SAN DIEGO
2018

NABT
National Association of
Biology Teachers

Professional Development Conference

2018 PROGRAM GUIDE

NOVEMBER 8-11

SHERATON SAN DIEGO
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SAN DIEGO, CA

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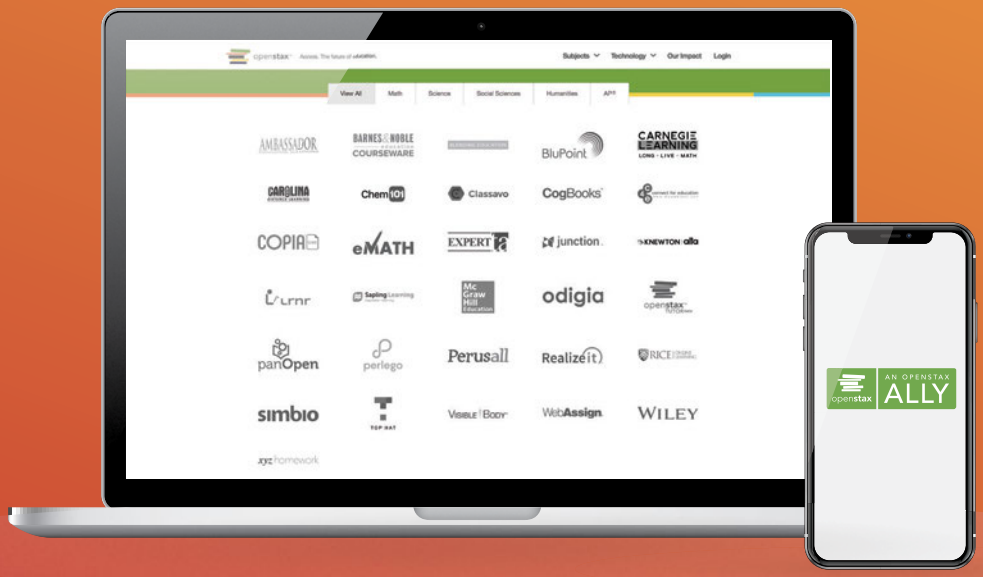

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SPECIAL THANKS

NABT thanks these organizations for their generous support of activities at the 2018 Professional Development Conference.

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SAN DIEGO 2018
NOVEMBER 8–11

NABT Professional Development Conference
SHERATON SAN DIEGO HOTEL & MARINA
SAN DIEGO, CA

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FROM THE PRESIDENT

Elizabeth A. Cowles, Ph.D.
NABT President 2018

A warm welcome to San Diego and the 2018 NABT Professional Development Conference. As the "leader in life science education," our annual conference is a time to share with and learn from each other, to meet and to greet fellow biology educators, and to make new friends. There are many workshops, forums, and seminars from which to choose. This year, we have a record number of posters from educators and students.

Do not miss these conference highlights:

- Thursday's Opening Session with Dr. Katie Hinde
- The Exhibit Hall Opening on Thursday afternoon
- The First Timer's Breakfast on Friday (for first time attendees)
- Friday morning's General Session with Dr. Sean M. Carroll
- HHMI Night at the Movies with Dr. Sean B. Carroll that evening (two Sean Carrolls in a single day—what could be better?)
- Our 2018 NABT Distinguished Service Award presentation to Ed Yong during Saturday's final General Session
- Saturday night's After Hours at the San Diego Zoo

We invite you to meet our leaders and the NABT executive director, Jacki Reeves-Pepin, at the NABT Open Forum Thursday, November 8 from 3–3:30 PM. Bring your suggestions to make NABT better than ever.

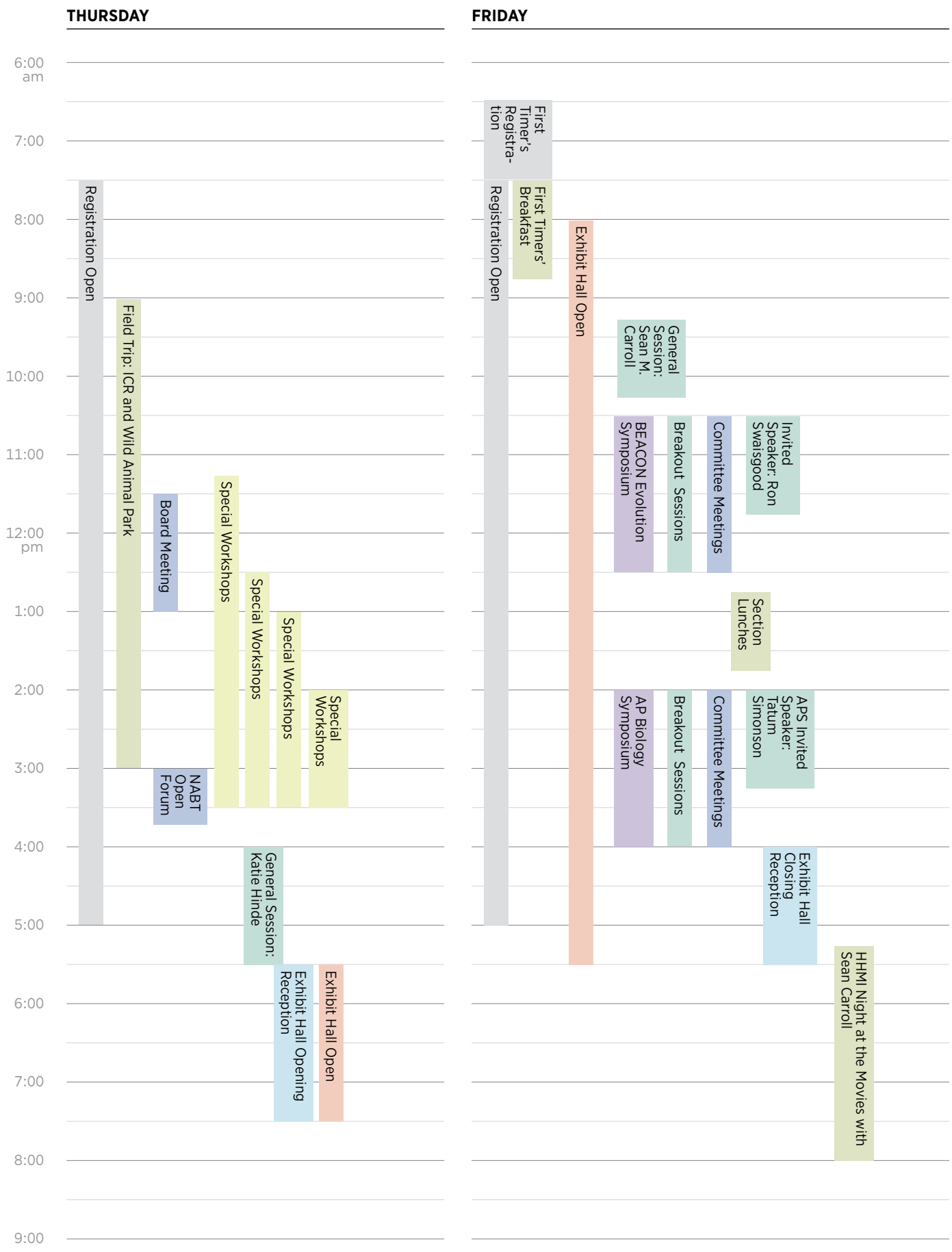
Conference planning is a year-round process. I would like to thank the Professional Development and Conference committees for their time and dedication to make the conference enriching, energetic, and entertaining. Our sponsors' and exhibitors' generosity make our meeting possible; please visit the exhibit hall to thank them personally. Our award sponsors help us to celebrate and to honor our outstanding colleagues. Many thanks to our member volunteers serving on several standing and ad hoc committees, on the Board of Directors, as regional directors, as state and provincial representatives, in BioClub chapters, and in our affiliates. NABT is a collaborative experience on many levels.

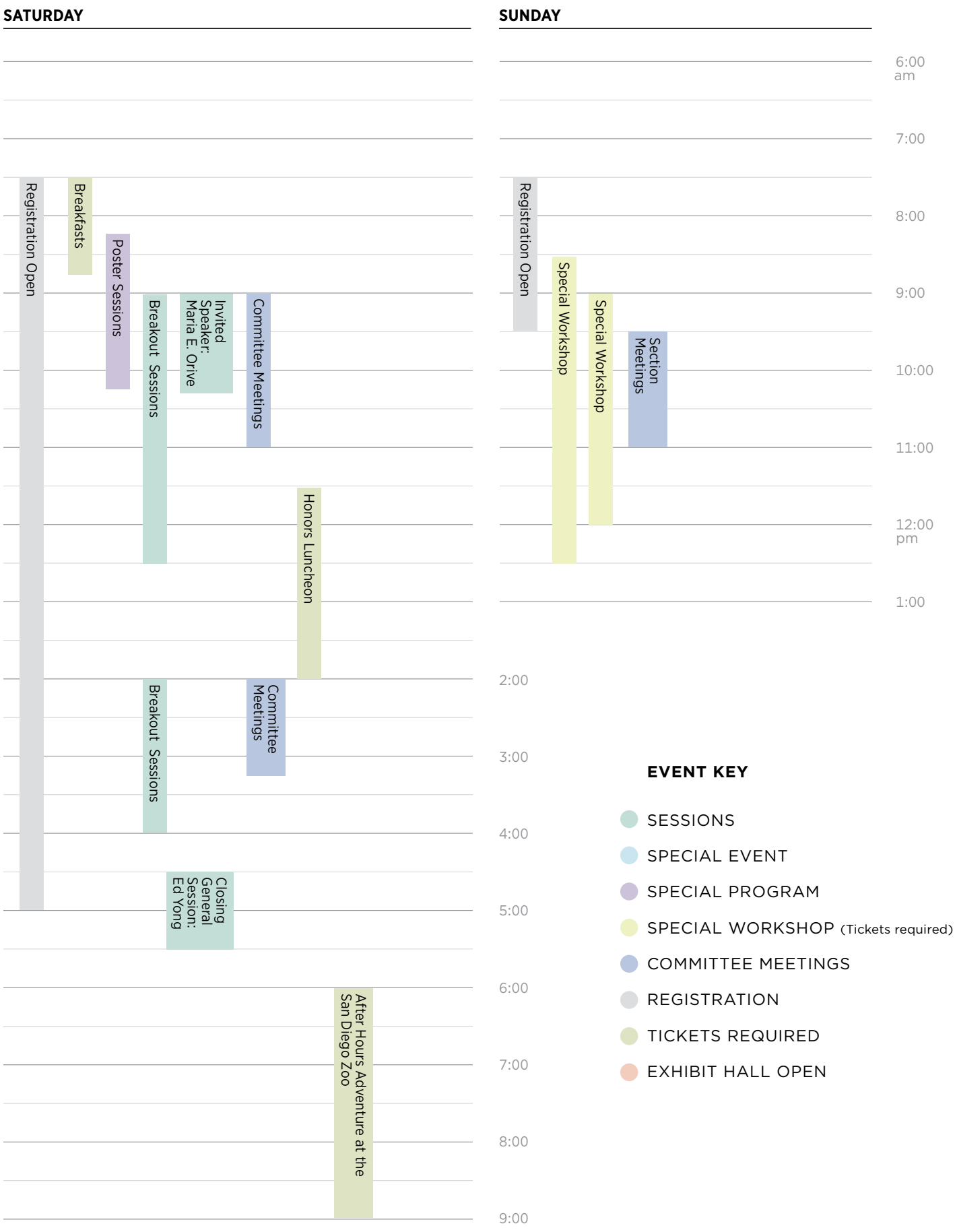
Enjoy the conference and our host city San Diego, with its regional neighborhoods and its cultural offerings. Share your experiences on the NABT Facebook page and #NABT2018 on Twitter. May you depart the conference energized, reinvigorated, and full of new ideas to share with your colleagues and your students.

We hope to see you next year in Chicago!

Elizabeth A. Cowles

Schedule at a Glance




SATURDAY
SUNDAY
Registration Open
Breakfasts
Poster Sessions
Breakout Sessions
Invited Speaker: Maria E. Orive
Committee Meetings
Honors Luncheon
Breakout Sessions
Committee Meetings
Closing General Session: Ed Yong
After Hours Adventure at the San Diego Zoo
Registration Open
Special Workshop
Special Workshop
Section Meetings
6:00 am
7:00
8:00
9:00
10:00
11:00
12:00 pm
1:00
2:00
3:00
4:00
5:00
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EVENT KEY
SESSIONS
SPECIAL EVENT
SPECIAL PROGRAM
SPECIAL WORKSHOP (Tickets required)
COMMITTEE MEETINGS
REGISTRATION
TICKETS REQUIRED
EXHIBIT HALL OPEN

ABOUT THE PROFESSIONAL DEVELOPMENT CONFERENCE

All functions, meetings and exhibits will take place at Sheraton San Diego Hotel & Marina. Please consult this guide and signage for room information.

FOR PERSONS WITH DISABILITIES

Careful thought is given when planning the NABT Conference to make it accessible to all persons. Should you require special services, please go to the registration area to contact an NABT representative. We will strive to meet your needs.

CERTIFICATE OF ATTENDANCE

See page 83.

REGISTRATION HOURS

The NABT registration desk is located in the Nautilus Foyer. It will be open during the following hours:

Wednesday, November 7
4:00 PM – 6:00 PM

Thursday, November 8
7:30 AM – 5:00 PM

Friday, November 9
6:30 AM – 7:30 AM
First Timers' registration

7:30 AM – 5:00 PM

Saturday, November 10
7:00 AM – 6:00 PM

Sunday, November 11
7:30 AM – 9:30 AM

FUTURE NABT CONFERENCE DATES & SITES

2019 Professional Development Conference
November 14–17, 2019
Sheraton Grand Chicago
Chicago, IL

2020 Professional Development Conference
November 5–8, 2020
Baltimore Marriott Waterfont
Baltimore, MD

Use #NABT2018 to Tweet from San Diego!

ABOUT NABT

The National Association of Biology Teachers (NABT) is the leader in life science education.™ Our association is the largest national organization dedicated exclusively to supporting biology and life science educators. Our members—representing all grade levels—teach more than one million students each year! Learn more by visiting www.NABT.org.

VISITING THE EXHIBIT HALL

The NABT Exhibit Hall is your venue to interact with a variety of curriculum publishers, equipment manufacturers, software developers, non-profit partners, and other organizations with resources to benefit you as a biology educator. Receptions, contests, and other special experiences will also be featured in the Exhibit Hall. Registration badges are required for admission to the Exhibit Hall.

Thursday, November 8	5:30 PM – 7:30 PM
Friday, November 9	8:00 AM – 5:30 PM (Closing Reception starts at 4:00 PM)

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TRANSPORTATION FOR FIELD TRIPS AND SPECIAL EVENTS

The NABT Conference will feature two programs that will be offsite. Tickets are required to attend. Please visit the registration desk for more details.

NEW THIS YEAR: 2018 NABT CONFERENCE APP

Search for NABT when you visit the App Store and Google Play to download the app and start using it today!

Providing Session Feedback

All education sessions are reviewed by the NABT Professional Development Committee for acceptance. Help us ensure you see great sessions at the NABT Conference. Use the QR code or visit https://www.surveymonkey.com/r/NABT2018Sessions to submit feedback.

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National Association of Biology Teachers

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Website: www.NABT.org

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Books That Live

Please visit us in booth 107

New and forthcoming titles include:

The Story of Life: Great Discoveries in Biology

SEAN B. CARROLL

ISBN: 978-0-393-63156-2 • AVAILABLE: FALL 2018

A unique opportunity for students to learn biology through stories about biology's great discoveries and the people who make them told by one the great science storytellers of our time: Sean Carroll. This enriching text follows the structure of an introductory biology course, with brief stories that span the breadth of the life sciences. This gives maximum flexibility to assign a few stories, or all of them.

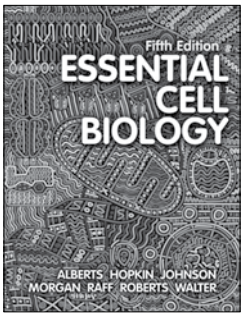
Go to DIGITAL.WWNORTON.COM/STORYOFLIFE for a sample interactive ebook chapter.

Biology Now, Second High School Edition

ANNE HOUTMAN, MEGAN SCUDELLARI, CINDY MALONE, REBECCA BREWER

ISBN: 978-0-393-66376-1 • AVAILABLE NOW

Developed by a science journalist and instructors at both the college and high school level, *Biology Now*, High School Edition, was created with three distinct goals in mind: to increase students' ability to think critically, encourage them to identify and engage with the world around them, and to tie the concepts they learn to Next Generation Science Standards. A robust digital program further reinforces these goals.



Essential Cell Biology, Fifth Edition

BRUCE ALBERTS, KAREN HOPKIN, ALEXANDER JOHNSON, DAVID MORGAN, MARTIN RAFF, KEITH ROBERTS, PETER WALTER

ISBN: 978-0-393-67953-3 • AVAILABLE: FALL 2018

The gold standard textbook, thoroughly updated, now with online homework. For the first time ever, *Essential Cell Biology* will come with access to Smartwork5, Norton's innovative online homework platform, creating a more complete learning experience. Additional resources include an Interactive Instructor's Guide featuring over 100 videos from expert sources.

Go to DIGITAL.WWNORTON.COM/ECB5 to try Smartwork5 and an read an interactive ebook sample chapter.

For a full catalog of our biology titles, go to WWNORTON.COM/BIOLOGY

SEAN CARROLL: PHOTOGRAPHY BY HADAR GOREN

THURSDAY November 8

Katie Hinde, Ph.D.

Associate Professor, School of Human Evolution and Social Change
Center for Evolution and Medicine, Arizona State University, Tempe, AZ

For session details, see page 24.

Katie Hinde is an Associate Professor in the School of Human Evolution and Social Change, Center for Evolution and Medicine, at Arizona State University. As Director of the Comparative Lactation Lab, she investigates the evolutionary ecology and behavioral biology of milk, mothers, and infants. Hinde earned a B.A. in Anthropology from the University of Washington in 1999 and a Ph.D. in Anthropology from UCLA in 2008. In addition to dozens of scholarly publications, Hinde co-edited "Building Babies: Primate Developmental Trajectories in Ultimate and Proximate Perspective", and Hinde's TED talk "What We Don't Know About Mother's Milk" has been viewed over one million times. Hinde received Early Career Achievement Awards from the American Society of Primatologists and the International Society for Research in Human Milk and Lactation and has been recognized for her public outreach, sustainability, and academic activism. She showcases research on mother's milk, breastfeeding, and lactation for the general public, clinicians, and researchers at her blog "Mammals Suck... Milk!" Hinde is also the founder, director, and Editor-in-Chief for *March Mammal Madness*, an annual online science celebration since 2013.

FRIDAY November 9

Sean M. Carroll, Ph.D.

Research Professor of Physics
Walter Burke Institute for Theoretical Physics, Caltech, Pasadena, CA

For session details, see page 27.

Sean Carroll is a Research Professor of theoretical physics at the California Institute of Technology. He received his Ph.D. in 1993 from Harvard University. His research focuses on fundamental physics and cosmology, quantum gravity and spacetime, and the evolution of entropy and complexity. He is the author of The Big Picture: On the Origins of Life, Meaning, and the Universe Itself; The Particle at the End of the Universe: How the Hunt for the Higgs Boson Leads Us to the Edge of a New World; From Eternity to Here: The Quest for the Ultimate Theory of Time; and the textbook Spacetime and Geometry: An Introduction to General Relativity. He has been awarded prizes and fellowships by the National Science Foundation, NASA, the Sloan Foundation, the Packard Foundation, the American Physical Society, the American Institute of Physics, the Freedom From Religion Foundation, the Royal Society of London, and the Guggenheim Foundation. He frequently consults for film and television, and has been featured on shows such as *The Colbert Report*, PBS's *NOVA*, and *Through the Wormhole with Morgan Freeman*.

GENERAL SESSION SPEAKER

SATURDAY November 10

Ed Yong

The Atlantic
Washington, DC

Ed Yong is a science journalist who reports for *The Atlantic* and is based in Washington DC. His work appears several times a week on The Atlantic's website, and has also been featured in National Geographic, the New Yorker, Wired, Nature, New Scientist, Scientific American, and many more. He has won a variety of awards, including the Byron H. Waksman Award for Excellence in the Public Communication of Life Sciences in 2016, and the National Academies Keck Science Communication Award in 2010. *I Contain Multitudes*, his first book, became a New York Times best-seller and inspired an online film series, an anthology of plays, and a clue on Jeopardy!. Ed has a Chatham Island black robin named after him.

DISTINGUISHED SERVICE AWARD WINNER

NABT is proud to honor Mr. Ed Yong with the 2018 NABT Distinguished Service Award.

For session details, see page 61.

FEATURED SPEAKER

SATURDAY November 10

Kirstie Ruppert

Senior Research Coordinator, Community Engagement
Institute for Conservation Research, San Diego Zoo Global, Escondido, CA

Kirstie Ruppert works at the research arm of San Diego Zoo Global on the Community Engagement team. In this position, she conducts social research to understand the human dimensions of conservation issues and to evaluate conservation learning programs. Her current efforts are concentrated in Kenya, leading social science and community outreach for SDZG conservation efforts and assisting conservation organizations in the region with their education and evaluation planning. She is interested in the cultural relevance of wildlife conservation, approaches to understand and address human-wildlife conflicts, and the integration of human dimensions information with ecological data to address complex issues. Kirstie has a B.Sc. in Environmental Sciences from the University of California, Los Angeles, and a M.A. in Zoology from Miami University. She is a Ph.D. candidate at the University of Maine in Human Dimensions of Ecology and Environmental Sciences, studying illegal wildlife hunting behavior and poaching as a threat to giraffes.

For session details, see page 63.

INVITED SPEAKERS

FRIDAY November 9

APS SPONSORED SPEAKER

Tatum Simonson, Ph.D.

Assistant Professor, Department of Medicine, School of Medicine
University of California San Diego, La Jolla, CA

Tatum Simonson applies integrative physiological genomics approaches to understand systems-level responses to low oxygen (hypoxia) in highland populations. Her research provides evidence for genetic adaptations to high altitude and identifies associations among adaptive genetic factors and physiological traits. Aside from her research in the highlands of Tibet and Peru, her team studies natural variation in human responses to low oxygen and aims to understand the contributions of genetic and epigenetic factors to variation in hypoxia-related disease states (e.g., sleep apnea, altitude illness, and cardiopulmonary disease). These and related interdisciplinary efforts are coordinated through the recently developed Center for Physiological Genomics of Low Oxygen (CPGLO) at UC San Diego.

For session details, see page 36.

Ron Swaisgood, Ph.D.

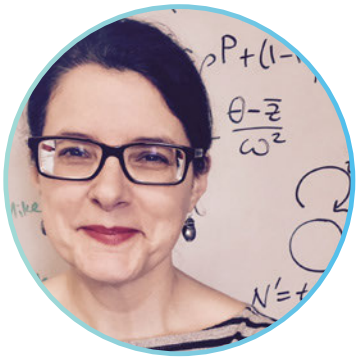
Director, Recovery Ecology
Institute for Conservation Research, San Diego Zoo Global, Escondido, CA

Ron Swaisgood serves San Diego Zoo Global as the Brown Endowed Director of Recovery Ecology. He also heads the Giant Panda Conservation Unit and is the General Scientific Director of the Cocha Cashu Biological Station in Manu National Park, in the Peruvian Amazon. Ron has a bachelor's degree from the University of North Carolina at Chapel Hill and a Ph.D. in Animal Behavior from the University of California, Davis. His interests lie primarily in the pragmatic application of ecological and behavioral knowledge to solving conservation problems, and he oversees conservation programs for several diverse species. His research focuses around themes involving habitat use and requirements, anthropogenic threats, translocation biology, and conservation breeding. As an advocate for reconnecting society to nature, he has served on committees for the Children & Nature Network, is co-President of San Diego Children & Nature Collaborative, and co-founded Family Adventures in Nature in 2009.

Special consideration provided by Bio-Rad.

For session details, see page 33.

SATURDAY November 10



SCOTT WILLIAMSON SPEAKER SERIES

Maria E. Orive, Ph.D.

Associate Professor, Department of Ecology & Evolutionary Biology
University of Kansas, Lawrence, KS

Maria E. Orive is an associate professor of evolutionary theory in the Department of Ecology and Evolutionary Biology at the University of Kansas. Her research develops mathematical models that provide a conceptual framework for exploring important questions in evolutionary biology. She has focused on the role of reproductive strategy in shaping the genetic diversity available for evolution to act on, and the relative strength of those evolutionary forces.

Maria received her B.S. with Honors from Stanford University, and her Ph.D. from the University of California at Berkeley. She was awarded an NSF Minority Graduate Fellowship and was an NSF-NATO Postdoctoral Fellow at the University of Edinburgh. During 2007-2008, she was the Carl and Lily Pforzheimer Foundation Fellow at the Radcliffe Institute for Advanced Study at Harvard University.

For session details, see page 47.

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NABT BioClub **Chris Monsour**
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Two-Year College Biology Section **Katrina Marcos**

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Sustainability Education **Teddie Phillipson-Mower**
Introductory Biology Task Force **Anna Hiatt and Cindy Gay**

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Colorado Biology Teachers Association **(CBTA)**
Cleveland Regional Association of Biologists **(CRABS)**
Connecticut Association of Biology Teachers **(CTABT)**
Delaware Association of Biology Teachers **(DABT)**
Empire State Association of Two-Year College Biologists **(ESATYCB)**
Hong Kong Association of Biology Teachers **(HKABT)**
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Illinois Association of Community College Biologists **(IACCB)**
Indiana Association of Biology Teachers **(IABT)**
Kansas Association of Biology Teachers **(KABT)**
Louisiana Association of Biology Teachers **(LABT)**
Massachusetts Association of Biology Teachers **(MABT)**
Michigan Association of Biology Teachers **(MABT)**
Mississippi Association of Biology Educators **(MSABE)**
Missouri Association of Biology Teachers **(MOBioTA)**
New York Biology Teachers Association **(NYBTA)**
South Carolina Association of Biology Teachers **(SCABT)**
Texas Association of Biology Teachers **(TABT)**
Tennessee Association of Biology Teachers **(TNABT)**
Virginia Association of Biology Teachers **(VABT)**

NABT is looking for a few good leaders: leaders like you. Committee and section meetings are open to all NABT members and you are invited to learn more about – and help develop – the programs that support you.

FULL MEETING SCHEDULE:

Member Resources Committee	Fri.	10:30 AM – 11:45 AM	Room 511
Pre-Service Teacher Committee	Fri.	10:30 AM – 11:45 AM	Room 514
Retired Member Committee	Fri.	12:00 PM – 12:30 PM	Room 511
Social Media Committee	Fri.	12:00 PM – 12:30 PM	Room 514
Awards Committee	Fri.	2:00 PM – 3:15 PM	Room 511
ABT Advisory Committee	Fri.	2:00 PM – 3:15 PM	Room 514
Archival Committee	Fri.	3:30 PM – 4:00 PM	Room 511
Nominating Committee	Fri.	3:30 PM – 4:00 PM	Room 514
Equity Committee	Sat.	9:00 AM – 10:15 AM	Room 511
Global Outreach Committee	Sat.	9:00 AM – 10:15 AM	Room 514
Conference Committee	Sat.	10:30 AM – 11:00 AM	Room 511
Professional Development Committee	Sat.	10:30 AM – 11:00 AM	Room 514
OBTA Directors	Sat.	2:00 PM – 3:15 PM	Room 511
Citizen Science Committee	Sat.	2:00 PM – 3:15 PM	Room 514
Four-Year College & University Section	Sun.	9:00 AM – 11:00 AM	Spinnaker 1
Two-Year College Section	Sun.	9:00 AM – 11:00 AM	Spinnaker 2
AP Biology Section	Sun.	9:00 AM – 11:00 AM	Seabreeze 1
Introductory Biology Task Force	Sun.	9:00 AM – 11:00 AM	Seabreeze 2

BIOCLUB STUDENT AWARDS

Hanna Bradford
Blue Valley Center for Professional Learning, Overland Park, KS

Riley Zollars
Vincennes University, Vincennes, IN

Outstanding student members of a NABT Bio-Club are eligible for this textbook scholarship, with one student from a BioClub high school chapter and one student from a community college chapter being eligible each year.

Sponsored by Carolina Biological Supply Company

BIOLOGY EDUCATOR LEADERSHIP SCHOLARSHIP (BELS)

Traci Richardson
Stillwater High School, Stillwater, OK

The Biology Educator Leadership Scholarship (BELS) supports teachers who are furthering their education in the life sciences or science education. The award recipient is a practicing educator who has been accepted into a graduate program at a Masters or Doctoral level.

Sponsored by NABT Member Donations

DISTINGUISHED SERVICE AWARD

Ed Yong
The Atlantic, Washington, D.C.

Established in 1988 to commemorate the 50th anniversary of the NABT, the Distinguished Service Award is presented to a nationally recognized individual who has made major contributions to biology education through his or her research, writing, and teaching.

Sponsored by the National Association of Biology Teachers

ECOLOGY/ENVIRONMENTAL SCIENCE TEACHING AWARD

Angela "Lacey" Hoosier
Buckeye High School, Deville, LA

This award recognizes a middle or high school teacher who has successfully developed and demonstrated an innovative approach in the teaching of ecology/environmental science and has carried their commitment to the environment into the community.

Sponsored by Vernier Software and Technology

EVOLUTION EDUCATION AWARD

Amanda Glaze
Georgia Southern University, Statesboro, GA

This award recognizes innovative classroom teachers and their efforts to promote the accurate understanding of biological evolution within the larger community.

Sponsored by BEACON and BSCS

FOUR-YEAR COLLEGE & UNIVERSITY SECTION BIOLOGY TEACHING AWARD

A. Malcolm Campbell
Davidson College, Davidson, NC

This award recognizes creativity and innovation in undergraduate biology teaching, including curriculum design, teaching strategies, and laboratory utilization that have been implemented and demonstrated to be effective.

Sponsored by NABT's Four-Year College & University Section

FOUR-YEAR COLLEGE & UNIVERSITY SECTION RESEARCH IN BIOLOGY EDUCATION AWARD

Sara Brownell
Arizona State University, Tempe, AZ

Recognizing innovation in research that furthers our understanding of undergraduate biology teaching, this award is given to an individual who displays creativity in scholarship and research in biology education.

Sponsored by NABT's Four-Year College & University Section

GENETICS EDUCATION AWARD

Myron Blosser
Harrisonburg High School, Harrisonburg, VA

This award recognizes innovative, student-centered classroom instruction that promotes the understanding of genetics and its impact on inheritance, health, and biological research.

Sponsored by ASHG and GSA

HONORARY MEMBERSHIP

Mike Sipes
Retired Teacher, Lakewood, CO

The highest honor from the association, the Honorary Membership recognizes those individuals who have achieved distinction in teaching, research, or service in the biological sciences and designates them lifetime members of NABT.

Sponsored by the National Association of Biology Teachers

THE KIM FOGLIA AP® BIOLOGY SERVICE AWARD

Kirstin Milks
Bloomington High School South, Bloomington, IN

The Kim Foglia AP® Biology Service Award recognizes an AP® Biology teacher who displays a willingness to share materials, serves as a mentor to both students and professional colleagues, creates an innovative and student centered classroom environment, and exemplifies a personal philosophy that encourages professional growth as a teacher and member of the AP® community.

Sponsored by the Neil A. Campbell Educational Trust and Pearson

OUTSTANDING BIOLOGY TEACHER AWARD (OBTA)

See the full OBTA listing for 2018 Honorees

For over 50 years, the Outstanding Biology Teacher Award (OBTA) honors outstanding biology educators from grades 7-12 who are judged on their teaching ability and experience, cooperativeness in the school and community, creativity, inventiveness, initiative, and student-teacher relationships.

Sponsored by Carolina Biological Supply Company, with special consideration from Bio-Rad Laboratories, the Botanical Society of America, Flinn Scientific, The MiniOne System, PASCO Scientific, and Population Connection.

OUTSTANDING NEW BIOLOGY TEACHER ACHIEVEMENT AWARD

Kiki Contreras
The Evergreen School, Shoreline, WA

This award recognizes outstanding teaching in grades 7-12 by a "new" biology/life science instructor within their first three years of teaching biology who has developed an original and outstanding program or technique while also making a contribution to the profession at the start of their career.

Sponsored by the Neil A. Campbell Educational Trust and Pearson

PROF. CHAN TWO-YEAR COLLEGE AWARD FOR THE ENGAGED TEACHING OF BIOLOGY

Olga Calderón
LaGuardia Community College, Long Island, NY

This award recognizes a two-year college faculty member who has successfully developed and demonstrated an innovative, hands-on approach in the teaching of biology and has carried their commitment into the community to promote biology education.

Sponsored by Sarah McBride and John Melville

THE RON MARDIGIAN BIOTECHNOLOGY TEACHING AWARD

Joshua Paschedag
Lindblom Math and Science Academy, Chicago, IL

This award recognizes a secondary school teacher or undergraduate college biology instructor who demonstrates outstanding and creative teaching of biotechnology by incorporating active laboratory work in the classroom.

Sponsored by Bio-Rad Laboratories

TWO-YEAR COLLEGE BIOLOGY TEACHING AWARD

Josephine Pino
Portland Community College, Portland, OR

This award recognizes a two-year college biology educator who employs new and creative techniques to demonstrate excellence in teaching and scholarship through publications, teaching strategies, curriculum design, or laboratory utilization.

Sponsored by NABT's Two-Year College Section and Cell Zone, Inc.

OBTA OUTSTANDING

OBTA HONOREES 2018

Region I

Erica Archambault
Terryville High School
Burlington, CT

David Mangus
Brockton High School
Paxton, MA

Region II

Peter McLean
St. Andrew's School
Middletown, DE

Reena Ninan
Kingsway Regional High School
Mickleton, NJ

Samuel Washington
Woodlands High School
Hartsdale, NY

Kelley Bethoney
Episcopal Academy
Wynnewood, PA

Linda Correll
Kettle Run High School
Warrenton, VA

Region III

Pamela Phelps
Oswego High School
Oswego, IL

Kirstin Milks
Bloomington High School South
Bloomington, IN

Alison Maes
Ferndale High School
Ferndale, MI

Kevin English
Perrysburg High School
Perrysburg, OH

Stacey Strandberg
Divine Savior Holy Angels High School
Milwaukee, WI

Region IV

Jesica Rhodes
Santa Fe Trail High School
Baldwin City, KS

Chuck McWilliams
Maplewood Richmond Heights High School
St. Louis, MO

Dawn Fuelberth
Skutt Catholic High School
Omaha, NE

Angela Wachal
Harrisburg High School
Harrisburg, SD

Region V

Susan Dillery
Taylor County High School
Campbellsville, KY

Mary Ruffin
White Oak High School
Jacksonville, NC

Dale Jacobs
Lower Richland High School
Hopkins, SC

Thomas Cox
Brentwood Academy
Brentwood, TN

Rachel Eades-Gill
Midland Trail High School
Ansted, WV

Region VI

Mary Busbee
Vestavia Hills High School
Vestavia Hills, AL

Diana Moore
Lithia Springs High School
McDonough, GA

Gina Rhodes
South Terrebonne High School
Bourg, LA

Crystal Bigham
Pontotoc High School
Pontotoc, MS

Region VII

Jeremy Jonas
Tucson High Magnet School
Tucson, AZ

SueAnn Whisker
Cabot High School
Cabot, AR

Tanner Bryan
Stillwater High School
Stillwater, OK

John Mead
St. Mark's School of Texas
Allen, TX

Region VIII

Justin Silcox
Glenwood Springs High School
Glenwood Springs, CO

Lily Apedaile
Frenchtown High School
Frenchtown, MT

Kristin Birdzell
Elko High School
Elko, NV

Dana McIlvain
Cheyenne Central High School
Cheyenne, WY

Region IX

Amy Welch
Sonora High School
La Habra, CA

Nel Venzon
Mililani High School
Mililani, HI

Tai Quirke
Sam Barlow High School
Gresham, OR

Lisa Garcia
A.C.Davis High School
Yakima, WA

Outstanding Biology Teacher Award

For over 50 years the National Association of Biology Teachers has been committed to recognizing outstanding biology teachers.

The Outstanding Biology Teacher Award is proudly sponsored by:

CAROLINA®
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Other consideration provided by Bio-Rad Laboratories, the Botanical Society of America, Flinn Scientific, The MiniOne System, PASCO Scientific, and Population Connection.

THANK YOU TO OUR OBTA DIRECTORS

NABT would like to thank our OBTA Directors, whose ongoing commitment to this program has helped NABT present the award to thousands of outstanding teachers.

NABT
National Association of Biology Teachers

PAST PRESIDENTS & CONFERENCE LOCATIONS

2017 — Susan Finazzo, St. Louis, MO
2016 — Bob Melton, Denver, CO
2015 — Jane Ellis, Providence, RI
2014 — Stacey Kiser, Cleveland, OH
2013 — Mark Little, Atlanta, GA
2012 — Donald French, Dallas, TX
2011 — Dan Ward, Anaheim, CA
2010 — Bunny Jaskot, Minneapolis, MN
2009 — John M. Moore, Denver, CO
2008 — Todd Carter, Memphis, TN
2007 — Pat Waller, Atlanta, GA
2006 — Toby Horn, Albuquerque, NM
2005 — Rebecca E. Ross, Milwaukee, WI
2004 — Betsy Ott, Chicago, IL
2003 — Catherine W. Ueckert, Portland, OR
2002 — Brad Williamson, Cincinnati, OH
2001 — Ann S. Lumsden, Montreal, QC, Canada
2000 — Phil McCrea, Orlando, FL
1999 — Richard D. Storey, Ft. Worth, TX
1998 — ViviannLee Ward, Reno, NV
1997 — Alan McCormack, Minneapolis, MN
1996 — Elizabeth Carvellas, Charlotte, NC
1995 — Gordon E. Uno, Phoenix, AZ
1994 — Barbara Schulz, St. Louis, MO
1993 — Ivo E. Lindauer, Boston, MA
1992 — Alton L. Biggs, Denver, CO
1991 — Joseph D. McInerney, Nashville, TN
1990 — Nancy V. Ridenour, Houston, TX
1989 — John Penick, San Diego, CA
1988 — Jane Abbott, Chicago, IL
1987 — Donald S. Emmeluth, Cincinnati, OH
1986 — George S. Zahrobsky, Baltimore, MD
1985 — Thomas R. Mertens, Orlando, FL
1984 — Marjorie King, Purdue Univ., IN
1983 — Jane Butler Kahle, Philadelphia, PA
1982 — Jerry Resnick, Detroit, MI
1981 — Edward J. Kormondy, Las Vegas, NV
1980 — Stanley D. Roth, Boston, MA
1979 — Manert Kennedy, New Orleans, LA
1978 — Glen E. Peterson, Chicago, IL
1977 — Jack L. Carter, Anahein, CA
1976 — Haven Kolb, Denver, CO
1975 — Thomas J. Cleaver, Portland, OR
1974 — Barbara K. Hopper, New York, NY
1973 — Addison E. Lee, St. Louis, MO
1972 — Claude A. Welch, San Francisco, CA
1971 — H. Bently Glass, Chicago, IL
1970 — Robert E. Yager, Denver, CO
1969 — Burton E. Voss, Philadelphia, PA
1968 — Jack Fishleder, Anaheim, CA
1967 — William V. Mayer, New York, NY w/AAAS
1966 — Arnold B. Grobman, Washington, D.C. w/AAAS
1965 — L. S. McClung, U of CA, Berkley w/AAAS
1964 — Ted F. Andrews, Boulder, CO w/AIBS
1963 — Philip R. Fordyce, U of MA, Amherst, MA w/AIBS
1962 — Muriel Beuschlein, Corvalis, OR w/AIBS
1961 — Paul V. Webster, Denver, CO w/AAAS
1960 — Howard E. Weaver, New York City, NY w/AAAS
1959 — Paul Klinge, Chicago, IL w/AAAS
1958 — Irene Hollenbeck, Washington, D.C. w/AAAS
1957 — John Breukelman, Indianapolis, IN w/AAAS
1956 — John P. Harrold, New York City, NY w/AAAS
1955 — Bro. H. Charles Severin, Atlanta, GA w/AAAS
1954 — Arthur J. Baker, Berkley, CA w/AAAS
1953 — Leo F. Hadsall, Boston, MA w/AAAS
1952 — Harvey E. Stork, St. Louis, MO w/AAAS
1951 — Richard L. Weaver, Philadelphia, PA w/AAAS
1950 — Betty L. Wheeler, Cleveland, OH w/AAAS
1949 — Ruth A. Dodge, New York City, NY w/AAAS
1948 — Howard A. Michaud, Washington, D.C. w/AAAS
1947 — E. Laurence Palmer, Chicago, IL w/AAAS
1946 — Prevo L. Whitaker, Boston, MA w/AAAS
1945 — Helen Trowbridge, St. Louis, MO w/AAAS
1944 — Merle A. Russell, No Meeting
1943 — Merle A. Russell, No Meeting
1942 — Homer A. Stephens, No Meeting
1941 — George W. Jeffers, Dallas, TX w/AAAS
1940 — Malcolm D. Campbell, Philadelphia, PA w/AAAS
1939 — Myrl C. Lichtenwalter, Columbus, OH w/AAAS
1938 — First Formal Meeting*, Richmond, VA w/ AAAS
* birth of NABT occurred on July 1, 1938 in New York City, NY

HONORARY MEMBERS

2018 — Michael Sipes
2017 — John M. Moore
2016 — Margaret (Betsy) Ott
2015 — Sharon Radford
2014 — Jay Labov
2013 — Todd Carter
2012 — Maura Flannery
2011 — Louisa Stark
2010 — Patricia Waller, Brad Williamson
2009 — NOT AWARDED
2008 — Donald Cronkite
2007 — William H. Leonard
2006 — Terry Hufford
2005 — Randy Moore, Eugenie Scott
2004 — John Penick
2003 — Donald Emmeluth
2002 — Leonard Blessing
2001 — Gordon E. Uno
2000 — Elizabeth Carvellas
1999 — NOT AWARDED
1998 — Ivo Lindauer
1997 — Sam Rhine
1996 — Kenneth S. House
1995 — Joseph D. Novak
1994 — Nancy V. Ridenour, Alton L. Biggs
1993 — George S. Zahrobsky
1992 — Jon R. Hendrix
1991 — Robert E. Yager
1990 — Jane Butler Kahle
1989 — Joseph D. McInerney
1988 — Thomas Mertens, Marjorie King
1987 — Floyd Nordland
1986 — Donald S. Dean
1985 — Stanley Weinberg
1984 — Jack Carter, Samuel Postlethwait
1983 — Manert Kennedy
1982 — Harold "Sandy" Wiper, Jerry P. Lightner
1981 — Sophie Wolfe
1980 — Sister M. Gabrielle, Ted F. Andrews
Sister Marian Catherine McGrann
1979 — Ingrith Olsen
1978 — John A. Moore
1977 — Addison E. Lee
1976 — Paul DeHart Hurd
1975 — Garrett Hardin, Stanley E. Williamson
1974 — H. Seymour Fowler
1973 — William V. Mayer
1972 — Chester A. Lawson, Paul E. Klinge, Robert L. Gantert
1971 — NOT AWARDED
1970 — NOT AWARDED
1969 — Arnold B. Grobman
1968 — NOT AWARDED
1967 — NOT AWARDED
1966 — NOT AWARDED
1965 — John Breukelman, H. Bentley Glass, George W. Beadle, Paul B. Sears, Brother H. Charles Severin
1964 — E. Laurence Palmer, Hermann J. Muller
Roger Tory Peterson, Oscar Riddle, Helen Irene Battle

NABT DISTINGUISHED SERVICE AWARD RECIPIENTS

2018 — Ed Yong, *The Atlantic,* Washington, D.C.

2017 — May Berenbaum, University of Illinois Urbana-Champaign, Urbana, IL

2016 — Temple Grandin, Colorado State University, Fort Collins, CO

2015 — Carl Zimmer, Yale University, New Haven, CT

2014 — The Lacks Family (descendents of Henrietta Lacks), Baltimore, MD

2013 — Rita R. Colwell, University of Maryland College Park and Johns Hopkins University Bloomberg School of Public Health, College Park, MD

2012 — Michael Pollan, UC Berkeley Graduate School of Journalism, Berkeley, CA

2011 — Neil Shubin, University of Chicago, Chicago, IL

2010 — Richard Dawkins, The Richard Dawkins Foundation for Reason and Science, Falcon, CO

2009 — Mario Capecchi, University of Utah, Salt Lake City, UT

2008 — Ken Miller, Brown University, Providence, RI

2007 — Sean Carroll, University of Wisconsin — Madison, Madison, WI

2006 — Shirley Malcom, AAAS, Washington, D.C.

2005 — James A. Thompson, University of Wisconsin–Madison, Madison, WI; and Nina Leopold Bradley, Aldo Leopold Foundation, Baraboo, WI

2004 — Barbara Bancroft, RN, CPP Associates, Inc., Chicago, IL

2003 — Roberta Pagon, M.D., Children's Hospital & Regional Medical Center, Seattle, WA

2002 — Thomas E. Lovejoy, The H. John Heinz III Center for Science, Economics and the Environment, Washington, D.C.

2001 — E.O. Wilson, Harvard University, Cambridge, MA

2000 — Roger and Deborah Fouts, Chimpanzee and Human Communication Institute, Ellensburg, WA

1999 — Jack Horner, Museum of the Rockies, Bozeman, MT

1998 — Leroy Hood, University of Washington, Seattle, WA

1997 — Neal Lane, National Science Foundation, Washington, D.C.; and Donald Kennedy, Stanford University, Palo Alto, CA

1996 — Francis Collins, National Institutes of Health, Bethesda, MD

1995 — Carl Djerassi, Stanford University, Palo Alto, CA

1994 — Bruce Alberts, National Academy of Sciences, Washington, D.C.

1993 — Nancy S. Wexler, College of Physicians and Surgeons of Columbia University, New York State Psychiatric Institute, New York, NY

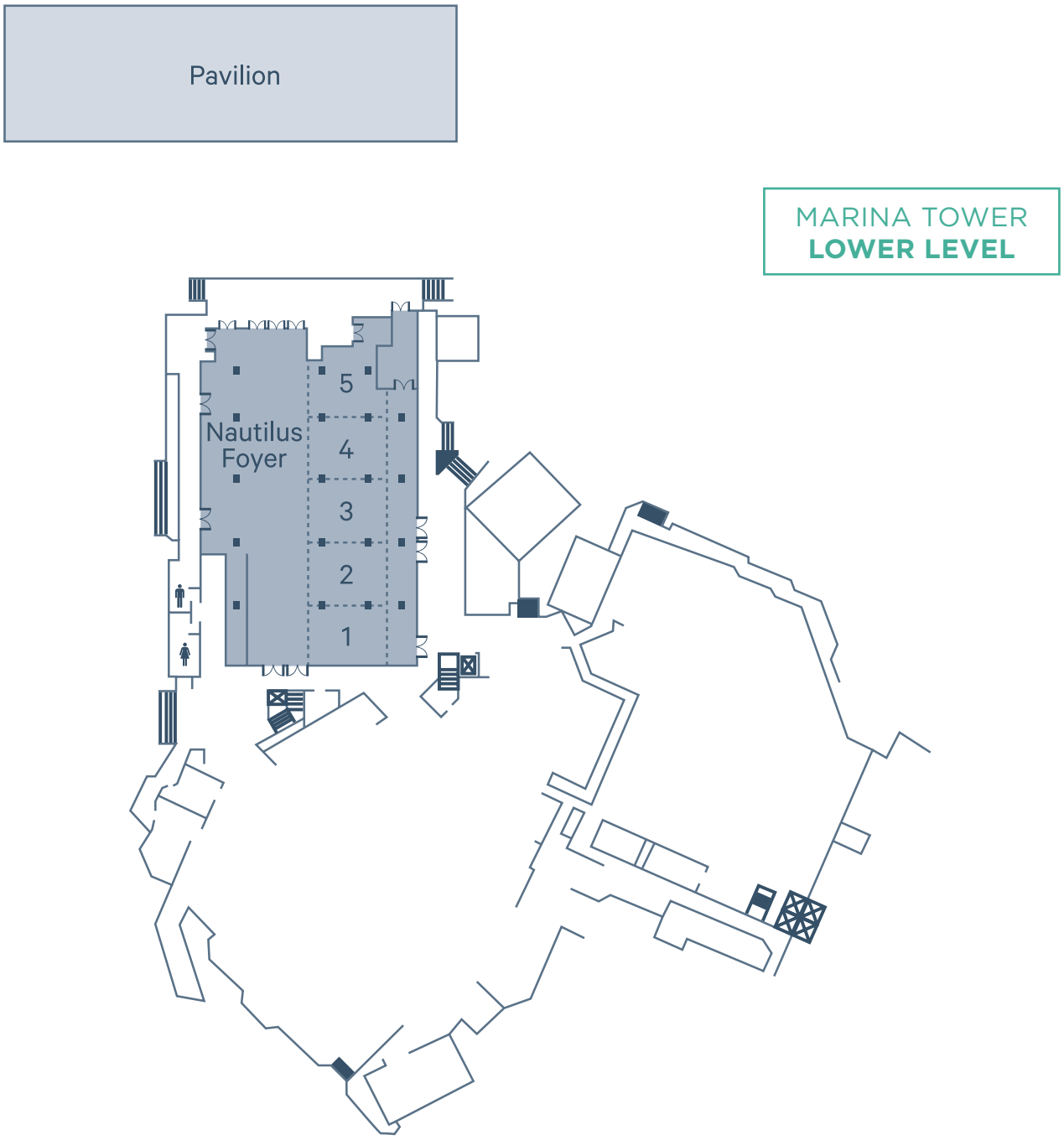
1992 — Paul R. Ehrlich, Stanford University, Palo Alto, CA

1991 — Stephen Jay Gould, Harvard University, Cambridge, MA

1990 — Peter Raven, Missouri Botanical Garden, St. Louis, MO

1989 — Stanley Cohen, Stanford University, Palo Alto, CA

1988 — Lynn Margulis, University of Massachusetts, Boston, MA; and James D. Watson, Cold Spring Laboratory, Cold Spring Harbor, NY


Pavilion
MARINA TOWER
LOWER LEVEL
Nautilus
Foyer
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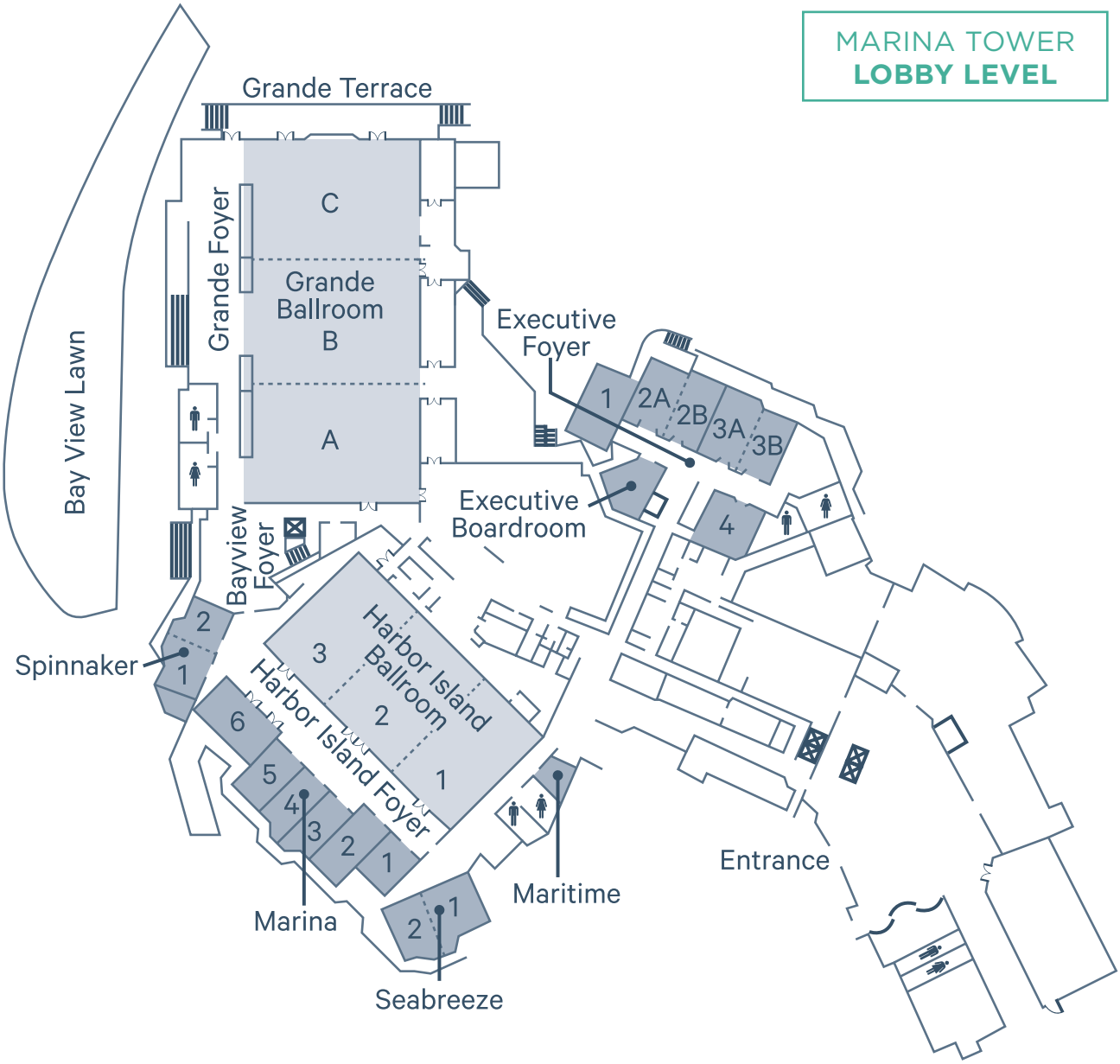
MARINA TOWER
LOBBY LEVEL
Grande Terrace
Bay View Lawn
Grande Foyer
C
Grande Ballroom B
A
Executive Foyer
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2A
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3A
3B
Executive Boardroom
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Bayview Foyer
Harbor Island Ballroom
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Spinnaker
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Marina
Maritime
Entrance
2
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Seabreeze

MEAL FUNCTIONS

FRIDAY November 9

First Timers' Breakfast

7:30 AM – 8:45 AM
FREE (Tickets Required)

NABT Conference "first timers" are invited to learn more about 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 San Diego.

The NABT First Timers' Breakfast is made possible through the generous support of HHMI BioInteractive.

AP Biology Section Luncheon

12:45 PM – 1:45 PM
~~**$10 Advance / $15 Onsite**~~ SOLD OUT

Meet other AP Biology teachers in a friendly informal setting to ask questions, share insight, and build community. You may even finally get to meet some of your favorite fellow AP teachers in person. The luncheon also includes a special presentation of the *Kim Foglia AP Biology Service Award*.

SOLD OUT

Sponsored by minipcr

Four-Year College & University Section Luncheon

12:45 PM – 1:45 PM
~~**$10 Advance / $15 Onsite**~~ SOLD OUT

Do you teach at a four-year college or university? Join faculty, education researchers, graduate students, and others for some networking and nourishment. The lunch will include a meeting to highlight projects and initiatives of the section, including a special presentation of the *Four-Year College & University Section Awards*.

SOLD OUT

Two-Year College Section Luncheon

12:45 PM – 1:45 PM
$10 Advance / $15 Onsite

Join other two-year college instructors to share your successes, challenges, epiphanies, and best practices over lunch. The winners of the *Two-Year College Biology Teaching* and *Prof. Chan Teaching Award* will also be recognized.

SATURDAY November 10

BioClub Breakfast

7:30 AM – 8:45 AM
FREE (Tickets Required)

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 CAROLINA www.carolina.com

Abbreviation Key
MS: Middle School; **HS:** High School; **2Y:** Two-Year College; **4Y:** Four-Year College; **GA:** General Audience

SPECIAL EVENTS

FRIDAY November 9

HHMI Night at the Movies

5:30 PM – 8:00 PM
FREE

HHMI BioInteractive (www.biointeractive.org) and NABT are pleased to host the 8th Annual *HHMI Night at the Movies with Sean Carroll*. Join Dr. Carroll for a new movie followed by discussions with the featured scientists/filmmakers. This free red-carpet event will begin at 5:30pm with a reception including free food and drinks.

SATURDAY November 10

NABT Honors Luncheon

11:30 AM – 2:00 PM
$50 Advance / $60 Onsite

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.

After Hours Adventure at the San Diego Zoo

6:00 PM – 8:30 PM
~~**$45 Advance / $55 Onsite**~~ SOLD OUT

Celebrate another fantastic NABT Conference with an evening under the stars at the iconic San Diego Zoo. You're invited to 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! The evening will also include a presentation highlighting some of the SDZ's conservation efforts and feature a unique encounter with the Zoo's animal ambassadors.

SOLD OUT

Tickets include transportation, admittance to the Sydney Grill area of the zoo, and food and drinks.

SPECIAL WORKSHOPS

THURSDAY November 8

20 in 20: The Next Chapter

1:00 PM – 3:30 PM
General Biology • Special Workshop • MS, HS, 2Y
FREE (Tickets Required)

Come try numerous 20-minute inquiry-based activities that will engage and excite your students. You and your students will be glad you did!

Developing and Using Mini Case Studies to Accompany HHMI BioInteractive Resources

11:15 AM – 3:45 PM
Instructional Strategies • Special Workshop • HS, 2Y, 4Y
FREE (Tickets Required)

Experience and then develop your own mini case study that uses HHMI BioInteractive resources to engage students to think scientifically.

Math and Stats in the Biology Classroom with HHMI BioInteractive

11:15 AM – 3:45 PM
Science Practices • Special Workshop • HS, 2Y, 4Y
FREE (Tickets Required)

Conquer basic math and statistics used in biology while exploring classroom-ready resources. Concepts will include central tendency and variation, spreadsheet skills, graphing, and data analysis with Chi-Square and T-Tests.

Teaching Scientific Practices through Historical Inquiry Cases

2:00 PM – 3:30 PM
Science Practices • Special Workshop • HS, 2Y, 4Y
$50 Advance / $55 Onsite

Participate in a sample inquiry class, following the notable historical work of Dave Keeling as he measures carbon dioxide in the atmosphere. Discussion of teaching skills and other cases follows.

Using Guided Inquiry to Teach Anatomy and Physiology Core Concepts

12:30 PM – 3:30 PM
Anatomy & Physiology • Special Workshop • HS, 2Y, 4Y
FREE (Tickets Required)

This workshop will help A&P educators determine what to teach and how to teach it. Participants will explore inquiry-based curriculum materials that address core concepts of anatomy and physiology.

Using the NGSS Storyline Approach to Help Students Understand the Processes of Science and Global Change

12:30 PM – 3:30 PM
Instructional Strategies • Special Workshop • MS, HS, GA

FREE (Tickets Required)

Experience how the Understanding Science and Understanding Global Change resources support the scientific practices of posing and investigating questions about complex phenomena, such as sea level rise.

SUNDAY November 11

A Penicillium Fungus Antibiotic Effect Activity

8:30 AM – 12:30 PM
AP Biology • Special Workshop • HS, 2Y
$40 Advance / $45 Onsite

Learn how to introduce fungal biology and the discovery of antibiotics into the classroom with this activity. Participants will quantify the antibiotic effect on bacteria and return home with materials.

**Due to the supplies necessary for this hands-on experience, a minimum of 12 participants must be registered for this workshop to be conducted.*

Class Ethos: The "4th Dimension" of the NGSS Highlighting the Understanding Global Change Resources from UC Berkeley's Museum of Paleontology

9:00 AM – 12:00 PM
Curriculum Development • Special Workshop • MS, HS, 2Y
FREE (Tickets Required)

The NGSS requires teachers to shift classroom dynamics. The greatest shift may be classroom ethos. This session enables teachers to create inclusive tasks that value the experiences of all students.

FIELD TRIP

THURSDAY November 8

San Diego Zoo's ICR & Safari Park

9:00 AM – 3:00 PM
~~**$40 Advance / $50 Onsite**~~ SOLD OUT

Visit the Beckman Center, home of the San Diego Zoo Institute for Conservation Research, and take a special tour of the facility. Along the way, you will learn about eight research teams: Community Engagement, Conservation Genetics, Reproductive Sciences, Disease Investigations, Global Partnerships, Recovery Ecology, Plant Conservation, and Population Sustainability. The tour will include visits to a number of research labs, and a stop at the innovative *Frozen Zoo*. The tour will be led by members of SDZ's *Community Engagement* team, who will also provide an introduction to classroom resources, conservation science curriculum, field trips, and teacher professional development opportunities.

SOLD OUT

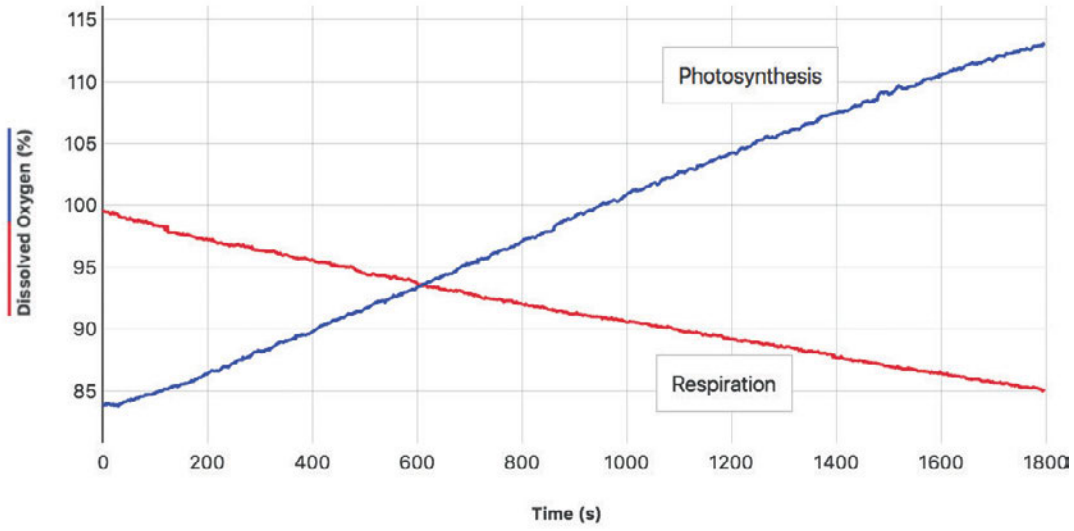
Participants will then visit the San Diego Zoo Safari Park to explore on your own some of the amazing exhibits at this unique facility.

MORE OBSERVATIONS INSTEAD OF CALIBRATIONS

Go Direct® Optical Dissolved Oxygen

Ideal for experiments in biology, ecology, and environmental science courses, the Go Direct® Optical Dissolved Oxygen Probe uses wireless and luminescent technologies to provide fast, easy, and accurate results.

Stop by our workshop to learn more about our Go Direct line of sensors for biology.



Dissolved oxygen saturation levels increase during photosynthesis (in the light) and decrease during respiration (in the dark).

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Visit booth #300 for a chance to win a Go Direct Optical Dissolved Oxygen

Learn more at vernier.com/gdx-odo

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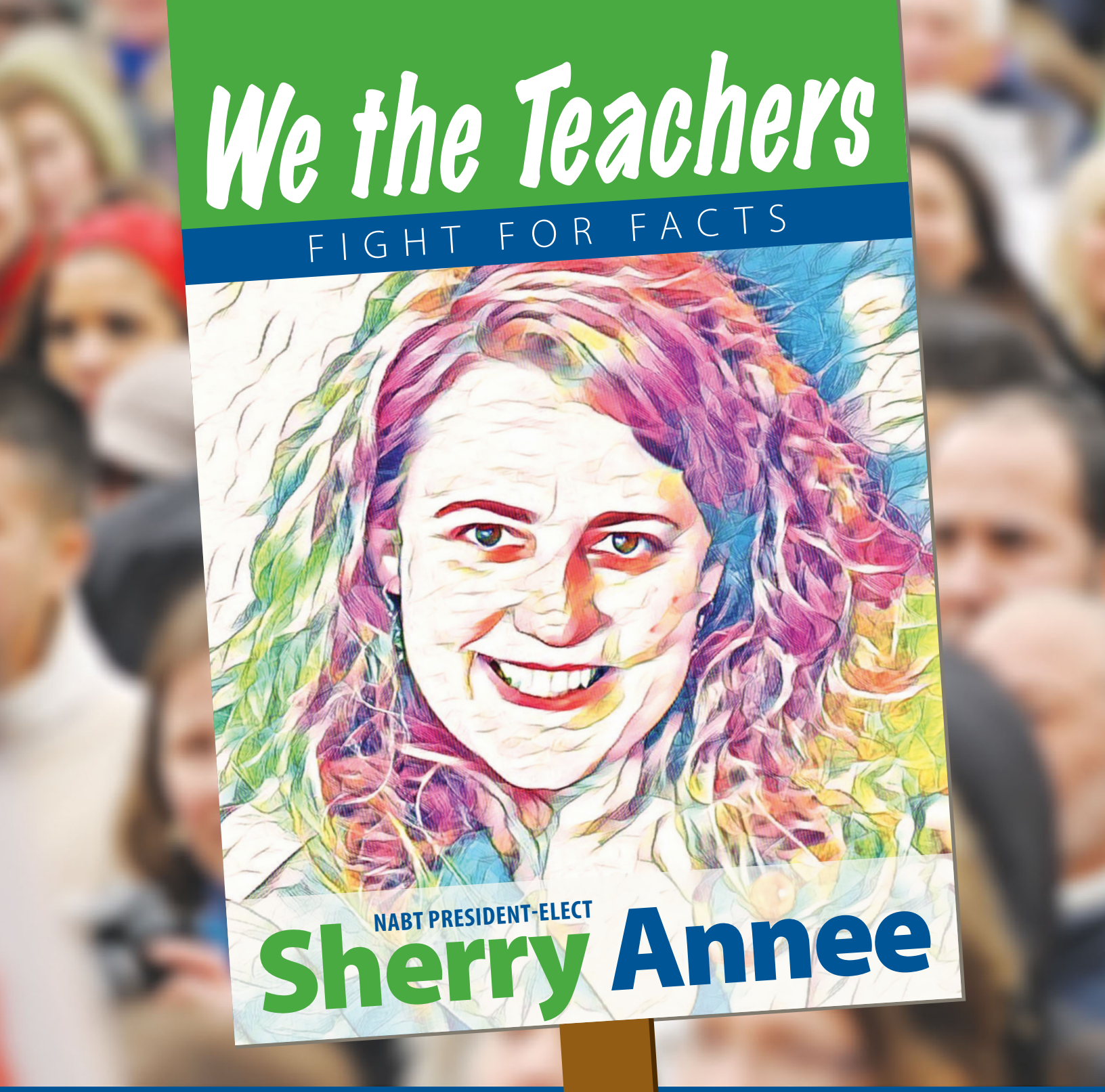

Sherry Annee is marching into the NABT Presidency.
Can you find her in the crowd?

SAN DIEGO 2018

Meet Sherry at the NABT Conference in San Diego and enter to win some great prizes from NABT.
The drawing will be **Friday, November 9th.**

NABT
National Association of Biology Teachers

SAN DIEGO 2018

THU

Thursday

Abbreviation Key
E: Elementary School
MS: Middle School
HS: High School
2Y: Two-Year College
4Y: Four-Year College
GA: General Audience

9:00 AM – 3:00 PM

San Diego Zoo's ICR & Safari Park

Meet in Lobby for Bus • Field Trip (Tickets Required) • GA (SOLD OUT)

Visit the Beckman Center, home of the San Diego Zoo Institute for Conservation Research, and take an exclusive tour of the facility. Along the way, you will learn about eight research teams: Community Engagement, Conservation Genetics, Reproductive Sciences, Disease Investigations, Global Partnerships, Recovery Ecology, Plant Conservation, and Population Sustainability. The tour will include visits to research labs and a stop at the innovative *Frozen Zoo*. The tour will be led by members of SDZ's Community Engagement team, who will also highlight classroom resources, conservation science curriculum, field trips, and teacher professional development opportunities.

This field trip also includes admission to the San Diego Zoo Safari Park, allowing participants to explore the impressive exhibits at this unique facility.

11:30 AM – 1:00 PM

NABT Board of Directors Meeting & Leader Lunch

Executive Conference 1 • Committee Meeting • Invitation Only

11:15 AM – 3:30 PM

1671 • Developing and Using Mini Case Studies to Accompany HHMI BioInteractive Resources

Nautilus 3 • Instructional Strategies • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Experience and then develop your own mini case study that uses HHMI BioInteractive resources to engage students to think scientifically.

Phil Gibson, University of Oklahoma, Norman, OK; Annie Prud'homme-Genereux, TELUS World of Science - Edmonton, Edmonton, AB, Canada; and Melissa Csikari, HHMI BioInteractive, Chevy Chase, MD

1677 • Math and Stats in the Biology Classroom with HHMI BioInteractive

Nautilus 2 • Science Practices • Special Workshop (Tickets Required) • HS, 2Y

Conquer basic math and statistics used in biology while exploring classroom-ready resources. Concepts will include central tendency and variation, spreadsheet skills, graphing, and data analysis with Chi-Square and T-Tests.

Kristine Grayson, University of Richmond, Richmond, VA; Bob Kuhn, Centennial High School, Roswell, GA; and Karen Lucci, Hopewell Valley Central High School, Pennington, NJ

12:30 PM – 3:30 PM

1412 • Using Guided Inquiry to Teach Anatomy and Physiology Core Concepts

Marina 5 • Anatomy & Physiology • Special Workshop (Tickets Required) • HS, 2Y, 4Y

This workshop will help A&P educators determine what to teach and how to teach it. Participants will explore inquiry-based curriculum materials that address core concepts of anatomy and physiology.

Murray Jensen, University of Minnesota, Minneapolis, MN and Kerry Hull, Bishop's University, Lennoxville, QC, Canada

1534 • Using the NGSS Storyline Approach to Help Students Understand the Processes of Science and Global Change

Seabreeze 1 • Instructional Strategies • Special Workshop (Tickets Required) • MS, HS, GA

Experience how the Understanding Science and Understanding Global Change resources support the scientific practices of posing and investigating questions about complex phenomena, such as sea level rise.

Jessica Bean, Museum of Paleontology, UC Berkeley, Berkeley, CA and Abraham Lo, BSCS Science Learning, Colorado Springs, CO

1:00 PM – 3:00 PM

NABT/BSCS AP & Biology Teacher Academy Leader Workshop

Executive Conference 4 • Instructional Strategies • Invitation Only

THU

1:00 PM – 3:30 PM

1663 • 20 in 20: The Next Chapter

Marina 2 • General Biology • Special Workshop (Tickets Required) • MS, HS, 2Y

Come try numerous 20-minute inquiry-based activities that will engage and excite your students. You and your students will be glad you did!

Whitney Hagins, MassBioEd/BioTeach, Cambridge, MA

2:00 PM – 3:30 PM

1616 • Teaching Scientific Practices Through Historical Inquiry Cases

Spinnaker 2 • Science Practices • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Participate in a sample inquiry class, following the notable historical work of Dave Keeling as he measures carbon dioxide in the atmosphere. Discussion of teaching skills and other cases follows.

Douglas Allchin, University of Minnesota, Saint Paul, MN

3:00 PM – 3:30 PM

NABT Open Forum

Executive Conference 1 • Committee Meeting • GA

Join NABT leaders and volunteers for an interactive discussion that highlights "the state of the association," ongoing projects, and upcoming initiatives to better support you as an eductor. Committee chairs, section chairs, and regional coordinators will be on hand to answer questions about getting more involved with NABT.

4:00 PM – 5:35 PM

GENERAL SESSION SPEAKER

Katie Hinde

See page 8 for biography.

Baby Mine: 300 Million Years, the Evolution of Mother's Milk, and the Rise of the Mammals

Grand Ballroom • Special Speaker • GA

Did you know mother's milk is older than dinosaurs? Or that the "biological recipe" of milk differs for sons and daughters? Or that a mother's milk changes across time? Mother's milk is food, medicine, and message that organizes a baby's brain, body, and behavior. What we take for granted in the grocery store dairy aisle has been shaped by hundreds of millions of years of natural selection. This precision medicine and personalized nutrition has not been a primary target of biological research, but 21st Century scientists have made amazing advances in how we study and have come to understand the first substance a mammalian neonate is adapted to consume. Importantly, as we better unlock the mysteries of milk, we gain essential new tools for human health and well-being.

3:00 PM – 3:45 PM

NABT/BSCS AP & Biology Teacher Academy Meet Up

Executive Break Area • Special Program • Invitation Only

All participants of the NABT/BSCS AP & Biology Teacher Academies are invited to "meet-up," network with other program leaders and participants, and enjoy a light snack before the opening general session.

Sponsored by

CAROLINA® www.carolina.com BIO-RAD

Graduate Student Meet Up

Marina 1 • Special Program • GA

CALLING ALL GRADUATE STUDENTS! You are invited to an informal Meet & Greet to meet other student members of NABT and learn more about programs and opportunities designed specifically for students.

5:30 PM – 7:30 PM

Exhibit Hall Opening Reception

Pavilion • Special Event

Kick off the NABT Conference *California style* by meeting us outside for a unique exhibit hall experience. The 2018 NABT Exhibit Hall showcases the very best resources and products available to biology teachers. Whether you're looking for that old favorite or new innovation, you'll want to visit all of our sponsors and exhibitors this year.

Special thanks to

illumina® FOUNDATION

for sponsoring the 2018 NABT Opening Reception.

6:30 PM – 7:30 PM

Past President Meeting

Invitation Only

Career and Family. We've got you covered.

NABT-sponsored member insurance plans and services have been carefully chosen for their **valuable benefits** at **competitive group rates** from a variety of **reputable, highly-rated carriers**.

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National Association of Biology Teachers

Professional

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- Private Practice Professional Liability
- Student Educator Professional Liability

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- New York Life Group Accidental Death & Dismemberment Insurance†

Health

- American Health Insurance Exchange, Offering ACA-Compliant Public and Private Plans
- Educators Dental Plan‡
- New York Life Group Disability Income Protection†
- Long-Term Care Insurance
- Medicare Supplement Insurance
- Cancer Insurance Plan

Home & Auto

- GEICO Auto / Boat Insurance
- GEICO Homeowners / Condo / Renters Insurance
- GEICO Umbrella
- NEW **LegalShield™ Legal Plans and LegalShield™ Identity Theft Protection**
- ASPCA Pet Health Insurance

For more information, visit **www.ftj.com/NABT** or call **(800) 821-7303**.

* *All plans not available in all states.*
† *Underwritten by New York Life Insurance Company, New York, NY 10010 Policy Form GMR.*
‡ *Underwritten by The United States Life Insurance Company in the City of New York. AG-11194*

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(800) 821-7303 I www.ftj.com/NABT

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SAN DIEGO 2018

Friday

Abbreviation Key

E: Elementary School
MS: Middle School
HS: High School
2Y: Two-Year College
4Y: Four-Year College
GA: General Audience

7:30 AM – 8:45 AM

First Timer's Breakfast

Harbor Island 2 • Meal Function (Tickets Required) • GA

NABT Conference "first-timers" are invited to learn more about the Professional Development Conference over complimentary breakfast. Each table will have an NABT leader available to answer your questions and help you make the most of your time in San Diego.

The NABT First Timers' Breakfast is made possible through the generous support of

hhmi BioInteractive

10:15 AM – 12:00 PM

Book Signing with Sean M. Carroll

Pavilion

10:30 AM – 12:30 PM

△ INTRO BIO TASK FORCE

1667 • Intro Bio Task Force: The Pre-College Experience and Next Steps to Advancing Intro Bio

Nautilus 1 • Instructional Strategies • Symposium (120 min) • HS, 2Y, 4Y

The IBTF will explore how pre-college intro bio courses and experiences (AP Biology, Dual Enrollment, MOOCs, etc.) influence undergraduate biology education. Additional discussions will focus on strategies that will utilize partnerships across K-16 to advance the ideal introductory biology experience.

Coordinated by the NABT Introductory Biology Task Force

9:15 AM – 10:15 AM

GENERAL SESSION SPEAKER

Sean M. Carroll

See page 8 for biography.

The Arrow of Time and the Meaning of Life

Grand Ballroom • Special Speaker • GA

Nothing is more obvious about the nature of time than the fact that the past is different from the future. Physics ascribes this difference to the fact that entropy — randomness or disorder — increases with time. Dr. Carroll will talk about why this is so, a mystery that will lead us to the origin of the universe. He'll also talk about why the increase of entropy is responsible for all of the differences between past and future, from memory to aging. Finally, he'll discuss the relationship between entropy and complexity, and why it's not so surprising that complex life came into existence in a decaying universe.

Directly following the session, join Sean M. Carroll in the Exhibit Hall for a book signing.

10:30 AM – 11:45 AM

SPECIAL PROGRAMMING PRESENTED BY

The MiniOne Systems

1726 • #JungleGenomics: Teaching Tropical Biology and Genetics in the Amazon Rainforest

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

What do tamarin fecal samples, possum blood and giant snail eggs have in common? They all contain DNA. Learn how a field course barcoded DNA in the Amazon rainforest.

Mrinalini Erkenswick Watsa, MiniOne Systems/Field Projects International/PrimatesPeru

1527 • System Dynamics Modeling: Constructing and Simulating Mental Models

Executive Conference 1 • Science Practices • Hands-on Workshop (75 min) • MS, HS, 2Y, 4Y, GA

Build systems dynamics models using free online tools to model dynamic patterns characteristic throughout biological systems. Design computational models to confront and intervene in students misconceptions about biological systems. BYOD

Jon Darkow, Seneca East High School, Attica, OH

1590 • Climate Change and the Coughing Dog: Exploring Global Changes and Local Impacts Through a Phenomena-Based Case Study

Executive Conference 2A • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • MS, HS

Explore local connections to a global issue while taking on the role of a veterinary assistant in a small town in this phenomena-based unit examining climate change, populations, and ecosystems.

James Planey and Barbara Hug, University of Illinois at Urbana-Champaign, Champaign, IL

FRI

8:00 AM – 4:00 PM

SPECIAL PROGRAMMING PRESENTED BY

Bio-Rad Laboratories

All sessions in Executive Conference 2B

All sessions: Cassandra Granieri, Bio-Rad Laboratories, Hercules, CA

8:00 AM – 9:15 AM

1703 • Become a GMO Investigator

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

Regardless of where you stand in the GM debate, wouldn't it be interesting to know which foods you eat are GM foods?

10:30 AM – 11:45 AM

1704 • Are Increased Incidences of Infection the Result of Climate Change?

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

Why does climate change matter? Find out which suspected microbes are associated with increased reports of infections and why they may be more common as the temperature on earth increases.

12:00 PM – 12:30 PM

1708 • Ready or Not, Here it Comes! It's Biotechnology, the Science of Our Age. Are Your Students Prepared?

AP Biology • Demonstration (30 min) • HS, 2Y, 4Y

Glowing cats? Designer babies! Empower students to be independent thinkers. Learn from a leader in biotechnology teaching how to build your lab program step-by-step with equipment, supplies, and student credentials.

1:00 PM – 1:45 PM

1706 • Shifting Practices to Infuse Science and Engineering Practices with Common Core Strategies

General Biology • Hands-on Workshop (45 min) • HS, 2Y, 4Y

This workshop will focus on illustrating the science and engineering practices described in the NGSS framework through the engaging pGLO Bacterial Transformation activity.

2:00 PM – 3:15 PM

1705 • Conserving Panda Population: One Hormone Test Design at a Time!

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

Come put your immunology and reproductive endocrinology systems knowledge basics to the test as you engineer a hormone detection system that can be utilized for Giant Panda Population Conservation efforts.

3:30 PM – 4:00 PM

1707 • Precision Medicine – A Reality with Revolutionary Droplet Digital PCR (ddPCR) Technology

Biotechnology • Demonstration (30 min) • HS, 2Y, 4Y

ddPCR technology is a precision medicine tool and its sensitivity make it well-suited to "Liquid Biopsies" to detect rare cancer mutations, and when combined with CRISPR technology, is revolutionizing medicine.

10:30 AM – 11:45 AM cont.

393 • Mission: Possible – Using Breakout Escape Room Games to Transform Teaching and Learning in a Science Classroom

Executive Conference 3A • Instructional Strategies • Hands-on Workshop (75 min) • MS, HS, GA

Can you think "outside of the box" to break into a locked box? Learn how to facilitate and design content-based games to challenge and engage your students.

Chris Chou, Longmont High School, Longmont, CO

1637 • Serenity Now! Keep Calm and Do Science with Real Data in the Classroom

Executive Conference 3B • Technology in the Classroom • Demonstration (75 min) • HS, 2Y, 4Y

We will demonstrate the free web application on QUBES called *Serenity* that brings data science into classrooms. Designed for education, *Serenity* puts real data into students' hands to do science.

Drew LaMar, College of William and Mary, Williamsburg, VA

1424 • 5 Practices to Create Meaningful Discussions in Biology Tasks

Executive Conference 4 • Instructional Strategies • Hands-on Workshop (75 min) • GA

Ever have an awesome task that falls flat when you discuss it as a class? Come learn about a strategy for orchestrating productive task-based discussions in a Biology class.

Sara Abeita, Lawrence Free State High School / Knowles Teaching Fellowship, Lawrence, KS and John Maddux, Festus High School, Festus, MO

10:30 AM – 12:30 PM

2018 EVOLUTION SYMPOSIUM

1724 • Emerging Research in Evolutionary Biology

Nautilus 3 • Evolution • Symposium (120 min) • HS, 2Y, 4Y

Join us for this talk featuring cutting-edge research in evolutionary biology, followed by a workshop on strategies to bring this authentic data into your classroom!

Presented by BEACON and ASN

Cold Truths: Evolutionary Impacts of Winter on Terrestrial Ectotherms

Climate change research historically focused on summer, and winter climate change was considered mostly beneficial due to amelioration of damaging cold. It is now becoming increasingly apparent that variation in winter conditions drives responses of many terrestrial organisms to climate change in complex ways, and that a mechanistic understanding of the impact of winter conditions is essential to identify vulnerabilities to climate change. We are working to untangle the complex interactions between cold hardiness and energetics in the winter, using a range of insect species, with the goal of understanding how winter shapes ecology and evolution.

Caroline Williams, University of California Berkeley, Berkeley, CA

Data Nugget Workshop: Waking up to Climate Change – Adaptation and Natural Selection in Ladybird Beetles

Data Nuggets (http://datanuggets.org) are free classroom activities, designed to improve the scientific and quantitative abilities of K-12 students by providing them with authentic data collected by practicing scientists. In this workshop, we will introduce a Data Nugget that features data on the variability of cold coma recovery time in ladybird beetles. This Data Nugget will give students an opportunity to investigate the degree of variation in populations of ladybirds as they respond to changing temperature conditions.

Nikki Chambers, West High School, Torrance, CA and Elizabeth Schultheis and Melissa Kjelvik, Michigan State University, East Lansing, MI

8:00 AM – 4:00 PM

SPECIAL PROGRAMMING PRESENTED BY

miniPCR

All sessions in Marina 5

All sessions: Zeke Alvarez Saavedra and Bruce Bryan, miniPCR, Cambridge, Massachusetts

8:00 AM – 9:00 AM

1714 • Lab in a Box: A Free Biotechnology Loaner Program from Genes in Space

Biotechnology • Workshop (60 min) • MS, HS

Learn about the free biotechnology loan program that brings hands-on DNA science into middle and high school classrooms across the USA. Training, free PCR, gel electrophoresis curriculum and loans.

10:30 AM – 11:45 AM

1716 • GLOW Labs: DNA Structure and Enzyme Activity Through Fluorescence

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

A completely new approach to studying both DNA and enzyme activity in the classroom. Using fluorescence your students can now directly visualize the effects of temperature, pH, and genetic sequence on DNA structure.

12:00 PM – 12:30 PM

1717 • Solving a Forensics Mystery Through DNA Analysis: D1S80 VNTR Lab

Biotechnology • Demonstration (30 min) • MS, HS, 2Y, 4Y

Bring real DNA analysis into your forensics classroom. Students use their own DNA and PCR and electrophoresis to investigate if they can rule themselves out as a suspect.

12:45 PM – 1:45 PM

1720 • Sickle Cell Genetics: Using Gel Electrophoresis to Investigate Molecular Genetics, Inheritance and Disease

Biotechnology • Hands-on Workshop (60 min) • MS, HS, 2Y, 4Y

Engage your students by introducing fictional family dealing with the realities of sickle cell anemia. Rich extensions make this lab perfect for a wide range of abilities and backgrounds.

2:00 PM – 3:15 PM

1718 • Are You a Night Owl? A Morning Lark? The Answer May Be in Your Genes...

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

The miniPCR Sleep Lab links the genetic control of circadian rhythms to students' own DNA. Students explore a genetic association in an authentic research investigation.

3:30 PM – 4:00 PM

1719 • LARP! Live Action Role Playing and the Biology Curriculum

General Biology • Demonstration (30 min) • MS, HS, 2Y, 4Y

Kinesthetic learning is more than doing labs. Our curriculum director, a veteran biology teacher, will share his favorite activities to get students out of their desks and role-playing biological processes.

10:30 AM – 11:45 AM cont.

1430 • The American Association of Immunologists Presents: AAI Teachers Research Program – Immunology Lessons for the Classroom

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

Learn how to bring the excitement of immunology research to students in the classroom with units presented by teachers from the American Association of Immunology Summer Research Program for Teachers.

Courtney Pinard and Megean Garvin, American Association of Immunologists, Rockville, MD

371 • Marine Science Mania VII

Marina 3 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • MS, HS

Do you, or are you planning to, teach a course in Marine Science? Experience hands-on activities designed to teach Marine Science, receive many giveaways, activities, and labs.

Thomas Froats, Prospect High School, Mount Prospect, IL

1645 • Fixing a Broken Heart: A Cardiac Modeling and STEM Project

Marina 4 • Anatomy & Physiology • Hands-on Workshop (75 min) • HS, 2Y

No better way to learn how oxygenated blood circulates than to engineer a solution for when it doesn't! Learn how to incorporate modeling and engineering practices into your curriculum.

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

BIO-RAD Explorer

HANDS-ON INQUIRY-BASED SCIENCE EDUCATION

NABT San Diego Workshop Schedule & Special Events

Join us at the Sheraton San Diego Hotel at Executive Conference 2B, for our free workshops

Visit Us at Booth #201

Friday November 9 *(all at Executive Conference 2B)*

8:00–9:00 AM	***Become a GMO Investigator****. Regardless of where you stand in the GM debate, wouldn't it be interesting to know which foods you eat are GM foods?*
10:30–11:45 AM	***Are increased incidences of infection the result of climate change?*** *Why does climate change matter? Find out which suspected microbes are associated with increased reports of infections and why they may be more common as the temperature on earth increases.*
12:00–12:30 PM	***Ready or not, here it comes! It's biotechnology, the science of our age. Are your students prepared?*** *Glowing cats? Designer babies! Empower students to be independent thinkers. Learn from a leader in biotechnology teaching, author J. Kirk Brown, how to build your lab program step-by-step with equipment, supplies, and student credentials. The first 40 attendees will receive a complimentary signed copy of Kirk's new biotechnology textbook.*
1:00–1:45 PM	***Shifting practices to infuse Science and Engineering Practices with Common Core Strategies.*** *This workshop will focus on illustrating the science and engineering practices described in the NGSS framework through the engaging pGLO Bacterial Transformation activity.*
2:00–3:15 PM	***Conserving Panda Population: One Hormone Test Design at a Time!*** *Come put your immunology and reproductive endocrinology systems knowledge basics to the test as you engineer a hormone detection system that can be utilized for Giant Panda Population Conservation efforts.*
3:30–4:00 PM	***Precision Medicine — a reality with revolutionary Droplet Digital PCR (ddPCR) technology!*** *ddPCR technology is a precision medicine tool and its sensitivity makes it well-suited to "Liquid Biopsies" to detect rare cancer mutations and when combined with CRISPR technology is revolutionizing medicine.*

Special Events

Textbook giveaway and signing with author J. Kirk Brown (limited supply) at the Bio-Rad booth #201
Thursday November 8 from 6:30–7:00 PM and Friday November 9 from 4:00–5:00 PM

Bio-Rad is proud to provide support for an Invited Speaker Session. *Join us on Friday, November 9 from 10:30–11:45 AM in Nautilus 5 to learn more about the efforts to save endangered species through conservation and reproductive sciences.*

Learn more about giraffe reproduction and conservation at the After Hours Adventure at the San Diego Zoo *(Special ticketed event). Saturday Night November 10 — Special programmatic support provided by Bio-Rad.*

Visit us at **bio-rad.com/NABT**
Call toll free at 1-800-424-6723.
Outside the U.S. contact your local sales office.

BIO-RAD

10:30 AM – 4:00 PM

SPECIAL PROGRAMMING PRESENTED BY

Carolina Biological Supply Company

All sessions in Marina 1

All sessions: Ashley Faucette, Carolina Biological Supply Company, Burlington, NC

10:30 AM – 11:45 AM

1713 • Genes and ConSEQUENCES: Unlocking the Power of DNA Sequence Analysis

Genetics • Hands-on Workshop (75 min) • HS

Reinforce the central dogma of biology and give students basic bioinformatics tools. Use a case study approach with your students as they explore their given sequences and work to determine the location and role of their gene in a disease.

12:00 PM – 12:30 PM

1712 • Arriving on the Scene: Collect and Analyze Evidence Like the Pros

Genetics • Hands-on Workshop (30 min) • HS

Expose your students to the fascinating world of forensics using real-world techniques practiced by law enforcement. Keep your students captivated by analyzing and documenting evidence to recreate a crime scene.

2:00 PM – 3:15 PM

1711 • Protein Necklace: Harnessing the Glow of Jellyfish

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

This classroom exercise allows your students to isolate the green fluorescent protein (GFP) found in jellyfish. Show them that protein science can be engaging but not overwhelming with this activity.

3:30 PM – 4:00 PM

1710 • AP® Biology Roundtable with Carolina Biological Supply

AP Biology • Demonstration (30 min) • HS

You can make an impact! Join Carolina Biological Supply Company and give your feedback on current products and upcoming ideas. Door prizes and other opportunities to win will be available.

10:30 AM – 11:45 AM cont.

1680 • CRISPR-Cas9: the Mechanism, Applications, and New HHMI Resources

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

Hot off the presses - new CRISPR-Cas9 resources from HHMI BioInteractive! Build a model, explore an interactive, and analyze knock-out genes based on sequence data to determine their functions.

Ann Brokaw, Rocky River High School, Rocky River, OH and Mark Randa, Cumberland County College, Vineland, NJ

10:30 AM – 11:45 AM cont.

1483 • Top 10 Biotech Stories of 2017/18

Nautilus 4 • General Biology • Demonstration (75 min) • MS, HS, 2Y, GA

Want to include cutting-edge biotech discoveries in your classroom? See Dr. Lamb present the top 10 findings in genomics and biotech in student-friendly language and receive your FREE Guidebook.

Neil Lamb and Madelene Loftin, HudsonAlpha Institute for Biotechnology, Huntsville, AL

1515 • Teaching of Cell Respiration and Photosynthesis Does Not Have to Be Difficult

Seabreeze 1 • Curriculum Development • Hands-on Workshop (75 min) • HS, 2Y, GA

As moderator of the NABT Facebook page, Bioenergetics and how to teach it is a common request. This session will provide a structure to teach CR and Photosynthesis.

John Moore, Taylor University, Upland, IN

1466 • Biology Practices That Drive Thinking Forward

Spinnaker 1 • General Biology • Hands-on Workshop (75 min) • HS

Explore the use of interactive biology manipulatives and engaging kits that get students figuring out biological concepts, while enjoying learning. Emphasis will be on "designed to discover" high school activities.

Rebecca Brewer, Troy High School, Troy, MI

1428 • Using Mitotic Division to Introduce Statistical Hypothesis Testing in AP and IB Biology

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

Turn the root tip mitosis lab into an opportunity to teach test of correlation and chi-squared so students are prepared to analyze more complex data.

Kristen Dotti, Verde Valley School, Sedona, AZ

10:30 AM – 11:45 AM cont.

INVITED SPEAKER

Ron Swaisgood

See page 10 for biography.

From Endangered to Vulnerable: A Personal Walk Through Two Decades of Science and Policy for the Giant Panda

Nautilus 5 • Biotechnology • Special Speaker • GA

How did the panda come to be "downlisted" from endangered to vulnerable? Dr. Swaisgood will share 20 years of his research on pandas and discuss how the panda measures up to International Union for Conservation of Nature (IUCN) criteria, how it came to be that the panda is no longer Endangered, and forward-looking conservation implications of downlisting. He will also provide an overview of the behavioral and ecological research he and his colleagues have conducted. Behavior research played a critical role in turning around the conservation breeding programs for pandas and how field research helped us gain a better understanding of the ecological factors and human disturbance that determine panda population size. He will then conclude with a brief horizon scan for where we are going in panda conservation in the future.

NABT Committee Meeting: Member Resources Committee

Room 511 • Committee Meeting (75 min) • GA

Catherine Ambos, Committee Chair

NABT Committee Meeting: Pre-Service Teacher Committee

Room 514 • Committee Meeting (75 min) • GA

Julie Angle, Committee Chair

12:00 PM – 12:30 PM

1550 • Quantitative Modeling in Biology

Executive Conference 1 • General Biology • Paper (30 min) • HS, 2Y, 4Y

The Quantitative Undergraduate Biology Education and Synthesis (QUBES) project developed an assessment of quantitative modeling in biology. Results from a pilot of the assessment will be presented.

Robert Mayes, Georgia Southern University, Statesboro, GA

405 • The Results of Longitudinal Water Quality Monitoring of the Brandywine River, Chester County, Pennsylvania by High School Students

Executive Conference 2A • Ecology / Environmental Science / Sustainability • Paper (30 min) • HS, 2Y, 4Y, GA

Data analysis summary of a decade-long longitudinal water quality study conducted by high school students along the West and East Branches of the Brandywine River.

Dina DiSantis, Downingtown Area School District/Montgomery County Community College, Downingtown, PA

12:00 PM – 12:30 PM cont.

1495 • Tailoring Instruction to Low Level, Overaged, and Under-Credited Students

Executive Conference 3A • Instructional Strategies • Demonstration (30 min) • HS, GA

This session will review strategies that have been successful in engaging and challenging students who have struggled with traditional teaching methods. We will also review how to combat attendance issues.

Joseph McKeel, Independence High School, New York, NY

1465 • Independent Research in High School – Successes and Setbacks

Executive Conference 3B • Instructional Strategies • Demonstration (30 min) • Shows participants how to use data sets, equipment, online resources, etc. • HS

We will share our experiences in establishing and running our independent research course. What went well, what we would do differently, and what we plan for the future.

Todd Gordon and Daniel Barrientes, Concordia International School Shanghai, Shanghai, China

1445 • Contributing to *The American Biology Teacher*: A Hands-On Workshop

Executive Conference 3B • Curriculum Development • Hands-on Workshop (30 min) • GA

The editorial team of *The American Biology Teacher* will jointly present a workshop for all those who would like to be authors and/or reviewers with this practice article development and review session.

William McComas, ABT Editor, University of Arkansas, Fayetteville, AR

FRI

12:00 PM – 12:30 PM continued

1472 • Zombie Outbreak! Students Learn Critical Thinking Through Creativity, Neuroscience, and Microbiology Concepts Used to Build a Better Zombie Outbreak Story

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

The audience will see examples of flipped class activities for Zombie Outbreak course, and be challenged to build a more scientifically accurate Zombie Outbreak story than Hollywood using curriculum tools.

Stephanie Daugherty, University of Texas at Tyler, Tyler, TX

408 • Plant-Based, Student-Centered, Self-Designed Independent Research Project

Marina 3 • Botany & Plant Biology • Demonstration (30 min) • HS

Introduce a student-designed, independent research project on seed germination and plant growth. This project has been enhanced through collaboration with *Planting Science* (www.plantingscience.org).

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

1644 • Integrating Cardiovascular and Respiratory Physiology with the Help of a Patient Simulator

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

This session presents an Anatomy & Physiology lab in which non-biology-major students diagnose the clinical condition of a "patient" based on cardiovascular and respiratory data.

Nadine Stecher, Wentworth Institute of Technology, Boston, MA

1683 • Teach Regulation at Multiple Scales Using HHMI Data Points

Nautilus 2 • Science Practices • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Engage your students by using free HHMI Data Points on p53/cancer, dinosaurs/thermoregulation, and population dynamics to teach regulation at cellular, organismal, and ecosystem scales.

Natalie Dutrow, Salt Lake City School District, Salt Lake City, UT; Mary Wuerth, Tamalpais High School, Mill Valley, CA; and Bridget Conneely, HHMI BioInteractive, Chevy Chase, MD

1687 • AP Biology, Then and Now

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

If you've taught AP Biology forever or are just starting to teach it, this session will give insight into where the course has been and where it is going.

Catherine Walsh, College Board, New York City, NY

1587 • Biology Best Bets XVII

Spinnaker 1 • General Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Join us, teacher-to-teacher, for a collection of biology learning experiences. This year we're focusing on student engagement, team building, and NGSS phenomena and modeling. Adapt them for your needs!

Suzanne Black, Inglemoor High School, Kenmore, WA; Nancy Monson, West Linn High School, West Linn, OR; and Jennifer Lockwood Armstrong, Newbury Park High School, Newbury Park, CA

NABT Committee Meeting: Retired Member Committee

Room 511 • Committee Meeting (30 min) • GA

Dennis Gathmann, Committee Chair

NABT Committee Meeting: Social Media Committee

Room 514 • Committee Meeting (30 min) • GA

John Moore, Lead Moderator

12:45 PM – 1:45 PM

AP Biology Section Luncheon

Harbor Island 1 • Meal Function (Tickets Required) • AP (SOLD OUT)

Meet other AP Biology teachers in a friendly informal setting to ask questions, share insights, and build community. You may even get to finally meet some of your favorite fellow AP teachers in person. The luncheon also includes a special presentation of the *Kim Foglia AP Biology Service Award*.

Sponsored by minipcr

Two-Year College Section Luncheon

Harbor Island 2 • Meal Function (Tickets Required) • 2Y

Help support the two-year college community by sharing your successes, challenges, epiphanies, and best practices (and funny stories) over lunch. The winners of the *Two-Year College Biology Teaching* and *Prof. Chan Teaching Award* will also be recognized.

Four-Year College and University Section Luncheon

Harbor Island 3 • Meal Function (Tickets Required) • 4Y (SOLD OUT)

Do you teach at a four-year college or university? Join faculty, education researchers, graduate students, and others for some networking and nourishment. The lunch will include a meeting to highlight projects and initiatives of the section, including a special presentation of the Four-Year College & University Section Awards.

2:00 PM – 4:00 PM

10th Annual Biology Education Research Symposium

Nautilus 1 • Instructional Strategies • Symposium (120 min) • HS, 2Y, 4Y

NABT is proud to present the 10th year of the Annual Biology Education Research Symposium. Presentations were accepted through a double-blind review process that was open to biology instructors and education researchers at all levels. The format of the symposium will be a traditional presentation of papers by individual or co-authors lasting 15 minutes each.

Full abstracts are available on page 38 and proceedings will be published online at www.nabt.org/2018-Research-Symposium

Coordinators: Jaime Sabel, University of Memphis, Memphis, TN and Suann Yang, SUNY Geneseo, Geneseo, NY

1670 • NABT AP Biology Symposium

Nautilus 4 • AP Biology • Symposium (120 min) • HS, 2Y, 4Y

Asking good questions is central to the practice of being a scientist, yet we often struggle to ask good questions in the context of teaching students to be scientists. Join us for an interactive session to focus on the design and development of questions that prepare students for instruction, assist students with instruction, and assess student mastery of concepts after instruction. We'll then focus on instructional strategies that help participants learn how "doing biology" incorporates both skills and content.

Coordinated by the NABT AP Biology Section

2:00 PM – 3:15 PM

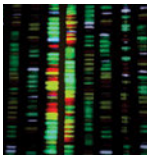
1625 • Genome Engineering and Ethical Issues – Tackling the Scientific and Ethical Questions in the High School Classroom

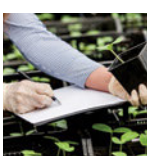
Executive Conference 1 • Biotechnology • Hands-on Workshop (75 min) • MS, HS, 2Y

Learn about the latest topics in genome engineering not yet in your classroom textbooks – including the scientific and ethical questions, CRISPR, and the history of the eugenics movement.

Robin Bowman and Florcy Romero, Personal Genetics Education Project - Harvard Medical School, Boston, MA

FRI





BIO-LINK AT 20:
BUILDING THE EDUCATION ECOSYSTEM TO HELP INSTRUCTORS HELP STUDENTS TO BIOTECH-CAREERS

SANDRA PORTER, PHD,
BRIDGETTE KIRKPATRICK, PHD, JENNIFER LAZARE,
PAULA SUMNER, LOUISE PETRUZZELLA

LOCATION: Marina 5
DATE: November 10, 2018
TIME SLOT: 9:00AM-10:15AM

Come learn about new ideas in educating the biotechnology workforce! Bio-Link and AC2 Bio-Link Regional Center representatives will discuss resources for teaching including an interactive movie, curriculum, a teacher mentor network, biotech incubators, college-run service labs, undergraduate research, and immunobiotechnology.

Join our session and learn how you can be involved!

bio-link

ACC
AC2 BIO-LINK REGIONAL CENTER
DUE # 1501207

2:00 PM – 3:15 PM continued

INVITED SPEAKER

Tatum Simonson

See page 10 for biography.

Cross-Population Insights into Hypoxia Adaptation and Maladaptation

Nautilus 5 • Anatomy & Physiology • Special Speaker • GA

Human populations at high altitude have been challenged by low oxygen for hundreds of generations and show unique physiological responses to this environmental stress, some of which are associated with genomic signatures of adaptation. Our integrative studies in Tibetans and Andeans provide evidence for both genetic adaptations and physiological changes that are shared and unique to these populations and aim to elucidate how this variation relates to differences in human responses to hypoxia.

Sponsored by aps American Physiological Society

1603 • Aye-Ayes, Baobabs and Cheetahs: Applying Lessons from Conservation in Madagascar & Namibia to Your Classroom Projects

Executive Conference 2A • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Learn about two unique African countries, Madagascar and Namibia, and the relationships between their biodiversity, population density, environmental philosophy, and conservation efforts. Explore projects using this information with your colleagues.

Ann Burke, The Academy of Science & Entrepreneurship, Bloomington, IN

1451 • Meeting the Needs of EL's in the Science Classroom

Executive Conference 3A • Instructional Strategies • Hands-on Workshop (75 min) • MS, HS, GA

How do we support EL's learning Biology? We will find instructional resources within the research-based ELA/ELD Framework, and examine tools or strategies (many tech-based) to meet the needs of ELs.

Franz Ruiz and Annika Goodin, Grossmont Union High School District, El Cajon, CA

1642 • Sketch Notes – Getting Students to Create Their Own

Executive Conference 3B • Instructional Strategies • Hands-on Workshop (75 min) • GA

Many of us have seen clever, creative, and beautifully done sketch notes, but they're almost always done by teachers. Come learn how to help students develop this skill.

Angela Little, Westside Christian High School, Tigard, OR

1631 • The Phenomena Finder: An Interdisciplinary Tool for Use in Designing NGSS-Aligned Curriculum Materials

Executive Conference 4 • Curriculum Development • Hands-on Workshop (75 min) • ES, MS, HS

Experience what phenomena based instruction feels like as a learner. Explore and contribute to a digital resource used in designing NGSS aligned phenomena based curriculum materials.

Barbara Hug, James Planey, and Natasha Capell, University of Illinois, Champaign, IL

1521 • Weaving Biotech Into the Curriculum

Marina 2 • Biotechnology • Hands-on Workshop (75 min) • HS

Examples of how biotechnology can be used throughout the year to reinforce concepts. Allow students to see it as a collection of tools/science practices that are integral to understanding biology.

Robert Dennison, Independent Consultant, Houston, TX

1468 • Aquaponics and Citizen Science: Promoting Systems-Thinking and Career Readiness

Marina 3 • Ecology / Environmental Science / Sustainability • Demonstration (75 min) • MS, HS, 2Y

Examine a global crisis and model a sustainable solution using aquaponics. Integrate open-access, NSF-funded, NGSS-aligned, STEM curricula to increase engagement and promote deep learning through case studies and citizen science.

Jessica Day, Institute for Systems Biology, Seattle, WA and Shari Carswell, Mayde Creek High School, Houston, TX

1665 • Salk Institute for Biological Studies Education Outreach Presents: Communicating Science, Taking Research Findings to the Classroom

Marina 4 • Instructional Strategies • Demonstration (75 min) • MS, HS

The Salk Institute is internationally renowned for biological research. We have a variety of resources for both local and out of area teachers to bring research science into your classroom.

Dona Mapston, Madison Dodds, and Amy Knight, Salk Institute Education Outreach, La Jolla, CA

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10TH ANNUAL BIOLOGY EDUCATION RESEARCH SYMPOSIUM

2:00 PM – 4:00 PM • Nautilus 1

Student Anxiety Varies Among Demographic Groups and Impacts Persistence in Introductory Biology Courses

Benjamin J. England and Elisabeth E. Schussler, The University of Tennessee, Knoxville, TN; Jennifer R. Brigati, Maryville College, Maryville, TN

Students respond to classroom activities and achievement outcomes with a variety of emotions, which can impact student success. One emotion students experience is anxiety, which can negatively impact student persistence. This study investigated the relationship between classroom anxiety and persistence in the major. Students in introductory biology classes self-reported their general course anxiety, intention to stay in the major, and demographic variables. Higher general course anxiety at the beginning and end of the semester was associated with intention to leave the major (N = 122), particularly for females and those with fewer AP courses. Students with consistently higher general anxiety were more likely to be female and freshman. Further research should identify what factors differentially impact student anxiety and how instructors may be able to mediate anxiety through reform of pedagogical implementation.

Can Two-Stage Exams Improve Retention and Decrease Achievement Gaps?

Nathan L. Kirk & Lori J. Kayes, Oregon State University, Corvallis, OR

Two-stage exams are summative assessments taken in two parts: 1) a traditional individual exam and 2) a group exam. These exams encourage collaborative discussion to promote deeper thinking and understanding of classroom material, transforming exams into additional learning experiences. Two-stage exams can improve student performance, learning, long-term retention, and even reduce student test anxiety. We implemented a two-stage exam in a ~1,100 student Principles of Biology for Majors course. To assess the efficacy of the group exam, we examined changes in student performance for questions differing in their level Bloom's level taxonomy. We also measured short-term and long-term knowledge in subsequent courses. In self-reported data, a majority of students felt they benefitted from group discussions, better understood and remembered content, and retained more of the material when they had questions on the group exam and individual exam versus on the individual exam only. Scores increased on questions in the group exam compared to the individual exam demonstrating peer instruction and productive discussion of material within a majority of the groups. There were even increases among top performing students indicating the exam was helpful for a majority of students by facilitating useful classroom discussion and increasing their performance.

Towards A More Human(e) Genetics Education: Learning about Human Genetic Variation Reduces Racial Bias

Brian Donovan, BSCS Science Learning, Colorado Springs, CO

Biology education is in the business of teaching about human genetic difference. And, experiments have found that when people overestimate the amount of genetic difference between racial groups it causes them to exhibit increased racial bias. However, there is apparently no experimental research that explores whether the converse is true. When people learn scientifically accurate information about the nature and extent of genetic and phenotypic variation across and within human races can such learning reduce racial bias? We explore this question. We randomized middle and high school aged students (N = 166) into separate classrooms to learn for an entire week either about the topics of: (1) human genetic variation and racial controversies in the media; or (2) climate variation and climate controversies in the media. Across two counterbalanced experimental replications, we demonstrate that when students learn about genetic and phenotypic variation in racial groups it causes a decrease in racial bias. Furthermore, we find that 22% of the reduction in racial bias caused by teaching about human genetic variation is transmitted through perceptions of human genetic variation. The implications of these findings for biology education are discussed.

SPECIAL GUEST PRESENTER

Sara Brownell, Arizona State University, Tempe, AZ

Recipient of the 2018 NABT Four-Year College Section Research in Biology Education Award

10TH ANNUAL BIOLOGY EDUCATION RESEARCH SYMPOSIUM

2:00 PM – 4:00 PM • Nautilus 1

Secondary Biology Misconceptions: Using 23 Years of Test-Data to Inform Pedagogy

Travis Fuchs, West Point Grey Academy, Vancouver, Canada and Mike Arsenault, Lakefield College School, Lakefield, Canada

Of all ideas students come to a science classroom with, some do not match those of the scientific community and can lead to misunderstandings. We will call these ideas misconceptions. Contemporary education literature views misconceptions as resources for learning. As such, we employed an action research methodology and compiled a reference guide of misconceptions to more effectively plan our biology courses. Using the University of Toronto's National Biology Competition, we identified 130 misconceptions from a national sample (111,238 students, 1,181 questions) over many years (1995–2017). We will present 21 of these misconceptions, highlighting their ability to inform pedagogy and commenting on the persistent nature of some throughout our sample.

Implementation of BioInquiry: A Leader Course Producing Perceived Learning Gains

Aimée K. Thomas, Don Hauber, Frank Jordan, Kim Mix, Patricia Dorn and Craig Hood, Loyola University New Orleans, New Orleans, LA

Persistence in and success matriculating through STEM curricula is a major challenge for many of today's students, especially those traditionally underrepresented in these fields (AAAS 2011). After a comprehensive departmental program review revealed that retention and graduation rates of Biology majors had declined significantly over the past two decades, we reviewed the biology education literature, met with STEM experts, conducted a critical review of the Biology major curriculum, and created a new first course utilizing high-impact teaching practices and training in fundamental skills and competencies needed by all life scientists. This three-year study included 154 biology majors who completed a pre/post Student Assessment of Their Learning Gains. We used an ANOVA to determine if there were significant differences among questions pre/post course. Students significantly increased their perceived understanding of all content and process skills questions. Student success and matriculation in STEM fields, particularly Biology, is important for many reasons, namely producing health care professionals and research scientists. Leader courses focusing on the process of science rather than content have been successful at other institutions and so far, we have found this to be true as well.

The Process of Science Identity Development: Esperanza's Persistence in the Face of Adversity

Michele Mann, The University of Texas at Austin, Austin, TX

Biology degrees are not equally accessible to all people. There is a disparity in STEM degree attainment for URM (under-represented minorities) and whites even though the same rate of these student groups begin STEM degrees. Thus, there is a need to have a better understanding of the challenges faced by URM or in this case Latino(a) students and how the development of a science identity increases their likelihood of completing a biology degree. This case study of a Latina looks at the connection between her developing a science identity and her pursuit of a STEM degree. Parental support, science extracurricular activities, and being part of a science community are all ways that students can build their own science identity. However, these factors are more likely to be absent for students from underrepresented groups. For this case, it was found that the practice of science, as opposed to doing school science, proved critical for Esperanza's (pseudonym) development of an identity. She was also a part of a science community thickening her science identity, which has been associated with the perseverance in STEM majors. Understanding the work of science identity development can help mitigate the leaking STEM pipeline.

2:00 PM – 3:15 PM continued

1672 • Extending HHMI BioInteractive's Sex Verification of Athletes Click & Learn to Discuss Biological Sex and Gender

Nautilus 2 • Anatomy & Physiology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Teach human development, sex determination, and gender in biological and social contexts, including genotype variation and resulting anatomical phenotypes, using case studies of methods used to assess sex of athletes.

Holly Basta, Rocky Mountain College, Billings, MT; David Julian, University of Florida, Gainesville, FL; and Melissa Csikari, HHMI BioInteractive, Chevy Chase, MD

410 • Meeting *Homo naledi*: Discovering and Teaching About Our Newest Fossil Relative

Nautilus 3 • Evolution • Demonstration (75 min) • MS, HS, GA

Learn about *Homo naledi*, the greatest hominin fossil discovery since "Lucy" and discover how to bring this ongoing research into your classroom in ways that were impossible until recently.

John Mead, St. Mark's School of Texas, Dallas, TX and Becca Peixotto, Perot Museum of Nature & Science, Dallas, TX

1467 • PlantingScience: Growing Students' Science Understanding Through Independent Investigations and Online Mentoring

Seabreeze 1 • Science Practices • Hands-on Workshop (75 min) • MS, HS, 2Y

PlantingScience.org is a free online resource for teachers. Take part in activities showing how students' understanding of science grows using increasingly independent investigations supported by online mentoring by research scientists.

Catrina Adams, Botanical Society of America, Saint Louis, MO and Anne Westbrook, BSCS, Colorado Springs, CO

SPECIAL PROGRAMMING PRESENTED BY

Labster

1727 • Reimagining Biology Education with Gamified Virtual Labs

Seabreeze 2 • Technology in the Classroom • Hands-on Workshop (75 min) • HS, 2Y, 4Y

In this session we will demonstrate how gamification, use of simulations, virtual reality and storytelling can be leveraged to improve lab prep, learning outcomes, retention of information, motivation & self-efficacy.

1557 • Designing Effective Introductory Biology Labs: Fostering a Spirit of Inquiry

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

Come and explore how to redesign your introductory biology labs to foster student engagement, a creative mindset, independence of thought, effective collaboration, and scientific intellectual and communication skills.

John Peters, College of Charleston, Charleston, SC

1635 • Visualize It: Using Molecular Models to Predict the Effects of Mutations on Protein Function

Spinnaker 2 • Biotechnology • Demonstration (75 min) • 2Y, 4Y

In this session, we will demonstrate how to identify the sites of pathogenic mutations using ClinVar, locate the corresponding protein structures, and use molecular modeling to explain the pathogenic phenotype.

Sandra Porter, Shoreline Community College, Seattle, WA

NABT Committee Meeting: Awards Committee

Room 511 • Committee Meeting (75 min) • GA

Jason Crean, Committee Chair

NABT Committee Meeting: ABT Advisory Committee

Room 514 • Committee Meeting (75 min) • GA

William McComas, ABT Editor

3:30 PM – 4:00 PM

1618 • Science Con-Artists, Fake News & Alternative Facts

Executive Conference 1 • General Biology • Paper (30 min) • HS, 4Y, GA

In the public media, people claim scientific expertise and authority when they have none. Learn their common tricks and how to prepare students to be savvy consumers of science.

Douglas Allchin, University of Minnesota, Saint Paul, MN

396 • Teach Your Students to Think Like a Scientist!

Executive Conference 2A • Science Practices • Hands-on Workshop (30 min) • HS

Explore two of our best classroom practices that we use to actively get our students thinking outside of the box. Participants are encouraged to bring their best practices as well!

Jennifer Jones and Matthew Shapiro, The Episcopal Academy, Newtown Square, PA

3:30 PM – 4:00 PM continued

1490 • 10 Brain-Based Classroom Hacks for Individualized Learning

Executive Conference 3A • Curriculum Development • Hands-on Workshop (30 min) • MS, HS

Learn the top 10 research-based activities that will increase deep learning and help create individualized lessons for students. Reach all learners with these differentiated lesson ideas.

Kirsten Landry, Kent Denver School, Englewood, CO

1609 A River Ran Through It – How to Survive a Natural Disaster and Save the Semester

Executive Conference 3B • General Biology • Paper (30 min) • 2Y, 4Y, GA

A panel discussion with LSC-Kingwood professors about how they dealt with the challenges of reorganizing the semester in the aftermath of Hurricane Harvey.

Betsy Morgan, Heather Scherr, and Brian Shmaefsky, Lone Star College-Kingwood, Kingwood, TX

1636 • Visualizing Student Thinking Using the NGSS Approach

Executive Conference 4 • General Biology • Hands-on Workshop (30 min) • MS, HS

Get your students excited to think and learn beyond the storyline. The goal of this workshop is to provide teachers with usable lessons and rubrics that incorporate NGSS activities.

Elizabeth Gonzalez and Bernadette Castaneda, Montclair High School, Montclair, CA

1614 • "Bugs on Bugs": An Inquiry-Based, Collaborative Activity to Illustrate the Existence and Diversity of Gut Flora of Arthropods

Marina 2 • General Biology • Hands-on Workshop (30 min) • 2Y, 4Y, GA

"Bugs on Bugs" is an inquiry-based research project in which students from two different courses collaborate, and both investigate arthropod and microbial.

Jeanelle Morgan and Swapna Bhat, University of North Georgia, Oakwood, GA

FRI

3:30 PM – 4:00 PM continued

1607 • A Coral Conundrum: Linking Genetics and Environmental Science

Marina 3 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • MS, HS, 2Y

Use a simulated DNA microarray to analyze the effect of rising sea temperatures on coral reef ecosystems. Leave with free resources to use immediately in your classroom!

Courtney Behrle, BioNetwork, Raleigh, NC

1463 • The Doctor Is In!

Marina 4 • Anatomy & Physiology • Hands-on Workshop (30 min) • HS

Learn about some new activities for your anatomy classroom that allow students to have inexpensive, hands-on fun while they learn about medicine and forensics!

Laura Woerner, Saint James School, Montgomery, AL

1729 • HHMI's Interactive Winogradsky Column: Linking Ecosystems to Metabolism

Nautilus 2 • Microbiology & Cell Biology • Demonstration (30 min) • 2Y, 4Y

Facilitate hypothesis generation and experimental design using HHMI's Interactive Winogradsky Column. Learn how to use this new resource with student-made columns to connect ecological concepts with bacterial metabolism.

Dave Westenberg, Missouri University of Science & Technology, Rolla, MO and Mark Nielsen, HHMI, Chevy Chase, MD

375 • Making Evolution Stick: Using Active Learning and Sticky Notes to Teach the Mechanisms of Evolutionary Change

Nautilus 3 • Evolution • Hands-on Workshop (30 min) 2Y, 4Y, GA

Participants will go through a hands-on activity using sticky notes to teach fundamental mechanisms of evolutionary change using active learning in small groups. This presentation is by the 2018 Huxley Awardee.

Kathleen Grogan, Pennsylvania State University, University Park, PA

1514 • Rosalind Franklin and the Discovery of the Structure of DNA: Using History to Help Students Understand Nature of Science

Spinnaker 1 • Nature of Science • Paper (30 min) • HS, 2Y, 4Y

Our study examined whether and how incorporating the historical story associated with discovering the structure of DNA coupled with the explicit, reflective approach affect undergraduates' understanding of NOS.

Peng Dai, Mallinson Institute for Science Education, Kalamazoo, MI

NABT Committee Meeting: Archival Committee

Room 511 • Committee Meeting (30 min) • GA

Carrie Jo Bucklin and Jill Maroo, Committee Chairs

NABT Committee Meeting: Nominating Committee

Room 514 • Committee Meeting (30 min) • GA

Donald French, Committee Chair

4:00 PM – 5:30 PM

Exhibit Hall Closing Reception

Pavilion • Special Event

It's last call in the NABT Exhibit Hall. That means it's your last chance to talk with exhibitors and get those freebies for the classroom. Join us for a special reception, prize giveaways, and more!

Sponsored by

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5:30PM – 8:00PM

HHMI Night at the Movies featuring Sean Carroll

Grand Ballroom • Special Event (Tickets Required)

HHMI BioInteractive and NABT are pleased to host the 8th Annual *HHMI Night at the Movies with Sean Carroll*. Join Dr. Carroll for the premiere of a new feature-length film, followed by a discussion with the filmmakers. This free red-carpet event will begin at 5:30PM with a free reception.

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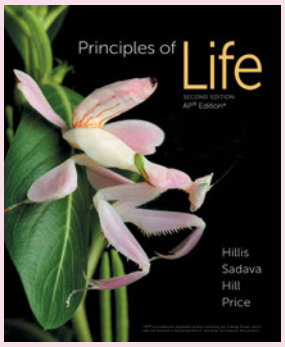

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SAN DIEGO 2018

Saturday

Abbreviation Key
E: Elementary School
MS: Middle School
HS: High School
2Y: Two-Year College
4Y: Four-Year College
GA: General Audience

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

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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

SAT

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

SAT

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

SAT

9:00 AM – 10:15 AM continued

SPECIAL PROGRAMMING PRESENTED BY

AC-2 BioLink Regional Center

1699 • Bio-Link at 20: Building the Education Ecosystem to Help Instructors Help Students to Biotech Careers

Seabreeze 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: Equity Committee

Room 511 • Committee Meeting (75 min) • GA

Committee Chair for 2019 TBD

NABT Committee Meeting: Global Outreach Committee

Room 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 Constructivist Approach

Spinnaker 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

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

394 • *C. elegans* as a Genetic Model in the Classroom

Executive 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 Selection

Executive 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

SAT

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

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

SAT

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

SAT

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: Purrrfect 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; Jacqualine 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

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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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36. Reducing Barriers in the Open Educational Resources (OER) Life-cycle 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 Braido, 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

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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 Alqirem, 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

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

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 erythrogaster

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

SAT

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

SAT

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

SAT

2:00 PM – 3:15 PM cont.

1610 • 5 New Genomics Education 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

SAT

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

SAT

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

SAT

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.

SAT

SAN DIEGO 2018

Sunday

Abbreviation Key
E: Elementary School
MS: Middle School
HS: High School
2Y: Two-Year College
4Y: Four-Year College
GA: General Audience

8:30 AM – 12:30 PM

398 • A Penicillium Fungus Antibiotic Effect Activity

Marina 1 • AP Biology • Special Workshop (Tickets Required) • HS, 2Y

Learn how to introduce fungal biology and the discovery of antibiotics into the classroom with this activity. Participants will quantify the antibiotic effect on bacteria and return home with materials.

Nadja Anderson and Jesse Lewis, University of Arizona, Tucson, AZ

9:00 AM – 12:00 PM

1639 • Class Ethos: The "4th Dimension" of the NGSS Highlighting the Understanding Global Change Resources from UC Berkeley's Museum of Paleontology

Marina 3 • Curriculum Development • Special Workshop (Tickets Required) • MS, HS, 2Y

The NGSS requires teachers to shift classroom dynamics. The greatest shift may be classroom ethos. This session enables teachers to create inclusive tasks that value the experiences of all students.

Jim Clark, Next Gen Science Innovations, Pleasanton, CA; Samantha Johnson, San Lorenzo Unified School District, San Lorenzo, CA; and Jessica Bean, University of California Museum of Paleontology, UC Berkeley, Berkeley, CA

9:30 AM – 11:00 AM

NABT Section Meeting: Four-Year College & University Section

Spinnaker 1 • Committee Meeting • GA

NABT Section Meeting: Two-Year College Section

Spinnaker 2 • Committee Meeting • GA

NABT Section Meeting: AP Biology Section

Seabreeze 1 • Committee Meeting • GA

NABT Meeting: Intro Bio Task Force

Seabreeze 2 • Committee Meeting • GA

SUN

EXHIBIT HALL HOURS

Thursday

5:30 PM – 7:30 PM

Exhibit Hours

+ Exhibit Hall Opening Reception

Sponsored by illumina® FOUNDATION

Friday

8:00 AM – 9:00 AM

Exhibit Hall Coffee Break

Sponsored by openstax™

8:00 AM – 5:30 PM

Exhibit Hours

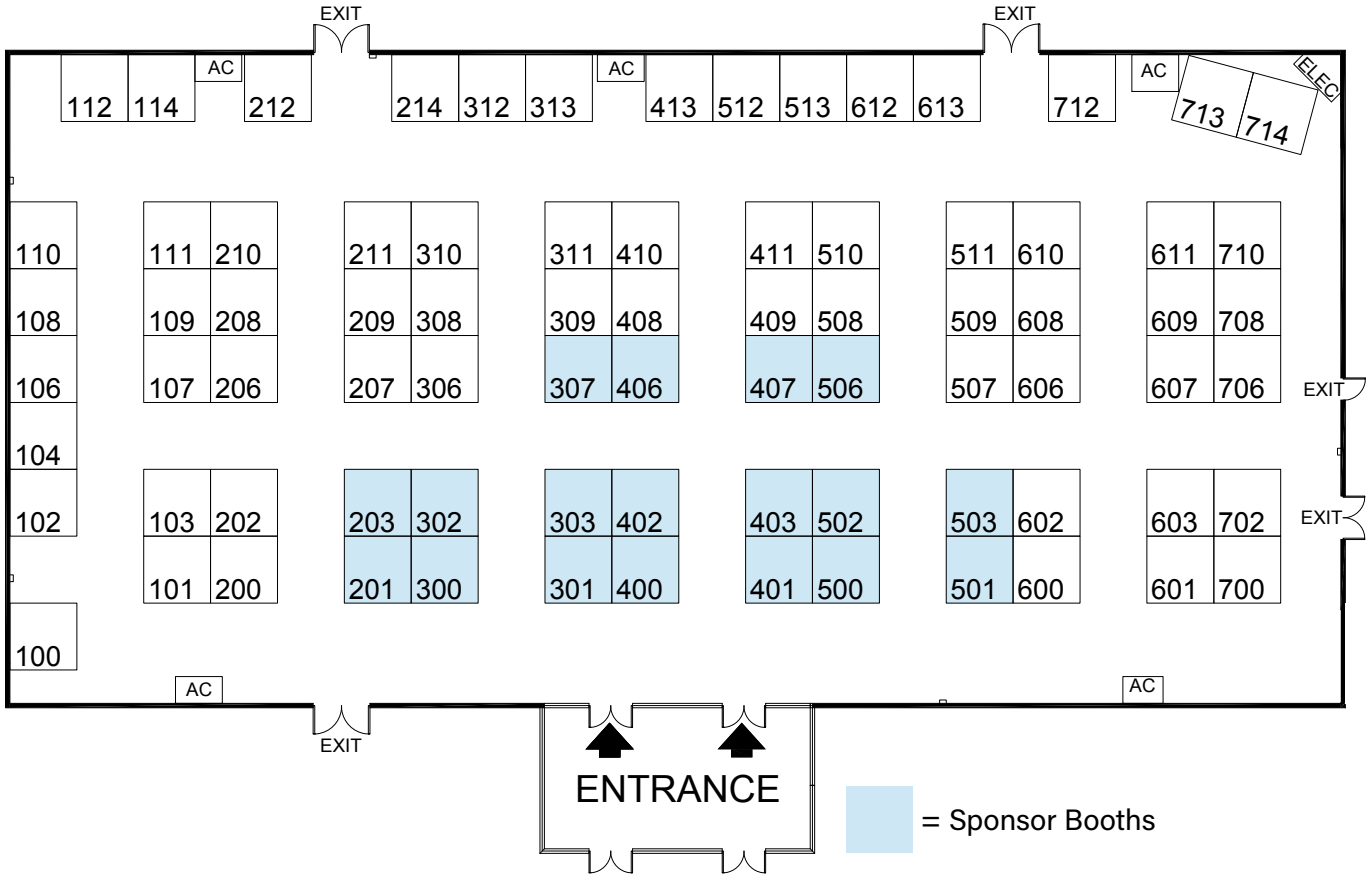
4:00 PM – 5:30 PM

Exhibit Hall Closing Reception

Sponsored by hhmi BioInteractive

EXHIBIT HALL MAP

Exhibit hall is located in the Pavilion (see page 16 for full venue map).



3D Molecular Designs

Booth 101

Milwaukee, WI •
3dmoleculardesigns.com

Hands-on and minds-on! Our three-dimensional kits and models focus on core ideas and cross-cutting concepts in biology, chemistry, physical and life sciences. We involve teachers in developing products, writing materials and field testing. Kits support STEM and NGSS. Ask about our new Dynamic DNA Kit!

AC2 Bio-Link Regional Center

Booth 303

Austin, TX • ac2.bio-link.org

The AC2 Bio-Link Regional Center works with educators, high schools, colleges, and industry representatives in Texas and Kentucky to develop integrated networks that support and provide high quality educational experiences for students at multiple levels who wish to pursue careers in biotechnology.

American Museum of Natural History

Booth 104

New York, NY • learn.amnh.org

Seminars on Science is the online teacher education program from the American Museum of Natural History in New York City. Our six-week online graduate courses in the life, Earth, and physical sciences connect you to cutting-edge research, powerful classroom resources, and a network of educators from around the world.

American Phytopathological Society

Booth 214

St. Paul, MN • apsnet.org

APS is a diverse global community of scientists researching, educating and sharing plant knowledge to meet the world's need for safe and nutritious food while promoting economically and environmentally sustainable plant health practices. APS encourages teachers to introduce plant related topics in their curriculum to students of all ages.

American Physiological Society

Booth 509

Bethesda, MD • the-aps.org

The American Physiological Society (APS) is a nonprofit devoted to fostering education, scientific research, and dissemination of information in the physiological sciences.

American Society of Plant Biologists

Booth 408

Rockville, MD • aspb.org

ASPB is a professional society devoted to the advancement of the plant sciences. It publishes two world-class journals and organizes conferences, and other activities that are key to the advancement of the science.

Anatomage

Booth 411

San Jose, CA • anatomage.com

Anatomage is a medical company, driving innovation through advanced solutions in hospitals and educational institutions. Our products include medical tables, surgical devices, and radiology software. Our cutting-edge equipment has been featured numerous times in journals, publications, and the media, including: TED Talks, BBC, CBC, Japanese Fuji TV, and PBS.

Andamio Games

Booth 212

Minneapolis, MN • andamiogames.com

Andamio Games develops mobile apps that make hard science concepts easier to learn. Our new app, CellEnergy: Photosynthesis Labs, was developed with a grant from the National Science Foundation, and in collaboration with Sehoya Cotner, NABT's 2016 university teacher of the year. Mention 'NGSS' for a free trial!

EXHIBITOR KEY

Sponsorship Tiers

- Diamond
- Silver
- A La Carte
- Treasure Hunt Exhibitors

Animalearn

Booth 609

Jenkintown, PA • animalearn.org

Stop by Animalearn's booth to check out the latest innovative non-animal resources to help you teach life science! Learn how you can access Animalearn's The Science Bank, the largest FREE loan program of humane science education products in the U.S. Take the leap into the 21st century biology class today.

B.A.C.K. for Learning

Booth 311

Casa Grande, AZ • backforlearning.com

Biology Active Classroom Kits are designed to help with teaching hard to visualize concepts and promote an active learning environment. All kits and accompanying materials are developed and produced by a Biology professor with 15 years teaching experience.

Backyard Brains

Booth 202

Ann Arbor, MI • backyardbrains.com

Using simple, yet powerful neuroscience kits, popularized through engaging TED TALKS and MYTHBUSTER videos, you can help enlist the next generation of neuroscientists. Backyard Brains' kits show students first-hand how the brain communicates with our senses, memories, and desires. This workshop will demonstrate our human, invertebrate and plant biology devices.

Bedford, Freeman & Worth High School Publishers

Booth 310

Hamilton, NJ • highschool.bfwpub.com

Bedford, Freeman & Worth (BFW) High School Publishers is your source for innovative science resources. We publish the best-selling book, Environmental Science for AP®, as well as Principles of Life for AP® Biology and Living by Chemistry for pre-AP® Chemistry. Stop by our booth to receive more information on these programs.

BioCorporation

Booth 603

Alex, MN • biologyproducts.com

Bullfrogs an fetal pigs an eyes...oh my! All joking asides, we have what you need for your dissection labs. Come check out our selection and choose a free sample.

Bio-Rad Laboratories, Inc.

Booth 201

Hercules, CA • explore.bio-rad.com

Bio-Rad provides a completely supported life science experience. Starting with the highest quality curriculum and reagents, Bio-Rad provides peace of mind each time you spend your precious lab budget. We focus on providing teachers with the best resources possible so you can focus on what you do best – teach!

Bone Clones, Inc.

Booth 301

Chatsworth, CA • boneclones.com

Bone Clones, Inc. manufactures detailed, high-quality osteological reproductions of skeletal elements. In addition to producing specimens exhibiting trauma and pathology, we have an extensive range of skulls and skeletons providing age, sex, and ancestry differences. Our durable replicas obviate the need for a dedicated teaching collection of real human remains.

Carolina Biological Supply Company

Booth 401

Burlington, NC • carolina.com

Carolina Biological Supply Company is a worldwide leader in science education, providing top-quality, innovative science and math materials for educators. Carolina serves the K-16 market with everything needed to equip science laboratories and classrooms. Products, kits and free teacher resources are available at carolina.com. Carolina™ Science catalog available upon request.

Catalyst Learning Curricula

Booth 208

Asheville, NC • catalystlearningcurricula.com

Catalyst Learning Curricula provides comprehensive, student-centered lesson plans and training to teachers of college, high school and middle school science. We specialize in hands-on, inquiry-based curricula and instructional methods for AP/IB, Pre-AP/Pre-IB and NGSS courses that prepare students for self-directed explorations with a high level of critical thinking and engagement.

Cell Zone, Inc.

Booth 507

Springfield, MA • cellzone.org

Cell Zone provides interactive materials, designed by a biology teacher, that incorporate active learning and UDL to engage students. Our products target traditionally difficult topics in biology and facilitate learning in the classroom. Visit our booth and see how to transform your classroom to be more inclusive, interactive and fun!

Clemson University

Booth 309

Clemson, SC • clemson.edu

The Department of Biological Sciences is proud to offer an online, non-thesis Master of Biological Sciences designed specifically for K-12 teachers. The curriculum consists 30 credit hours of relevant, rigorous, and challenging graduate courses that are specifically designed to improve science-content knowledge. This program is fully in a distance-learning format.

Cognitive Surplus

Booth 706

Portland, OR • cognitive-surplus.com

Cognitive Surplus was started in 2013 by Kristen and Geoff Zephyrus to celebrate the intersection of science and design. We are proudly based in Portland, Oregon. Whether you're looking for a birthday gift for your lab partner, or a sweet new graphic t-shirt for yourself, we've got your smarty-pants covered.

Earthwatch Institute

Booth 413

Boston, MA • earthwatch.org

Earthwatch connects teachers and students with expert scientists studying environmental issues around the world. Through our fully-funded teacher fellowships and exclusive student travel programs, teachers and students experience hands-on scientific field research while helping to conserve the natural world.

Ecology Project International

Booth 106

Missoula, MT • ecologyproject.org

Ecology Project International (EPI) is a nonprofit dedicated to improving and inspiring science education and conservation. EPI offers 9-12-day science-focused travel programs that give students and teachers the opportunity to visit some of the world's most biodiverse locales, study ecology, and assist in ongoing scientific research.

Educurious Project-Based Learning

Booth 210

Seattle, WA • educurious.org

Educurious is a 501c3, specializing in project-based learning. When a student is in charge of his/her own learning, working on solving authentic problems, their curiosity and interest become the energy that drives the learning. Come see Engaging in 21st Century Biology – a course that prepares students for their future.

EDVOTEK

Booth 502

Washington, DC • edvotek.com

In 1987, Edvotek envisioned how the emerging area of biotechnology could inspire students to choose a career in science. Since then, Edvotek has expanded to become the world's leading supplier of safe, affordable and easy-to-use biotechnology kits and equipment designed specifically for education.

Fisher Science Educator/G-Biosciences

Booth 613

San Francisco, CA • bioteched.com

Fisher Science Education, a leader in laboratory materials for K-14, along with G-Biosciences, an innovative biotechnology laboratory products company, are working with Ellyn Daugherty to supply a complete list of kits, equipment and reagents for Ellyn's Biotechnology: Science for the New Millennium curriculum as well as professional development opportunities teachers.

Flinn Scientific

Booth 511

Batavia, IL • flinnsci.com

Flinn Scientific is a leader in providing quality material, equipment, and digital resources for science education including the WhiteBox Learning system of web-based 3D/STEM engineering. For more than 40 years, Flinn has provided educators with innovative products, lab safety training, lab design guidance, and helpful support.

Foldscope Instruments, Inc

Booth 100

Palo Alto, CA • foldscope.com

Foldscope is the ultra-affordable, paper microscope that you assemble yourself. Designed to be extremely portable, durable, and to give optical quality similar to conventional research microscopes (magnification of 140X and 2 micron resolution). Our mission is to produce low-cost scientific tools that globally expand access to science.

GrowNextGen.org

Booth 607

Columbus, OH • grownextgen.org

GrowNextGen.org is a website that contains free educational resources that teach applied science through the lens of agriculture. Supported by Ohio Soybean Farmers, the site includes curriculum, career videos, elearning courses and more related to biology, environmental science, chemistry, and engineering, aligned with NGSS.

HudsonAlpha Institute for Biotechnology

Booth 207

Huntsville, AL • hudsonalpha.org

HudsonAlpha Institute for Biotechnology is a nonprofit institute dedicated to innovating in the field of genomic technology and sciences. Opened in 2008, its mission is four-fold: sparking scientific discoveries; bringing genomic medicine into clinical care; fostering life sciences entrepreneurship and business growth; and encouraging the creation of a genomics-literate society.

iBiology

Booth 708

San Francisco, CA • iBiology.org

iBiology is a non-profit organization that, in the form of open-access free videos, conveys the excitement of modern biology and the process by which scientific discoveries are made. Our aim is to provide a platform that educators can use during their teaching plans and in their classrooms.

Illumina

Booth 506

San Diego, CA • illumina.com

A global genomics leader, Illumina provides next-generation sequencing solutions to the research, clinical, and applied markets. Illumina technology is responsible for generating more than 90% of the world's sequencing data. Through collaborative innovation, Illumina is fueling groundbreaking advancements in oncology, reproductive health, genetic disease, microbiology, agriculture, forensic science, and beyond.

Labster

Booth 307

Somerville, MA • labster.com

Labster is a company dedicated to developing fully interactive advanced lab simulations for higher education and high school levels. Labster's virtual labs are designed to stimulate students' natural curiosity and highlight the connection between science and the real world, improving student learning outcomes and retention rates.

Macmillan Learning

Booth 308

New York, NY • macmillanlearning.com

Macmillan Learning brings together some of the most respected imprints in Biology Education to enhance the classroom and lab. Learn how we partner with thought leaders in Biology Education to produce the best in scientific publishing from W.H. Freeman, Roberts & Company, Hayden-McNeil, Sapling Learning, and Late Nite Labs.

Maderas Rainforest Conservancy

Booth 606

Miami, FL • maderasrfc.org

The Maderas Rainforest Conservancy 501 (c) 3, was established to promote the conservation and management of Mesoamerican forests through education, conservation and community outreach. We are funded by travel opportunities available for groups and researchers in Nicaragua, Costa Rica, and Guatemala. We sell products made by our women's entrepreneurship project.

MiniOne Systems

Booth 407

San Diego, CA • theminione.com

MiniOne Systems provides electrophoresis and PCR systems specifically for hands-on bioscience learning in classrooms. Our student-centered systems are designed to be safe, reliable, robust, fast, and affordable. Our menu of MiniLabs simplify classroom management and engage students with real world experiments. Bring hands-on electrophoresis- and PCR-based labs to your classroom!

miniPCR

Booth 400

Cambridge, MA • minipcr.com

miniPCR develops innovative tools to enable hands-on DNA experimentation. The DNA Discovery System is a complete biotech lab: miniPCR, blueGel electrophoresis/transilluminator, and micropipette. Pair it with miniPCR Learning Labs to teach genetics, forensics, and more. New! The P51 molecular viewer brings the study of DNA structure to your class.

Monsanto

Booth 406

St. Louis, MO • advancingtogether.com

Monsanto (now Bayer) is a global modern agriculture company. We develop products and tools to help farmers around the world grow crops more productively, while using energy, water, and land more efficiently. Through programs and partnerships, we collaborate with many organizations to help tackle some of the world's biggest challenges.

Montana State University

Booth 513

Bozeman, MT • montana.edu/msse

The MS in Science Education (MSSE) program is designed exclusively for science educators to improve science content knowledge, providing innovative teaching strategies across all science disciplines. Online courses allow teachers to continue to work as they pursue an advanced degree, in addition to unique summer field/lab courses offering hands-on experience.

National Academies Press

Booth 209

Washington, DC • nap.edu

The National Academies Press (NAP) publishes the reports of the National Academies of Sciences, Engineering and Medicine. The NAP publishes more than 200 books a year, providing authoritative information on important matters in science and health policy.

National Center for Science Education

Booth 510

Oakland, CA • ncse.com

The National Center for Science Education (NCSE) works to ensure that what is taught in science classrooms and beyond is accurate and consistent with the best current understanding of the scientific community. Currently, NCSE focuses on climate change and evolution—well-established areas of science that are culturally controversial.

New York Chiropractic College

Booth 611

Seneca Falls, NY • nycc.edu

NYCC's M.S. in Human Anatomy and Physiology Instruction (MSHAPI) is a multidisciplinary online degree program that is part anatomy and physiology content expertise and part pedagogy. This well-respected degree is designed to fully develop highly successful and effective undergraduate A&P instructors and ensure their qualifications to obtain sought-after teaching positions.

NHGRI/NIH

Booth 206

Bethesda, MD • genome.gov

The National Human Genome Research Institute (NHGRI) is the driving force for advancing genomics research at the National Institutes of Health (NIH). By conducting and funding world-class genomics research, training the next generation of genomics experts, and collaborating with diverse communities, NHGRI accelerates scientific and medical breakthroughs that improve human health.

OpenStax, Rice University

Booth 501

Houston, TX • openstax.org

OpenStax provides free, peer-reviewed, openly licensed textbooks for introductory college and advanced placement courses, as well as low-cost, personalized courseware. A nonprofit ed-tech initiative based at Rice University, we're committed to helping students access the tools they need to complete their courses and meet their educational goals.

Oregon National Primate Research Center/OHSU

Booth 612

Beaverton, OR • ohsu.edu/onprc

The Oregon National Primate Research Center (ONPRC) is one of 7 national centers dedicated to improving human and animal health. Providing critical information required to support human clinical trials, scientists at ONPRC are currently exploring health questions related to addiction, aging, the immune system, obesity, fertility, diabetes, and more.

PASCO Scientific

Booth 500

Roseville, CA • pasco.com

PASCO, the award-winning leader in hands-on, inquiry-based science, transforms science education and student learning with innovative probeware, software, and curriculum. Because our products support the science and engineering practices, students gain a deeper understanding of science. PASCO products can be used with any tablet, computer, or smartphone.

Pearson

Booth 108

Austin, TX • pearson.com/us

Every learning moment builds character, shapes dreams, guides futures, and strengthens communities. At Pearson, your learning gives us purpose. We are devoted to creating effective, accessible solutions that provide boundless opportunities for learners at every stage of the learning journey.

Personal Genetics Education Project (pgEd)

Booth 109

Boston, MA • pged.org

The Personal Genetics Education Project raises awareness and sparks conversation about potential benefits as well as ethical, legal, and social implications of personal genetics. We strive to be inclusive of all voices in these discussions, regardless of socioeconomic or educational background, cultural or religious affiliation, and ethnic or personal identity.

PhytoTechnology Laboratories

Booth 610

Lenexa, KS • phytotechlab.com

PhytoTechnology Laboratories® is a global supplier of microbiological media, biochemicals, plant tissue culture media, and laboratory supplies for the plant pathology, plant molecular biology, and plant science markets. Visit our booth for more details and information about our products and company. For unmatched quality & service, choose PhytoTechnology Laboratories®.

PlantingScience/Botanical Society of America

Booth 512

St. Louis, MO • plantingscience.org

PlantingScience is a free online resource for teachers and schools. We are a learning community where scientists provide online mentorship to student teams as they design and think through their own inquiry projects. Our open education resources support NGSS-aligned plant investigations that integrate scientific practices and big ideas in biology.

Princeton University Press

Booth 608

Princeton, NJ • press.princeton.edu

Princeton University Press publishes biology books that can be used as texts or supplemental readings at the high school level and above, including The Serengeti Rules, How to Clone a Mammoth (Winner, 2016 AAAS/Subaru SB&F Prize for Excellence in Science Books, Young Adult Science Books), and Live Long and Evolve.

Salk Institute - Education Outreach Programs

Booth 312

La Jolla, CA • salk.edu/education

The Salk Institute is world-renowned for basic research discoveries ranging from cancer to neuroscience to plant biology and more. The award winning Education Outreach programs bring science knowledge and scientist volunteers directly to students, teachers, and the community through a variety of school based, on-site and virtual opportunities.

Science Learning Resources, Inc.

Booth 306

Washington, NC • science-learning.com

Science Learning Resources, Inc. produces and sells a virtual microscope program, the V-Scope Explorer containing digital micrographic images of the highest quality to support courses in Anatomy/Physiology, Biology, and Microbiology. In addition, high-resolution micrographic images are incorporated into fabric in BioWild Designs, a line of scarfs, skirts, leggings, and dresses.

SimBio

Booth 601

Missoula, MT • simbo.com

SimBio is a leading developer of interactive, simulation-based biology labs. We hope you will stop by our booth to chat with our content specialists, see demos of our ecology, evolution, genetics, and cell-biology modules, including a NEW proven-effective module exploring genetic drift, and/or to register for FREE evaluation software.

Society for Neuroscience - BrainFacts.org

Booth 211

Washington, DC • sfn.org

BrainFacts.org shares neuroscience with educators and students through engaging articles, videos, activities, and more. Neuroscience is rich with exciting discoveries, continuing profound unknowns, and critical implications for individuals, families, and societies. BrainFacts.org is a public information initiative of The Kavli Foundation, the Gatsby Foundation, and the Society for Neuroscience.

The Dana Foundation

Booth 111

New York, NY • dana.org

The Dana Foundation is a private philanthropic organization that supports advancing understanding of brain research through grants, publications, and educational programs. Stop by our booth for free booklets, fact sheets, and puzzles about the brain, and to learn more about our public outreach initiatives.

Vaccine Education Center at Children's Hospital of Philadelphia

Booth 102

Philadelphia, PA • vaccine.chop.edu

The Vaccine Makers Project (VMP) offers lessons and resources about the immune system, infectious diseases and vaccines. A program of the Vaccine Education Center at CHOP, the VMP seeks to inspire students with compelling materials and introduction to real-world scientists while equipping educators with easy-to-use, scientifically-accurate tools. Visit Booth #102!

Vernier Software & Technology

Booth 300

Beaverton, OR • vernier.com

Founded in 1981, Vernier pioneers award-winning interfaces, sensors, software, and curriculum to transform how educators teach science and how students collect, analyze, and interpret scientific data.

Ward's Science

Booth 112

Rochester, NY • wardsci.com

Serving science educators since 1862, Ward's Science provides innovative science supplies and services for teachers in all science disciplines across grades K-12 and college. Founded in Rochester, New York, Ward's Science is a leader in science education, dedicated to helping science teachers inspire students to explore the world.

Washington University in St Louis

Booth 200

St. Louis, MO • ucollege.wustl.edu

Teachers earn their Master of Science in Biology degree in two years through this hybrid program that combines life science content knowledge with pedagogy & leadership projects. It consists of two, three week summer institutes in residence. The remaining coursework during the 2 academic years is completed through distance learning.

Wisconsin Fast Plants Program

Booth 313

Madison, WI • fastplants.org

Wisconsin Fast Plants freely shares innovative resources for teaching science at all levels with rapid-growing Fast Plants. We bring to NABT and share online NGSS-aligned resources for elementary, middle/high school, and AP Biology. From life cycle, to genetics, evolution and environmental sciences, Fast Plants bring science alive.

W.W. Norton

Booth 107

New York, NY • books.wwnorton.com

The oldest and largest publishing house owned wholly by its employees, W. W. Norton, Inc. publishes about 400 trade, college, and professional titles each year.

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Bladen Community College, Dublin, NC
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Central Magnet School, Murfreesboro, TN
Chester High School, Chester, PA
Clayton High School, Clayton, MO
Colonia High School, Colonia, NJ
Convent of the Sacred Heart, New York, NY
Darnell-Cookman School of the Medical Arts, Jacksonville, FL
Dora R-III School, Dora, MO
Dougherty Valley High School, San Ramon, CA
El Centro College, Dallas, TX
Emmett High School, Emmett, ID
Fairhaven High School, Fairhaven, MA
Florida SouthWestern State College, Naples, FL
Frankford High School, Philadelphia, PA
Freedom High School, Freedom, WI
George Mason High School, Falls Church, VA
George Washington High, Charleston, WV
Gillette College, Gillette, WY
Grafton High School, Grafton, WI
Grand View University, De Moines, IA
Grants Pass High School, Grants Pass, OR
Greater New Bedford Regional Vocational Technical High School, New Bedford, MA
Greensburg Salem High School, Greensburg, PA
Harmony School in Innovation, Katy, TX
Heathwood Hall Episcopal School, Columbia, SC
Incarnate Word Academy, Houston, TX
The Independent School, Wichita, KS
Iowa City West High, Iowa City, IA
Kenmore West High School, Buffalo, NY
Kent County High School, Worton, MD
Lake Metroparks, Concord, OH
Lincoln High School, Esko, MN
Mallinson Institute for Science Education at WMU, Kalamazoo, MI
Martin Luther College, New Ulm, MN
Marysville High School, Marysville, KS
McCluer North High School, Florissant, MO
Metropolitan Community College, Omaha, NE
Midland Park High School, Midland Park, NJ
Moscow High School, Moscow, ID
Mount Saint Mary Academy, Watchung, NJ
Nassau Community College, Garden City, NY
North Shore Country Day School, Winnetka, IL
Packer Collegiate Institute, Brooklyn, NY
Palm Tree School, Fairfax, VA
Panorama High School, Panora, IA
Perkins High School, Sandusky, OH
Pike High School Freshman Center, Indianapolis, IN
Pikeview High School, Princeton, WV
Pontotoc Technology Center, Ada, OK
Presidio High School, Presidio, TX
Putnam City High School, Oklahoma City, OK
Riverside City College, Riverside, CA
Ronald Reagan College Prep School, Milwaukee, WI
Salem High School, Salem, IN
Saltsburg High School, Saltsburg, PA
Seabury Hall, Makawao, HI
Seneca East High School, Attica, OH
Skyline High School, Sammamish, WA
Southern Wells High School, Poneto, IN
St. Andrew's Episcopal School, Potomac, MD
St. Clair High School, St. Clair, MI
St. Thomas High School, Pasadena, TX
St. Ursula Academy, Cincinnati, OH
State Library of PA, Lykens, PA
Stillwater High School, Stillwater, OK
The Summit County Day School, Cincinnati, OH
Sunlake High School, Land O'Lakes, FL
Tiffin Columbian High School, Tiffin, OH
Troy High School, Troy, MI
Unionville High School, Kennett Square, PA
University Christian High School, Hickory, NC
Vincennes University, Vincennes, IN
Visitation Academy - Saint Louis, St. Louis, MO
West Mifflin Area High School, West Mifflin, PA
Western Sierra Collegiate Academy, Rocklin, CA
Whiting High School, Laramie, WY
Windsor High School, Windsor, CO
Worthington Christian High School, Worthington, OH

The mission of the NABT BioClub is to recruit, support, nurture, and promote students who have an interest in biological sciences for personal reasons, academic preparation, the betterment of society, and possible career opportunities by providing guidance, resources, and activities to meet these goals.

Look for the BioClub logo to indicate recommended articles for NABT BioClub members. If you are interested in forming a chapter of the NABT BioClub, contact NABT at office@nabt.org.

Anatomy & Physiology

AP Biology

Biotechnology

Botany & Plant Biology

Committee Meeting

Curriculum Development

Ecology / Environmental Science / Sustainability

Evolution

Field Trip

General Biology

General Session Speaker

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Instructional Strategies

Meal Function (Tickets Required)

Microbiology & Cell Biology

Nature of Science

Poster Session

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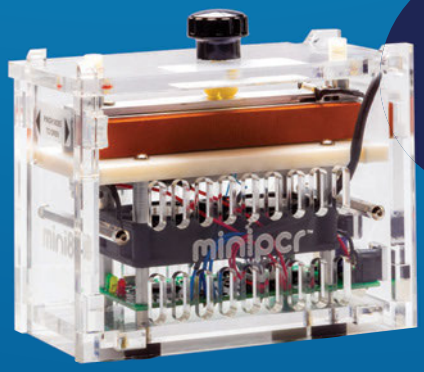

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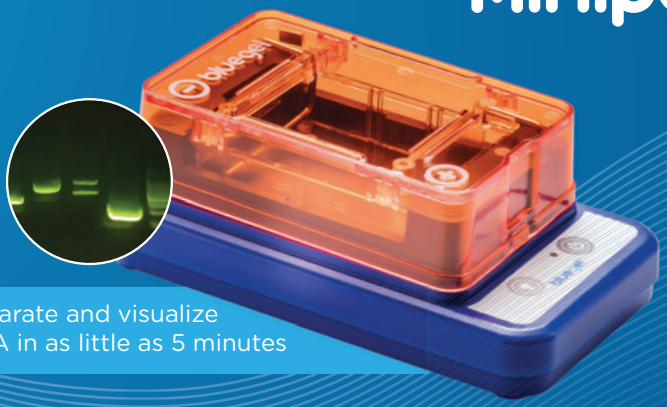

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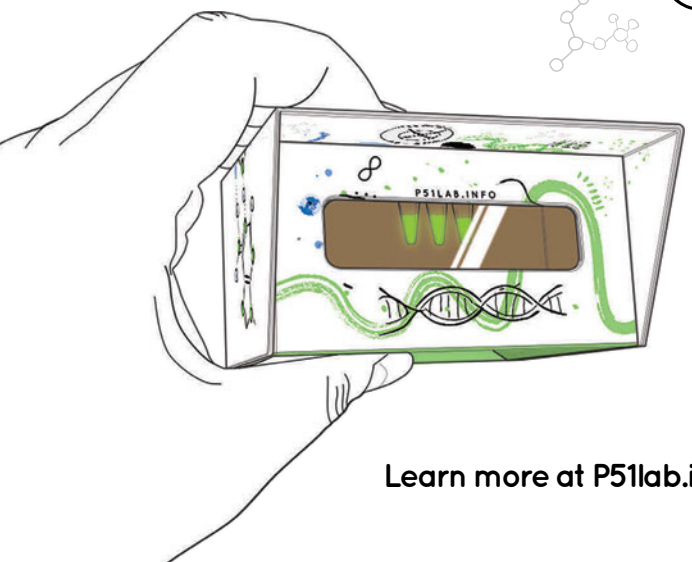

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