimp.

Linda Sigismondi, University of Rio Grande, Rio Grande, OH

1073 | Accessibility of Biology Lab for Students Who are Blind Increased by Making Novel Models and Tactile Items
Governor’s Square 16 • General Biology • Paper (30 min) • HS, 2Y
Attend this session and learn how to make inexpensive models and tactile items. These items can make a variety of organisms and structures observed in a General Biology lab accessible to students who are blind or vision impaired.

Linda Smith-Staton, Pellissippi State Community College, Knoxville, TN

1095 | Getting More Out of Less: Designing Short Homework Assignments that Focus on Application and Analysis
Governor’s Square 17 • Curriculum Development • Hands-on Workshop (30 min) • 2Y, 4Y, GA
Studies on student learning show work outside of class focusing on application and analysis produce higher achievement on course learning outcomes. See how shorter homework assignments incorporating higher order thinking improve student learning.

Julie Minbiole, Columbia College Chicago, Chicago, IL

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Denver 2016
978 | Assessing Students’ Prior Knowledge of the Chemistry in Cellular Respiration
Plaza Court 5 • General Biology • Paper (30 min) • 2Y, 4Y, GA
Wouldn’t it be useful to know what chemistry knowledge concerning cellular respiration your students have? Come listen to our progress creating the Chemistry in Cellular Respiration Concept Inventory.
Lance Forshee and Donald French, Oklahoma State University, Stillwater, OK

1085 | Implementing Profession-Based Learning and Entrepreneurship in the Bioscience Classroom
Plaza Court 6 • Curriculum Development • Paper (30 min) • HS, 2Y
Wanting to provide real-world and authentic experiences for your students while also maintaining a rigorous curriculum? Techniques, tips, and lessons-learned on how to infuse profession-based teaching and entrepreneurship into your bioscience program.
Joe Whalen, Blue Valley CAPS, Overland Park, KS

1039 | Feedback for Learning in Biology
Plaza Court 7 • Instructional Strategies & Technologies • Hands-on Workshop (30 min) • MS, HS
Participants complete an inheritance activity that will be used for demonstrating feedback models that are incorporated into the classroom. Self, peer, teacher, and whole class feedback strategies are illustrated. The NGSS in HS Genetics are targeted as the learning goals for this activity.
Donna Satterthwait, University of Tasmania, Hobart, Tasmania
but that they would continue to use the materials. Our work provides a model for curriculum development integrating the three dimensions of the NGSS with published scientific data and gives preliminary evidence of promise for this approach to increasing students’ understanding of natural selection.

Reducing College Biology Students’ Perceived Conflict between Religion and Evolution
M. Elizabeth Barnes, James Elser, and Sara E. Brownell, Arizona State University, Tempe, AZ
Up to sixty percent of students in college biology classes have been shown to reject evolution. The source of rejection most often stems from an interplay of students’ misconceptions about evolution and their perceptions that evolution is in conflict with their religious beliefs. While college evolution instructors are often versed on how to provide instruction on understanding of evolution, they are often unsure about how to reduce students’ perceptions that evolution is in conflict with religious beliefs. We asked how our evolution curriculum influences students’ perceptions of evolution and religion. Using an open ended survey, we analyzed students’ perceptions of conflict between evolution and religion before and after instruction. We found that over the course of the module, the number of students who perceived that evolution and religion are in conflict was reduced by half. Surprisingly, we saw this reduction among both religious and non-religious students. This study suggests that by incorporating explicit discussion of the perceived conflict between religion and evolution we may be able to ameliorate students’ perceived conflict and thus improve student attitudes towards evolution. In the session we will provide a detailed description of our curriculum as well as practical suggestions for how to implement our module.

Using Human Case Studies to Teach Evolution
Briana Pobiner, Smithsonian Institution, Washington, D.C.; Paul Beardsley, California State Polytechnic University, Pomona, CA; Connie Berthka, Science and Society Resources, Potomac, MD; and William Watson, Diocese of Camden Catholic Schools, Camden, NJ
Studies demonstrate that evolution is one of the most difficult aspects of biology to teach and learn due to cognitive and cultural barriers to understanding and acceptance core concepts of evolution. Despite the potentially controversial topic of human evolution, research at the college level suggests that a pedagogical focus on human examples is a useful way to teach core concepts of evolutionary biology. Here we report on a project that developed and field tested (1) three curriculum units for high school Advanced Placement biology classes that teach core evolutionary concepts using case studies of human evolution (Adaptation to Altitude, Evolution of Human Skin Color, and Malaria), and (2) a Cultural and Religious Sensitivity (CRS) Teaching Strategies Resource to encourage and help equip high school teachers to promote positive dialogue around the topic of evolution in their classrooms. During the 2013-2014 school year 304 students field tested the curriculum units and 148 students also field tested one of the two CRS activities in 10 schools in 10 states. Feedback indicates that the materials align very well with the criteria established to guide the development process and assessments suggest that they generally increase both understanding and acceptance of evolution among students.

Fidelity of Implementation of Peer Instruction in High School Biology Classrooms
Jennifer Parrish, Grant Gardner, Leigh McNeil, and Tom Cheatham, Middle Tennessee State University, Murfreesboro, TN
This NSF-funded DRK-12 project, Promoting Active Learning in Science (PALS), sought to facilitate and evaluate the transfer of Peer Instruction (PI) from undergraduate physics to high school biology classrooms. Participating high school biology teachers (n = 22) used PI over the course of two semesters. Teacher self-report data, classroom observations, and open-ended questionnaires revealed the motivation for using pedagogically-critical aspects of PI varied by instructor. Teachers often chose not to use PI because of concerns that materials were too high of a cognitive level for their students and numerous adaptations to the pedagogy were made that affected fidelity of the strategy. This presentation will focus on the adaptations necessary to successfully move PI into high school biology classrooms and how to help teachers differentiate PI without unknowingly omitting critical features that can lead to a reduction of pedagogical effectiveness.

SPECIAL GUEST PRESENTER:
Marcelle A. Siegel, University of Missouri, Columbia, MO
Recipient of the 2015 NABT Four-Year Section Research in Biology Education Award
3:30PM – 4:00PM continued

1062 | DNA Sequencing in the High School Classroom

Plaza Court 8 • Biotechnology • Demonstration (30 min) • HS, 2Y
We will introduce the Independent Research Project our students perform on bacterial species identification by way of DNA sequencing. This project has grown out of a collaboration with scientists at the Broad Institute of Harvard and MIT.

Julie Boehm and Ken Bateman, Wellesley High School, Wellesley, MA

4:00PM – 5:30PM
Exhibit Hall Closing Reception
Plaza Court • Special Program • GA
It’s last call in the Exhibit Hall. This is your last chance to talk with exhibitors and get those freebies for the classroom. Join us for a reception, drawings for prizes, and more.

5:30PM – 6:30PM
HHMI Night at the Movies Pre-Reception
Plaza Ballroom E • Special Event (Tickets Required)
This free red-carpet event will begin at 5:30pm with a reception including free food and drink.

6:30PM – 8:00PM
HHMI Night at the Movies with Sean Carroll
Plaza Ballroom ABC • Special Event (Tickets Required)
HHMI BioInteractive (www.biointeractive.org) and NABT are pleased to host the 6th Annual HHMI Night at the Movies with Sean Carroll. Join Dr. Carroll for the premiere of a new short film and discussion.

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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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