



NABT '23

BALTI MORE

NOVEMBER 2-5, 2023

2023 Professional
Development Conference

Baltimore Marriott Waterfront • Baltimore, Maryland

PROGRAM GUIDE





Abington Heights High School, Clarks Summit, PA
Aiken County Career and Technology Center, Warrenton, SC
Arcadia High School, Phoenix, AZ
Archbishop Curley High School, Baltimore, MD
Arroyo High School, San Lorenzo, CA
Athens High School, Troy, MI
Athens High School, Athens, IL
The Barstow School, Kansas City, MO
Bethlehem High School, Bardstown, KY
Bishop Garcia Diego High School, Santa Barbara, CA
Bloomington High School South, Bloomington, IN
Brentwood Academy, Brentwood, TN
Cabarrus Kannapolis Early College High School, Concord, NC
Canadian Valley Technical Center, OK
Caney Valley High School, Ramona, OK
Cardinal Gibbons High School, Raleigh, NC
Carrboro High School, Carrboro, NC
Castle Park High School, Chula Vista, CA
Central Carolina Technical College, Sumter, SC
Central Falls High School, Central Falls, RI
Central Magnet School, Murfreesboro, TN
Chelan High School, Chelan, WA
Chester High School, Chester, PA
Clayton High School, Clayton, MO
Colonia High School, Colonia, NJ
Coronado High School, Colorado Springs, CO
Cuyohoga Community College, Macedonia, OH
Darnell-Cookman School of the Medical Arts, Jacksonville, FL
DeVry Advantage Academy, Chicago, IL
Divine Savior Holy Angels High School, Milwaukee, WI
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
Florence Freshman Center, Florence, AL
Florida SouthWestern State College, Naples, FL
Freedom High School, Freedom, WI
Frontier Regional School, S Deerfield, MA
Gillette College, Gillette, WY
Grafton High School, Grafton, WI
Grandville High School, Grandville, MI
Greater Lowell Technical High School, Tyngsborough, MA
Greater New Bedford Regional Vocational Technical High School, New Bedford, MA
Greensburg Salem High School, Greensburg, PA
Hampton Roads Academy, Newport News, VA
Harmony School in Innovation, Katy, TX
Hillsboro High School, Hillsboro, OR
Hilltop High School, Chula Vista, CA
Holt High School, Holt, MI
The Independent School, Wichita, KS
Kenmore West High School, Buffalo, NY
Kent County High School, Worton, MD
Kettle Run High School, Nokesville, VA
Lake Metroparks, Concord, OH
Lexington High School, Mansfield, OH
Martin Luther College, New Ulm, MN
Mary Persons High School, Forsyth, GA
Marysville High School, Marysville, KS
McDowell Intermediate High School, Erie, PA
Metropolitan Community College, Omaha, NE
Midland Park High School, Midland Park, NJ
Minnetonka High School, Minnetonka, MN
Morganton, NC West Mifflin Area High School, West Mifflin, PA
Moscow High School, Moscow, ID
Mount Abraham Union High School, Bristol, VT
Nassau Community College, Garden City, NY
Northampton Area High School, Northampton, PA
Olivet Nazarene University, Bourbonnais, IL
Palm Tree School, Fairfax, VA

Perkins High School, Sandusky, OH
Pike High School Freshman Center, Indianapolis, IN
Pikeview High School, Princeton, WV
Pinecrest High School, Southern Pines, NC
Putnam City High School, Oklahoma City, OK
Riverside City College, Riverside, CA
Riverside High School, Leesburg, VA
Seabury Hall, Makawao, HI
Seneca East High School, Attica, OH
Sherando High School, Winchester, VA
Sibley East Middle and High School, Arlington, MN
Skyline High School, Sammamish, WA
Snow College, Ephraim, UT
South Central Jr Sr High School, Elizabeth, IN
South Garner High School, Garner, NC
Southeast Community College, Lincoln, NE
Southern Wells High School, Poneto, IN
St. Andrew's Episcopal School, Potomac, MD
St. Clair High School, St. Clair, MI
State Library of PA, Lykens, PA
Stillwater High School, Stillwater, OK
Stouffville District Secondary School, Whitchurch-Stouffville, ON, Canada
The Summit County Day School, Cincinnati, OH
Sunlake High School, Land O'Lakes, FL
Taylor University, Upland, IN
Tiffin Columbian High School, Tiffin, OH
Troy High School, Troy, MI
Unionville High School, Kennett Square, PA
University Christian High School, Hickory, NC
Ursuline Academy, Dedham, MA
Vincennes University, Vincennes, IN
Visitation Academy - St. Louis, St. Louis, MO
Westdale Secondary School, Hamilton, Ontario, Canada
Western Piedmont Community College, Morganton, NC
West Mifflin Area High School, West Mifflin, PA
Wheeling Park High School, Wheeling, WV
Worthington Christian High School, Worthington, OH

CONGRATULATIONS

to the Life Science Winners!

BEST OF STEM 2023[®]
EDUCATORS PICK

The winners of the 2023 BEST of STEM competition in the Life Science category represent a new frontier in giving students remarkable opportunities to explore the wonders of science and the possibilities of new academic and career opportunities. These learning solutions engage students and empower teachers to make strides in life science and STEM education.

- 267,000 STEM educators surveyed
- An expert panel of judges selected the finalists

Accelerate Learning:
Collaborate Science ML-PBL Powered,
Best of STEM: Phenomena-Based Teaching Grades K-5.

Avantis Education:
Eduverse, Trailblazer Award: Immersive Reality.

BrainPOP:
Science, Best Educator Support for Teaching & Learning.

BrainPOP:
Science, Best of STEM: Phenomena-Based Teaching Grades 6-8.

Carolina Biological:
Building Blocks of Science 3D, Bridging the Gap—English Language Learners: Science & Literacy.

Carolina Biological:
Carolina[®] Healthcare Simulations Kit, CTE Training: Health Science—Training Kits.

Carolina Biological:
Smithsonian Science for the Classroom, Best of STEM: Most Comprehensive Culturally Relevant Teaching.

Carolina Distance Learning[®]:
Online Gateway, Trailblazer Award: Hybrid Learning Superhero.

Code.org:
CS Connections—Simulating a Marine Ecosystem, Best of STEM: Environmental Science.

Code.org:
Culturally Responsive 6–12 Curriculum, Best of STEM: Culturally Relevant Teaching Grades 6–12.

Discovery Education:
STEM Careers Coalition, Best Freebies for STEM Careers.

ExploreLearning:
Frax, Best Innovation for 2023.

ExploreLearning:
Reflex, Bridging the Gap—Math Intervention Resources.

HudsonAlpha Institute for Biotechnology:
FILTERED, Best Freebies for STEM Curriculum Integration.

JASON Learning:
Beyond the Water Bottle: Minimizing Microplastic Pollution, Social Impact Award: Developing Citizen Scientists.

JASON Learning:
Pathways to Success, CTE Champion: Career Explorations.

Learning Undeclared:
Breakout Box: Body Systems Mission, Best of STEM: Life Sciences.

RealityWorks:
ECG Simulators, CTE Training: Health Science—ECG Training.

Visit the website for complete competition details.

bestofstemawards.com

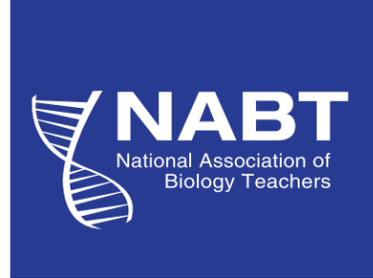
The mission of the NABT BioClub is to recruit, support, nurture, and promote students who have an interest in biological sciences for personal reasons, academic preparation, the betterment of society, and possible career opportunities by providing guidance, resources, and activities to meet these goals.

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.

SPONSORED BY

CAROLINA
www.carolina.com

Educators Pick Best of STEM Awards™ is a project of Catapult X, NSTA, MCH Strategic Data, and for first time this year, with the National Association of Biology Teachers (NABT). Winners are chosen by educators and certified by The Teich Group. Catapult X administers the program. For questions contact daylenelong@catapult-x.com.



NABT PROFESSIONAL
DEVELOPMENT CONFERENCE
NOVEMBER 2-5, 2023
BALTIMORE MARIOTT
WATERFRONT, BALTIMORE, MD

A SPECIAL THANKS to Our Generous 2023 Conference Sponsors & Exhibitors!

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From the President

Welcome to Baltimore and the 2023 National Association of Biology Teachers (NABT) Annual Conference! This is my favorite conference of the year, and I am so excited to be attending along with such a wonderful group of dedicated educators from across the world. Some program highlights include:

Thursday: I encourage you to kick off the conference at our NABT Open Forum to learn more about NABT and speak with the Board. Then join us for our opening General Session and Exhibit Hall Grand Opening to get the conference off to a great start!

Friday: If this is your first NABT Conference, don't miss the First Timers' Coffee Break to start the day! Take advantage of the speakers and sessions highlighting their work on the cutting edge of science and life science education. "Find the President" and win some great prizes in the exhibit hall in the afternoon.

Friday will then conclude with another wonderful HHMI Night at the Movies.

Saturday: Begin your morning with the Biology Education Poster Session, offering an excellent chance to delve deeper into the research conducted by our members. Following lunch, a variety of outstanding conference sessions await you! Later in the day, join us in applauding the Student Poster Award winners, and then for the closing session, where we will honor Dr. Lee Berger and his wonderful achievements in education, open science, and human evolution.

It is important to acknowledge that the generosity of our partners, sponsors, and exhibitors enables us to organize this event; I encourage you to take a moment to thank them throughout the conference.

I want to express my gratitude to the Professional Development Committee and our dedicated volunteers for their time and forward-thinking efforts in ensuring that the conference remains dynamic and highly beneficial to our community.

I also want to commend the NABT members who devote their time and energy to serve on committees, the Board of Directors, Regional Coordinators, State and Provincial representatives, BioClub Advisors, and our State Affiliates. Our exceptional team has dedicated themselves tirelessly to ensure the success of NABT. And, finally, a special thank you to our amazing staff and Executive Director, Jacki Reeves-Pepin, for her outstanding leadership.

I look forward to meeting and gaining insights from all of you during our time in Baltimore. May you be refreshed, nourished, and affirmed when you return on Monday.



Tara Jo Holmberg

Tara Jo (TJ) Holmberg, PhD
NABT President, 2023

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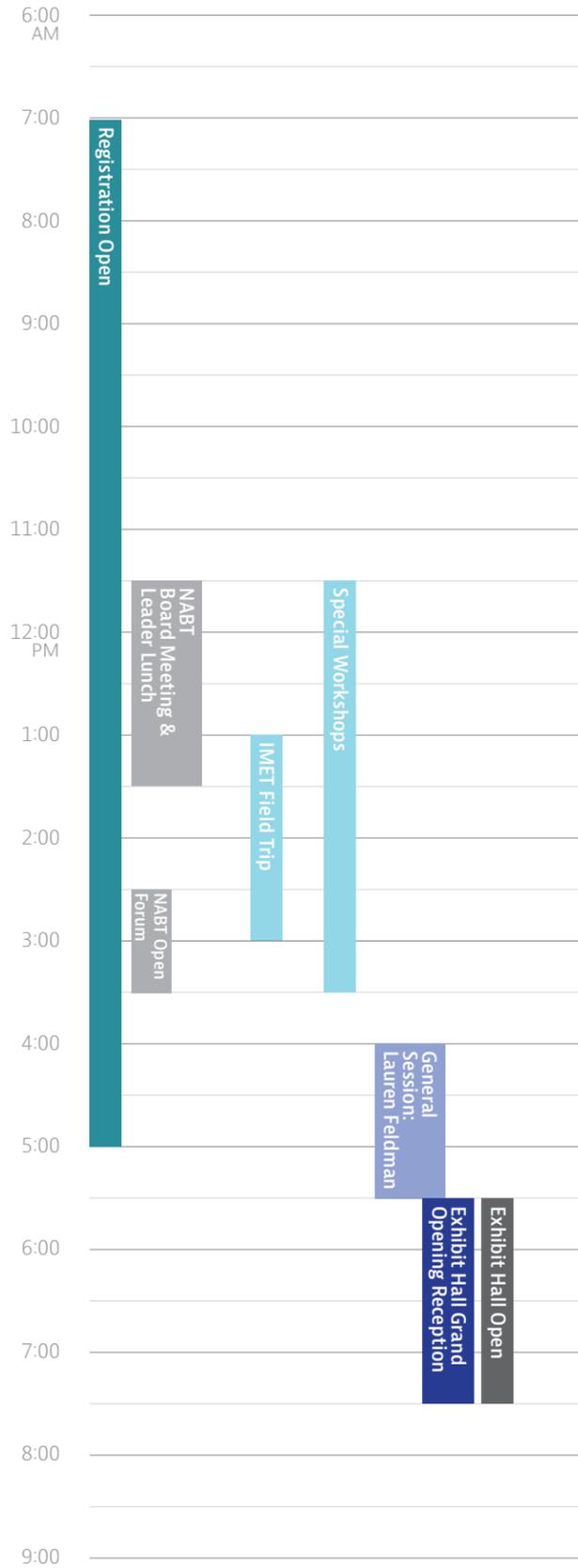
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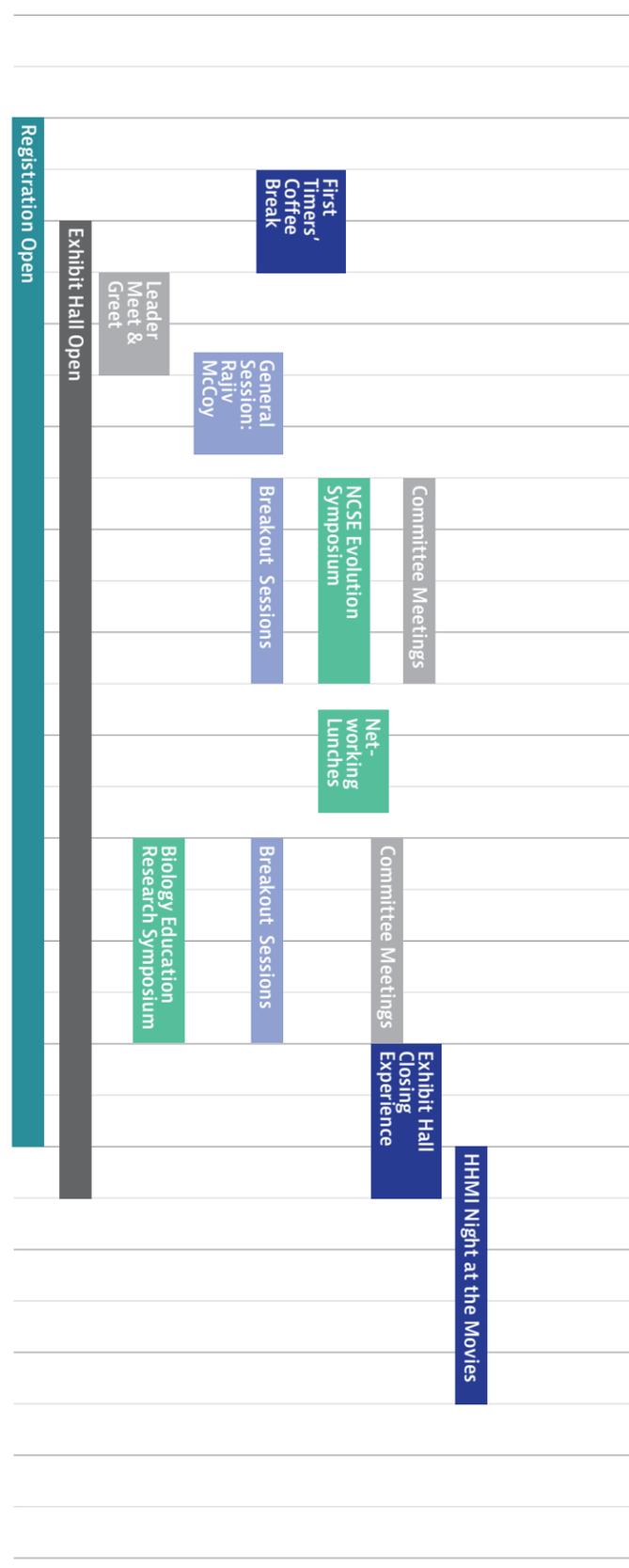
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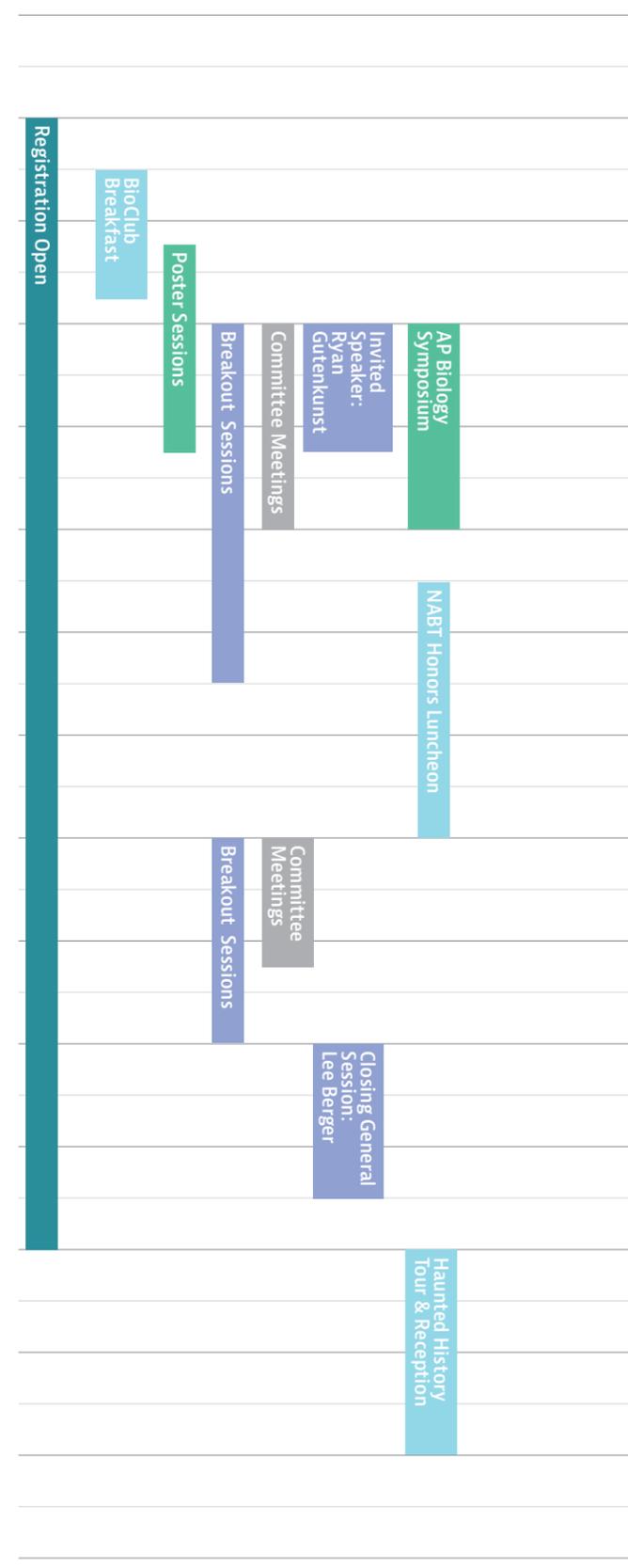
THURSDAY



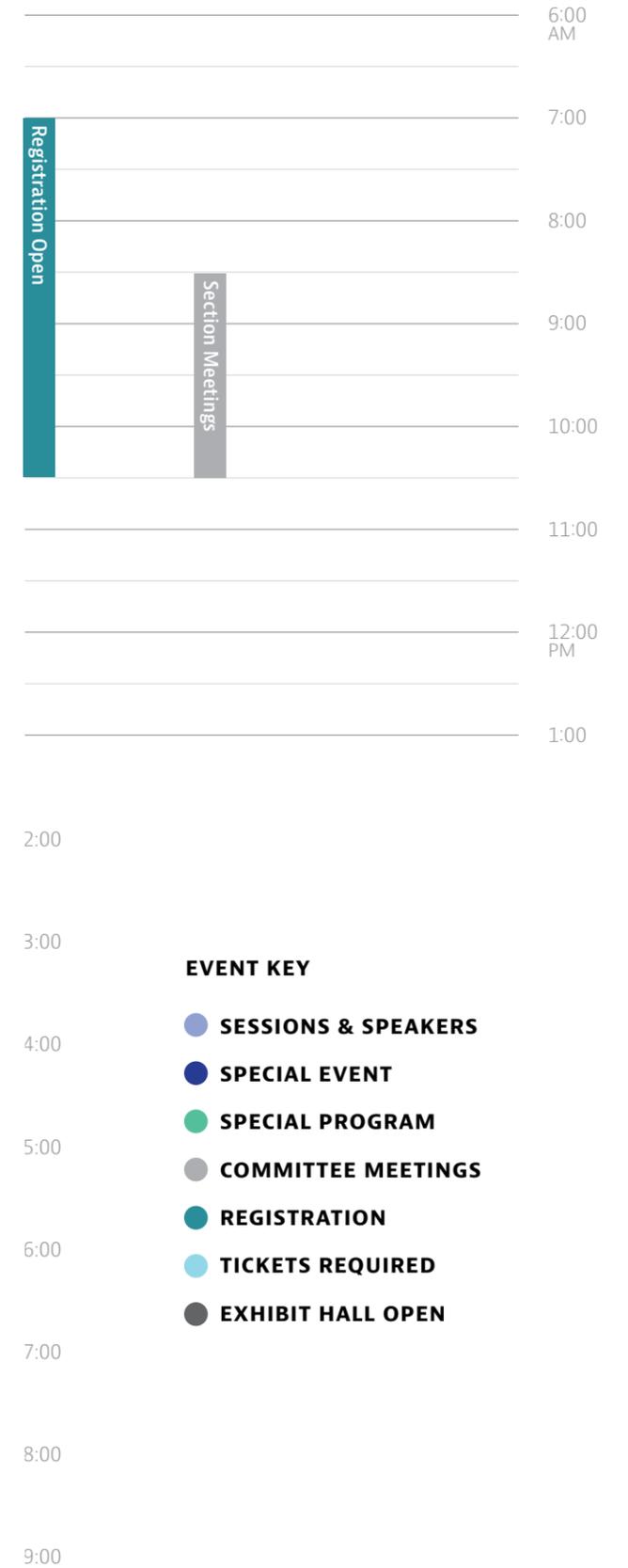
FRIDAY



SATURDAY



SUNDAY



EVENT KEY

- SESSIONS & SPEAKERS
- SPECIAL EVENT
- SPECIAL PROGRAM
- COMMITTEE MEETINGS
- REGISTRATION
- TICKETS REQUIRED
- EXHIBIT HALL OPEN

GENERAL CONFERENCE INFORMATION

ABOUT THE PROFESSIONAL DEVELOPMENT CONFERENCE

All functions, meetings, and exhibits will take place at the Baltimore Marriott Waterfront unless otherwise noted. Please consult this guide and signage for room information.

FOR PERSONS WITH DISABILITIES

Careful consideration is made during the planning of the NABT Conference to make it accessible to all participants. Should you require special services, please go to the registration area to contact an NABT representative. We will strive to meet your needs.

NURSING ROOM

A quiet space has been set aside for you across from Grand Ballroom II (3rd Floor).

CERTIFICATE OF ATTENDANCE

See page 71

REGISTRATION HOURS

The NABT registration desk is located on the 3rd Floor. It will be open during the following hours:

Thursday, November 2

7:00AM – 5:00PM

Friday, November 3

7:00AM – 5:00PM

Saturday, November 4

7:00AM – 5:00PM

Sunday, November 5

7:00AM – 10:30AM

FUTURE NABT CONFERENCE DATES & SITES

2024 Professional Development Conference
November 14–17, 2024
Anaheim Marriott
Anaheim, CA



2023 NABT CONFERENCE APP

Download the Grupio App when you visit the App Store or Google Play. Search for NABT in the App to access the event!



A limited NABT WiFi network is available.
NETWORK: NABT **PASSWORD: NABT2023**

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 diverse group of curriculum designers, publishers, manufacturers, developers, non-profit partners, and other providers with resources to support 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 2 5:30PM – 7:30PM

Friday, November 3 8:00AM – 5:30PM
(Closing Reception starts at 4:00PM)

TRANSPORTATION FOR OFFSITE EVENTS

Transportation will be provided on request for the field trip to IMET and the Haunted History Tour. Tickets are required to attend. Please visit the registration desk for more details.



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 by sharing your comments at bit.ly/NABT2023



PHONE: (888) 501-NABT
EMAIL: office@NABT.org
WEBSITE: www.NABT.org

Booth
300

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Join us on Friday
at Laurel
A&B (4th Floor)

- 8:00 – 9:00 AM Build it to understand it: An active learning, low cost approach to electrophoresis and micropipetting
- 10:30 – 11:45 AM Using synthetic biology to explore the Central Dogma and protein structure
- 12:00 – 12:30 PM Hands-on activities to bring CRISPR/Cas to your class
- 2:00 – 3:15 PM Using molecular tools to identify antibiotic resistance genes in environmental DNA
- 3:30 – 4:00 PM True blue™: Bacterial transformation made easy

Enter to win
a miniPCR
thermal cycler!

SCAN ME!



THURSDAY NOVEMBER 2



GENERAL SESSION SPEAKER

Lauren Feldman, Ph.D.

Professor, Journalism & Media Studies
Rutgers, The State University of New Jersey
New Brunswick, NJ

→ See page 24 for session details

Lauren Feldman, Ph.D. is a Professor in the School of Communication & Information at Rutgers University. She is a leading scholar in the areas of political science and environmental communication. Her current research emphasizes three primary areas of interest: climate change communication, partisan media and misinformation, and comedy and social change. Lauren's research has been published in more than thirty peer-reviewed journal articles, as well as in several edited volumes, and has been widely covered in major media outlets. She is co-author, with Caty Borum Chattoo, of the book, "A Comedian and an Activist Walk into a Bar: The Serious Role of Comedy in Social Justice," which examines how comedy can be used to engage audiences with challenging issues such as climate change and global poverty.

Her work has been supported by grants from the National Science Foundation, the Carnegie-Knight Task Force on Journalism, and the Spanish Ministry of Science, among other funders, and has been recognized with various academic awards. Lauren serves on the editorial boards of the *Journal of Communication*, *Communication Research*, and *Environmental Communication*, and she is an affiliate of the Rutgers Climate Institute and the George Mason University Center for Climate Change Communication.

Lauren earned her Ph.D. from the Annenberg School for Communication at the University of Pennsylvania. She also holds an M.A. in Communication from the University of Pennsylvania and a B.A. in English from Duke University. Prior to joining the Rutgers faculty, she was an Assistant Professor in the School of Communication at American University.

FRIDAY NOVEMBER 3



GENERAL SESSION SPEAKER

Rajiv McCoy, Ph.D.

Assistant Professor,
Department of Biology
Johns Hopkins University
Baltimore, MD

→ See page 27 for session details

Rajiv McCoy, Ph.D. is an assistant professor in the Department of Biology at Johns Hopkins University, where he began his appointment in 2018. He received a Ph.D. in Biology from Stanford University in 2015 and completed postdoctoral work in the Department of Ecology and Evolutionary Biology at Princeton University, as well as the Department of Genome Sciences at the University of Washington.

The McCoy lab (<https://mccoy-lab.org>) seeks to understand the genetic basis of variation in human complex phenotypes and fitness through the development and application of computational methods. This work combines diverse datasets and concepts from population genetics and statistics to achieve quantitative perspectives on human evolution and reproduction. Evolutionary research in the lab includes investigation of poorly resolved and repetitive regions of the genome; functional and fitness impacts of gene flow between modern and archaic hominins; and development of statistical methods for improving the

mapping of complex traits in samples from diverse and admixed populations. Reproductive research includes investigation of the molecular origins of human aneuploidy, implications for human development, and genetic factors influencing its occurrence; improved analysis of data from preimplantation and prenatal genetic testing; and testing for violations of Mendelian inheritance, for example by meiotic drive, embryonic mortality, or other mechanisms of transmission distortion.

Rajiv is a member of the Origins of Aneuploidy Research Consortium as well as a co-organizer of its annual meeting. He is also a member of the Telomere-to-Telomere Consortium, contributing to analysis of the first gapless assembly of a complete human genome. The McCoy lab is funded by a R35 Outstanding Investigator Award from the National Institute of General Medical Sciences of the NIH, as well as a Discovery Award from Johns Hopkins University.

SATURDAY NOVEMBER 4



SCOTT WILLIAMSON
SPEAKER SERIES

Ryan Gutenkunst, Ph.D.

Associate Professor,
Molecular and Cellular
Biology
University of Arizona
Tucson, AZ

→ See page 41 for session details

Ryan Gutenkunst, Ph.D. came late to the study of biology, after receiving his B.S. in Physics from the California Institute of Technology. It was while pursuing his Ph.D. in Physics at Cornell University that he discovered the beautiful depth of modern biology, shifting his research toward modeling the complex biochemical networks within cells. In his postdoctoral work, he expanded his biological breadth by modeling intracellular immune signaling and by developing a powerful and popular method for learning population history from genomic data.

Ryan joined the Department of Molecular and Cellular Biology at the University of Arizona in 2010, where he now serves as Interim Department Head.

His research has focused on developing computational methods for learning about history and natural

selection from genomic data, with notable applications to humans, fruit flies, and desert tortoises. His teaching has primarily been in computational biology, but he is currently developing a course focused on the relationships between personal genetics, ancestry, and conceptions of race.

SATURDAY, NOVEMBER 4

GENERAL SESSION SPEAKER

Lee Berger, Ph.D., D.Sc.

Explorer in Residence at National Geographic; Senior Carnegie Science Fellow; Director of the Centre for the Deep Human Journey, University of Witwatersrand, Johannesburg, South Africa

→ See page 53 session details

NABT IS PROUD TO HONOR

Dr. Lee Berger with the 2023 NABT Distinguished Service Award



Lee R. Berger, Ph.D., D.Sc., is an award-winning researcher, explorer, author, and speaker. He is the recipient of the National Geographic Society's inaugural Prize for Research and Exploration, the Academy of Achievement's Golden Plate Award, the South African Academy of Sciences Gold Medal, and was the 2016 National Geographic Society's Rolex Explorer of the Year. His work has brought him recognition as a Fellow of the Royal Society of South Africa, the Royal Geographical Society, the Explorers Club, and the South African Academy of Sciences. He holds prominent advisory positions, including the Chairmanship of the Fulbright Commission of South Africa, the Senior Advisory Board of the Global Young Academy, and the Centre of Excellence in Palaeosciences of South Africa, among many others.

He has been awarded several humanitarian awards, and his efforts in conservation have been recognized by the William T. Hor-

naday Award and Georgia's Youth Conservationist of the Year. His explorations into human origins on the African continent, Asia, and Micronesia for the past two and a half decades have resulted in many new discoveries, including the discovery of two new species of early human relatives—*Australopithecus sediba* and *Homo naledi*.

Lee has authored more than two hundred scholarly and popular works, including refereed publications and books on paleontology, natural history, and exploration. His discoveries have been featured three times on the cover of *Science* and have been named the top 100 science stories of the year by *Time*, *Scientific American*, and *Discover Magazine* on numerous occasions. He has appeared in many television documentaries on subjects related to archaeology, paleoanthropology, and natural history. The 2015 PBS Nova National Geographic documentary "Dawn of Humanity," about Lee's discovery of *Homo naledi*

and the Rising Star expedition, was nominated for an Emmy. Lee is an internationally recognized proponent of open-access science and open sourcing. His collaborative team of scientists numbers over 140 individuals, and his novel approach to inclusive science and open collaboration has given him recognition as a Pioneer in Science by the World Science Festival. In 2016, *Time* recognized him as one of the 100 Most Influential People in the World.

Lee is an avid diver and adventurer and holds a PADI Divemaster certificate, among many other specialties. He was born in Shawnee Mission, Kansas, and grew up in rural Georgia. He is presently the Director of the Centre for the Deep Human Journey at the University of the Witwatersrand, Johannesburg, South Africa, and an Explorer in Residence for the National Geographic Society. His collaborative team of scientists numbers over 140 individuals. He holds a Ph.D. in palaeoanthropology and a Doctor of Science in the same field.

BOARD OF DIRECTORS

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 AP Biology Section: **Mark Little**
 Four-Year College & University Section: **Carrie Jo Bucklin**
 Two-Year College Biology Section: **Karla Fuller**

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 Archival Committee: **Vacant**
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 Informal Science Education Committee: **Jill Maroo**
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 Nominating Committee: **Bob Melton**
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 Professional Development Committee: **Vacant**
 Retired Member Committee: **Dennis Gathmann**

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 Introductory Biology Task Force: **Anna Hiatt**
 Social Media Task Force: **John M. Moore & Stacey Kiser**
 Pre-Service Teacher Advisory Committee: **Julie Angle**

AFFILIATE MEMBERS

Biology Teachers Association of New Jersey (**BTANJ**)
 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**)
 Illinois Association of Biology Teachers (**IABT**)
 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**)

BioClub Student Awards

Jenna Hauptert
Cardinal Gibbons High School, Ft. Lauderdale, FL

Gillian Freeze
Western Piedmont Community College,
Morganton, NC

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

Sponsored by Carolina Biological Supply Company

Biology Educator Leadership Scholarship (BELS)

Nina Marchiando
Alliance Renee and Meyer Luskin College Ready Academy, Los Angeles, CA

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

Lee Berger, Ph.D., D.Sc
University of Witwatersrand, Johannesburg, South Africa

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 their research, writing, and teaching.

Sponsored by the National Association of Biology Teachers

Ecology/Environmental Science Teaching Award

Lisa Bircher, Ph.D.
East Palestine High School, East Palestine, OH

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

Excellence in Encouraging JEDI Award

Kelly Moore, Ph.D. & Elesa Goodfriend
Walters State Community College,
Morristown, TN

The NABT Excellence in Encouraging Justice, Equity, Diversity, and Inclusion (JEDI) Award recognizes efforts to promote equity in life science education. The recipient/recipients demonstrate a passion and commitment for JEDI through their teaching and outreach while also identifying successful strategies that increase enthusiasm for biology.

Sponsored by National Association of Biology Teachers

Evolution Education Award

Rebecca Brewer
Troy High School, Troy, MI

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

Sponsored by BSCS Science Learning & NCSE

Four-Year College & University Section Biology Teaching Award

Samiksha Raut, Ph.D.
University of Alabama, Birmingham, AL

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

Stanley Lo, Ph.D.
University of California San Diego, La Jolla, CA

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

Karla Kaun, Ph.D.
Brown University, Providence, RI

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 GSA

Honorary Membership

William F. McComas, Ph.D.
University of Arkansas, Fayetteville, AR

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

Jennifer Pfannerstill Travel Award

Not awarded in 2023.

Established to honor the memory of Jennifer Pfannerstill, this award is a need-based scholarship to support a teacher who has demonstrated a commitment to personal and professional development by helping that individual attend the NABT Conference for the first time.

Sponsored by NABT, BFW, & Donations

The Kim Foglia AP® Biology Service Award

Jacqueline Fernandez
Oakton High School, Vienna, VA

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 2023 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, miniPCR, and Population Connection.

Outstanding New Biology Teacher Achievement Award

Alexander Eden
Greater Lowell Technical High School,
Tyngsborough, MA

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

K. Rebecca Thomas, Ph.D.
Montgomery College, Rockville, MD

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

James DeKloe
Solano Community College, Fairfield, CA

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

Sheela Vemu, Ph.D.
Waubonsee Community College, Sugar Grove, IL

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.

**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®
www.carolina.com

Other consideration provided by Bio-Rad Laboratories, the Botanical Society of America, miniPCR, and Population Connection.

THANK YOU TO 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.

**OBTA HONOREES 2023****Region I**

Kenneth Bateman
Wellesley High School
Wellesley, MA

Region II

Joseph Evans
Kent County High School
Worton, MD

Carisa Steinberg
Syosset High School
Syosset, NY

Camilla Walck
Princess Anne High School
Virginia Beach, VA

Region III

Madeline Munar
Glenbrook South High School
Glenview, IL

Jeremy Cook
Carmel High School
Carmel, IN

Chandler Missig
L'Anse Creuse Frederick V.
Pankow Center
Clinton Township, MI

Anna Riddell
Fairfield City Schools
Fairfield, OH

Region IV

Kelley Bennett Tuel
Blue Valley Center for
Professional Studies
Overland Park, KS

Region V

Jessica Minton
Houston High School
Germantown, TN

Renee Haines
Martinsburg High School
Martinsburg, WV

Region VI

Lara McDonald
Etowah High School
Woodstock, GA

Raven Veillon-Skrmetti
Schools of the Sacred Heart
Grand Coteau, LA

Lincoln Clark
Spain Park High School
Pelham, AL

Region VII

Matthew Holden
Fayetteville High School
Fayetteville, AR

Miranda Thornton
Basha High school
Gilbert, AZ

Region VIII

Linda Rost
Baker High School
Baker, MT

Kimberly McCollum
SUCCESS Academy
Cedar City, UT

Region IX

Daniel Shay
North Central High School
Spokane, WA

PAST PRESIDENTS & CONFERENCE LOCATIONS

2022	Chris Monsour, Indianapolis, IN	1993	Ivo E. Lindauer, Boston, MA
2021	Julie Angle, Atlanta, GA	1992	Alton L. Biggs, Denver, CO
2020	Sharon Gusky, Online Conference	1991	Joseph D. McInerney, Nashville, TN
2019	Sherry Annee, Chicago, IL	1990	Nancy V. Ridenour, Houston, TX
2018	Elizabeth Cowles, San Diego, CA	1989	John Penick, San Diego, CA
2017	Susan Finazzo, St. Louis, MO	1988	Jane Abbott, Chicago, IL
2016	Bob Melton, Denver, CO	1987	Donald S. Emmeluth, Cincinnati, OH
2015	Jane Ellis, Providence, RI	1986	George S. Zahrobsky, Baltimore, MD
2014	Stacey Kiser, Cleveland, OH	1985	Thomas R. Mertens, Orlando, FL
2013	Mark Little, Atlanta, GA	1984	Marjorie King, Purdue Univ., IN
2012	Donald French, Dallas, TX	1983	Jane Butler Kahle, Philadelphia, PA
2011	Dan Ward, Anaheim, CA	1982	Jerry Resnick, Detroit, MI
2010	Bunny Jaskot, Minneapolis, MN	1981	Edward J. Kormondy, Las Vegas, NV
2009	John M. Moore, Denver, CO	1980	Stanley D. Roth, Boston, MA
2008	Todd Carter, Memphis, TN	1979	Manert Kennedy, New Orleans, LA
2007	Pat Waller, Atlanta, GA	1978	Glen E. Peterson, Chicago, IL
2006	Toby Horn, Albuquerque, NM	1977	Jack L. Carter, Anaheim, CA
2005	Rebecca E. Ross, Milwaukee, WI	1976	Haven Kolb, Denver, CO
2004	Betsy Ott, Chicago, IL	1975	Thomas J. Cleaver, Portland, OR
2003	Catherine W. Ueckert, Portland, OR	1974	Barbara K. Hopper, New York, NY
2002	Brad Williamson, Cincinnati, OH	1973	Addison E. Lee, St. Louis, MO
2001	Ann S. Lumsden, Montreal, QC, Canada	1972	Claude A. Welch, San Francisco, CA
2000	Phil McCrea, Orlando, FL	1971	H. Bentley Glass, Chicago, IL
1999	Richard D. Storey, Ft. Worth, TX	1970	Robert E. Yager, Denver, CO
1998	VivianLee Ward, Reno, NV	1969	Burton E. Voss, Philadelphia, PA
1997	Alan McCormack, Minneapolis, MN	1968	Jack Fishleder, Anaheim, CA
1996	Elizabeth Carvellas, Charlotte, NC	1967	William V. Mayer, New York, NY w/AAAS
1995	Gordon E. Uno, Phoenix, AZ	1966	Arnold B. Grobman, Washington, D.C. w/AAAS
1994	Barbara Schulz, St. Louis, MO	1965	L. S. McClung, U of CA, Berkeley w/AAAS

HONORARY MEMBERS

2022	John A. Jungck	2000	Elizabeth Carvellas
2021	Patsye Peebles	1999	<i>NOT AWARDED</i>
2020	Bob Melton	1998	Ivo Lindauer
2019	Dennis Gathmann	1997	Sam Rhine
2018	Michael Sipes	1996	Kenneth S. House
2017	John M. Moore	1995	Joseph D. Novak
2016	Margaret (Betsy) Ott	1994	Nancy V. Ridenour, Alton L. Biggs
2015	Sharon Radford	1993	George S. Zahrobsky
2014	Jay Labov	1992	Jon R. Hendrix
2013	Todd Carter	1991	Robert E. Yager
2012	Maura Flannery	1990	Jane Butler Kahle
2011	Louisa Stark	1989	Joseph D. McInerney
2010	Patricia Waller, Brad Williamson	1988	Thomas Mertens, Marjorie King
2009	<i>NOT AWARDED</i>	1987	Floyd Nordland
2008	Donald Cronkite	1986	Donald S. Dean
2007	William H. Leonard	1985	Stanley Weinberg
2006	Terry Hufford	1984	Jack Carter, Samuel Postlethwait
2005	Randy Moore, Eugenie Scott	1983	Manert Kennedy
2004	John Penick	1982	Harold "Sandy" Wiper, Jerry P. Lightner
2003	Donald Emmeluth	1981	Sophie Wolfe
2002	Leonard Blessing	1980	Sister M. Gabrielle, Ted F. Andrews, Sister Marian Catherine McGrann
2001	Gordon E. Uno		

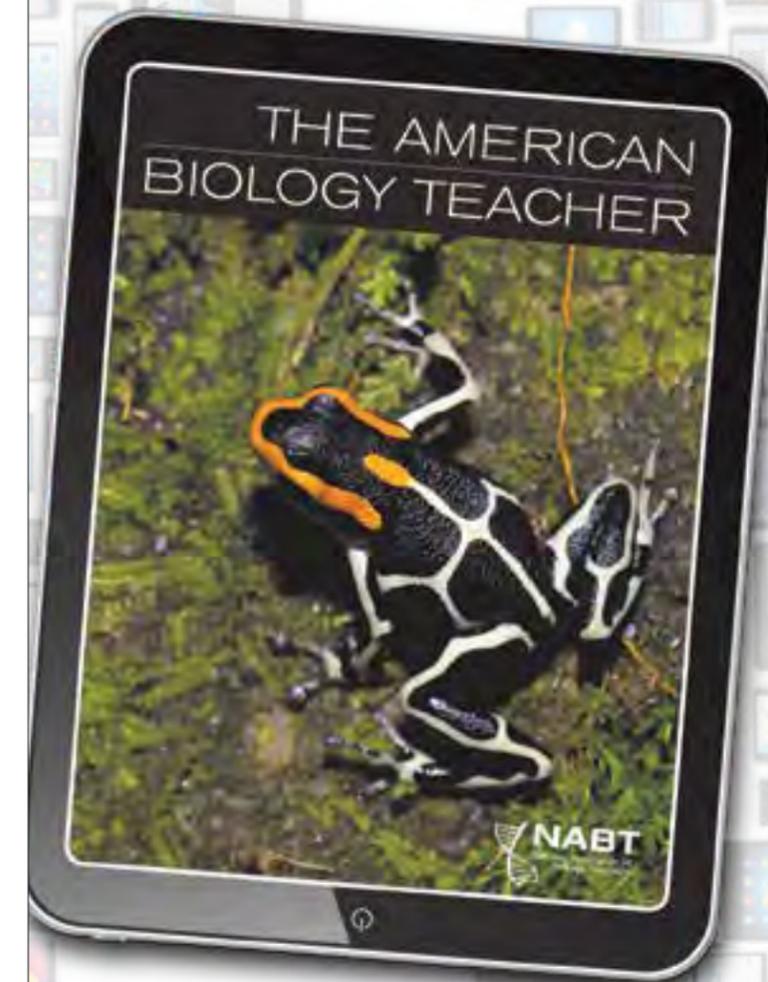
1964	Ted F. Andrews, Boulder, CO w/AIBS
1963	Philip R. Fordyce, U of MA, Amherst, MA w/AIBS
1962	Muriel Beuschlein, Corvallis, OR w/AIBS
1961	Paul V. Webster, Denver, CO w/AAAS
1960	Howard E. Weaver, New York, NY w/AAAS
1959	Paul Klinge, Chicago, IL w/AAAS
1958	Irene Hollenbeck, Washington, D.C. w/AAAS
1957	John Breukelman, Indianapolis, IN w/AAAS
1956	John P. Harrold, New York, NY w/AAAS
1955	Bro. H. Charles Severin, Atlanta, GA w/AAAS
1954	Arthur J. Baker, Berkeley, 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, 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

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	<i>NOT AWARDED</i>
1970	<i>NOT AWARDED</i>
1969	Arnold B. Grobman
1968	<i>NOT AWARDED</i>
1967	<i>NOT AWARDED</i>
1966	<i>NOT AWARDED</i>
1965	John Breukelman, H. Bentley Glass, George W. Beadle, Paul B. Sears, Brother H. Charles Severin, E. Laurence Palmer, Hermann J. Muller, Roger Tory Peterson, Oscar Riddle, Helen Irene Battle

NABT DISTINGUISHED SERVICE AWARD RECIPIENTS

2022	Michael Osterholm, CIDRAP, University of Minnesota, Minneapolis, MN
2021	Jeff Corwin, Marshfield, MA
2020	<i>NOT AWARDED</i>
2019	Bonnie Bassler, Princeton University, Princeton, NJ
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



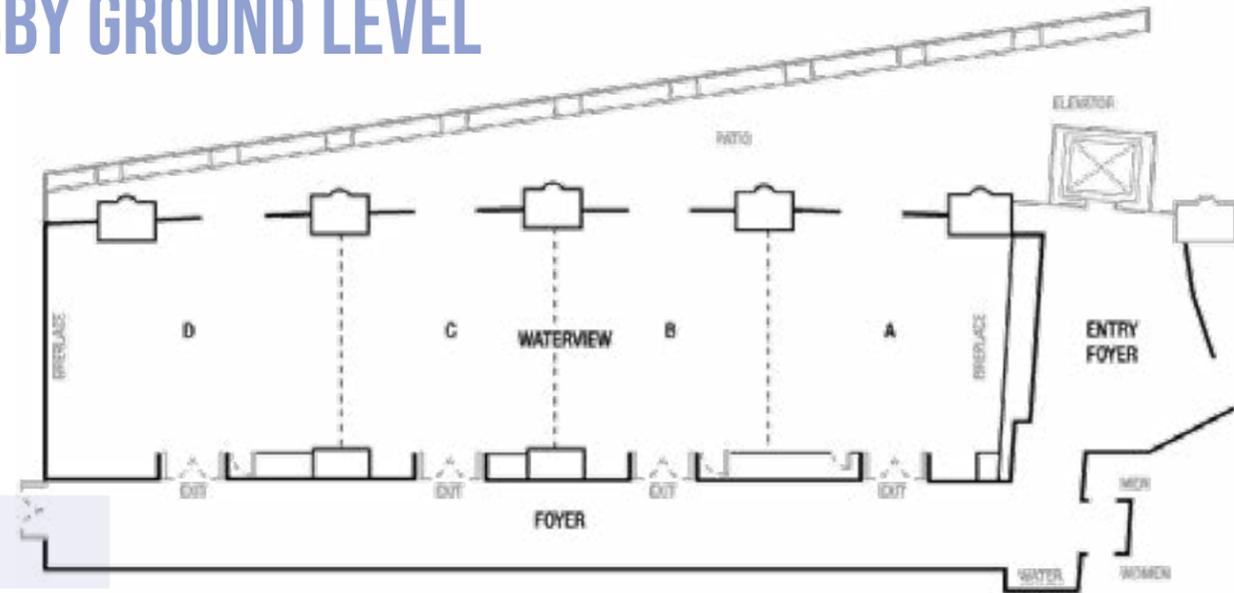
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for more information, or
find the *ABT* on iTunes,
Google Play, and Amazon.



LOBBY GROUND LEVEL



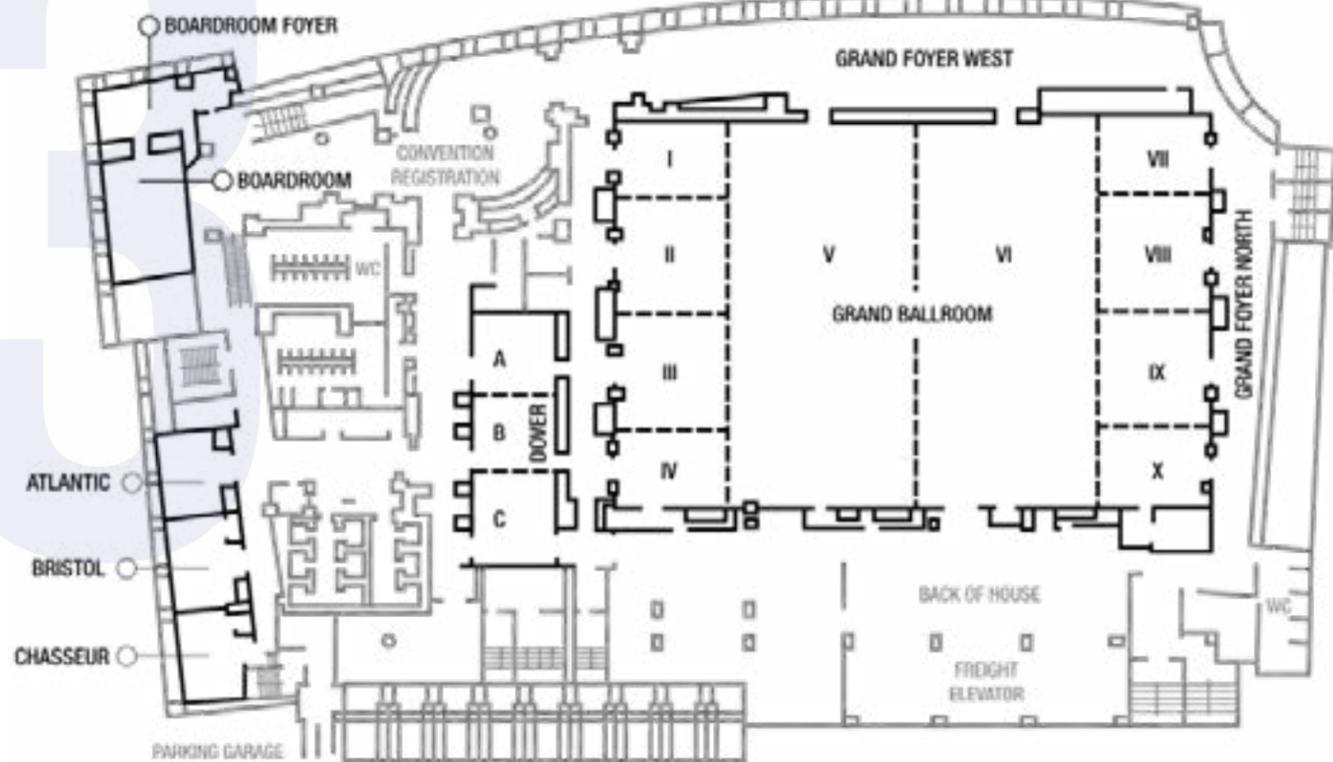
COMMITTEE MEETING SCHEDULE

There are many opportunities to volunteer at NABT. Committee and section meetings are open to all NABT members, and we invite you to get involved—and help develop—the programs that support you as a leader in life science education.

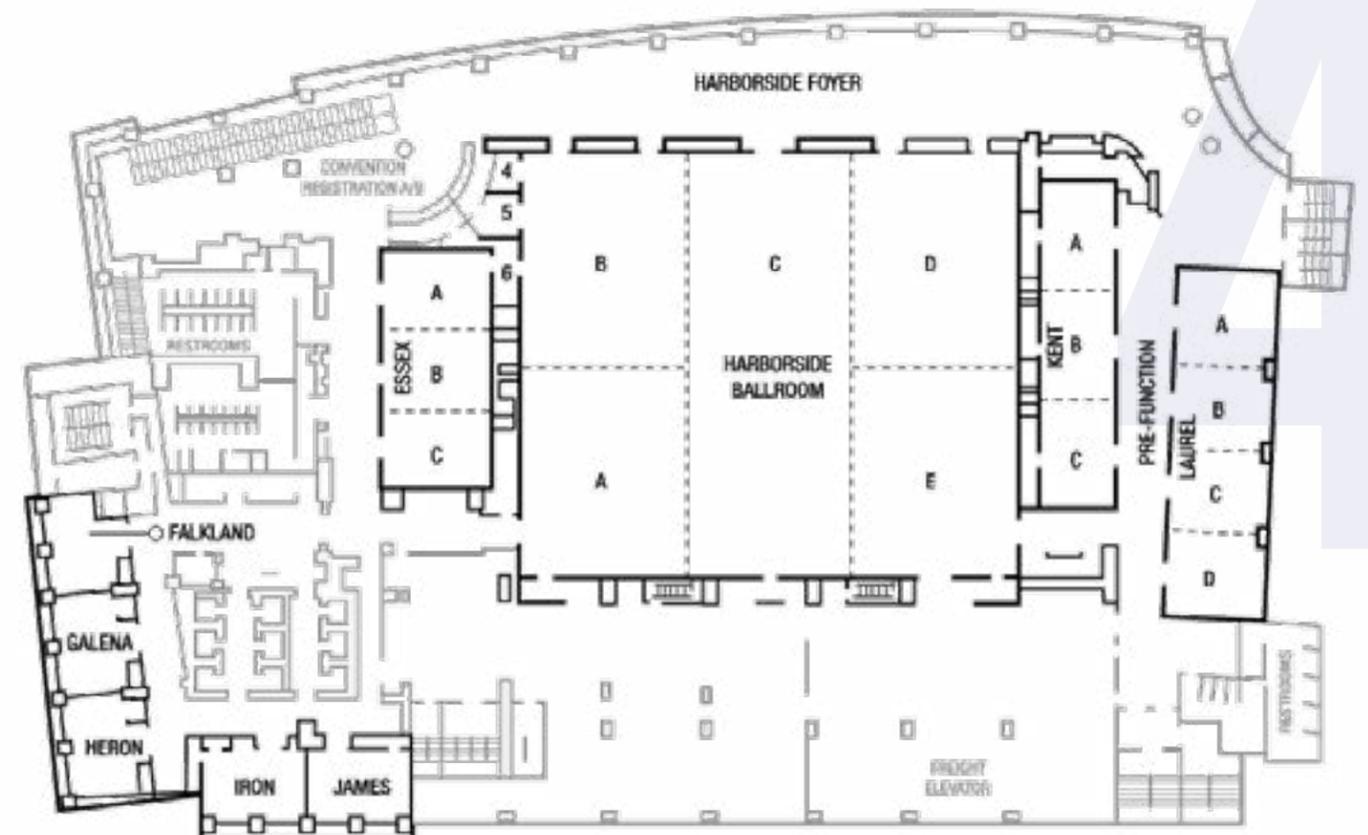
ABT Advisory Committee	Friday, Nov. 3	12:00PM–12:30PM	James
Awards Committee	Friday, Nov. 3	2:00PM–3:15PM	James
Informal Science Committee	Friday, Nov. 3	2:00PM–3:15PM	Iron
Justice, Equity, Diversity, & Inclusion (JEDI) Committee	Friday, Nov. 3	10:30AM–11:45AM	Iron
Long Range Planning Committee	Friday, Nov. 3	12:00PM–12:30PM	Iron
Member Resources Committee	Saturday, Nov. 4	10:30AM–11:00AM	Iron
Nominating Committee	Saturday, Nov. 4	2:00PM–3:15PM	James
OBTA Directors & Regional Coordinators	Saturday, Nov. 4	9:00AM–10:15AM	James
Professional Development Committee	Saturday, Nov. 4	2:00PM–3:15PM	Iron
Retired NABT Member Committee	Friday, Nov. 3	3:30PM–4:00PM	Iron
Social Media Committee	Saturday, Nov. 4	10:30AM–11:00AM	James

Another great place to find out more about NABT programs is the *NABT Leader Meet & Greet* in the Exhibit Hall from 8:30AM – 9:00AM on Friday, November 3rd.

THIRD FLOOR LEVEL



FOURTH FLOOR LEVEL



SPECIAL WORKSHOPS (TICKETS REQUIRED)

Thursday, November 2
11:30AM – 3:30PM

Interactions in General Education Life Science Courses (IGELS): Introducing the LifeSkills Guide for Undergraduate Faculty

This interactive, inquiry-based workshop will engage participants in practical activities to help students increase their reasoning and science process skills. Workshop participants will be introduced to a newly developed tool, the “LifeSkills Guide,” based on *Vision and Change*.

IGELS faculty will also share learning outcomes, activities, and assessments for undergraduate non-science students’ LifeSkills.

Sponsored by 

FIELD TRIPS

Thursday, November 2
12:30PM – 3:00PM

Tour of the Institute of Marine and Environmental Technology (IMET)

FREE (Tickets Required)

The Institute of Marine and Environmental Technology (IMET) is a premier marine and environmental sciences research and education facility. The tour of IMET will spotlight some of the institute’s current research, including an exclusive tour of the Aquaculture Research Center (ARC), home to some of the most advanced recirculating aquaculture in the world.

IMET is a short walk from the hotel, but transportation will be provided for those who need it.

Sponsored by 

Thursday, November 2
12:30PM – 3:30PM

Introducing OpenSciEd Biology!

Come join us to see how OpenSciEd’s materials can help you build science learning experiences anchored in compelling phenomena and in important community and global problems. This session will introduce you to the first unit in the OpenSciEd biology course and provide you with a launching point for teaching OpenSciEd Biology in your classroom.

Tackling Misconceptions in Climate Change: The Power of Place-Based Resources

The National Center for Science Education (NCSE) has developed free place-based NGSS-aligned lessons to help overcome student misconceptions about climate change. Come preview these activities, then learn how to create relevant lessons based on local climate issues.

Sponsored by 

Storylining in Biology for Coherent Instruction

Storylines led by engaging phenomena improve student engagement and understanding of the overarching biological concepts. Using phenomena to anchor instruction and lead instruction are modeled in the workshop hosted by the team at All Species Animal Consulting.

Hands-on Activities from Carolina, HudsonAlpha, and Wisconsin Fast Plants

Stop by for a special open pop-up event! Carolina, HudsonAlpha, and Wisconsin Fast Plants showcase new activities and resources with multiple hands-on stations. Be introduced to Carolina’s new Labskills series of free instructional content for teaching essential lab skills such as testing pH, micropipetting, measuring volume, and more. HudsonAlpha’s authentic genetic and biotechnology activities will be available. Wisconsin Fast Plants will demonstrate how rapid growing brassica plants can be used to teach selection and inheritance. (Tickets not required.)

NABT NETWORKING LUNCHES

Friday, November 3
12:45 – 1:45PM

Everyone’s conference registration includes a boxed lunch, and tickets for your entrée selection were made with your registration.

Pick up your lunch outside the Grand Ballroom and join a section event, meet up with friends, or find a quiet spot to relax and recharge.

Elementary & Middle Level Teachers Luncheon

Grab your lunch and meet up with other elementary and middle-level teachers at this informal networking lunch designed to help you connect with colleagues.

High School Teachers Luncheon

If you teach funny freshmen, serious seniors, and/or everyone inbetween, you will want to grab your lunch, grab a seat, and connect with other high school biology teachers in this informal setting.

AP Biology Section Luncheon

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

Sponsored by 

Two-Year College Section Luncheon

Join a supportive community of two-year college educators to share your strategies, your struggles, and your successes. The winners of the *Two-Year College Biology Teaching Award* and the *Professor Chan Teaching Award* will also be recognized.

Four-Year College & University Section Luncheon

Faculty, education researchers, graduate students, and anyone associated with four-year colleges and universities are invited to network with colleagues and learn about section programs and opportunities. There will also be a special presentation of the *Four-Year College & University Section Awards*.

Friday, November 3
5:00PM – 7:00PM

HHMI Night at the Movies

Join us for a sneak peek of the upcoming *Wild Hope* season from Tangled Bank Studios and help us celebrate Sean B. Carroll’s pioneering approach to science storytelling and education.

WILDHOPE

Saturday, November 4
7:30AM – 8:45AM

NABT BioClub Breakfast

FREE (Tickets Required)

The BioClub continues to grow, with new chapters being formed at K-12 schools, community colleges, and informal learning organizations all over North America. Share the great things your club is doing, or learn how to start one.

Sponsored by  www.carolina.com

SPECIAL EVENTS

Saturday, November 4
11:30AM – 2:00PM

2023 NABT Honors Luncheon

Tickets Required •
\$50 Advance/ \$60 Onsite

NABT is proud to recognize the 2023 NABT Award Recipients during this celebration. We will honor exceptional biology teachers from all levels, and everyone is welcome to join us and congratulate these remarkable professionals.

Saturday, November 4
6:00PM – 8:00PM

Baltimore Haunted History Tour & Closing Reception

Tickets Required •
\$35 Advance/ \$45 Onsite

Conclude the 2023 NABT Conference experience with an evening of Baltimore history and haunts. Picture Fell’s Point, as it was, a rowdy seaport town, the birthplace of the sleek and dangerous clipper ship. Its streets were full of sailors from foreign lands spilling off ships, immigrants anxious to start a new life, and ladies of the night looking to make ends meet. Given this explosive combination, is it any wonder that many ghosts remained behind?

Join us for a bite and a beverage harborside at the hotel, before our guides lead the groups in a walking tour of Baltimore’s most historic waterfront neighborhood, closing out at a popular spot to “cheers” to a successful conference.

We hope to make this experience as accessible as possible.

Please contact conference@nabt.org if you need an accommodation or special consideration to participate.



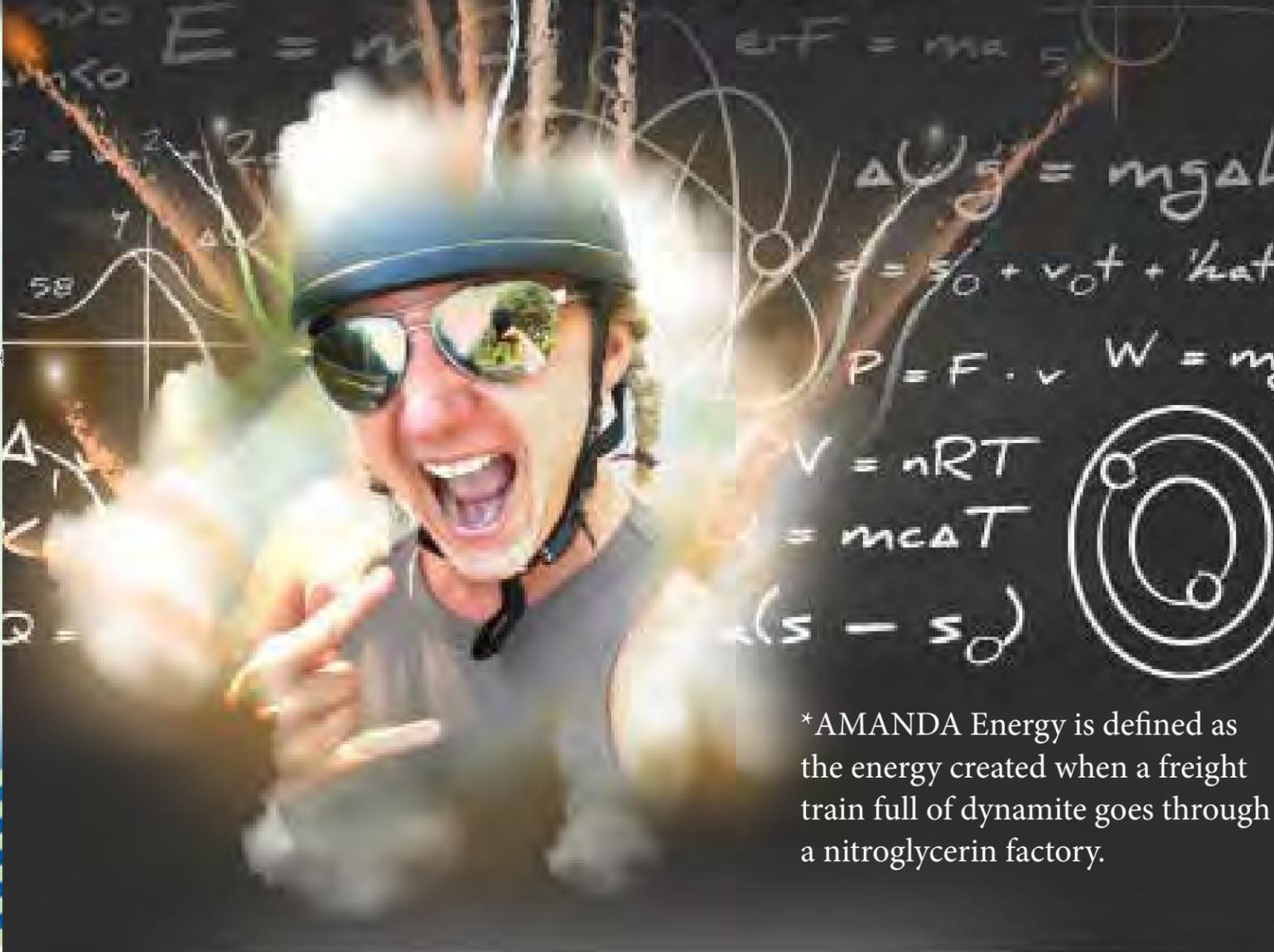
Nominate a teacher for a
2024 NABT award.

Submit your nomination online before March 15th
<https://nabt.org/Awards-NABT-Award-Nomination-Form>



There is HIGH energy and then there is...

AMANDA*
 ENERGY

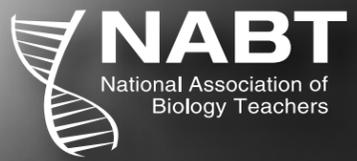


*AMANDA Energy is defined as the energy created when a freight train full of dynamite goes through a nitroglycerin factory.



Good luck keeping up with Amanda at the NABT Conference!
 If you match her speed and **FIND THE PRESIDENT**,
 you can enter to win some great prizes from NABT.

The drawing will be Friday, November 3rd.



THURSDAY



9:00AM–2:30PM

PALM Network Vision and Change Workshop

Essex B & C (4th Floor) • Committee Meeting • Invitation Only

11:30AM–1:30PM

NABT Board of Directors Meeting & Leader Lunch

Dover B & C (3rd Floor) • Committee Meeting • Invitation Only

11:30AM–3:30PM

1536-94538 Interactions in General Education Life Science Courses (IGELS): Introducing the LifeSkills Guide for Undergraduate Faculty

Grand I Ballroom (3rd Floor) • Science Practices • Special Workshop (Tickets Required) • 2Y, 4Y

This interactive, inquiry-based workshop will engage participants in practical activities to help students increase their reasoning and science process skills. Workshop participants will be introduced to a newly developed tool, the “LifeSkills Guide”, based on Vision and Change. IGELS faculty will share learning outcomes, activities, and assessments for undergraduate non-science students’ LifeSkills.

In the second part of the workshop, participants will use the IGELS LifeSkills Guide to refine or revise their own classroom activity. Participants should bring an activity or draft activity to work on.

Bryan Dewsbury, Florida International University, Miami, FL; Sam Donovan, BioQUEST, Pittsburgh, PA; Karla Fuller, Gutmann Community College, New York, NY; Tamar Goulet, University of Mississippi, MS; Gabriela Hammerlinck, University of Florida, Gainesville, FL; Elizabeth Harrison, Kennesaw State University, Kennesaw, GA; John Moore, Taylor University, Upland, IN; Heather Rissler, North Iowa Area Community College, Mason City, IA; Davida Smyth, Texas A&M University-San Antonio, San Antonio, TX; Gordon Uno, University of Oklahoma, Norman, OK

12:30PM–3:00PM

Tour of the Institute of Marine and Environmental Technology (IMET)

Offsite • Field Trip (SOLD OUT) • GA

The Institute of Marine and Environmental Technology (IMET) is a premier marine and environmental sciences research and education facility. The tour of IMET will spotlight some of the institute’s current research, including an exclusive tour of the Aquaculture Research Center (ARC), home to some of the most advanced recirculating aquaculture in the world.

12:30PM–3:30PM

1536-94452 Tackling Misconceptions in Climate Change: The Power of Place-Based Resources

Grand Ballroom II (3rd Floor) • Ecology / Environmental Science / Sustainability • Special Workshop (Tickets Required) • MS

The National Center for Science Education (NCSE) has developed free place-based NGSS-aligned lessons to help overcome student misconceptions about climate change. Come preview these activities, then learn how to create relevant lessons based on local climate issues.

Lin Andrews and Cari S. Herndon, National Center for Science Education, Oakland, CA

12:30PM–3:30PM CONT.

1536-94506 Introducing OpenSciEd Biology!

Grand Ballroom VII (3rd Floor) • General Biology • Special Workshop (Tickets Required) • HS

Learn how OpenSciEd’s materials can help you build science learning experiences anchored in compelling phenomena and in important community and global problems. This session will introduce you to the first unit in the OpenSciEd biology course, providing you with a launch point for teaching OpenSciEd Biology in your classroom. Teachers will put on a “student hat” so they can feel what it’s like to be a student whose thoughts and questions help drive learning forward in the unit. We will then open up and explore the structure of units and discuss the routines and resources to promote equitable science learning in high school.

Kate Henson, University of Colorado Boulder, Boulder, CO

SPECIAL PROGRAMMING PRESENTED BY CAROLINA & PARTNERS

1536-99226 Hands-on Activities from Carolina, HudsonAlpha, and Wisconsin Fast Plants

Grand Ballroom IX (3rd Floor) • General Biology • Special Workshop (Tickets Not Required) • HS

Stop by for a special open pop-up event! Carolina, HudsonAlpha, and Wisconsin Fast Plants showcase new activities and resources with multiple hands-on stations. Be introduced to Carolina’s new *Labskills* series of free instructional content for teaching essential lab skills such as testing pH, micropipetting, measuring volume, and more. HudsonAlpha’s authentic genetic and biotechnology activities will be available. Wisconsin Fast Plants will demonstrate how rapid growing brassica plants can be used to teach selection and inheritance.

12:30PM–3:30PM CONT.

1536-96584 Storylining in Biology for Coherent Instruction

Grand Ballroom VIII (3rd Floor) • Nature of Science • Special Workshop (Tickets Required) • ML, HS

Storylines led by engaging phenomena improve student engagement and understanding of the overarching biological concepts. Using phenomena to anchor instruction and lead instruction are modeled in the workshop hosted by the team at All Species Animal Consulting.

Jason Crean, Britt Czupryna, Gloria Latta, Madeline Munar, Lisa Pavic, Kristin Rademaker, and Kathy van Hoeck, All Species Education Consulting, Orlando, FL

2:30PM–3:30PM

NABT Open Forum
Dover B & C (3rd Floor) • Committee Meeting • GA

The NABT Board of Directors and Executive Director will lead this interactive discussion focused on the current state of the association. They will also share updates on current and future strategic initiatives. Everyone is invited to learn more about our operations, provide feedback on the programs we support, and get more involved with NABT.

4:00PM–5:30PM

Lauren Feldman

See biography on page 8

Finding Hope: Challenges and Opportunities in Climate Change Communication

Grand Ballroom V & VI (3rd Floor) • Special Speaker • GA

Even as the realities of climate change grow starker, communicating about climate change in ways that engage the public and motivate collective action remains a challenge. Despite widespread scientific agreement about climate change's causes, consequences, and solutions, misinformation and misperceptions abound. Powerful industries and actors pollute the communication environment and stymie meaningful climate action. Media coverage of climate change often reinforces partisan divides and falls short of providing the quality and quantity of information that citizens need to respond effectively to the climate crisis. As a result, much of the public is immobilized by apathy or despair. This talk will first consider these and other climate communication challenges, focusing on the role of media.

Dr. Feldman will then discuss how media can be harnessed to more productively engage the public, especially young people, with climate change. From comedy and entertainment to innovations in journalism to social media activism, media can be used to spark hope, promote climate justice, and inspire action. Communicating effectively about climate change is not just about scientific facts; it requires engaging emotions and meeting people where they are, while also providing tools to navigate the increasingly complex information environment. These ideas have implications for the classroom and beyond.

5:30PM–6:00PM

NABT Four-Year College & University Executive Committee Meeting

Iron (4th Floor) • Committee Meeting • 4Y

5:30PM–7:30PM

Exhibit Hall Grand Opening Reception

Harborside Ballroom (4th Floor) • Special Event • GA

We welcome everyone to Baltimore with a special opening of the 2023 NABT Exhibit Hall. Our vendor and partner community will showcase the latest and greatest resources for teaching life science, helping you find those familiar favorites and new innovations.

6:00PM–7:00PM

NABT Past President's Advisory Council Meeting & Reception

Presidential Suite • Invitation Only

2023 NABT EVOLUTION SYMPOSIUM
Friday, November 3, 2023 | 10:30 am – 12:30 pm | Room: Laurel C&D



The Road to Extinction



How to Survive A Mass Extinction
Riley Black, Science Writer

Join award-winning author Riley Black as she discusses what made the difference between survival and extinction as the Age of Dinosaurs ended and the Age of Mammals began.



NCSE TEACHER WORKSHOP: The Road to Extinction
Chandler Tawney, Blake Touchet, Lin Andrews

Explore the relationship between extinction, evolution, and biodiversity as part of an NGSS-aligned storyline that utilizes hands-on activities focused on the fossil record.



Join us at the Baltimore Marriott Waterfront Hotel
Friday Nov 3, 2023 – Grand ballroom II

8:00 – 9:00 AM
PCR Amplified: Advanced Topics & Techniques
Learn about the versatile techniques of PCR (qPCR, ddPCR etc.) and the real-world applications in life science research, clinical and molecular diagnostics like gene expression, disease outbreaks, mutation detection and more.



10:30 – 11:45 AM
Hands-On Chromosomal Gene Editing with the Out of the Blue CRISPR Kit
CRISPR's most relevant uses require more than just knockouts! In this hands-on workshop you'll use CRISPR-Cas9 to cut and repair an *E. coli* chromosomal gene while learning about essential experimental controls.

12:00 – 12:30 PM
Track Norovirus Spread Using Modeling and Gel Electrophoresis
Put your epidemiologist hat on and determine the transmission mode of a norovirus using molecular data, patient histories, and clues hidden in a restaurant.

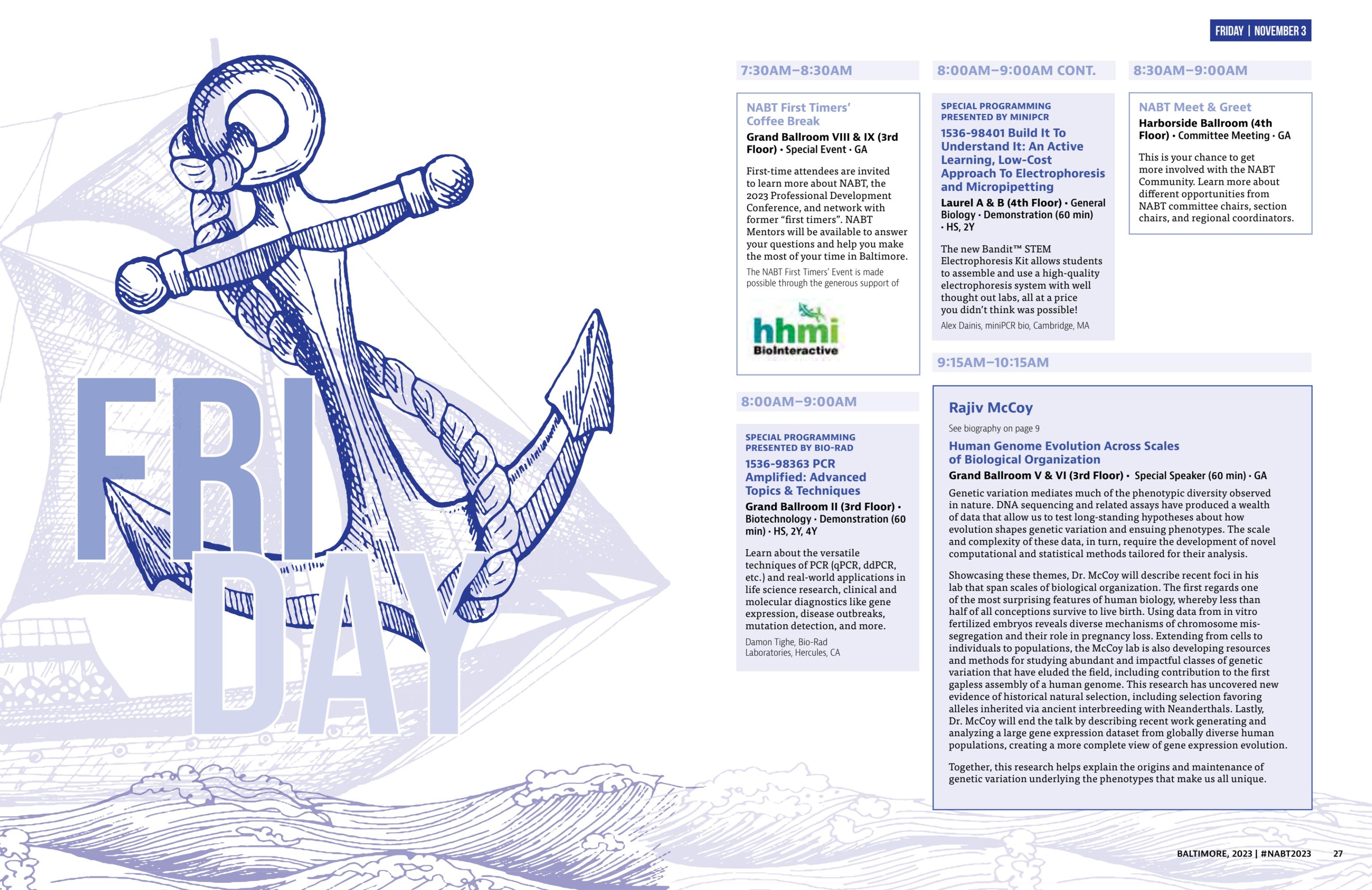
2:00 – 3:15 PM
The Plight of the Bumblebee: Studying Bee Genetic Biodiversity using DNA Barcoding
Taxonomy in action: use visual cues and biotechnology techniques to sort bumblebees into separate species. Experience how PCR, sequencing, and bioinformatics help scientists distinguish bee species.

3:30 – 4:00 PM
Personalized medicine: Cell and Gene Therapy in Cancer treatments!
Learn about CAR-T cells and how immunotherapies are produced, how viral vectors deliver gene therapies and how physicians use them to treat inherited genetic disorders.

There's more to learn! Register now at [Bio-Rad.com/Explorerevents](https://www.bio-rad.com/explorerevents) for our upcoming webinars.

Bio-Rad Explorer — Advancing Student Discovery





FRIDAY

7:30AM–8:30AM

NABT First Timers' Coffee Break**Grand Ballroom VIII & IX (3rd Floor) • Special Event • GA**

First-time attendees are invited to learn more about NABT, the 2023 Professional Development Conference, and network with former “first timers”. NABT Mentors will be available to answer your questions and help you make the most of your time in Baltimore.

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



8:00AM–9:00AM CONT.

SPECIAL PROGRAMMING PRESENTED BY MINIPCR**1536-98401 Build It To Understand It: An Active Learning, Low-Cost Approach To Electrophoresis and Micropipetting****Laurel A & B (4th Floor) • General Biology • Demonstration (60 min) • HS, 2Y**

The new Bandit™ STEM Electrophoresis Kit allows students to assemble and use a high-quality electrophoresis system with well thought out labs, all at a price you didn't think was possible!

Alex Dainis, miniPCR bio, Cambridge, MA

8:30AM–9:00AM

NABT Meet & Greet**Harborside Ballroom (4th Floor) • Committee Meeting • GA**

This is your chance to get more involved with the NABT Community. Learn more about different opportunities from NABT committee chairs, section chairs, and regional coordinators.

9:15AM–10:15AM

Rajiv McCoy

See biography on page 9

Human Genome Evolution Across Scales of Biological Organization**Grand Ballroom V & VI (3rd Floor) • Special Speaker (60 min) • GA**

Genetic variation mediates much of the phenotypic diversity observed in nature. DNA sequencing and related assays have produced a wealth of data that allow us to test long-standing hypotheses about how evolution shapes genetic variation and ensuing phenotypes. The scale and complexity of these data, in turn, require the development of novel computational and statistical methods tailored for their analysis.

Showcasing these themes, Dr. McCoy will describe recent foci in his lab that span scales of biological organization. The first regards one of the most surprising features of human biology, whereby less than half of all conceptions survive to live birth. Using data from in vitro fertilized embryos reveals diverse mechanisms of chromosome mis-segregation and their role in pregnancy loss. Extending from cells to individuals to populations, the McCoy lab is also developing resources and methods for studying abundant and impactful classes of genetic variation that have eluded the field, including contribution to the first gapless assembly of a human genome. This research has uncovered new evidence of historical natural selection, including selection favoring alleles inherited via ancient interbreeding with Neanderthals. Lastly, Dr. McCoy will end the talk by describing recent work generating and analyzing a large gene expression dataset from globally diverse human populations, creating a more complete view of gene expression evolution.

Together, this research helps explain the origins and maintenance of genetic variation underlying the phenotypes that make us all unique.

8:00AM–9:00AM

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD**1536-98363 PCR Amplified: Advanced Topics & Techniques****Grand Ballroom II (3rd Floor) • Biotechnology • Demonstration (60 min) • HS, 2Y, 4Y**

Learn about the versatile techniques of PCR (qPCR, ddPCR, etc.) and real-world applications in life science research, clinical and molecular diagnostics like gene expression, disease outbreaks, mutation detection, and more.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

10:30AM–12:30PM

NABT EVOLUTION SYMPOSIUM PRESENTED BY NCSE

The Road to Extinction

Laurel C & D (4th Floor) • Evolution • Special Session (120 min) • GA

How to Survive a Mass Extinction

There's never been a mass extinction like it. Sixty-six million years ago, an immense asteroid struck the Earth and approximately 75% of known species disappeared virtually overnight. Yet many forms of life made it through the catastrophe, from feathered dinosaurs, to our primate ancestors. In this talk, award-winning author of "The Last Days of the Dinosaurs", Riley Black will replay what made the difference between survival and extinction as the Age of Dinosaurs ended and the Age of Mammals began.

Riley Black, Science Writer, Las Vegas, NV

The Road to Extinction

Are humans living through the sixth great extinction? While extinction is a major feature of the history of life, students often have a variety of preconceived notions about Earth's fossil record. This lesson set explores the relationships between extinction, evolution, and biodiversity in an effort to resolve these issues. Teachers will explore a free NGSS-aligned storyline from the National Center for Science Education that investigates mass extinctions to better understand how current populations adapt (or not) to human impacts. Walk away with hands-on activities grounded in primary evidence from the fossil record that allow students to explore possible solutions to mitigate the adverse impacts on biodiversity that often result from human activity.

Chandler Tawney, L'Anse Creuse Public Schools, Clinton Township, MI and Blake Touchet and Lin Andrews, National Center for Science Education, Oakland, CA

10:30AM–11:45AM

**SPECIAL PROGRAMMING
PRESENTED BY EDVOTEK**

1536-97069 Introducing Your Students to Gene Editing with CRISPR

Dover A (3rd Floor) • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Explore the Nobel Prize-winning gene-editing tool CRISPR with your students! In this workshop, we'll experiment with guide RNA design, curing genetic diseases, and changing bacterial genes!

Thomas Cynkar, Stephanie Sturm, Edvotek, Washington, DC

1536-93403 Meet the 2023 HudsonAlpha Guidebook

Dover B & C (3rd Floor) • Biotechnology • Demonstration (75 min) • GA

Want to include cutting-edge genetic discoveries in your class? Meet the 2023 HudsonAlpha Guidebook. This free resource is packed with "too new for textbooks" content, phrased in student-friendly language.

Kelly East and Madelene Loftin, HudsonAlpha Institute for Biotechnology, Huntsville, AL

**SPECIAL PROGRAMMING
PRESENTED BY CAROLINA
BIOLOGICAL SUPPLY COMPANY**

1536-97083 Photosynthesis, Cellular Respiration, and Enzymes: Teaching Common Biology Concepts with Alginate Beads

Essex A (4th Floor) • General Biology • Hands-on Workshop (75 min) • ML, HS, 2Y

Participants will make and use alginate beads containing algae, yeast, and enzymes. They will learn how the beads can be used to teach photosynthesis, cellular respiration, and enzymatic processes.

Crystal Risko, Carolina Biological Supply Company, Burlington, NC

1536-94431 Engineering in Biology: Free Labs and Project-Based Learning

Essex B & C (4th Floor) • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS

Engineering Tomorrow STEM labs is developed and delivered by engineers for free and can work well in your biology classroom! Come learn about the program and receive complimentary Teacher Toolkit!

Marissa Maggio, Stuyvesant High School, New York, NY and Constance Chiplock, Engineering Tomorrow, Fairfax Station, VA

1536-94410 The American Association of Immunologists Presents: AAI Teachers Research Program—Immunology Lessons for the Classroom

Grand Ballroom I (3rd Floor) • Microbiology & Cell Biology • Hands-on Workshop (75 min) • HS

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

Mike Criscitiello, Texas A&M University, College Station, TX

**SPECIAL PROGRAMMING
PRESENTED BY BIO-RAD**

1536-98394 Hands-On Chromosomal Gene Editing with the Out of the Blue CRISPR Kit

Grand Ballroom II (3rd Floor) • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

CRISPR's most relevant uses require more than just knockouts! In this hands-on workshop, use CRISPR-Cas9 to cut and repair an E. coli chromosomal gene while learning about essential experimental controls.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

1536-96778 Designing a Phenomenon-Based Genetics Learning Sequence with BioInteractive Stickleback Resources

Grand Ballroom III & IV (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Join us as we explore a phenomenon-driven learning sequence that elicits student interest and builds knowledge utilizing BioInteractive resources about inheritance patterns and the control of gene regulation in sticklebacks.

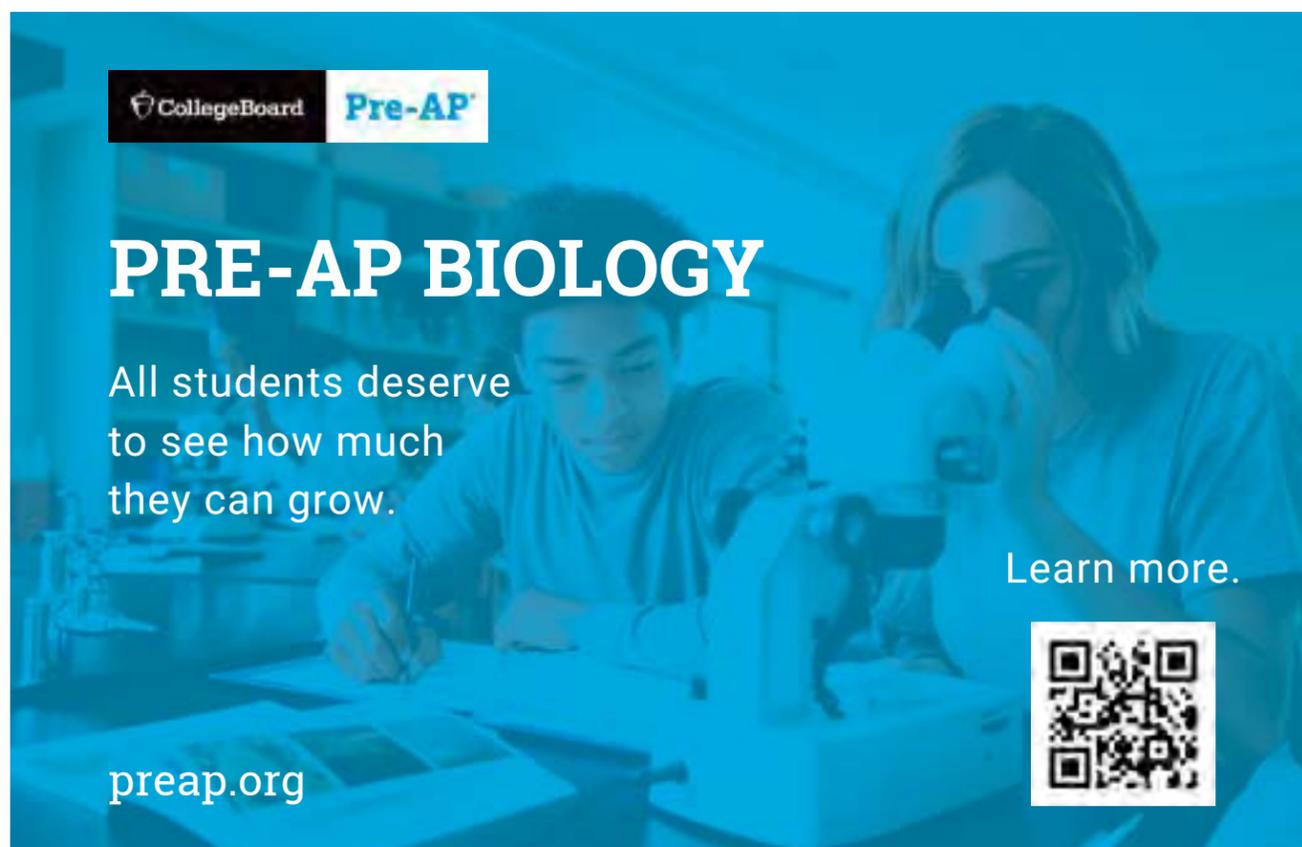
Kasey Christopher, Duquesne University, Pittsburgh, PA and Helen Snodgrass, Sidwell Friends School, Bethesda, MD

1536-94447 Climate Hope in the Classroom: Using Local Climate Impacts and Environmental Actions to Teach Climate Science

Grand Ballroom VII (3rd Floor) • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • ML, HS, GA

Attendees will walk through a task that engages students in climate science and inspires them to action. The task centers regional impacts, environmental actions, and strategies to address climate anxiety.

Erin Capra, West High School, Salt Lake City, UT; Erin Smith, Berkeley High School, Berkeley, CA; Lucas Risinger, West Albany High, Albany, OR; Jody DeAraujo, Balboa High School, San Francisco, CA



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10:30AM–11:45AM CONT.

1536-93653 What Are We Learning Again? Reducing Cognitive Clutter to Focus Students on Science Practice**Grand Ballroom VIII (3rd Floor)** • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Advanced labs often require students to perform unfamiliar procedures, acquire new content, and often end in frustration. Come see how NGSS science practices can clarify learning goals in sophisticated labs.

Stephen Traphagen, Oak Park and River Forest High School, Oak Park, IL; Julie Minbiolo, Columbia College Chicago, Chicago, IL; and Kirstin Milks, Bloomington High School South/Indiana University Bloomington, Bloomington, IN

1536-94267 Tasks and FRQs: Deciphering the Science Practices in AP Biology**Grand Ballroom IX (3rd Floor)** • AP Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

This session will explore the AP Biology Science Practices that students should develop. The session will also model how the science practices are assessed in FRQs.

Catherine E. Walsh, College Board, New York, NY and Chris Monsour, Tiffin Columbian High School, Tiffin, OH

1536-94391 QB@CC Biological and Mathematical Methods to Assess Biodiversity**Grand Ballroom X (3rd Floor)** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Using QB@CC “Impact of Introduction of American Bullfrogs on Species Diversity Activity” to demonstrate a biological and mathematical approach to teaching species biodiversity concepts in the classroom and beyond.

Christine Patrum, Georgia State University, McDonough, GA and Heather Zimler-DeLorenzo, Georgia State University, Mableton, GA

Justice, Equity, Diversity, & Inclusion (JEDI) Committee**Iron (4th Floor)** • Committee Meeting (75 min) • GA

The JEDI Committee helps NABT develop programs and resources that address the needs of a diverse community of biology teachers to ensure full access and opportunities following the guidance articulated by the NABT values statement.

Enya Granados, Committee Chair

1536-96394 Scientific Literacy Re-visited**Kent A (4th Floor)** • Nature of Science • Demonstration (75 min) • 2Y, 4Y, GA

Workshop participants will explore activities illustrating components of the new model of scientific literacy for undergraduates developed by the NSF-funded “Liberal Art of Science” (AAAS, 1990) revision project.

Gordon Uno, University of Oklahoma, Norman, OK, Sam Donovan, BioQUEST, Pittsburgh, PA

1536-94367 The BioGraphI Curriculum: Valuing Diverse Identities and Fostering Data Literacy in Biology**Kent B & C (4th Floor)** • Curriculum Development • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Learn how to adapt open educational resources from the Biologists and Graph Interpretation (BioGraphI) Project to improve representation of diverse scientists and incorporate data interpretation skills in your courses.

Rachel M. Pigg, University of Louisville, Louisville, KY; Suann Yang, SUNY Geneseo, Geneseo, NY; Stanley M. Lo, University of California San Diego, La Jolla, CA; Sheela Vemu, Waubensee Community College, Chicago, IL; Elizabeth Hamman, St. Mary's College of Maryland, St. Mary's City, MD; Catherine L. Quinlan, Howard University, Washington, DC

SPECIAL PROGRAMMING PRESENTED BY MINIPCR**1536-98408 Using Synthetic Biology to Explore the Central Dogma and Protein Structure****Laurel A & B (4th Floor)** • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Use the cell-free BioBits® system to experiment directly with concepts that have previously been inaccessible in many educational settings. Simple to implement, authentic molecular investigations with bright fluorescent readouts!

Ally Huang, miniPCR bio, Cambridge, MA

12:00PM–12:30PM

1536-94138 How to Be A Better Teacher Collaborator**Dover A (3rd Floor)** • Curriculum Development • Demonstration (30 min) • HS, 4Y, GA

This is a presentation on best practices for how to work with university research partners in urban contexts to facilitate teacher research enabling the use of their resources.

Richard Jacob Zimny, Julia R Masterman School, Philadelphia, PA

1536-94552 “Dear Colleague:” Meet Your NSF Program Officers**Dover B & C (3rd Floor)** • Instructional Strategies • Symposium (75 min) • GA

This session will highlight some of NSF's key programs while also giving participants practical advice on how to improve their chances of impressing Reviewer #2.

Kalyn Shea Owens, National Science Foundation, Alexandria, VA

SPECIAL PROGRAMMING PRESENTED BY CAROLINA BIOLOGICAL SUPPLY COMPANY**1536-97082 Guiding Light: Measuring and Analyzing Fluorescence with a Serial Dilution****Essex A (4th Floor)** • Biotechnology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Go hands-on with a serial dilution activity that uses a typical highlighter and unique viewer to examine the relationship between fluorescence intensity and concentration of fluorescent molecules.

Ryan Hainey, Carolina Biological Supply Company, Burlington, NC

1536-94443 Using Art to Engage Non-Biology Majors**Essex B & C (4th Floor)** • Instructional Strategies • Hands-on Workshop (30 min) • HS, 2Y, 4Y

This session discusses how using various art forms to introduce biology topics engages students, maintains their interest, and provides unique connections to the subject matter.

Heather Minges Wols, Columbia College Chicago, Chicago, IL

1536-94453 Where Does the Pipeline Begin? A Peek into the Start-up of a Middle School Biotechnology Program**Grand Ballroom I (3rd Floor)** • Biotechnology • Hands-on Workshop (30 min) • ML, HS, GA

Come learn about how we started a biotechnology-themed program at a middle school! It is never too early to expose learners to this exciting and fast-growing field.

Katherine Harris, Baylor College of Medicine, Richmond, TX

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD**1536-98395 Track Norovirus Spread Using Modeling and Gel Electrophoresis****Grand Ballroom II (3rd Floor)** • Biotechnology • Demonstration (30 min) • HS, 2Y, 4Y

Put your epidemiologist hat on and determine the transmission mode of a norovirus using molecular data, patient histories, and clues hidden in a restaurant.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

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Join us for a Workshop!

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12:00PM–12:30PM CONT.

1536-96526 Take Math Anxiety Out Of Teaching Population Growth With HHMI BioInteractive's Lionfish Click & Learn**Grand Ballroom III & IV (3rd Floor)** • General Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Come explore how to incorporate math concepts into life science curricula with BioInteractive's lionfish interactive. We'll discuss how to adapt this resource for active learning in online and in-person settings.

Megan Lupek, North Carolina State University, Raleigh, NC

Long Range Planning Committee**Iron (4th Floor)** • Committee Meeting (30 min) • GA

Working with the Board of Directors and other NABT leaders, the Long Range Planning Committee develops goals and objectives that align with NABT's Strategic Plan.

Steve Christenson, Committee Chair

ABT Advisory Committee**James (4th Floor)** • Committee Meeting (30 min) • GA

The ABT Advisory Committee helps ensure the American Biology Teacher publishes articles and highlights themes relevant to the teaching and learning of biology and life science at all levels.

William McComas, ABT Editor-in-Chief

1536-94294 Student-Centered Learning in Biology Content Using the Explorations of Diverse Scientists**Kent A (4th Floor)** • General Biology • Paper (30 min) • ML, HS, GA

Biology texts provide legitimacy and belonging in science. The explorations of National Geographic African American scientist explorers connect socio-emotional learning and social awareness with biology content in the classroom.

Catherine L Quinlan, Howard University, Rockville, MD

1536-94366 How Focus Questions Work to Make Student Thinking Visible**Kent B & C (4th Floor)** • Instructional Strategies • Hands-on Workshop (30 min) • HS, 4Y, GA

We will discuss using focus questions at the beginning of lessons and units as a way to improve student engagement, agency, and inclusion as they learn biology.

Thomas Oviatt and Paul K. Strode, Fairview High School, Boulder, CO

SPECIAL PROGRAMMING PRESENTED BY MINIPCR**1536-98405 Hands-on Activities to Bring CRISPR-Cas9 to Your Class****Laurel A & B (4th Floor)** • Biotechnology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

See our suite of CRISPR-Cas9 activities. We have something for everyone with both in vitro and in vivo CRISPR/Cas labs and free resources like paper modeling activities.

Ally Huang, miniPCR bio, Cambridge, MA

NABT Book Club**4th Floor Landing (4th Floor)** • Special Program • Discussion (30 min) • GA

Join the NABT Book Club for a discussion of the 2024 selection and timeline. This community read is a great way to talk to other biology teachers about what you're learning in an informal (and fun) setting.

Cindy Gay, NABT Director-at-Large, Steamboat Springs, CO

12:45PM–1:45PM

NABT Lunch Break

Your conference registration includes a boxed lunch, and we invite you to pick up your lunch outside the Grand Ballroom and join a section event, meet up with friends, or find a quiet spot to relax and recharge.

Tickets for your entrée selection were made with your registration. Please present your lunch ticket to staff to pick up your boxed lunch.

AP Biology Section Luncheon**Grand Ballroom V (3rd Floor)** • AP Biology • Meal Functions (60 min) • HS

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

Sponsored by 

High School Level Luncheon**Grand Ballroom V (3rd Floor)** • General Biology • Meal Functions (60 min) • HS

If you teach funny freshmen, serious seniors, and/or everyone in between, you will want to grab your lunch, grab a seat, and connect with other high school biology teachers in this informal setting.

Elementary and Middle-Level Luncheon**Grand Ballroom VII (3rd Floor)** • General Biology • Meal Functions (60 min) • ELEM, MS

Grab your lunch and meet up with other elementary and middle-level teachers at this informal networking lunch designed to help you connect with colleagues.

Two-Year College Section Luncheon**Grand Ballroom VIII (3rd Floor)** • General Biology • Meal Functions (60 min) • 2Y

Join a supportive community of two-year college educators to share your strategies, your struggles, and your successes. The winners of the *Two-Year College Biology Teaching Award* and the *Professor Chan Teaching Award* will also be recognized.

Four-Year College & University Section Luncheon**Grand Ballroom IX (3rd Floor)** • General Biology • Meal Functions (60 min) • 4Y

Faculty, education researchers, graduate students, and anyone associated with four-year colleges and universities are invited to network with colleagues and learn about section programs and opportunities. There will also be a special presentation of the *Four-Year College & University Section Awards*. Be sure to grab your lunch before heading to the luncheon!

2:00PM–4:00PM

1536-94735 14th Annual Biology Education Research Symposium**Dover B & C (3rd Floor)** • Instructional Strategies • Symposium (120 min) • 2Y, 4Y, GA

NABT is proud to present the 14th 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 for the symposium is a traditional presentation of papers by individual or co-authors lasting 15 minutes each.

See page 34 for the full listing.

2:00PM–3:15PM

1536-97501 Writing for The American Biology Teacher**Dover A (3rd Floor)** • Curriculum Development • Hands-on Workshop (75 min) • GA

Work with members of the ABT editorial team during this interactive session designed to help get your idea through submission, review, and acceptance.

William McComas, ABT Editor-in-Chief, University of Arkansas, Fayetteville, AR

SPECIAL PROGRAMMING PRESENTED BY MINIONE SYSTEMS**1536-99346 Wet and Dry Labs to Introduce CRISPR-Based Gene Editing****Essex A (4th Floor)** • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Unveil CRISPR's genetic prowess in this novel wet and dry lab simulation to introduce high school and undergraduate students to CRISPR-based gene editing technology.

David Wollert, Chattanooga State Community College, Chattanooga, TN

14th Annual Biology Education Research Symposium

2:00PM – 4:00PM
Dover B & C
(3rd Floor)

The symposium is coordinated by the NABT Four-Year College & University Section's Research Committee.

Proceedings will be posted online at NABT.org

Instructional Strategies in AP Science Classes: A Systematic Literature Review

Robin Bulleri & Soonhye Park,
North Carolina State University,
Raleigh, NC

The Advanced Placement (AP) program provides an opportunity for students to learn rigorous, college-level content while they are in high school. In addition, it provides financial benefit as students can earn college credit with a qualifying score on the end of course exam (Kolluri, 2018). The College Board, who designs the AP courses and exams, aims to increase both access and equity in the AP program. Consequently, in the past two decades, the number of students who take an AP course has doubled, to nearly three million (Saavedra et al., 2021). Despite recent efforts to expand both equity and access to AP courses, however, significant gaps remain in both areas. Historically, high-income schools offered more AP courses than low-income schools. Due to dramatic financial support from federal, state, and local governments, 90% of students now attend a school offering at least one AP course (Long et al., 2019). However, gatekeeping practices such as prerequisite mathematics and science courses like chemistry, algebra II, and precalculus create barriers to AP science courses which, in turn, yield student populations that are less diverse than introductory courses (Kolluri, 2018). Further, quality AP programs require effective teachers along with support from school and district (Long et al., 2019). In particular, given the close relationship between teachers' instructional practices and student learning outcomes (Hattie, 2012; Liou, 2021), understanding how AP courses are delivered in classrooms is imperative to better support AP teachers to implement effective teaching approaches that will promote science learning for all students from diverse backgrounds. In this regard, this review study aims to identify and characterize instructional strategies implemented in AP science courses for biology, chemistry, environmental science (APES), and physics, that are featured in research articles about AP courses published for the past ten years using a systematic approach to literature review. In addition, this review aims to identify instructional strategies that are empirically supported to contribute to student learning outcomes in AP science courses.

How Should I Write Exam Questions: An Investigation into How Different Framings of Exam Questions in Biology Classes Can Influence Student Performance and Attitudes

Jeremy Hsu, Noelle Clark, Kate Hill, Melissa Rowland-Goldsmith,
Chapman University, Orange, CA

Quizzes and exams are nearly ubiquitous across both K-12 and college biology courses, with such assessments often playing major roles in determining student success and persistence in science, technology, engineering, and math (STEM). However, little work has explored how the framing of assessment questions may influence student performance and affect, despite past work showing that small changes in questions can have large impacts. For instance, personalizing questions with students' interests (i.e., grounding scenarios in students' academic and extracurricular topics relevant to students) can increase motivation and learning (e.g., Awofala 2014; Bernacki & Walkington 2014; D'Agata 2015; Ku & Sullivan 2001; Melsky 2021). However, this past work has primarily been done in the context of math, physics, and engineering courses, and we are not aware of any work examining the influence of how questions are worded in biology classes on student performance or affect.

Here, we explore question framing in scenario-based constructed-response questions where students read real scenarios and predict results in the context of an undergraduate introductory molecular genetics course. These authentic assessments mimic real-world application since students think critically about open-ended tasks (Koh 2017; Wiggins 2019). We also situate our work in discourse comprehension (Van Dijk & Kintsch 1983). Under this theory (also known as construction-integration), students must build both a textbase and situation model when reading a new scenario. The textbase represents a basic understanding of the language used and contains only minimal levels of inferences, while the situation model represents more complex mental representations (Graesser & Zwaan 1995; Gunel et al. 2009; Kintsch 1986; Van Dijk & Kintsch 1983)

Do the Benefits of Collaborative Group Exams Extend Beyond Just Improved Student Learning?

Jillian Arzoumanian, University of Tampa, Tampa, FL; Suann Yang, SUNY-Geneseo, Geneseo, NY; Michelle Roux-Osovitz, Jeffrey Grim University of Tampa, Tampa, FL

Modern pedagogical approaches are adapted to facilitate student-centered learning to promote engagement and interpersonal skills. Collaborative group exams (CGEs) allow students to work together in collective peer groups after first attempting an assessment individually. The implementation of CGEs should convert exam-style assessments into learning opportunities focused on improving performance and learning.

Students seek an educational experience that will aid in achieving their academic, professional, and personal goals. Consequently, career readiness competencies were developed to provide students with the necessary resources employers look for, and increasing attention is given to promoting student well-being and a sense of belonging.

This study explores the effects of large-scale adoption of CGEs on student performance, learning, and group dynamics across all levels of a biology curriculum at a medium-sized private university, with quantitative and qualitative data recorded from 834 individual students. Our data indicate students at all levels benefit from CGEs, improving exam performance (by 44%) and perceived learning through positive group dynamics and peer interactions, which likely assist students' career preparation and promote student retention. Therefore, we recommend CGEs to all educators, especially those teaching biology, to ensure students' academic achievement, career readiness, and overall well-being both in and out of the classroom.

Causal Mechanisms Behind Changing Minds About Evolution Using Cultural Competence

Jamie Jensen, Brigham Young University, Provo, UT; Morgan Meyers, University of Georgia-Athens, Athens, GA; Jonathan Hodson, Dalton Bourne, Noah Emery Brigham Young University, Provo, UT

It has now been established that religiously culturally competent strategies for evolution education (ReCCEE, Barnes & Brownell, 2017) can be successful. We have developed a ReCCEE strategy, which we refer to as the Reconciliation Model (RM), that appears to be successful in a variety of settings and religious affiliations in overcoming barriers to evolution acceptance, specifically among Judeo-Christian audiences (e.g., Ferguson & Jensen, 2021; Lindsay et al., 2019). Although some of the factors that influence acceptance have been studied, including religiosity (Glaze & Goldston, 2015; Rissler, et al., 2014), perceived conflict (Barnes et al., 2021), understanding the nature of science (Glaze & Goldston, 2015), and sometimes knowledge (see Dunk et al., 2017), very little is known about the causal mechanisms directly underlying this specific ReCCEE model (the RM). In this presentation, we will share the results of a combined analysis of nationwide survey data with classroom interventions that shed light on the potential causal mechanisms behind the RM.

Special Guest Presenter

Stanley Lo

University California
San Diego, La Jolla, CA

Recipient of the 2023 NABT
Four-Year College & University
Section Research in Biology
Education Award

2:00PM–3:15PM CONT.

1536-94390 DataVersify: Humanizing and Diversifying Scientist Role Models in Data Literacy Instruction**Essex B & C (4th Floor)** • General Biology • Demonstration (75 min) • HS, 2Y, GA

Strategies and resources to use scientist profiles in tandem with data literacy instruction will be discussed. Results from our efficacy study, examining how the inclusion of diverse scientist role models in instruction affected student attitudes will also be shared.

Melissa Kjelvik, Michigan State University, Valdez, AK

1536-96935 Science Communication: It's Not Just about the Facts!**Grand Ballroom I (3rd Floor)** • Instructional Strategies • Demonstration (75 min) • ML, HS, GA

Using vaccines as an example, this session will examine the complex relationship between science and science communication and explore the individual context on both sides of any message: messenger and recipient.

Charlotte A. Moser, Vaccine Education Center Children's Hospital of Philadelphia, Philadelphia, PA

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD**1536-98396 The Plight of the Bumblebee: Studying Bee Genetic Biodiversity using DNA Barcoding****Grand Ballroom II (3rd Floor)** • Biotechnology • Demonstration (75 min) • HS, 2Y, 4Y

Taxonomy in action: use visual cues and biotechnology techniques to sort bumblebees into separate species. Experience how PCR, sequencing, and bioinformatics help scientists distinguish bee species.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

1536-96527 Winging It: Using BioInteractive's CRISPR Resources to Unpack Primary Literature**Grand Ballroom III & IV (3rd Floor)** • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Reading a scientific paper can seem daunting for students. During this workshop, we'll explore strategies for navigating primary sources using BioInteractive's suite of CRISPR activities.

Young Yoo, Augustana College, Rock Island, IL and Karen Avery, Pennsylvania College of Technology, Williamsport, PA

Informal Science Committee**Iron (4th Floor)** • Committee Meeting (75 min) • GA

Help NABT identify initiatives, develop activities, and promote services that highlight how informal and community science programs can support biology and life science instruction.

Jill Maroo, Committee Chair

Awards Committee**James (4th Floor)** • Committee Meeting (75 min) • GA

This committee coordinates the nomination and application process for the NABT Awards program. Committee members evaluate applications, select award recipients, and notify the honorees of their awards.

Jason Crean, Committee Chair

1536-94479 Enhancing Biology Education Through the Use of ChatGPT: Exploring the Benefits and Challenges**Kent A (4th Floor)** • Technology in the Classroom • Demonstration (75 min) • ML, HS, 4Y

ChatGPT was released to much fanfare and consternation. Its brief utilization in Brandon Boswell's biology classroom (since January 2023) has had a compelling impact on his practice, students, and assessments.

Brandon Boswell, Broward County Public Schools, Miami, FL

1536-94545 Fostering Figuring and Fascination**Kent B & C (4th Floor)** • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, GA

How can crafts (crocheting, 3D & 4D printing, origami), toys, games, and puzzles help us appreciate the beauty and utility of mathematics in engaging biology students? We'll show you!

John R. Jungck, University of Delaware, Newark, DE

SPECIAL PROGRAMMING PRESENTED BY MINIPCR**1536-98406 Using Molecular Tools to Identify Antibiotic Resistance Genes in Environmental DNA****Laurel A & B (4th Floor)** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Use PCR to detect antibiotic resistance genes in soil samples and contribute your data to a national database.

Alex Dainis, miniPCR bio, Cambridge, MA

2:00PM–3:15PM CONT.

1536-94499 EvolvingSTEM: A Three-Dimensional Laboratory Evolution Curriculum That Improves Student Learning and Engagement in Life Sciences**Laurel C & D (4th Floor)** • Evolution • Hands-on Workshop (75 min) • ML, HS, 4Y

We will share a broadly adaptable, NGSS-aligned curriculum that uses authentic, student-led research to teach genetics, ecosystem dynamics, microbiology, and biotechnology skills within the organizing principle of evolution.

Abigail Matela, University of Pittsburgh, Pittsburgh, PA; Edwina Kinchington, Pittsburgh Science and Technology Academy, Pittsburgh, PA; and Karie Suhajda, Pittsburgh Creative and Performing Arts School, Pittsburgh, PA

3:30PM–4:00PM

1536-94515 The Highs and Lows and Joys and Woes of Creating and Maintaining a State NABT Affiliate**Dover A (3rd Floor)** • International / Global Education • Hands-on Workshop (30 min) • GA

If you've ever wanted to bring NABT back to your home state, you may have considered establishing a state affiliate. Meet with colleagues who can help troubleshoot the hurdles of making that dream a reality.

Brenda Royal, Central Magnet School, Murfreesboro, TN and Robert Pruitt, Montgomery Bell Academy, Nashville, TN

3:30PM–4:00PM CONT.

SPECIAL PROGRAMMING PRESENTED BY ALGAE RESEARCH AND SUPPLY**1536-99094 Algae Beads and Brainy Brinys (Algae Culture and Brine Shrimp Experiment Kit)****Essex A (4th Floor)** • AP Biology • Hands-on Workshop (75 min) • ML, HS, 4Y

We will play with algae beads for photosynthesis and respiration and with Brainy Brinys, a kit to grow algae and feed it to brine shrimp while quantifying everything!

Matthew Huber, Algae Research and Supply, Inc., Carlsbad, CA

1536-94385 Contextualizing the Social and Cultural Embeddedness of the Nature of Science Using the Lived Experiences and Narratives of Black Heritage**Essex B & C (4th Floor)** • Curriculum Development • Paper (30 min) • ML, HS, GA

Preservice teachers engage in inquiry explorations using the science capital and cultural scripts of Black heritage. Findings using modified Views of the Nature of Science (version C) are presented.

Catherine L. Quinlan, Howard University, Rockville, MD

SPECIAL PROGRAMMING PRESENTED BY PIVOT INTERACTIVES**1536-98005 Data and the Science Practices for AP Bio****Grand 1 (3rd Floor)** • AP Biology • Demonstration (30 min) • HS, 2Y, 4Y

Infuse data, the science practices, math, and more into your AP courses while being both effective and efficient as you try to cram in the CED before the May exam!

Eric Friberg, Pivot Interactives, Mendota Heights, MN

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD**1536-98397 Personalized Medicine: Cell and Gene Therapy in Cancer Treatments!****Grand Ballroom II (3rd Floor)** • Biotechnology • Special Speaker • HS, 2Y, 4Y

Learn about CAR-T cells and how immunotherapies are produced, how viral vectors deliver gene therapies, and how physicians use them to treat inherited genetic disorders.

James DeKloe, Solano Community College, Fairfield, CA

3:30PM–4:00PM CONT.

1536-96528 HHMI BioInteractive's Assessment Builder: A Crowdsourced Tool to Facilitate Assessment for Learning

Grand Ballroom III & IV (3rd Floor) • Instructional Strategies • Hands-on Workshop (30 min) • HS, 2Y, 4Y

We will demonstrate the capabilities of HHMI BioInteractive's Assessment Builder, a crowdsourced database of high-quality questions intended to improve learning in AP Biology and undergraduate introductory biology.

Angela Hodgson, North Dakota State University, Fargo, ND

1536-94517 Critical Conversations in Science: A Call to Equitable Practice Through Language

Grand Ballroom VIII (3rd Floor) • Instructional Strategies • Demonstration (30 min) • ELEM, MS, HS

Through personal narratives and culturally responsive pedagogy, this session will provide participants with the resources needed to support 2SLGBTQIA+ equitable practices in a classroom setting through inclusive language.

Cassandra Herndon, University of San Diego, San Diego, CA and Traci Richardson-McVicker, Oklahoma State University, Stillwater, OK

1536-94312 Strategies for Increasing Diversity and Inclusion and Reducing Bias in AP Environmental Science

Grand Ballroom IX (3rd Floor) • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Design a more diverse, inclusive, and less bias-driven AP Environmental Science Course. Topics include designing curricular resources, evaluating grading practices, and updating classroom strategies. Participants will model a redesigned lesson.

Sarah Utley, New Trier Township High School, Evanston, IL and David Hong, College Board/La Habra Heights, CA

3:30PM–4:00PM CONT.

1536-98665 Student Poster Practice Session

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

Join other student presenters (and their mentors) for an informal practice session to help you prepare for the NABT Biology Education Poster Session.

Michael Moore and Rachel Pigg, NABT Biology Education Poster Session Coordinators

1536-93049 The Making of University Life Science Lab: A Vision and Change Transition

Grand Ballroom X (3rd Floor) • Instructional Strategies • Hands-on Workshop (30 min) • 2Y, 4Y

"Vision and Change: A Call to Action" appeared twelve years ago. This session shares one university's journey to bring the Vision and Change Core Competencies to fruition for non-majors biology.

Bob Melton and Alan Jones, University of Central Oklahoma, Edmond, OK

Retired Members Committee

Iron (4th Floor) • Committee Meeting (30 min) • GA

Engage NABT's active retired members to promote the initiatives of the association and facilitate service as mentors and volunteers.

Dennis Gathmann, Committee Chair

1536-94101 Implementing Standards-Based Grading When the Rest of Your School Uses Traditional Grading

Kent A (4th Floor) • General Biology • Demonstration (30 min) • ML, HS, 2Y

Wendy will share her experience transitioning her 9th grade class to standards-based grading and "making it fit" with the traditional 100-point grading scale. Example assessments and tips and tricks!

Wendy R. Johnson, Kentwood Public Schools, Kentwood, MI

1536-94522 Evaluating OER as an Inclusive Teaching Practice in STEM

Kent B&C (4th Floor) • Curriculum Development • Paper (30 min) • 2Y, 4Y

We share results from an institutional study on adoption of Open Educational Resources (OER) and Inclusive Access (IA) materials in helping address issues regarding access and equity across STEM courses.

Anna Hiatt, Hannah Ray, and Chad Brassil, University of Nebraska at Lincoln, Lincoln, NE

SPECIAL PROGRAMMING PRESENTED BY MINIPCR

1536-98410 True Blue: Bacterial Transformation Made Easy

Laurel A & B (4th Floor) • Biotechnology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Bacterial transformation made easy. Introduce a phenotypic change leading to bright blue colonies and antibiotic resistance. Protocol requires less than 45 minutes of class time and doesn't require any incubators.

Alex Dainis, miniPCR bio, Cambridge, MA

1536-92814 The Learning Unity & Diversity in Alabama Project: Resources for Teaching Evolution in General Biology

Laurel C & D (4th Floor) • Evolution • Demonstration (30 min) • HS

The LUDA project centered around the accurate teaching of human and non-human evolution in Alabama, developing, testing, and now sharing modules to address misconceptions, perceived conflict, and critical content.

Amanda Townley, Georgia Southern University, Statesboro, GA; Connie Bertka, Science & Society Resources, Potomac, MD; and Briana Pobiner, Smithsonian Institution Human Origins Program, Washington, DC

4:00PM–5:30PM

Exhibit Hall Closing Experience

Harborside Ballroom (4th Floor) • Special Event • GA

It's last call in the NABT Exhibit Hall. It is also your last chance to visit booths, talk to exhibitors, and get those freebies for the classroom. This special reception will include giveaways and grand prize drawings for the *Find the President Contest*.

5:00PM–7:30PM

1536-98434 HHMI Night at the Movies

Grand Ballroom V & VI (3rd Floor) • Special Event • GA

Join us for a sneak peek of the upcoming Wild Hope season from Tangled Bank Studios and help us celebrate Sean B. Carroll's pioneering approach to science storytelling and education.

WILDHOPE

1536-94343 Sea to Sky: Free Online Educational Resources from the National Oceanic and Atmospheric Administration (NOAA)

Grand Ballroom VII (3rd Floor) • Ecology / Environmental Science / Sustainability • Demonstration (30 min) • ELEM, MS, HS

Join NOAA for a demo of our database of 1,300+ FREE educational resources covering ocean, coasts, Great Lakes, weather, and climate. Tour lesson plans and activities and ask us anything!

Bekkah Lampe, National Oceanic and Atmospheric Administration (NOAA), Silver Spring, MD

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SATURDAY DAY

7:30AM–8:30AM

NABT BioClub Breakfast

Grand Ballroom IX & X (3rd Floor) • Special Event (Tickets Required) • GA

The BioClub continues to support students at K-12 schools, community colleges, and informal learning organizations all over North America. Join us to share what your club is doing or learn how to start a BioClub Chapter of your own!

Sponsored by **CAROLINA**

8:15AM–10:15AM

NABT Biology Education Poster Session & Coffee Break

Harborside Ballroom C (4th Floor) • General Biology • Special Symposium (120 min) • 2Y, 4Y, GA

The NABT Poster Session features practices, programs, and research in three distinct categories: general strategies for teaching biology, the scholarship of teaching, and mentored student research. Posters presented by students are eligible for two competitions and winners will be announced before the closing general session.

See full listing on page 42-44

9:00AM–11:00AM

2023 NABT AP Symposium: Understanding Visual Representations in AP Biology

Laurel A & B (4th Floor) • AP Biology • Symposium (120 min) • HS

In this session, we'll introduce a variety of instructional strategies that can be integrated into lessons on how to interpret, analyze, describe, and explain the different visual representations of biological concepts students encounter in AP Biology. Students will learn the importance of data analysis and model evaluation to facilitate their decision-making in and out of the classroom..

Lee Ferguson & Maureen Jimenez,
AP Biology Section Professional
Development Committee Co-chairs

9:00AM–10:15AM

SCOTT WILLIAMSON SPEAKER SERIES

Ryan Gutenkunst

See biography on page 9

Insights from Population Genetics into Recent Human Evolution

Dover B & C (3rd Floor) • Evolution • Special Speaker • GA

The distribution of genetic mutations within and between human populations is determined by history and natural selection. Studying today's genetic variation can thus inform our understanding of the past. This motivates the study of population genetics, and Dr. Ryan Gutenkunst will first introduce key concepts from this scientific field. He will then discuss findings from his research group and others that shed light on our relationships with each other and with other extinct hominids. Disturbingly, genetic research is increasingly being weaponized by racists, and Dr. Gutenkunst will close with ideas of how educators can counter this trend.

SPECIAL PROGRAMMING PRESENTED BY PIVOT INTERACTIVES

1536-98003 Infuse Active Learning into Biology

Dover A (3rd Floor) • Technology in the Classroom • Demonstration (75 min) • HS, 2Y, GA

Active learning is the most effective form of instruction, but it's difficult to implement. Learn how Pivot Interactives can help infuse phenomena and the science practices into your instruction.

Eric Friberg, Pivot Interactives,
Mendota Heights, MN

SPECIAL SESSION PRESENTED BY LAB-AIDS

1536-94173 Sustaining the Commons

Essex A (4th Floor) • General Biology • Hands-on Workshop (75 min) • HS

In this interactive workshop, participants will engage with a model of how human choices affect the sustainability of a fish population and the potential effects of different human actions.

Lisa Kelp, Lab-Aids, Ronkonkoma, NY

1536-94520 Should We? Teaching Bioethics Through Mock Senate Hearings

Essex B & C (4th Floor) • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Explore modern dilemmas in genetics and biotechnology in a new way! Learn to incorporate bioethics into your curriculum using mock senate hearings and debates.

Rebecca Obniski and Jason Ader, Mount
Saint Joseph High School, Baltimore, MD

1536-94329 Anchored Inquiry Learning: Designing Meaningful Instruction to Make Sense of Authentic Phenomena

Grand Ballroom I (3rd Floor) • Instructional Strategies • Hands-on Workshop (75 min) • HS, GA

Experience how the BSCS Anchored Inquiry Learning instructional model builds on the 5Es to design learning experiences that motivate students to engage with real-world phenomena and problems in biology!

Cindy Gay, BSCS Science Learning,
Colorado Springs, CO

BIOLOGY EDUCATION RESEARCH COMPETITION (GRADUATE STUDENTS)

- 1. A Comparison of Biology Students and Biology Faculty Perceptions and Uses of ChatGPT**
Shifath Bin Syed & Joshua Reid, Texas Tech University, Lubbock, TX
- 2. An Investigation of College-Level Students' Interpretation of Phylogenetic Trees by Eye Movement**
Mallika Saha, Daniel Ferguson, & Kristy Daniel, Texas State University, San Marcos, TX
- 3. Examining Introductory Undergraduate Biology Students' Engagement in Metacognition Using the BioMet Learning Modules**
Elizabeth Schriener, Anjanique Gray, & Jaime Sabel, University of Memphis, Memphis, TN; Janvi Patel, Christian Brothers University, Memphis, TN
- 4. Exploring Demographics: Why are African American Students Leaving or Staying in the Biology Program?**
Kendra Wright, Sedra Sous, & Jaime Sabel, University of Memphis, Memphis, TN
- 5. Impact of Outdoor Science Activities on Participants' Understanding of STEM Techniques, Learning, and the Natural World**
Carolyn Jess, Jill Zipperer, & Kristy Daniel, Texas State University, San Marcos, TX
- 6. The Impact of Two Sequential CURES on Student Outcomes in an Introductory Biology Laboratory Course**
Emma Throneburg, Rachel Pigg, Natalie Christian, Jeffery Masters, & Mikus Abolins-Abols, University of Louisville, Louisville, KY
- 7. Using Discord as Primary Student-Student and Student-Teacher Interaction Tool for an Online, Synchronous Biology Lab During the COVID-19 Pandemic**
Rebekah White & Stefanie Leacock, University of Arkansas, Little Rock, AR

BIOLOGY EDUCATION RESEARCH COMPETITION (UNDERGRADUATE & HIGH SCHOOL STUDENTS)

- 8. A Comparative Analysis of ChatGPT's and Other Language Models' Performance on Open-Note Biochemistry Exams Versus Student Performances**
Ana Roman, Maria Simaitis, Katelyn Sheely, Michael Yotam Roth, & John Cogan, The Ohio State University, Columbus, OH
- 9. Bubble: Simplifying and Gamifying Science Literacy Through an Educational Technology Platform**
Rafee Mirza, Barry Fishman, Kali Francisco, & Ally Vern, University of Michigan, Ann Arbor, MI
- 10. Building a Basis for Community College Biology Education Research: Exploring Factors Which Influence Core Concept Understanding**
Noah Courtney, David Esparza, & Michelle Smith, Cornell University, Ithaca, NY
- 11. STEM Outreach Impacts Students' Self-Efficacy in Scientific Skills**
Vivian Swearingen, Sophia Taylor-Davis, Kamani Barnes, Pepper Hornung, Aubria Johnson, & Christie Palladino, Aiken County Career and Technology Center, Warrenton, SC
- 12. The Benefits of Collaborative Group Exams Transcend Specific Modes of Implementation**
Jillian Arzoumanian, Michelle Roux-Osovitz, & Jeffrey Grim, University of Tampa, Tampa, FL; Suann Yang, SUNY Geneseo, Geneseo, NY
- 13. Why is Cancer Weird? Implementation of a Cancer Biology Lab for K-12 Students**
Sophia Taylor-Davis, Kamani Barnes, Emily Heath, Alexandria Martin, Vivian Swearingen, & Christie Palladino, Aiken County Career and Technology Center, Warrenton, SC

MENTORED STUDENT RESEARCH COMPETITION (UNDERGRADUATE & HIGH SCHOOL STUDENTS)

- 14. A Novel Approach to Bone Marrow Biopsies: Disease Detection and Biomarker Identification of Blood Cancers via Peripheral Blood Sampling**
Anushka Peer, James Logan High School, Union City, CA; Varalakshi Murugesan, Vellore Institute of Technology, Chennai, India
- 15. Harnessing Bacterial Activity for Sustainable Decolorization of Textile Dyes and Pollution Mitigation**
Jolene Hayden & Banhi Nandi, Georgia Highlands College, Rome, GA
- 16. Improving Contemporary Mathematical Models of Metastatic Cancer: Analyzing PACC Quiescence, Treatment, and TME Stress-Response**
Caitlin Garrett, Vandegrift High School, Austin, TX; Hana Dobrovolsky, Texas Christian University, Dallas, TX
- 17. Trials of Triage: Using Classification to Detect Implicit Bias in Patient Disposition during Hospital Triaging**
Hireh Poosarla & Phil Mui, Aspiring Scholars Directed Research Program (ASDRP), Fremont, CA

GENERAL (NON-COMPETITION) CATEGORY CONT.

- 18. A Case for Place: Leveraging Placed-Based Education through Local Soundscapes to Make Connections to Ecosystem-Level Assessments of Prairie Conservation**
Kelsey Deal, ASTEC Charter Schools, Oklahoma City, OK
- 19. A Case-Control Study of the Effectiveness of a Microbiology-Focused CURE in an Introductory Biology Course**
Andrew Mashintonio & Richard Heineman, Kutztown University, Kutztown, PA

20. An HHMI-Supported Course-Based Research Program—A Call to Participate

Viknesh Sivanathan, Howard Hughes Medical Institute, Chevy Chase, MD

21. An OER Biotechnology Lab that Costs Less than 50 Cents per Student

Maryann Williamson, Northern Virginia Community College, Sterling, VA

22. Building a Community Among Maryland Community Colleges: An Inter-Institutional and Interdisciplinary Effort to Improve Engagement in Laboratory Activities

Kelly Livernoche, Anne Arundel Community College, Arnold, MD; Sean McNamara, Community College of Baltimore County, Catonsville, MD; Gina Wesley, Montgomery College, Rockville, MD; Allison Bell, Howard Community College, Columbia, MD; Richard Barclay, Smithsonian National Museum of Natural History, Washington, DC; Heather Killen, University of Maryland, College Park, MD

23. Complimentary Course Pairing: An Approach to Engage Community College Students with Vision and Change Core Competencies and Infuse Diversity, Inclusion, and Equity into Biology and English Curriculum

Ranya Taqieddin, Saint Charles Community College, Saint Peters, MO

24. Democratizing Student Access to Help: The Nationwide, Virtual Peer Mentoring Network of the Genomics Education Partnership

Katie Sandlin & Laura K. Reed, The University of Alabama, Tuscaloosa, AL; Wilson Leung, Washington University in St. Louis, St. Louis, MO; D'Andrew Harrington, College of Southern Nevada, Las Vegas, NV; David Lopatto, Grinnell College, Grinnell, IA; S. Catherine Silver Key, North Carolina Central University, Durham, NC; Melanie Van Stry, Lane

College, Jackson, TN; Jamie Siders, Ohio Northern University, Ada, OH

25. Development of a Flexible and Structured Model of Supplemental Instruction

Jon Lau & Picabo Roscher, Truckee Meadows Community College, Reno, NV; Sam Stynen, Steven Armstrong, & Brittney Ryun, University of Nevada Reno, Reno, NV

26. Diversifying Academia: Understanding and Implementing Equitable and Inclusive Hiring Practices through Faculty Learning Communities

Stanley Lo, Erik Arevalo, & Eva Fuentes-Lopez, University of California San Diego, La Jolla, CA; Mike Wilton, University of California Santa Barbara, Santa Barbara, CA

27. Effect of Climate Change on Resource Management in Some Selected Secondary Schools in Pankshin, Plateau State

Toma Maina Antip, Federal College of Education Pankshin, Plateau State, Nigeria

28. Engaging Students in Authentic Investigations Through Community Science

Sarah Jones, Emma Oschrein, Taran Lichtenberg, Jennifer Schwarz, & Kayri Havens, Chicago Botanic Garden, Glencoe, IL

29. Enhance Student Competency in Ecology with Figure Sets and 4-Dimensional Ecology Education (4DEE)

Emily Rauschert, Cleveland State University, Cleveland, OH; Suann Yang, SUNY Geneseo, Geneseo, NY

30. Enhance Student's Learning Efficiency and Knowledge Application Capacity: Active and High-Impact Teaching of Plant and Human Nutrition

Hong Li Wang, University of Arkansas, Little Rock, AR

31. Evolving the Culture of Biology through Teaching Assistant Training in Inclusive and Evidence-based Practices

Kaleb Heinrich, The University of Alabama, Tuscaloosa, AL; Stephanie Gutzler, Georgia State University, Atlanta, GA; Erin Shortlidge, Portland State University, Portland, OR; Mitra Asgari, University of Missouri, Columbia, MO; Adam Chouinard, Oregon State University, Corvallis, OR; Star Lee, University of California Irvine, Irvine, CA

32. Following the Science in the Age of Institutional Corruption

Antonio Chaves, Montgomery College, Takoma Park, MD

33. Fostering Scientific Literacy Across Disciplines: A Graphic Organizer-Based Approach to Analyzing Research Articles

Ashley Burkart, Estrella Mountain Community College & Maricopa Community College District, Avondale, AZ

34. Implementation of Collaborative Group Exams in Biology Courses Reduces the Student Performance Gap

Jillian Arzoumanian, Michelle Roux-Osovitz, & Jeffrey Grim, University of Tampa, Tampa, FL; Suann Yang, SUNY Geneseo, Geneseo, NY

NABT BIOLOGY EDUCATION POSTER SESSION • 8:15AM – 10:15AM • Harborside Ballroom C

GENERAL (NON-COMPETITION) CATEGORY CONT.

35. Inclusion in Learning Assistant Programs: Validation of a Measure Assessing Inclusion in Classes with Peer-Led Group Work

Michael Moore, Taylor Arnold, & Ronia Kattoum, University of Arkansas, Little Rock, AR

36. Maximizing Quantitative Skills: A Curricular Approach to Gain without the Pain

Emily Weigel, Georgia Institute of Technology, Atlanta, GA

37. Models for Incorporating the History of Biology into the Classroom

Cody Williams, Western Michigan University, Kalamazoo, MI

38. Moths: They're Cooler than You'd Think, and Students Can Trap Them to Conduct Their Own Research Projects!

Peter White, Brian Keas, & Chris Brown, Michigan State University, East Lansing, MI

39. ORACLE: Operationalizing Research Around College Lab Experiences

Sarah Gerken, University of Alaska Anchorage, Anchorage, AK

40. Providing Authentic Research Opportunities for Community College and High School Students

Sharon Gusky, Northwestern Connecticut Community College, Canton, CT; Angela Norige, Torrington High School, Torrington, CT

41. Responsible Conduct of Research Education in an Undergraduate Developmental Biology Lab Course

Stefanie Leacock, University of Arkansas, AR

42. The Impact of Using Human Examples and Cultural and Religious Sensitivity Teaching Strategies on Evolution Understanding and Acceptance in Alabama Introductory High School Biology Classrooms

Briana Pobiner, Smithsonian Institute, Washington, DC; William Watson, Diocese of Camden Catholic Schools, Camden, NJ; Paul Beardsley, California State Polytechnic University Pomona, Pomona, CA; Constance Bertka, Science and Society Resources, Potomac, MD; Amanda Townley, Georgia Southern University, Savannah, GA; Ella Beaudoin, Cambridge University, Cambridge, United Kingdom

43. The RIOS Institute: Supporting STEM Education Transformation through Innovation, Education Research, and Collaborative Learning for a Racially-Just, Inclusive, Open STEM Education

Kaitlin Bonner, St. John Fisher University, Rochester, NY; Carrie Diaz Eaton, Bates College, Lewiston, ME; Karen Cangialosi, RIOS, Lewiston, ME; Bryan Dewsbury, Florida International University, Miami, FL; Sam Donovan, BioQUEST, Pittsburgh, PA

44. University Life Science Lab: A Vision and Change Transition

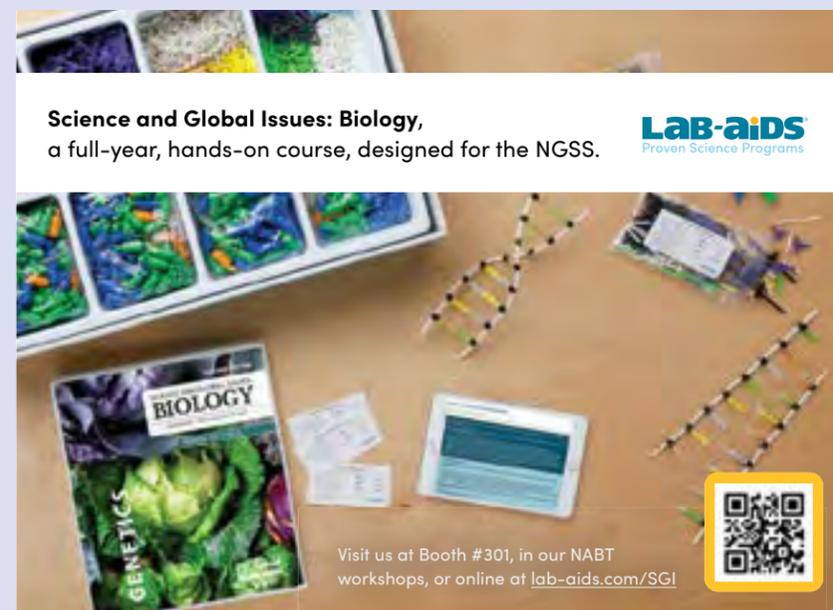
Alan Jones, University of Central Oklahoma, Edmond, OK

45. Using Book Clubs to Connect Students Across 2-YR and 4-YR Campuses: A Proposed Student Learning Community

Sayali Kukday, Iowa State University, Ankeny, IA; Heather Rissler, Northern Iowa Community College, Mason City, IA; Nousha Sabet, Western Iowa Tech Community College, Sioux City, IA

46. Using the MEGA-plate Experiment to Engage Students in Microbiological Concepts and Evolutionary Thinking around Antibiotic Resistance

Justin Pruneski, Heidelberg University, Tiffin, OH; Stephanie Carr, Hartwick College, Oneonta, NY; Stephanie Matthews, North Carolina State University, Raleigh, NC; Nikolas Stasulli, University of New Haven, New Haven, CT



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9:00AM–10:15AM

SPECIAL PROGRAMMING PRESENTED BY 3D MOLECULAR DESIGNS

1536-98156 Going with the Flow—From Genes to Proteins Using 3DMD Modeling Kits

Grand Ballroom II (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Participants engage in modeling and visualizing their understanding of transcription and translation, and how they influence the 3D structure of protein. Participants will disrupt their models and predict possible consequences.

Mark Eberhard, 3D Molecular Designs, Milwaukee, WI

1536-96530 Beyond Heterozygote Advantage: Using New BioInteractive Sickle Cell Resources to Explore A Key Human Phenomenon

Grand Ballroom III & IV (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

How can two patients with the same genetic variation have different disease outcomes? We'll explore this phenomenon with an activity focused on the central dogma that extends into genetic medicine.

Kristen Short, Fort Wayne Community Schools, Fort Wayne, IN and Sherry Annee, Brebeuf Jesuit Preparatory School, Indianapolis, IN

1536-94482 Lessons from Quantitative Biology @ Community Colleges: Overcoming Barriers to Implementing Open Education Resources

Grand Ballroom VII (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Quantitative skills are a necessary component of scientific literacy. But implementing non-textbook resources can be intimidating. Let's navigate perceived barriers and use evidence-based research to co-create solutions.

Melanie Lenahan, Raritan Valley Community College, Clinton, NJ; Jennifer Adler, Kentucky Community & Technical College System, Cynthiana, KY; and Sheela Vemu, Waubesa Community College, Sugar Grove, IL

1536-94340 Pollen Apocalypse: Using Local Phenomena to Teach Climate Science

Grand Ballroom X (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS

What is happening to allergy seasons? How does pollen cause allergies? Come explore a Climate Education Pathways project that uses evidence-based investigations, modeling, and student agency to empower climate action.

Rebecca Brewer, Troy High School, Lake Orion, MI

OBTA Directors & Regional Coordinators

Iron (4th Floor) • Committee Meeting (75 min) • GA

Help NABT recognize outstanding biology teachers in your state! This meeting will include updates and on the new procedures for the OBTA.

Mark Little, National OBTA Coordinator

1536-94190 Fascinating Catalase: Structure, Function, and Evolution

Kent A (4th Floor) • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Catalase is found in most organisms. This hands-on workshop explores the enzyme's evolution and phylogeny, and its unique structural characteristics. We will perform simple experiments to measure catalase activity.

Elizabeth Cowles, Eastern Connecticut State University, Willimantic, CT

1536-94473 Why Representation Matters? Curriculum Reform and Mentoring From an HBCU Perspective

Kent B & C (4th Floor) • General Biology • Symposium (75 min) • ML, HS, GA

HBCU professors and students provide insights into their experiences in a U.S. Department of Education funded peer-mentoring project. Students explore the impact of representation and mentoring on their education experiences.

Catherine L. Quinlan, Jasmine Prime, Charis Haynes, Selama Tesfamariam, Kennedy James, Eliana Lewis, Daina Potter, and Ilesha Fields, Howard University, Washington, DC

1536-94442 Is Bigfoot Among Us? Follow the Evidence to Combat Pseudoscience

Laurel C & D (4th Floor) • Nature of Science • Hands-on Workshop (75 min) • ML, HS, GA

Join NCSE to determine whether environmental DNA (eDNA) belongs to the elusive Bigfoot. This lab simulation highlights the importance of citing evidence in order to justify a claim.

Lin Andrews, Blake Touchet, and Cari Herndon, National Center for Science Education, Oakland, CA

10:30AM–11:00AM

1536-96933 Reimagining Scientific Literacy for Community Engagement**Dover B & C (3rd Floor)**
• Instructional Strategies • Demonstration (30 min) • 2Y, 4Y, GA

Scientific literacy plays an important role in the education of all undergraduate students. This talk explores how a community engagement tool was utilized to address socio-scientific topics of interest to enhance scientific literacy for non-STEM majors.

Samiksha Raut, University of Alabama at Birmingham, Birmingham, AL

SPECIAL PROGRAMMING PRESENTED BY NOURISH THE FUTURE**1536-99348 Tomorrow's Science is Looking for Leaders****Essex A (4th Floor)** • General Biology • Demonstration (30 min) • ML, HS, GA

Introduce students to high-tech STEM careers through the lens of agriculture! Learn about teacher leadership opportunities and explore free resources from nourishthefuture.org that connect your curriculum to a real-world context.er.

Heather Bryan, Nourish the Future, Columbus, OH and Gary Abud Jr, Education Projects, Grosse Pointe Woods, MI

SPECIAL PROGRAMMING PRESENTED BY NATIONAL GEOGRAPHIC - CENGAGE**1536-99708 National Geographic Learning - Cengage Presents: Lab it Up with National Geographic Learning****Essex B & C (4th Floor)** • General Biology • Hands-on Workshop (30 min) • HS

Lab It Up! from National Geographic Learning is a chance for Biology teachers to get hands-on by doing one of the Minilab lessons from the new National Geographic Biology program.

Brock O'Shell, National Geographic Learning - Cengage, St Johns, FL

1536-93820 Using Noches Bilingües to Recruit Hispanic Students to STEM Fields**Grand Ballroom I (3rd Floor)** • Science Practices • Paper (30 min) • 2Y, 4Y, GA

The number of Hispanic students in STEM majors is much lower than other populations. This presentation will introduce using Noches Bilingües to recruit and retain Hispanic students in STEM majors.

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

SPECIAL PROGRAMMING PRESENTED BY 3D MOLECULAR DESIGNS**1536-98151 Oh Meiosis! Modeling the Processes That Create Genetic Diversity****Grand Ballroom II (3rd Floor)** • General Biology • Hands-on Workshop (30 min) • ML, HS, 4Y

Engaging in scientific modeling improves student engagement and understanding. Participants will learn how to use 3DMD's Chromosome Connections Kit to model the processes of meiosis that lead to genetic diversity.

Susan Remshak, 3D Molecular Designs, Milwaukee, WI

1536-96779 How to Use and Contribute to HHMI BioInteractive's New Educator Resource Library**Grand Ballroom III & IV (3rd Floor)** • Instructional Strategies • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Join us as we share an exciting new BioInteractive feature — the Educator Resource Library! We'll discuss using and contributing to this repository of educator-generated materials connected to BioInteractive resources.

Kristine Grayson, University of Richmond, Richmond, VA and Missy Holzer, Great Minds PBC, Somerset, NJ

1536-94507 Citizen Science for Students: Monitoring Marine and Freshwater Microplastics**Grand Ballroom VII (3rd Floor)** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • HS, 4Y, GA

Microplastics permeate terrestrial and marine ecosystems. Engage students and your community in citizen science by collecting, analyzing, and reporting microplastics. Your classroom data makes a difference!

Brittany Bauer, Wyoming East High School, New Richmond, WV; Cassie Klein, New Jersey Audubon, Matawan, NJ; Rumson Fair-Haven Regional High School, Matawan, NJ; Garrison Union Free School District, Matawan, NJ

10:30AM–11:00AM

1536-94157 Evolution with Viruses for ALL Students**Grand Ballroom VIII (3rd Floor)** • Evolution • Paper (30 min) • ML, HS, GA

We will discuss how bacteriophages, model viruses that infect bacteria, are used for student-driven research on evolution and antibiotic resistance regardless of student expertise and available funding.

Zach Pratt, Parker High School, Janesville, WI and Maribel Gendreau, Hampton Roads Academy, Newport News, VA

1536-93400 Using NASA's GeneLab Platform to Explore Gene Expression**Grand Ballroom IX (3rd Floor)** • AP Biology • Demonstration (30 min) • HS, 2Y, 4Y

Gene expression is a key concept that is difficult for students to investigate. In this lesson, students are introduced to RNA sequencing and analyze NASA data to explore the topic.

Jennifer Callison-Bliss, Wheeler High School, Smyrna, GA

1536-93994 Crickets for Lunch? Using 3D Instruction to Build Science Literacy**Grand Ballroom X (3rd Floor)** • General Biology • Hands-on Workshop (30 min) • HS

The "Crickets for Lunch?" unit encourages high school biology students to reflect on community, culture, and personal experiences as they learn how to communicate their knowledge of life science concepts.

Kia G. Boose, Kevin S. Garner, and Maceo Cooper, Baltimore City Public Schools, Baltimore, MD

Member Resources Committee**Iron (4th Floor)** • Committee Meeting (30 min) • GA

Review resources, services, and program recommendations to better support both NABT members and the biology teacher community.

Catherine Ambos, Committee Chair

Social Media Committee**James (4th Floor)** • Committee Meeting (30 min) • GA

Use social media outlets such as Facebook and X to broaden the NABT Community and promote programs that support biology and life science teachers.

Stacey Kiser and John Moore, Task Force Chairs

1536-93667 Evolution with BiteScis: Misconceptions, Mastery, & Microorganisms**Kent A (4th Floor)** • Evolution • Paper (30 min) • ML, HS, 2Y

Explore BiteScis evolution lesson plans, which integrate current research and standards-aligned content, to help you target and overturn misconceptions and preview data from a pilot study on their effectiveness.

Stephanie Keep, BiteScis, Bedford, MA

1536-94381 Closing the Equity Gap in Success with Development of an Integrated Biology Course for Non-majors**Kent B & C (4th Floor)** • Curriculum Development • Paper (30 min) • 2Y, 4Y, GA

Converting mixed majors biology courses into majors and non-majors sequences has led to increased student performance and closure of equity gaps by integrating molecular metabolism with system function and application.

Mandy Comes and Teresa Fulcher, Pellissippi State Community College, Knoxville, TN

1536-96932 The Wolbachia Project: Student Research Experiences with Global Impact**Laurel C & D (4th Floor)** • Evolution • Hands-on Workshop (30 min) • 2Y, 4Y, GA

Wolbachia manipulates insect reproduction and reduces the transmission of mosquito-borne diseases. Join a global effort to determine the frequency and distribution of this microbial symbiont.

This session is a special presentation by the 2023 Huxley Award Winner.

Sarah Bordenstein, The Pennsylvania State University, University Park, PA

11:15AM–12:30PM

SPECIAL PROGRAMMING PRESENTED BY BIOZONE**1536-94477 BIOZONE's Latest Biology Titles: Learn How These Superb, Interactive Texts Deliver Flexible & Engaging Programs****Dover A (3rd Floor)** • General Biology • Demonstration (75 min) • HS

BIOZONE's innovative interactive worktext approach is a departure from traditional textbook learning—providing flexible, engaging, student-centered resources. Print and digital formats deliver powerful NGSS, IB, Texas, and AP programs.

Richard Allan, BIOZONE International, Hamilton, Waikato, New Zealand

11:15AM–12:30PM

1536-94046 Moving Beyond the Central Dogma: A Systems Biology Approach to Studying Environmental Influence of Disease**Dover B & C (3rd Floor)** • Science Practices • Hands-on Workshop (75 min) • HS, 2Y

Conduct an interactive activity to learn how biomedical researchers are using bioinformatics and a systems biology approach to investigate the effects of per- and poly-fluoroalkyl substances (PFAS) exposure on health.

Andromeda Crowell, Orange High School, Hillsborough, NC and Dana B. Haine, UNC-Chapel Hill, Chapel Hill, NC

SPECIAL PROGRAMMING PRESENTED BY LAB-AIDS**1536-94197 Lab-Aids Biology: Looking for Patterns in Species Diversity****Essex A (4th Floor)** • General Biology • Hands-on Workshop (75 min) • HS

Look for patterns in species diversity in coral reef ecosystems and other animals to determine cause and effect relationships and understand how ecosystem interactions affect patterns of biological diversity.

Lisa Kelp, Lab-Aids, Ronkonkoma, NY

1536-94504 Learning Cellular Respiration, pH, and Quantitative Skills Together: Curriculum from a Two-Year / Four-Year Faculty Collaboration**Essex B & C (4th Floor)** • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Practice an activity that helps students think quantitatively about pH changes in cellular respiration. Learn how faculty from two-year and four-year institutions collaborated to develop quantitative reasoning modules for biology.

Evdokia Kastanos and K. Rebecca Thomas, Montgomery College, Rockville, MD; Julie Takacs, Anne Arundel Community College, Arnold, MD

SPECIAL PROGRAMMING PRESENTED BY BIOLOGY MAGNETS**1536-100299 Tools for Biology Education****Grand Ballroom I (3rd Floor)** • Instructional Strategies • Hands-on Workshop (75 min) • ML, HS, GA

Biology Magnets are educational tools for magnetic whiteboards that allow you and your students to easily model complex biological processes. A free module will be given to all who attend!

Tom Willis, Biology Magnets, St. Simons Island, GA

SPECIAL PROGRAMMING PRESENTED BY 3D MOLECULAR DESIGNS**1536-98149 Teaching the Molecular Mechanisms of Addiction with Physical Models****Grand Ballroom II (3rd Floor)** • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

This hands-on session introduces physical models to explore the mechanisms of cell communication in the brain at the molecular level, including the specific application to teaching the pathways of addiction.

Alan Allmen, 3D Molecular Designs, Milwaukee, WI

1536-96532 Red-Light, Green-Light: Using BioInteractive Resources to Explore Cancer as a Phenomenon**Grand Ballroom III & IV (3rd Floor)** • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Explore BioInteractive resources to investigate how cancer affects checkpoints (stop-lights) in the cell cycle. We will provide opportunities for participants to collaborate to discuss implementation in their classroom contexts.

Jim Lane, Mahtomedi High School, Mahtomedi, MN and Amaya Garcia Costas, Colorado State University-Pueblo, Pueblo, CO

1536-94275 Exploring the Immune System Using Mini Cases and HHMI BioInteractive**Grand Ballroom VII (3rd Floor)** • General Biology • Demonstration (75 min) • GA

This workshop will explore narrative mini cases alongside the HHMI BioInteractive Immune System learning module. The activity introduces the cells of the immune system and walks through the timeline of a typical immune response while comparing it to several real-life immune reactions. Participants will identify and explain the role of memory cells when the body responds to various common antigens by interpreting graphs and images.

Melissa Haswell, Delta College, Midland, MI

1536-94223 The Robots Are Here, Now What? Implications and Uses of AI in the Classroom**Grand Ballroom VIII (3rd Floor)** • Technology in the Classroom • Hands-on Workshop (75 min) • HS, 2Y, 4Y

We will present what teachers should know about platforms such as ChatGPT and how the introduction of this platform presents both challenges and opportunities for learning.

Aaron L. Mathieu, Acton-Boxborough Regional High School, Acton, MA and Lee Ferguson, Allen High School, Dallas, TX

1536-94501 Inspire Future Changemakers by Discovering Biodiversity Hotspots**Grand Ballroom IX (3rd Floor)** • International / Global Education • Symposium (75 min) • ML, HS, GA

Discover conservation efforts at biodiversity hotspots across five continents and generate new ideas to increase cultural responsiveness, address biodiversity loss, and motivate your students to solve ecological issues.

Brittany Bauer, Wyoming East High School, New Richmond, WV; Garrison Union Free School District, Garrison, NY; Rumson Fair-Haven Regional High School, Matawan, NJ; Cassie Klein, New Jersey Audubon, Matawan, NJ

11:15AM–12:30PM CONT.

1536-94512 Elevating Student Voice & Choice: Creating an Inquiry-based, NGSS-aligned Project by Examining the Human Microbiome**Grand Ballroom X (3rd Floor)** • AP Biology • Hands-on Workshop (75 min) • HS, 2Y

By exploring the human microbiome, educators will design an inquiry-based, NGSS-aligned project, illustrating the importance of student choice and voice. They will also analyze data, formulate questions, and conduct research.

Carisa Steinberg, Syosset High School, Huntington, NY

1536-94318 Teaching the Genome Generation: Investigating Genetic Ancestry in the Biology Classroom through Data Analysis**Kent A (4th Floor)** • Genetics • Hands-on Workshop (75 min) • HS, 2Y, 4Y

In this hands-on workshop, participants will engage with a genetics curriculum focused on data analysis and quantitative skills framed around ancestry and genomic variation.

Sarah Wojiski, The Jackson Laboratory, Farmington, CT

1536-94404 Reaching Every Student in Your Classroom—Culturally and Linguistically Responsive Pedagogy**Kent B & C (4th Floor)** • Instructional Strategies • Hands-on Workshop (75 min) • ML, HS, 2Y

Participants will be guided to recognize and share approaches in culturally responsive teaching they already use, as well as develop new ways to implement equitable classroom practices.

Dessy Dimova, MassInsight Education and Research, Princeton, NJ

1536-94468 Conducting Research with the All of Us Database**Laurel A & B (4th Floor)** • Science Practices • Demonstration (75 min) • HS, 2Y, 4Y

The NIH is building the largest biomedical database of its kind and making it broadly accessible for research purposes. Learn how to access it to conduct your own authentic studies.

Louisa A. Stark, Genetic Science Learning Center at the University of Utah, Salt Lake City, UT and Rubin Baskir, All of Us Research Program at the National Institutes of Health, Bethesda, MD

1536-94356 Bioinformatics in the Classroom: From Sanger Sequencing to Phylogenetic Trees**Laurel C & D (4th Floor)** • Evolution • Hands-on Workshop (75 min) • HS, 2Y, 4Y

How can a single DNA sequence unveil the evolution and identity of an organism? Join Discover the Microbes Within: The Wolbachia Project (<https://wolbachiaproject.org>) for hands-on training using free bioinformatics software.

Sarah Bordenstein, The Pennsylvania State University, University Park, PA and Bob Kuhn, Innovation Academy STEM High School, Alpharetta, GA

11:30AM–2:00PM

NABT Honors Luncheon Harborside Ballroom A & B (4th Floor) • Special Event (Tickets Required) • GA

NABT is proud to recognize the 2023 NABT Award Recipients during this celebration. We will honor exceptional biology teachers from all levels, and everyone is welcome to help us congratulate these remarkable professionals.

2:00PM–4:00PM

SCST SYMPOSIUM

Highlighted Tips, Tools, & TA Professional Development**Dover B & C (3rd Floor)** • Instructional Strategies • Symposium (120 min) • 2Y, 4Y**Increasing Learner Engagement by Modeling DNA Replication with 3D Printed Models & Interlocking Building Toys**

Molecular processes are difficult to visualize. I developed a collaborative hands-on activity so students can model DNA replication using 3D-printed “enzymes” and interlocking building toys. Electronic resources will be provided.

Tarren J Shaw, University of Oklahoma, Norman, OK

Improving Inclusion and Belonging of STEM Undergraduates Through TA Teaching Professional Development

In this session, participants will learn about the NSF-funded TA Teaching Professional Development (TA-TPD) and receive resources to create, advocate for, and reform the TA-TPD program at their home institution.

Stephanie Gutzler, Georgia State University, Atlanta, GA and Kaleb Heinrich, University of Alabama, Tuscaloosa, AL

Meet Miro: The Collaborative Digital “Whiteboard” of the Future

Bring your laptop to explore applications of Miro for in-person and online courses, from enhanced lectures with activities to semester-long projects. Move beyond paper to increase engagement, collaboration, and creativity.

Heather Scherr, Lone Star College-Kingwood, Kingwood, TX

2:00PM–3:15PM

1536-94502 Teaching About Misconceptions and Science Communication Using Primary Scientific Literature**Dover A (3rd Floor) • Science Practices • Hands-on Workshop (75 min) • HS**

Participants will engage in an activity that uses primary scientific literature (PSL) to dispel misconceptions about various science topics and engage in a science communication activity to share their findings.

Ashli Wright, Florida International University, Miami, FL

1536-93301 Marginalizing Misinformation & Mentoring Myth-Busters**Essex A (4th Floor) • General Biology • Hands-on Workshop (75 min) • GA**

Anti-vaxxers, climate change naysayers, COVID myths, wonder diets, and greenwashing by industry — all challenges our students. Help them develop skills in assessing credibility and expertise and busting bogus scientific claims in the media.

Douglas Allchin, University of Minnesota, St Paul, MN

1536-94276 Dealing with a Zombie Epidemic: Applying Knowledge of Microbiology, Immunology, and Potential Treatments**Essex B & C (4th Floor) • Microbiology & Cell Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y**

This lesson puts students in the shoes of the CDC as they investigate the next pandemic by determining the type of pathogen attack and planning a viable treatment plan.

Kristy Daniel and Carrie Jo Bucklin, Texas State University, San Marcos, TX

1536-94542 DEI Implementation Framework for College Classrooms**Grand Ballroom I (3rd Floor) • Science Practices • Hands-on Workshop (75 min) • 2Y, 4Y**

We will introduce a template guide for implementing DEI concepts in the classroom. Participants will discuss and apply these strategies to an example resource.

Bryan Dewsbury, Florida International University, Miami, FL; Elizabeth Harrison, Kennesaw State University, Kennesaw, GA; Gabriela Hamerlinck, University of Florida, Gainesville, FL; Davida Smyth, Texas A&M University San Antonio, San Antonio, TX; Heather Rissler, North Iowa Area Community College, Mason City, IA; Dayna DeFeo, University of Alaska Anchorage, Anchorage, AK

SPECIAL PROGRAMMING PRESENTED BY 3D MOLECULAR DESIGNS**1536-98152 3D Molecular Designs Presents: Uncovering the Truth: Modeling a DNA Replication Error****Grand Ballroom II (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y**

Explore the incredible versatility of the Flow of Genetic Information Kit by using it to model one type of replication error within the context of a real crime.

Sherry Annee, 3D Molecular Designs, Milwaukee, WI

1536-96534 BioInteractive Data Explorer: A Versatile Tool for Graphing And Data Analysis**Grand Ballroom III & IV (3rd Floor) • Science Practices • Hands-on Workshop (75 min) • ML, HS, 4Y**

Data Explorer is a user-friendly tool that enables students to analyze datasets. Participants will use Data Explorer and connected BioInteractive resources to consider its applications in their classroom contexts.

Peter J. Park, Farmingdale State College, Farmingdale, NY and Samuel J. Loftus, Shasta Middle School, Eugene, OR

1536-94474 Mimicry in Velvet Ants: Investigating Evolution through the Practices of Science**Grand Ballroom VII (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS**

Participants will engage in a task for teaching evolution through mimicry in velvet ants (Mutillidae). Participants will also begin developing their own phenomenon-based tasks for teaching in their own context.

John Maddux, Festus Senior High School, Festus, MO and Jim Lane, Mahtomedi High School, Mahtomedi, MN

1536-94100 Biodiversity in the Anthropocene: A Guided Inquiry Into Climate Resilience Through Island Biogeography**Grand Ballroom VIII (3rd Floor) • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y**

Through the lens of island biogeography, students explore climate change unfolding on diverse spatio-temporal scales and problem-solving—from across continents and millennia into our ZIP codes and lifetimes.

Kirstin Milks, Bloomington High School South/Indiana University, Bloomington, IN and Armin Moczek, Indiana University, Bloomington, IN

2:00PM–3:15PM CONT.

1536-94466 Bringing Justice, Equity, Diversity, and Inclusion into Classrooms Through Networking and Take-Away Resources**Grand Ballroom IX (3rd Floor) • Instructional Strategies • Hands-on Workshop (75 min) • GA**

Participants will choose networking tables led by the NABT JEDI Committee. Each table will have a different equity focus for participants to gather resources, discuss applications, and collaborate.

Enya Granados, Cedar Shoals High School, Athens, GA; Maribel Gendreau, Hampton Roads Academy, Newport News, VA; Catherine Bischoff, Rye Country Day School, Rye, NY; Holly Basta, Rocky Mountain College, Billings, MT; Zach Pratt, Parker High School, Janesville, WI; Alston Brown, Hampton Roads Academy, Newport, VA

1536-93918 Using eDNA for Project Based Learning**Grand Ballroom X (3rd Floor) • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y**

Participants will learn methods to extract DNA from water samples in order to test for the presence of the amphibian pathogen *Batrachochytrium dendrobatidis* and salamandivorans.

Daniel Shay, North Central High School, Spokane, WA

Professional Development Committee**Iron (4th Floor) • Committee Meeting (75 min) • GA**

Provide oversight, evaluation, and implementation support for NABT professional development activities including but not limited to the NABT Conference.

Committee Chair to be Named

Nominating Committee**James (4th Floor) • Committee Meeting (75 min) • GA**

Recruit members to NABT leadership positions, including identifying and evaluating candidates for NABT elections based on nominations from members in good standing.

Bob Melton, Committee Chair

1536-94521 Some Like it Hot: Extremophiles of Yellowstone National Park**Kent A (4th Floor) • Ecology / Environmental Science Sustainability • Hands-on Workshop (75 min) • ML, HS, GA**

Engage students in evidence-based argumentations using extremophiles of Yellowstone National Park. Back by popular demand, this presentation describes a lesson designed to strengthen students' understanding of resource availability, even in the harshest of ecosystems.

Julie Angle, Oklahoma State University, Stillwater, OK

SPECIAL PROGRAMMING BY BEDFORD FREEMAN & WORTH**1536-10000 Effective Ways to Develop Science Practices for AP® Environmental Science Students, Using a Textbook****Kent B & C (4th Floor) • Ecology/Environmental Science/Sustainability • Demonstration (75 min) • HS**

Explore literacy and science skill enhancement opportunities for AP® Environmental Science students. Delve into the seven science practices using Environmental Science for AP® Course 4e.

Amy Fassler, Marshfield High School, Marshfield, WI

1536-94956 Insights on Student Success in the Community College Ecosystem**Laurel A & B (4th Floor) • Instructional Strategies • Symposium (75 min) • 2Y, GA**

Panelists will share their experience and insight on how to support faculty professional development and scholarship at the two-year college level. They will also provide recommendations for those trying to do similar work.

James DeKloe, Solano College, Fairfield, CA; Evdokia Kastanos, Montgomery College, Rockville, MD; and Paulette Reneau, Georgia State University-Perimeter College, Decatur, GA; and Sheela Vemu, Waubonsee Community College, Sugar Grove, IL

1536-94513 Teaching Naledi: Tools to Bring This Unique Discovery to Life for Your Students**Laurel C & D (4th Floor) • General Biology • Demonstration (75 min) • ML, HS, GA**

Encounter a range of *Homo naledi* resources that supports your teaching of this amazing discovery from multiple vantage points, including primary sources, 3D-printed fossils, and access to upcoming discoveries.

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

3:30PM–4:00PM

1536-94382 Play, Simulate, and Model - Using the BioGraph Curriculum to Teach Core Biological Concepts**Dover A (3rd Floor) • Technology in the Classroom • Demonstration (30 min) • HS, 2Y**

Struggling to teach students complex biological content like gene regulation, genetic drift, or cell transport? Learn about free NGSS-aligned online simulations that model real-world phenomena and engage students as scientists.

Meng-Ping Tu, Stuyvesant High School, Forest Hills, NY and Erika Mitkus, The Governor's Academy, Byfield, MA

3:30PM–4:00PM CONT.

1536-93865 The Empathetic Educator: Tips for Building Relationships in the Classroom**Grand Ballroom I (3rd Floor)**
• Instructional Strategies • Demonstration (30 min) • ML, HS

Building strong relationships with students is critical for creating an inclusive and welcoming classroom. Learn about the strategies that an early-career educator leveraged to build relationships with his students.

Alexander Eden, Florida International University, Miami, FL

SPECIAL PROGRAMMING PRESENTED BY 3D MOLECULAR DESIGN**1536-98157 3D Molecular Designs Presents: Hydrophobic Marvels: Using Water Models to Unravel the Self-Cleaning Secrets of Lotus Leaves****Grand Ballroom II (3rd Floor)**
• General Biology • Hands-on Workshop (30 min) • ML, HS, 4Y

Explore the wonders of lotus leaves as water droplets bead and flow. Engage with interactive water models to build your understanding of lotus leaves self-cleaning properties.

Andrew Taylor, 3D Molecular Designs, Milwaukee, WI

1536-96535 BioInteractive's New Online Community: A Space to Connect and Learn With Fellow Life Science Educators**Grand Ballroom III & IV (3rd Floor)**
• General Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

You're invited to BioInteractive's new Online Community! We'll discuss how this Community connects life science educators so you can share ideas, enhance classroom practice, and learn from each other's experiences.

Marjee Chmiel, Howard Hughes Medical Institute, Chevy Chase, MD and Melissa Haswell, Delta College, University Center, MI

1536-94505 Mathematics and Computational Thinking in OpenSciEd High School Biology**Grand Ballroom VIII (3rd Floor)**
• General Biology • Demonstration (30 min) • HS

Experience phenomenon-based, storyline curriculum in high school biology! Use an agent-based model (in the form of a tabletop game) to generate evidence to answer questions about predator-prey interactions.

Kate Henson, University of Colorado Boulder, Boulder, CO

1536-96587 NABT Equity Networking Social**Grand Ballroom IX (3rd Floor)**
• Instructional Strategies • Special Event (30 min) • GA

Network with other practitioners who are passionate about justice, equity, diversity, and inclusion. This event is open to all levels and light refreshments are included.

NABT Justice, Equity, Diversity, and Inclusion (JEDI) Committee

SPECIAL PROGRAMMING PRESENTED BY LABXCHANGE**1536-94964 The Virtual Lab Experience****Kent A (4th Floor)** • Curriculum Development • Hands-on Workshop (30 min) • ML, HS, 2Y, 4Y

Join a workshop on virtual labs on LabXchange, where you will discover the power of online labs to enhance your teaching and learning experience.

Jenny Frank, LabXchange, Harvard, Cambridge, MA

SPECIAL PROGRAMMING BY BEDFORD, FREEMAN & WORTH**1536-10001 Get AP Biology Ready with BFW Publishers****Kent B & C (4th Floor)** • AP Biology • Demonstration (30 min) • HS

Explore the transformative potential of the Biology for the AP® Course (BFW Publishers) program, in enhancing pedagogy and student engagement, with a focus on CED alignment, AP Practice, and Skills.

Thomas Menna, BFW Publishers, Hamilton, NJ

1536-92422 Where Are We Now? Evolution Teaching and Learning Across the United States**Laurel C & D (4th Floor)** • Evolution • Paper (30 min) • HS, 4Y, GA

Examining results from a national study on evolution education from universities around the United States, this session focuses on answering the question, "Where do we stand?" through a unique lens.

Amanda Townley, Georgia Southern University, Statesboro, GA

4:15PM–4:30PM

Announcement of the 2023 Poster Winners**Grand Ballroom V & VI (3rd Floor)** • Special Event • GA

NABT is pleased to announce the student winners of the Biology Education Research Competitions and the Mentored Student Research Competitions.

6:00PM–8:00PM

Baltimore Haunted History Tour & Closing Reception**Waterview ABC • Special Event (Tickets Required)** • GA

Conclude your 2023 NABT Conference experience with an evening of Baltimore history and haunts.

Join us for a bite and a beverage harborside at the hotel before our guides lead the groups in a walking tour of Baltimore's most historic waterfront neighborhood, closing out at a popular spot to cheers to a successful conference.

4:30PM–5:30PM

GENERAL SESSION & PRESENTATION OF THE 2023 NABT DISTINGUISHED SERVICE AWARD**Lee Berger**

See biography on page 10

The Future of Exploration in the Greatest Age of Exploration**Grand Ballroom V & VI (3rd Floor)** • Evolution • Special Speaker • GA

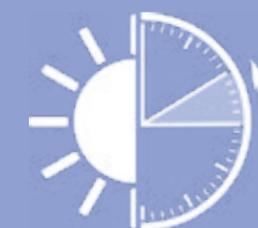
Dr. Lee Berger is an award-winning researcher, explorer, author, and speaker. Since finding a fossilized femur of an early hominin as an undergraduate, Lee has become one of the most successful (and recognizable) paleoanthropologists in the world. Berger's decades of research on human origins in Africa, Asia, and Micronesia have resulted in numerous new discoveries, including the discovery of two new species of early human relatives—*Australopithecus sediba* in 2008 and *Homo naledi* in 2013. Berger may be best known for his significant discoveries, but his contributions to exploration sciences have also resulted in advances in the application of technology to explore, excavate, and recover hominid remains in sub-equatorial Africa.

In this interactive presentation, Dr. Berger will share details about his work at the Rising Star Cave System in Africa's Cradle of Humankind, including some of his most recent findings. The presentation will then be followed by Q&A.

NABT is proud to name Dr. Lee Berger the recipient of the 2023 Distinguished Service Award for Enhancing Biology Education.

SUNDAY NOVEMBER 5

8:30AM–10:30AM

Four-Year College & University Section Meeting**Dover A (3rd Floor)** • Committee Meeting • 4Y, GA**Two-Year College Section Meeting****Dover B (3rd Floor)** • Committee Meeting • 2Y, GA**DAYLIGHT SAVINGS TIME!****DON'T FORGET TO CHANGE YOUR CLOCKS!**

GIVE THE GIFT OF COMMUNITY

Be the leader that empowers a fellow educator with an NABT membership.

Learn more at NABT.org/Gifts-Logowear

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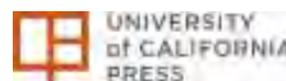


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The American Biology Teacher is an award-winning, peer-refereed professional journal for K-16 biology teachers. Topics covered in the journal include modern biology content, teaching strategies for the classroom and laboratory, field activities, applications,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

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Meet and Greet with NABT Leaders

4:00PM–5:30PM

Exhibit Hall Closing Experience

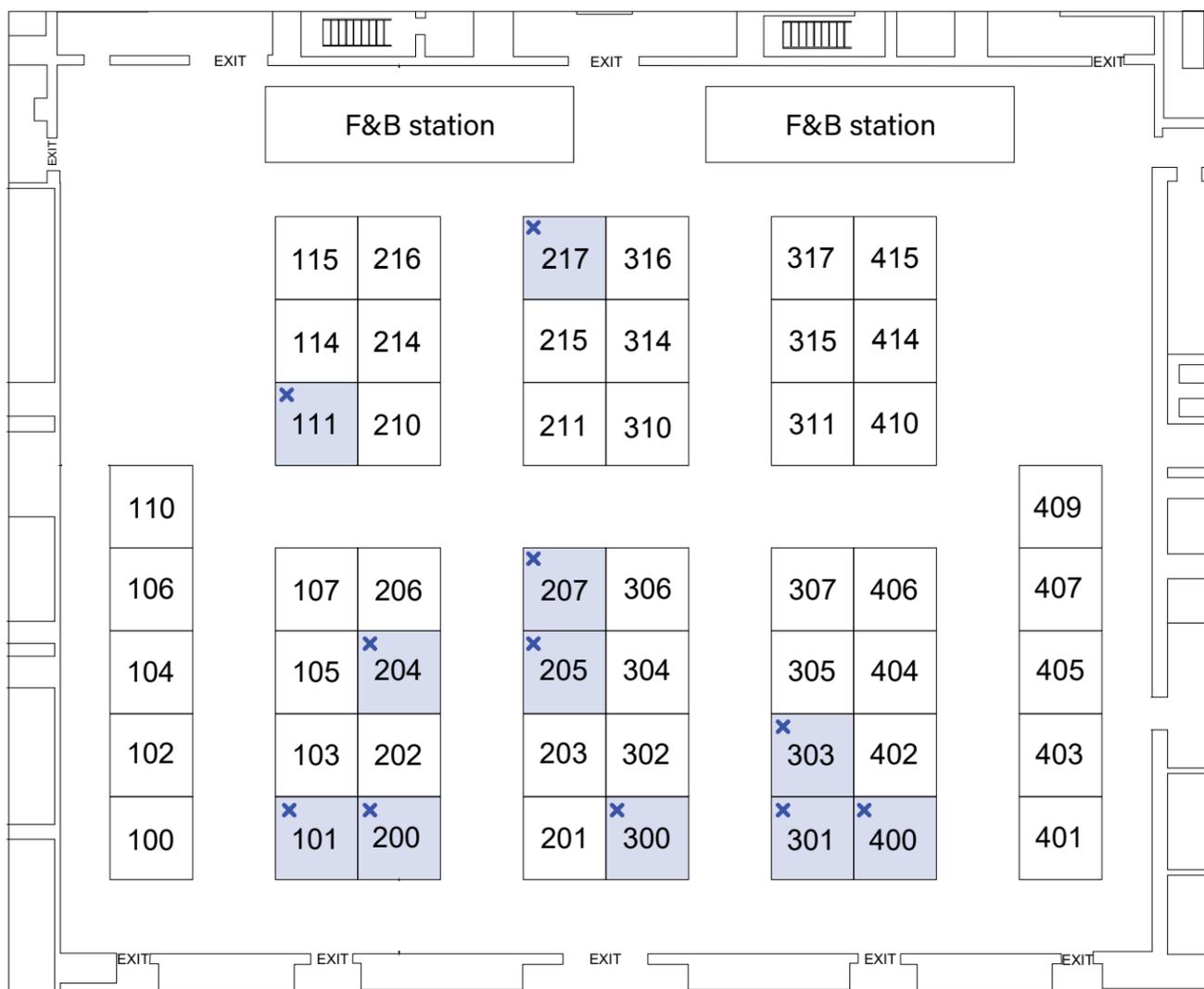
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Our collaborative kits and interactive models give words meaning by focusing on core ideas and intersecting concepts in biology, chemistry, physical and life sciences. Engaging kits and models invite students to explore patterns, make predictions, and revise their explanations while grappling with complex science ideas. Teachers play key roles in the design, field testing, and activity development of all our models so you can be sure learning is successful in the classroom. Kits support STEM, NGSS, IB, PLTW and can be incorporated in existing curriculum. Watch our newsletter for 2024 summer courses info and ask about our new Mighty Models today!

ADInstruments NZ Limited 🏠

Booth #205

adi.to/biology

ADInstruments is committed to its goal of making science easier for educators worldwide. We focus on fully-customizable, ready-to-use solutions to help keep your students engaged. Our Lt Biology Collection, developed in partnership with Vernier and Bio-Rad™ Laboratories, addresses core concepts in first-year undergraduate introductory biology. The collection introduces a variety of concepts fundamental to biology and biochemistry.

Aidmics Biotechnology

Booth #311

uhandy.cc/eng

uHandy Mobile Microscope is your second pair of eyes that create infinite possibilities for science education. From microscopic living cells to insects, from shimmering crystals to rocks, uHandy makes these fascinating subjects visible, approachable, and enlightening. To achieve the greatest impact, focus on the smallest details.

Algae Research Supply

Booth #214

algaereseearchsupply.com

Algae Research and Supply is a group of geeks who believe that algae will be one of the tools used to remove CO2 from the atmosphere. Our mission is to get the cultures, equipment, and know-how to teachers and students so that they can wield algae as means to fight climate change.

The American Phytopathological Society (APS)

Booth #405

apsnet.org

Advancing the science of plant health to assure a sustainable future. APS is a global community of individuals with a shared interest in plant health and a drive to discover, disseminate, and apply new knowledge of plant health worldwide to promote the development and adoption of economically and environmentally sustainable practices.

American Society of Plant Biologists

Booth #401

aspb.org

The American Society of Plant Biologists promotes the growth and development of plant biology, encourages and publishes research in plant biology, and provides vital supports for plant scientists. The Society actively works to increase awareness of the significance of plants, support educators, and increase student interest in STEM by promoting scholarly teaching, active learning, effective mentoring, and evidence-based public engagement.

Ampliyus (miniPCR) 🏠

Booth #300

minipcr.com

At miniPCR bio, we reimagine what is possible in the biology classroom. We design equipment and curriculum for affordable, hands on, truly engaging biology education for learners from middle school through college. Our DNA Discovery System, which combines miniPCR and blueGel electrophoresis, offers teachers and students unprecedented access to complete DNA analysis, and our curriculum products bring biology out of the black box by rendering complex concepts visible and tangible.

Anatomage

Booth #201

anatomage.com

Anatomage is a medical company, driving innovation through advanced solutions in hospitals and educational institutions. Our digital cadaver table, the Anatomage Table, allows a hands-on approach to learning the human body through unique visualization options, dissection tools, and quiz mode features, making it a strong asset to any anatomy class.

Animalearn

Booth #304

thesciencebank.org

Animalearn works to end the harmful use of animals in science education by providing non-animal resources to make positive change. We offer humane dissection alternatives, expert information, and advocacy tools. Animalearn's one-of-a-kind lending library, The Science Bank, is home to hundreds of high-quality, animal-friendly humane science education products that can be borrowed for FREE.

Avantor (Ward's Science)

Booth #106

wardsci.com

Ward's Science is your complete solution for materials and support for every science subject. Because YOU make big things happen in the classroom each day, we stand with you every step of the way.

Discover a powerful combination of products, resources, and expert support for worry-free shopping, so you're free to focus on connecting your students to science—and inspiring them to explore the world.

Bedford, Freeman & Worth High School Publishers

Booth #303

bfwpub.com

BFW Publishers is the leading provider of innovative AP® Science programs. With full CED alignment and integrated skills practice, our programs are designed to build the skills necessary for success on the AP exam and in the course. Our AP Biology program, Biology for the AP Course, and our market-leading AP Environmental Science program, Environmental Science for the AP Course—like all of our programs - provide unmatched AP specific features, teacher and student resources, online homework with targeted feedback, and much more. Additionally, we publish groundbreaking texts such as College Physics for the AP Physics 1 & 2 Courses and Living By Chemistry (an inquiry-based chemistry program). With a reputation for excellence, BFW is proud to be part of the Macmillan Learning Family.

BioBrain

Booth #105

biobrain.com.au

BioBrain is an online platform that offers STEM learning resources for high school and college students, focusing on biology, chemistry and physics. Created by teachers, BioBrain helps students achieve the best learning outcomes possible, utilizing the latest technology available. BioBrain's curriculum-aligned learning

materials are broken down into small bite-sized chunks, graded over three levels, to suit today's digital-native learners. Each subject features comprehensive learning materials with clear and detailed scientific diagrams. Short quizzes with a variety of question formats are used to assess understanding. The illustrated glossary helps students grasp the more difficult scientific concepts. BioBrain is available on all desktop and mobile devices, allowing students to learn at their own pace, anytime, and anywhere.

Bio-Rad Laboratories, Inc.

Booth #204

explorer.bio-rad.com

Bio-Rad provides a completely supported life science experience. Bio-Rad products are state of the art and take student learning objectives into account. Starting with the highest quality curriculum and reagents with guaranteed results, 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!

Biology Magnets

Booth #409

biology magnets.com

Biology Magnets is a company producing manipulative educational tools that allow teachers and students to physically model biological and chemical processes and molecular interactions on magnetic white boards in the classroom. Immediately increase student understanding and questioning, and easily identify student misconceptions. Modules cover all major units of biology for middle school through college curriculum. Chemistry and environmental science modules are also available. Modules are affordable, easy to store, and will last indefinitely. Add another dimension to your teaching.

BIOZONE Corporation

Booth #101

biozone.com

BIOZONE has more than 30 years of experience in the development of engaging and effective resources for science teaching and learning. Our resources are unlike any you've seen before and a departure from the traditional basal textbook paradigm. We take a "worktext" approach, combining the very best features of a traditional textbook with an interactive workbook. The resulting hybrid provides well-designed, compact lessons that engage students and provide a rigorous yet accessible program of work. Our expert writers bring science to life through the use of phenomena from engagement to assessment. We continually revise and improve our resources to ensure they remain current and relevant to your needs. Part of this process is engaging with you as teachers and valuing your feedback, and we are only ever a phone call or email away. By their innovative design, our resources encourage student interaction, using simple investigations and data analysis to engage students in the science around them.

BiteScis

Booth #314

bitescis.org

BiteScis is a Massachusetts-based program that brings together educators and researchers to develop NGSS-aligned, research-based lessons for college prep classes. Our lessons weave together core content knowledge with emerging research, making it easy for teachers to share exciting, creative, and authentic science research with their students. In this way, students come to understand that the knowledge they have right now is being used by actual scientists doing really cool "real" science. Students also learn about the many faces of science through our BiteScientist profiles. All of our lessons are available online in an editable form at no cost and we are continually working with teachers and researchers to create new content.

BiteScis is a program of ComSciCon, a fiscally sponsored program of Community Initiatives, Oakland, CA.

Botanical Society of America

Booth #407

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. The open education resources (OER) support NGSS-aligned plant investigations that integrate scientific practices and big ideas in biology.

Carolina Biological Supply Company

Booth #400

carolina.com

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

Clemson University

Booth #210

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 of 30 credit hours of relevant, rigorous, and challenging graduate courses specifically designed to improve science-content knowledge. This program is fully in a distance-learning format.

Cognitive Surplus

Booth #306

cognitive-surplus.com

We are fascinated by and curious about the science in the world around us. We love everything from physics jokes to the exquisite beauty of early scientific etchings and illustrations. We're inspired by a sense of wonder for our universe and a desire to look closer.

We think gazing up at the night sky, watching leaves turn color in the fall, and the way magnets work is intriguing and kinda magical, and we hope that we're able to share some of our excitement through our designs.

Discovery Education—Pivot Interactives

Booth #111

pivotinteractives.com

Pivot Interactives is an online science curriculum supplement that helps teachers provide more phenomena-based, active learning, with interactive video-based science activities for biology, environmental science, chemistry, earth and space science, and physics. Students see, measure, analyze, and explore science for themselves. The extensive library of activities crafted by veteran science educators makes it easy for teachers to actively engage students in the exploration of scientific phenomena while developing their skills in the science practices.

Edvotek, Inc.

Booth #200

edvotek.com

Edvotek was the world's first company dedicated to demystifying biotechnology for students. In 1987, we envisioned how the emerging area of biotechnology could inspire students to choose a career in science. Today, Edvotek has expanded to become the world's leading supplier of safe, affordable, and easy-to-use biotechnology kits and equipment.

Fair Hope Graphics

Booth #102

fairhopegraphics.com

Fairhope Graphics creates posters and murals illustrating the most current peer-reviewed evolutionary research tracing the common ancestry and diversification of life from the first single-celled organism to all major clades of extant life. Our continually updated tree of life and earth history graphics facilitate teaching evolutionary principles, phylogenetic classification, misconceptions, and deep time. Accompanying activities reinforce and test concepts.

The Foundation for Biomedical Research

Booth #104

FBResearch.org

The Foundation for Biomedical Research (FBR) is America's most experienced, trusted, and effective nonprofit dedicated to improving human and animal health by promoting public understanding and support for biomedical research. We believe that by illuminating the essential role animal research plays in changing health outcomes and defeating illnesses, we can help make lives even better.

iWorx Systems, Inc.

Booth #305

iworx.com

iWorx helps educators teach physiology. We provide affordable laboratory kits that engage your students. They contain all the sensors, software, and lab write-ups needed for fun hands-on experiments in cardiovascular, neuromuscular, and respiratory physiology.

The Jackson Laboratory

Booth #211

jax.org

The Jackson Laboratory (JAX) is an independent, nonprofit biomedical research institution which aims to discover precise genomic solutions for disease and empower biomedical researchers to improve human health. JAX Genomic Education develops NGSS-aligned lessons, activities, and hands-on laboratory protocols for teaching and learning about genetics and genomics. Our Teaching the Genome Generation™ professional development program provides teachers with the content knowledge, teaching strategies, and resources needed to implement molecular genetics labs, bioinformatics activities, and bioethics lessons that effectively engage students.

Kendall Hunt Publishing Co. Booth #307

kendallhunt12.com

Kendall Hunt has a 75-year history of providing innovative educational solutions. BSCS Biology: Understanding for Life is a full-year, high school level program and inquiryHub Biology is freely available digitally as an open educational resource. Understanding for Life is an inquiry-based, research-driven curriculum designed for the Next Generation Science Standards while inquiryHub Biology engages students in ways to help them become more proficient in all eight science and engineering practices. For more information, visit: <https://k12.kendallhunt.com/>.

● Lab-Aids

Booth #301

lab-aids.com/sgi

Lab-Aids is a core and supplementary curriculum publisher, exclusively in K-12 science, that focuses on providing a hands-on experience for students and field-tested instructional materials for teachers. Our high school biology course, Science and Global Issues: Biology, is developed at the Lawrence Hall of Science with a new NGSS edition released this year. For more, please visit lab-aids.com

LabXChange

Booth #115

labxchange.org/nabt-conference-2023

LabXChange is a global science classroom open to every curious mind. Created at Harvard University with support from the Amgen Foundation, this powerful digital platform makes high-quality science education accessible, connects learning to careers, and gives everyone, everywhere, the opportunity to chart a path in science—for free. Through collaboration, personalization, and contextualization, LabXChange offers an integrated teaching and learning ecosystem in which tomorrow's thought leaders can build knowledge, contribute unique perspectives, and engage with a diverse, global community to develop a sense of belonging.

MaLa Scientific Booth #315

malascientific.com

After decades of teaching biological and medical topics, MALA Scientific President, Dr. Lakshmi Atchison, knew the topics where students struggled. MaLa Scientific was created by educators, for educators. Our educational models and lesson plans enable students to understand blood cell diseases, human skin, and cancer. Lesson plans and model kits are available for (1) Blood cell biology and diseases (2) Human skin: Think Inside the Box. The kit includes a detailed lesson plan with information on all skin layers, materials for constructing a model of human skin, and colorful original hand-drawn illustrations. (3) Cancers that impact high school and college students. MALA Scientific provides an easy-to-read booklet to educate young adults on 8 cancers that can impact young people, and details on their prevention.

Maryland Sea Grant/Institute of Marine and Environmental Technology (IMET)

Booth #114

mdsg.umd.edu

Maryland Sea Grant is a state and federally funded organization that supports and provides environmental research, outreach, and education on the Chesapeake Bay, Maryland's coastal bays, and their watersheds. We work to fund research to advance understanding of Maryland's estuaries, coasts, and watersheds; help the people of Maryland solve environmental challenges; educate students of all ages, from K-12 to graduate students; promote a sustainable coastal economy; and support conservation of the Bay and Maryland's coastal resources. Our offices are in College Park, Maryland, and our funded researchers, fellows, and Extension specialists work across the state. Our focus areas include healthy coastal ecosystems, sustainable fisheries and aquaculture, resilient communities and economies, and environmental literacy and workforce development. Maryland Sea Grant, part of the University System of Maryland, is a partnership between the State of Maryland and the National Oceanic and Atmospheric Administration.

MiniOne Systems Booth #414

theminione.com

Game-changing MiniOne® Systems equipment and labs enable equal access to key biotech techniques for grades 7-12 and beyond. Whether used in the classroom lab or at home, our systems and inquiry-based lab kits save time and money, and engage students with hands-on participation to answer real world questions.

National Anti-Vivisection Society

Booth #110

navs.org

The National Anti-Vivisection Society (NAVS) is a nonprofit organization dedicated to advancing science without harming animals. Through our biology education advancement program, BioLEAP, we support teachers in providing a compassionate learning experience for students. Our program website, bioleap.org, offers an extensive catalog of over a hundred different humane dissection tools that serve as cruelty-free alternatives to specimen dissection. To further support teachers, we offer awards of up to \$1,000 through the BioLEAP Classroom Grant, assisting in the replacement or reduction of animal dissection labs. We also provide free high school level curricular materials that align with Next Generation Science Standards and introduce the 3Rs Principle of Humane Experimental Technique.

National Center for Science Education

Booth #215

ncse.ngo

The National Center for Science Education (NCSE) works to ensure that what is taught in science classrooms is accurate and consistent with the current best understanding in the scientific community. NCSE focuses on climate change and evolution—areas of science that are socially, but not scientifically, controversial. Additionally, NCSE works to provide nature of science resources to teachers during a time when understanding the process of science has never been more critical.

National Geographic Cengage Booth #310

ngl.cengage.com

National Geographic Learning, a part of Cengage Group, is a K-12 publisher focusing on college and career readiness with content and interactive learning and a new focus in on-level and AP science. We are launching our newest program, National Geographic Biology. Only National Geographic can present biology through amazing photography and diverse National Geographic Explorers who share biology stories, case studies, and original Virtual Labs that transport students to rain forests, deep oceans, and more to learn and study.

Nourish The Future

Booth #107

nourishthefuture.org

Nourish the Future (NTF) connects the agriculture industry to the classroom to make learning science fun and engaging for students. NTF believes that agriculture is the new environmental science, and the best way to teach science is through a real-world context. We want to help teachers inspire their students—not only to learn science and solve problems—but to see the possibilities of STEM careers in agriculture. Nourish the Future provides free learning resources for classrooms, free experiential professional learning, and a one-year national fellowship for a few select teacher leaders who want to impact their communities in big ways. NTF lessons are geared toward life science, chemistry, and environmental science—and aligned to the NGSS. NTF educator workshops happen around the country and online and are free to participate in for grades 6-12.

Get inspired and equipped to lead great inquiry-based STEM lessons with your students and share relevant career opportunities in science and agriculture! Find NTF lessons and resources, sign up for a workshop near you, or apply for our special fellowship program at nourishthefuture.org

Penn State University Booth #415

csats.psu.edu
wolbachiaproject.org

Join us to learn about exciting programs for teachers and students at Penn State University. The Center for Science and the Schools (CSATS) – CSATS works with Penn State researchers to develop and implement teacher professional development workshops based on the practices of scientists and engineers. Discover the Microbes Within: The Wolbachia Project is a freely available, integrative lab series that empowers students and teachers with real-world skills and experience in biodiversity, biotechnology, and bioinformatics. We invite your students to join thousands of young scientists across the world to contribute scientific data on arthropod diversity within their local communities and report the frequency of a fascinating bacterial endosymbiont, Wolbachia pipientis. Together, we will collaborate with scientists in The Penn State Microbiome Center to optimize, accelerate, and disseminate long-lasting applications and knowledge on the microbiome.

Seeds of Change Research

Booth #317

socresearch.org

Seeds of Change, Inc. (SOC Research) is a 501(C)(3) nonprofit corporation with a mission to encourage high school students to pursue science-related careers. SOC Research accomplishes this by immersing students in original research experiences that ignite a passion for science well before they are in college or graduate school. The SOC Tropical Field Research program in Costa Rica was developed to guide high school students in hands-on field research that takes advantage of the immense biodiversity of the tropical rainforest. In this program, students learn how to apply the scientific method while collaborating with team members to establish their original research question and experimental design for their project. Students work as a team to implement research steps effectively and overcome challenges.

They use statistics to validate the results and develop presentations. The SOC Bioinformatics Research immersion program for high school students is also taught in Costa Rica. Finally, SOC has been training teachers since 2021 on how to run Insect-Microbiome Antibiotic Bioprospecting research labs in their high school.

SimBio

Booth #406

simbio.com

SimBio produces proven-effective, state-of-the-art active learning tools used in college biology courses worldwide. Our modules employ sophisticated interactive simulations and other interactives to teach biology in an inquiry-driven learning style. Our goal is to improve biology education by creating content that engages students in critical thinking and active learning. We strive to bring the logic and elegance of biological processes to life, and to prime students to show up to class ready to learn. As of 2022 we're 100% employee-owned!

Stop by our booth at NABT to see a demo, receive free evaluation software, or learn how to replace your intro bio textbook with SimBio's affordable active learning teaching tools!

TeachDNA Booth #404

teachdna.net

TeachDNA was born to design, manufacture, distribute, and explain hands-on, buildable, dynamic models of biomolecular structure. Launching in 2023, we begin with PlayDNA!—a simple cartoon sculpture kit that uniquely enables tactile simulation of molecular geometry, bond strength, and the important bending and twisting mechanics of the nucleic acid double-helix. Students can build accurate representations of DNA replication, RNA synthesis, and even codon-anticodon pairing, for starters; advanced students can build Holliday junctions, pseudoknots, and other things real and imaginary. Deep learning is made possible by hands-on exploration! More designs are on the way. We use local talent and nontoxic materials to make durable, beautiful, and instructive things. Our things are engineered to minimize cost to consumers, thus maximizing accessibility. Have fun learning and teaching DNA!

University of Florida, Biotility Booth #103

biotility.research.ufl.edu

Biotility at the University of Florida offers pathways for individuals seeking to jumpstart or advance their career in the bioscience industries. Our programs include industry short-courses, bioscience educator professional development, and the Biotechnician Assistant Credentialing Exam (BACE) – a biotechnology industry-recognized credential that can be earned before students even graduate high school.

Vaccine Education Center at Children's Hospital of Philadelphia

Booth #100

vaccinemakers.org

The Vaccine Makers Project (VMP) is the classroom-based program of the Vaccine Education Center at Children's Hospital of Philadelphia (VEC). Our team is committed to public education about vaccine science via scientifically supported, historically accurate, and emotionally compelling content. To this end, the VMP has developed a variety of free, school-based curricula to educate students about how the immune system works, how diseases develop, and how vaccines work to prevent them. While the immediate goal is to provide educators with the information and resources necessary to teach this scientific success story, the greater opportunity is to immunize our country's next generation of adults against scientific misinformation and disinformation while also equipping them with the skills necessary to critically evaluate the multitude of science-based topics central to how we live on and interact with this planet. Only when people understand and consider the scientific underpinnings of relevant topics can we expect that they will be equipped to make informed and logical decisions.

● Vernier Software & Technology

Booth #207

vernier.com

Vernier Science Education is committed to using our experience, knowledge, and passion to create the best and most reliable solutions for biology education. Our comprehensive solutions include hardware, software, content, assessment, professional development, and technical support. We are dedicated to partnering with biology educators and communities to build a STEM-literate society where students grow up to become knowledgeable citizens who can solve problems, fully contribute to their communities, and drive innovation.

Visible Body Booth #202

visiblebody.com

Visible Body's 3D biology and AR human anatomy and physiology platforms improve in-class and online education outcomes while making learning anatomy easy and fun. Visible Body's Courseware platform integrates with Canvas and Blackboard and allows instructors to assign and customize auto-graded labs and homework, 3D models, and flashcards.

W.W. Norton & Company

Booth #216

wwnorton.com/biology

Norton Biology brings together the best minds in biology teaching and research under one roof—from Sean Carroll to Bruce Alberts to Peter Parham. We provide superior visuals, up-to-date research, and active learning resources to help students see the world like biologists.

Wisconsin Fast Plants Program

Booth #410

fastplants.org

Wisconsin Fast Plants of UW-Madison 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.

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Interactive kits and models
invite students to:

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Explore these innovative models
and experience "Aha" moments
during our sessions at NABT23!

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