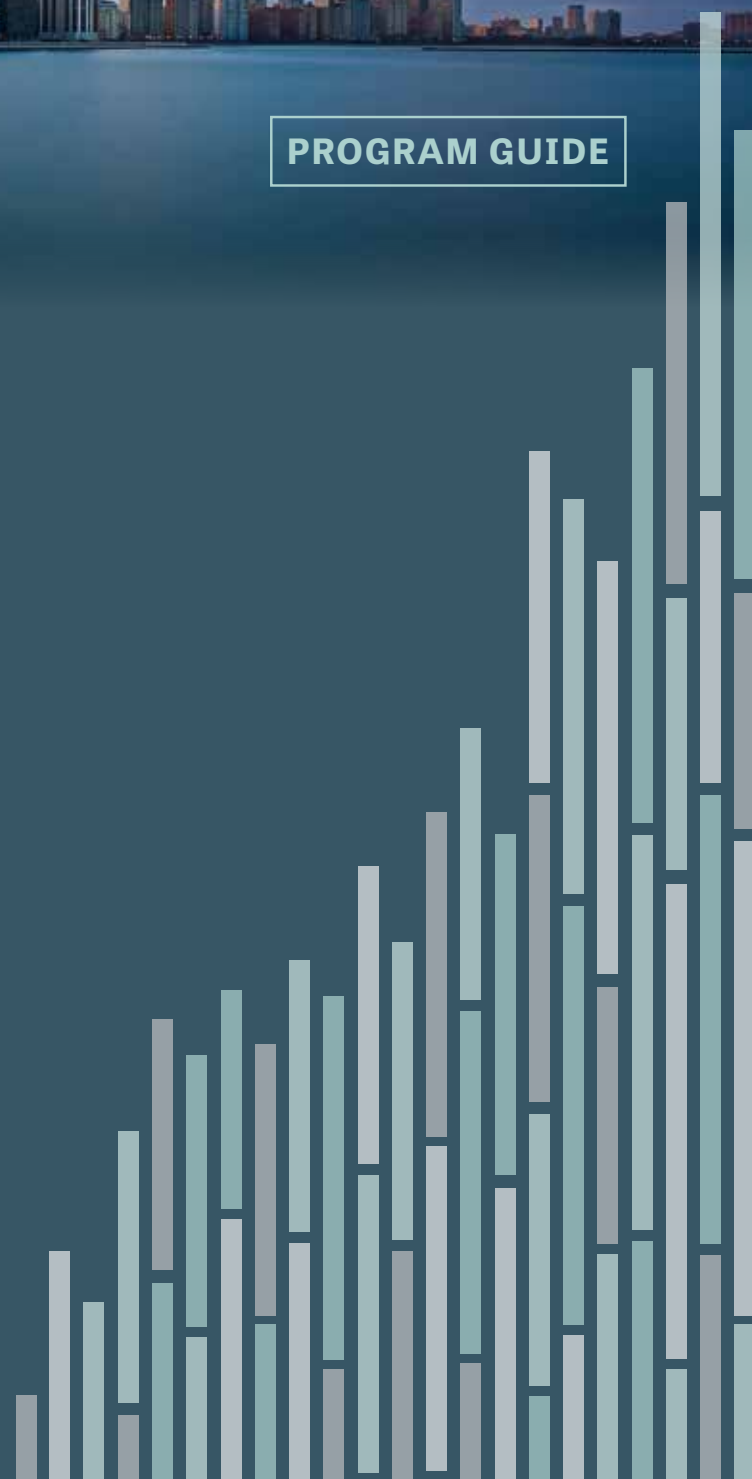


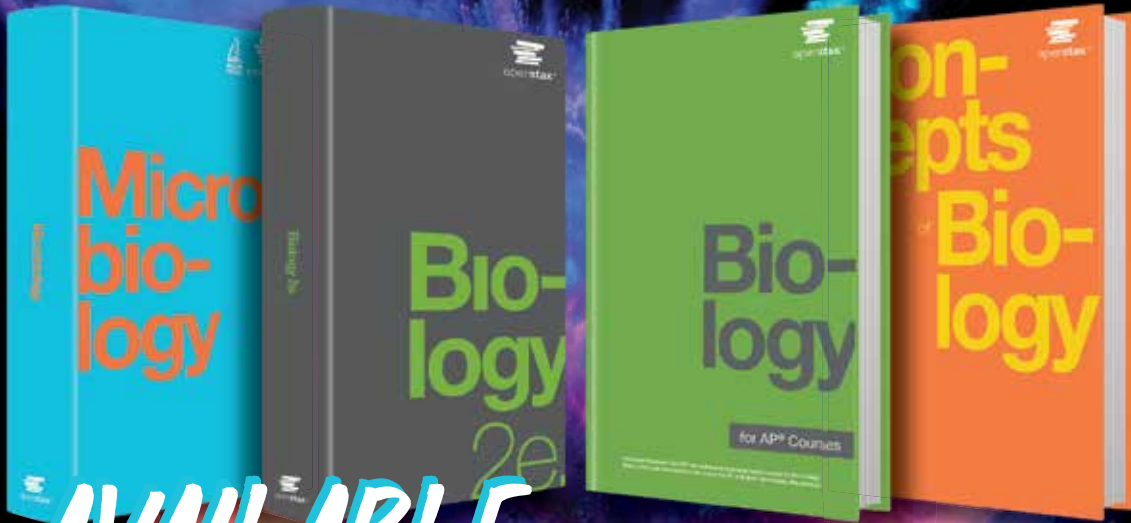
**PROGRAM GUIDE**

# CHICAGO 2019

**NABT PROFESSIONAL  
DEVELOPMENT CONFERENCE  
NOVEMBER 14-17**

SHERATON GRAND CHICAGO  
CHICAGO, ILLINOIS





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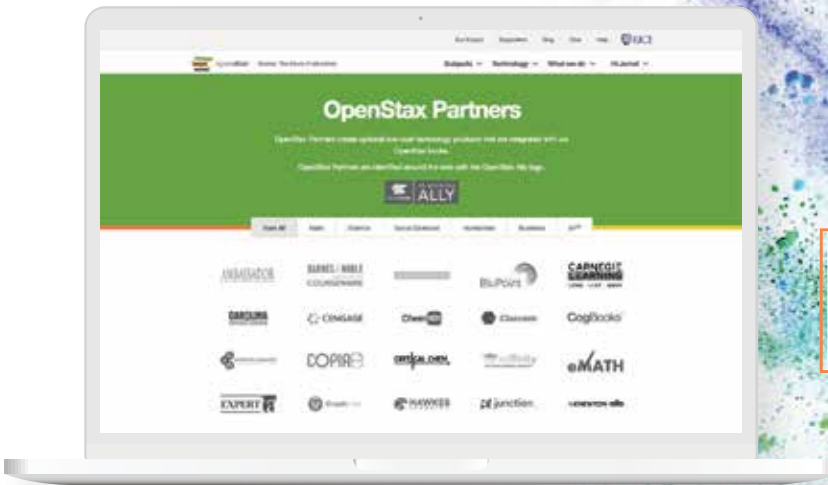
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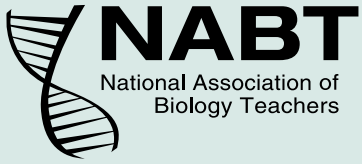
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# SPECIAL THANKS

NABT thanks these organizations for their generous support of activities at the 2019 Professional Development Conference.

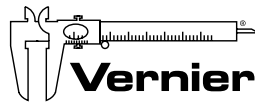
## PROGRAM PARTNER



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# CHICAGO 2019

NABT PROFESSIONAL  
DEVELOPMENT CONFERENCE  
NOVEMBER 14-17  
SHERATON GRAND CHICAGO

Welcome to Chicago for the 2019 NABT Professional Development Conference, which I describe as my lifeblood conference. I attended my first NABT conference in Cincinnati in 2002 and have not missed a conference since. I have come to depend upon NABT for high-quality professional development filled with content, pedagogy, and networking with inspirational, dedicated colleagues.

I encourage you to take full advantage of the multitude of enriching activities during the conference. Here are some of the programs I am looking forward to:

- Everyone has a “first NABT.” If this is yours, be sure to attend a special breakfast on Friday, November 15th. Meet other “first-timers” as well as NABT leaders that can help you make the most of your time in Chicago.
- Don’t miss the General Session and Invited Speakers, who are on the cutting edge of science and life science education.
- Make sure to “Find the President” and enter to win some great prizes from NABT.
- The HHMI Night at the Movies on Friday, November 15th will surely inspire you.
- Help us celebrate the achievements of Dr. Bonnie Bassler on Saturday, November 15th. Learn more about her research, her teaching, and what she wants her own students to learn.

As a member of the NABT Board of Directors, I fully appreciate that conference planning is a year-round process. I would like to thank the Professional Development Committee and our local volunteers for their time and vision in making the conference energetic and invaluable. Our sponsors’ and exhibitors’ generosity make this meeting possible; please visit the Exhibit Hall to thank them personally. Our award sponsors help us celebrate and honor our outstanding colleagues. Many thanks to those NABT members serving on several standing and ad hoc committees, the Board of Directors, Regional Directors, State and Provincial representatives, BioClub Advisors, and our State Affiliates. NABT is a collaborative experience that requires the work of many devoted individuals, all lead by our stalwart Executive Director, Jacki Reeves-Pepin.

While you are here, be sure to share your NABT conference experiences using #NABT2019. If you are a first-timer, know that you have just joined a family of educators who welcomes you! Take advantage of meeting other passionate professionals to help guide you on your teaching journey.

I look forward to meeting and learning from all of you while we are in Chicago. May your teaching soul feel enriched, affirmed, and recharged when you re-enter your classroom on Monday.

Thank you for attending NABT 2019, and I hope to see you in Baltimore next year!



*Sherry L. Annee*

**Sherry L. Annee**  
NABT President  
2019

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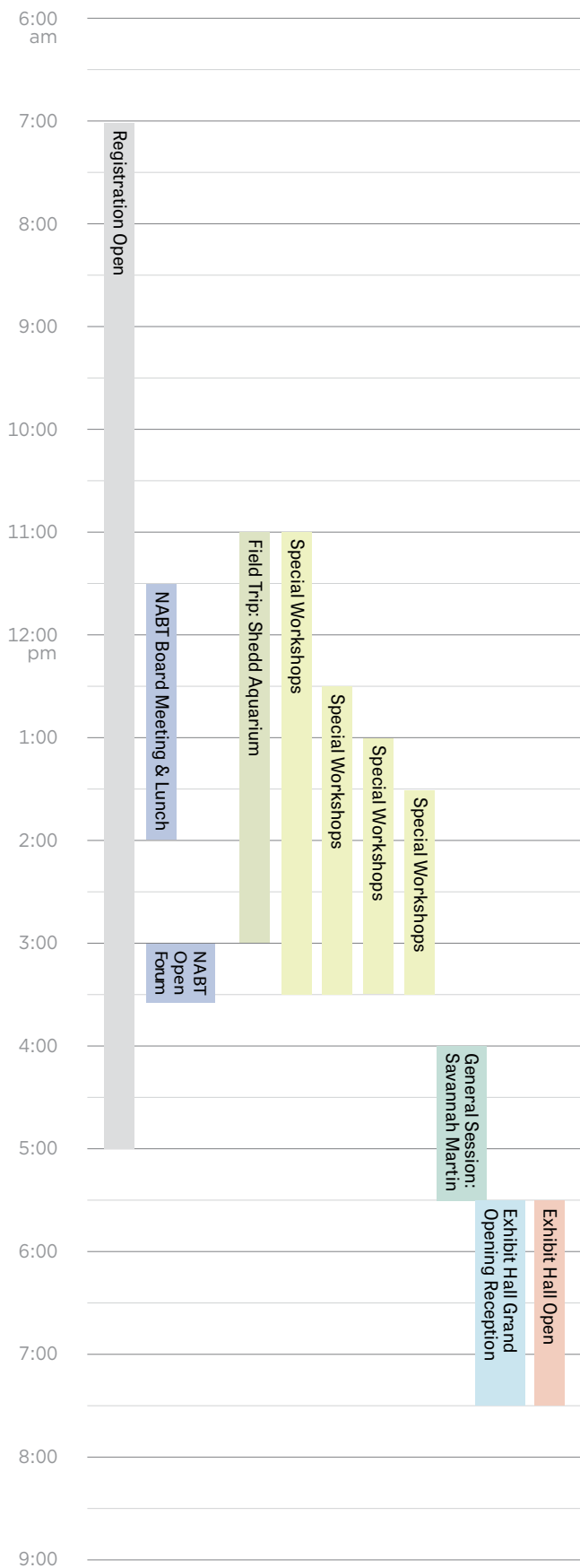
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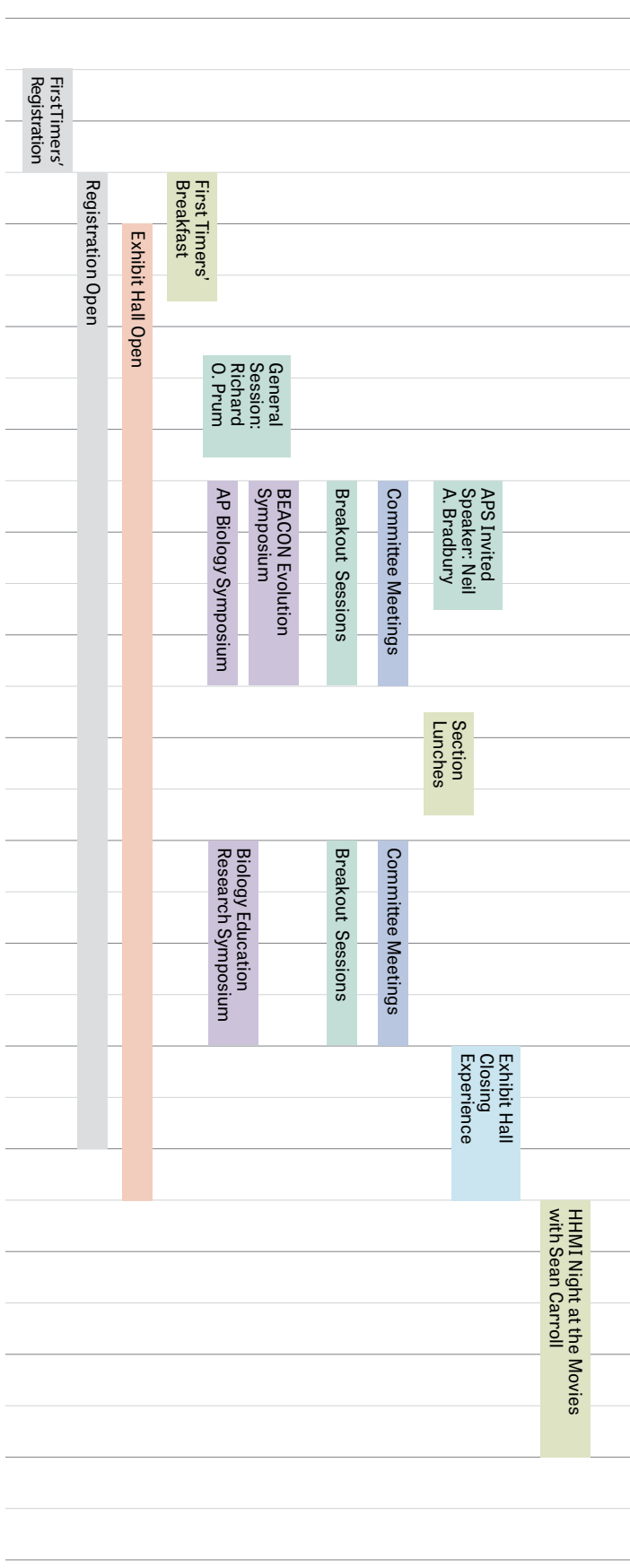
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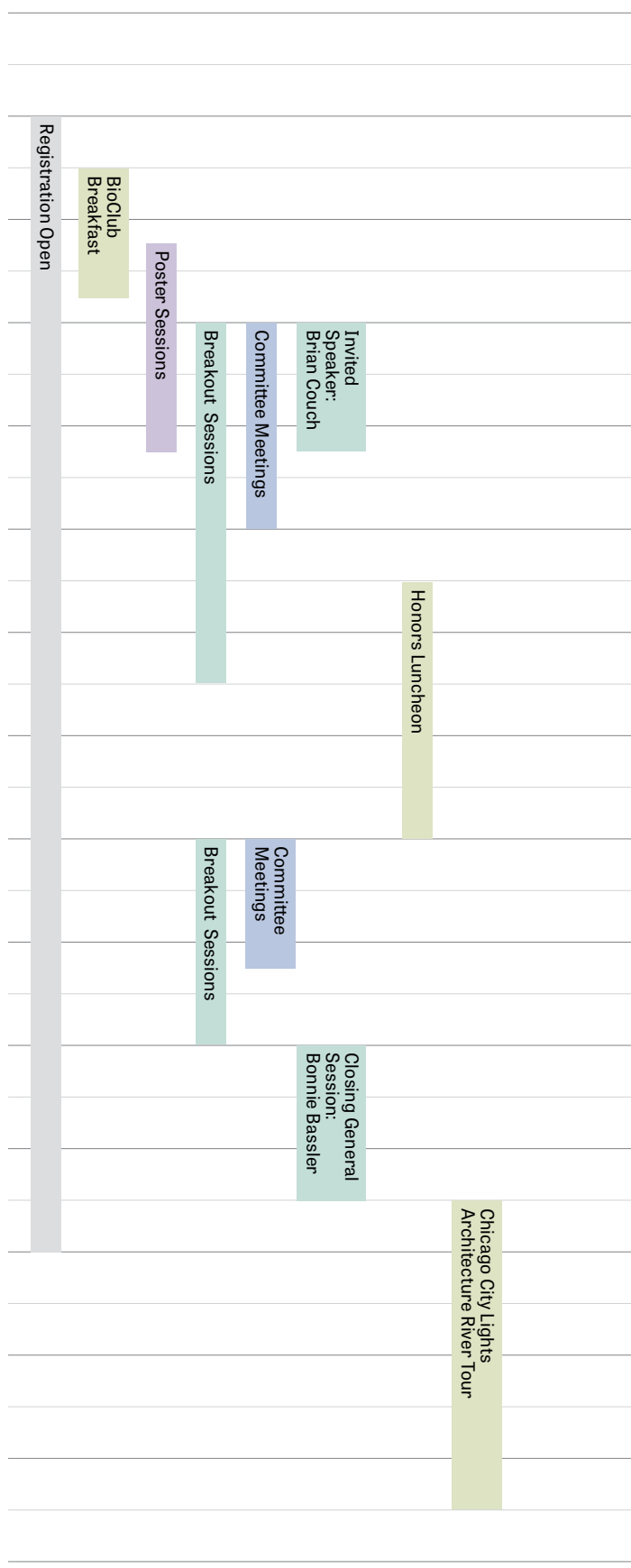
**THURSDAY**



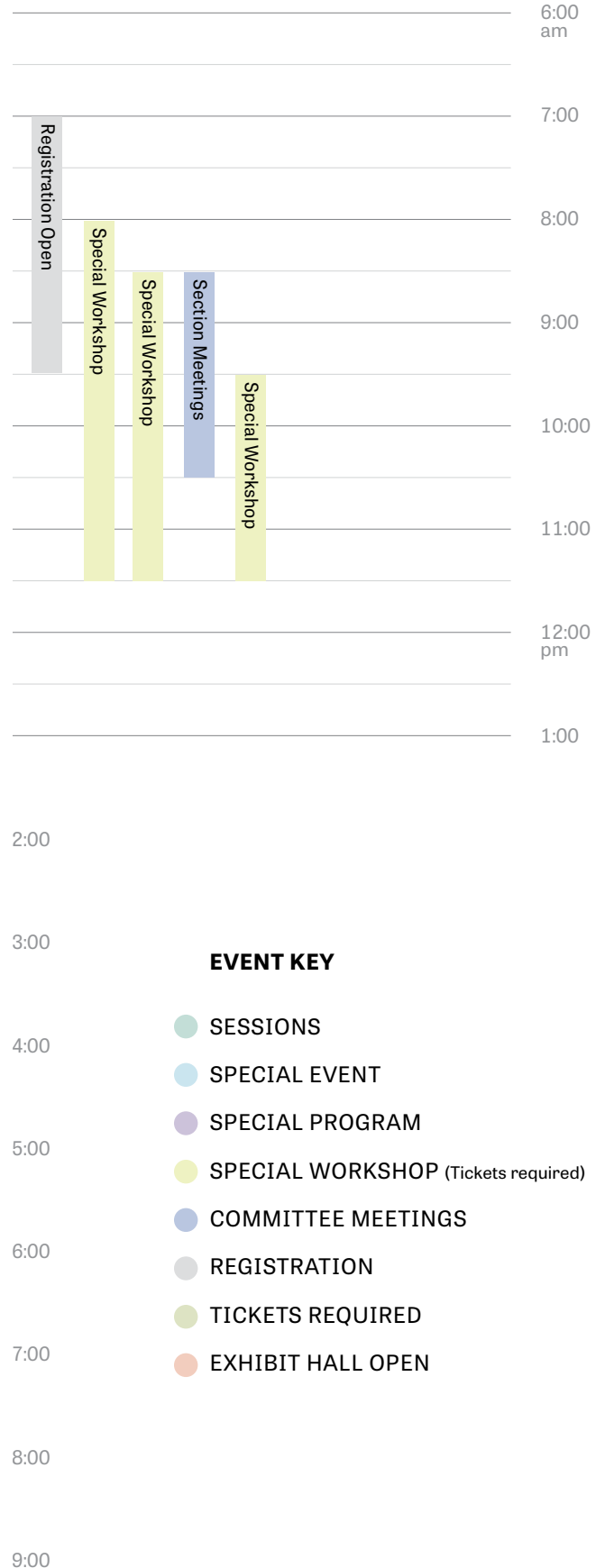
**FRIDAY**



**SATURDAY**



**SUNDAY**



**EVENT KEY**

- SESSIONS
- SPECIAL EVENT
- SPECIAL PROGRAM
- SPECIAL WORKSHOP (Tickets required)
- COMMITTEE MEETINGS
- REGISTRATION
- TICKETS REQUIRED
- EXHIBIT HALL OPEN

# GENERAL CONFERENCE INFO

## ABOUT THE PROFESSIONAL DEVELOPMENT CONFERENCE

All functions, meetings, and exhibits will take place at the Sheraton Grand Chicago 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.

## CERTIFICATE OF ATTENDANCE

See page 83.

## REGISTRATION HOURS

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

### Thursday, November 14

7:00 AM – 5:00 PM

### Friday, November 15

6:30 AM – 7:30 AM

*First Timers' registration*

7:30 AM – 5:00 PM

### Saturday, November 16

7:00 AM – 6:00 PM

### Sunday, November 17

7:00 AM – 9:30 AM

## FUTURE NABT CONFERENCE DATES & SITES

### 2020 Professional Development Conference

November 5–8, 2020  
Baltimore Marriott Waterfront  
Baltimore, MD

### 2021 Professional Development Conference

November 11–14, 2021  
Atlanta Marriott Marquis  
Atlanta, GA



## 2019 NABT CONFERENCE APP

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



Use #NABT2019 to Tweet from Chicago!

## 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](http://www.NABT.org).

## VISITING THE EXHIBIT HALL

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

Registration badges are required for admission to the Exhibit Hall.

**Thursday, November 14** 5:30 PM – 7:30 PM

**Friday, November 15** 8:00 AM – 5:30 PM  
(Closing Experience starts at 4:00 PM)



## WIFI LOG-IN DETAILS

SSID  
**NABT**

Password  
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## TRANSPORTATION FOR FIELD TRIP AND SATURDAY SPECIAL EVENT

The NABT Conference will feature two programs that will be offsite. 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 <https://www.surveymonkey.com/r/2019sessionfeedback>

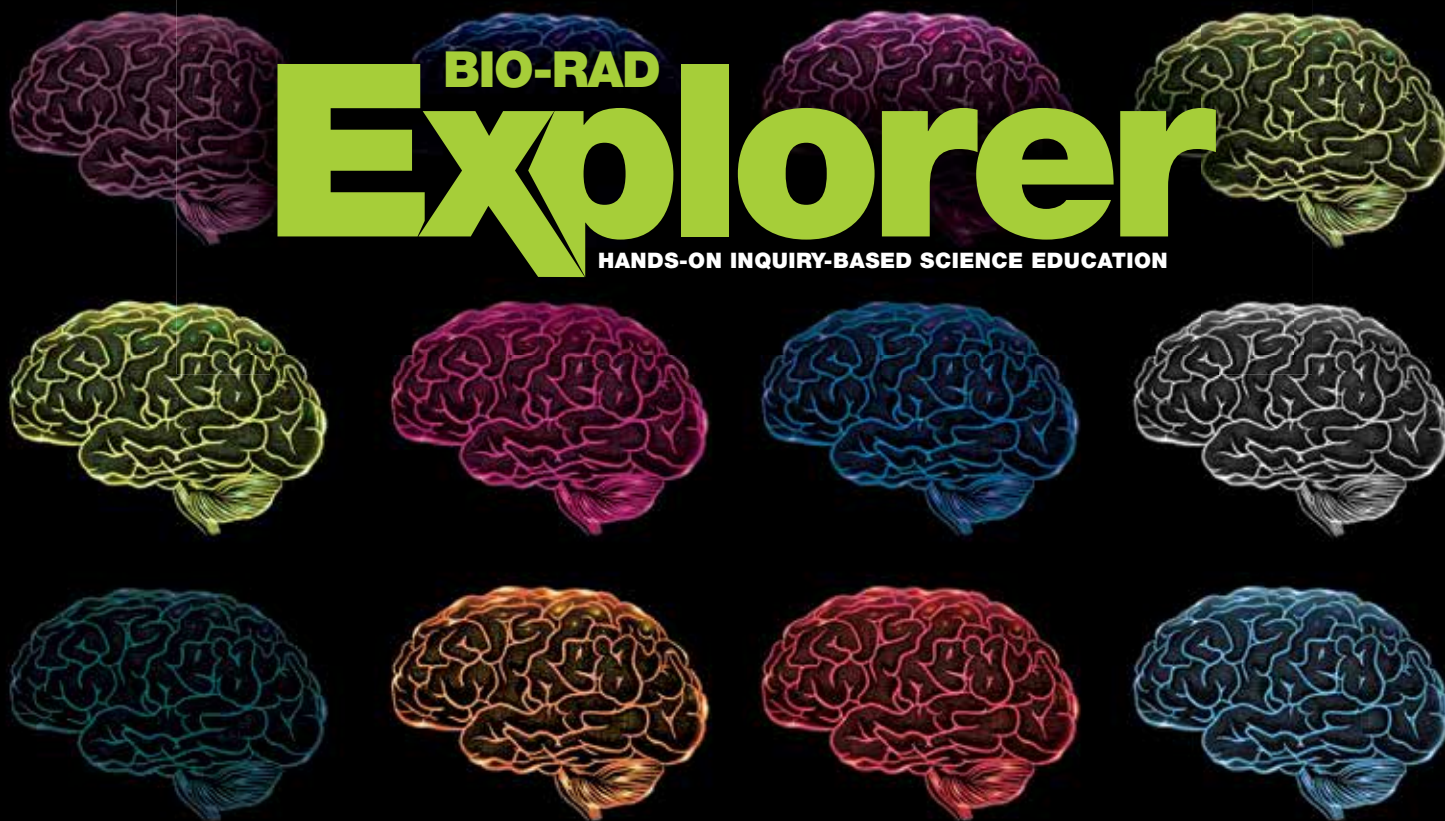


Phone: (888) 501-NABT

E-mail: [office@NABT.org](mailto:office@NABT.org)

Website: [www.NABT.org](http://www.NABT.org)





## NABT Chicago Workshop Schedule & Special Events

Join us at the Sheraton Grand Chicago Hotel at the Colorado room, for our free workshops

**Friday November 15** (all at the Colorado room)

- 8:00–9:00 AM **Are Increased Incidences of Infection the Result of Climate Change?** Why does climate change matter for human health? Discover why rates of harmful infections may become more common as earth's temperature increases.
- 10:30–11:45 AM **The Opioid Epidemic: Decoding the Genetic Associations to Opioid Abuse.** As the opioid crisis surges, researchers race to decode the genetics of opioid dependence. In this hands-on workshop, use fast DNA electrophoresis to evaluate genetic links and explore personalized medicine.
- 12:00–12:30 PM **Ready or Not, It's Coming! Biotechnology, the Science of Our Age. Are Your Students Prepared?** Glowing cats? Designer babies! Empower students to be independent thinkers. Learn from a leader in biotechnology teaching how to build your lab program step-by-step with equipment, supplies, and student credentials.
- 1:00–1:45 PM **Think Like an Engineer in Your Biology Class.** Incorporate NGSS engineering practices in your biology class by challenging students to address world hunger. Students will consider constraints and design an evidence-based treatment plan (solution) for protein-energy malnutrition.
- 2:00–3:15 PM **It's in Their DNA! Teach Personalized Medicine with Students' Own DNA.** Experience a hands-on classroom activity where students work with their own genes and PCR in the context of personalized medicine, the wave of future disease treatment.
- 3:30–4:00 PM **Precision Medicine — a Reality with CRISPR and Revolutionary Droplet Digital PCR (ddPCR) Technology!** ddPCR technology is a precision medicine tool and its sensitivity makes it well-suited to "Liquid Biopsies" to detect rare cancer mutations and when combined with CRISPR technology is revolutionizing medicine.

**Friday November 15 — 12:45–1:45 PM**

Proud sponsor of the **Four-Year College & University Section Luncheon** (tickets required)

### Special Events

**Saturday November 16 (Chicago Ballroom 8) — 11:30 AM–2:00 PM**

Lab Skills: **The Escape Room! Experience an escape room like no other.** Space is limited. Get tickets at the Bio-Rad booth.

**Sunday November 17 (Erie Room) — 8:30–11:30 AM**

Strategies for a **More Inclusive Biology Classroom** presented by iEMBER, NABT and Bio-Rad Laboratories

Visit Us  
at Booth  
#508

Visit us at [bio-rad.com/NABT19](http://bio-rad.com/NABT19)  
Call toll free at 1-800-424-6723.  
Outside the U.S. contact your local sales office.

**BIO-RAD**

Thursday, November 14

**Savannah Martin, M.A.**

**Confederated Tribes of Siletz  
Ph.D. Candidate in Biological Anthropology**

Washington University in St. Louis, St. Louis, MO



Savannah Martin is an enrolled member of the Confederated Tribes of Siletz Indians of Oregon and doctoral candidate in biological anthropology at Washington University in St. Louis. Her doctoral research focuses on health disparities in Native American communities and how cultural identity impacts the relationship between exposure to

psychosocial stressors and the incidence of stress-related diseases. Through her work as an Indigenous anthropologist, Savannah aims to demonstrate the value of integrating Indigenous epistemologies and Western science research, and to improve relationships between anthropological and Indigenous communities. In 2015, she was a participant in the Summer Internship for Indigenous Peoples in Genomics (SING) Workshop at the University of Illinois Urbana-Champaign, where she returned this past summer to serve as faculty.

Savannah has written on the issues of diversity and inclusion in STEM in online blogs such as *Anthrodendum* (formerly *Savage Minds*) and is a co-founder of the multi-modal, anticolonial, and iconoclastic anthropology blog *Footnotes*. She has written, performed, and published poetry on these topics, and her chapter “Bringing Ourselves Back from Extinction in Academia: Becoming an Indigenous Scholar” can be found in the edited volume “The Crisis of Race in Higher Education: A Day of Discovery and Dialogue.”

While one of her proudest scientific accomplishments is learning to knit various double-helix themed accessories for her friends and family, Savannah was also recently awarded a Doctoral Dissertation Research Improvement Grant by the National Science Foundation for her dissertation research project entitled “Cultural Identity as a Moderator of Stress Physiology in an Indigenous Community in the Pacific Northwest.” Savannah is an avid proponent of equity, inclusion, and accessibility in science and academia, and her #scicomm endeavors can be followed on Twitter, @SavvyOlogy.

For session details, see page 25.

Friday, November 15

**SCOTT WILLIAMSON SPEAKER SERIES**

**Richard O. Prum, Ph.D.**

**William Robertson Coe Professor of Ornithology  
Ecology and Evolutionary Biology**

Yale University, New Haven, CT



Richard O. Prum is the William Robertson Coe Professor of Ornithology at Yale University, and the Curator of Ornithology in the Yale Peabody Museum of Natural History. Prum is an evolutionary ornithologist with broad interests in avian biology. A life-long bird-watcher, Prum has researched many topics in bird biology

including avian phylogeny, behavioral evolution, feather development and evolution, structural coloration, sexual selection, and the dinosaur origin of birds. He has conducted fieldwork on birds on all continents and has studied fossil theropods in China. In 2017, he published *The Evolution of Beauty*, which was named one of the Top Ten Books of the Year by the *New York Times* and was a finalist for the 2018 Pulitzer Prize in General Non-Fiction. He has been awarded MacArthur, Guggenheim, and Fulbright Fellowships.

For session details, see page 27.

Saturday, November 16


**NABT  
DISTINGUISHED  
SERVICE AWARD**

## Bonnie L. Bassler, Ph.D.

### Squibb Professor in Molecular Biology Professor and Chair of Molecular Biology

Princeton University, Princeton, NJ

Bonnie Bassler is a Howard Hughes Medical Institute Investigator and the Squibb Professor and Chair of the Department of Molecular Biology at Princeton University. Bassler received a B.S. in Biochemistry from the University of California at Davis, a Ph.D. in Biochemistry from the Johns Hopkins University, and she performed postdoctoral work in Genetics at the Agouron Institute. She joined the Princeton faculty in 1994. The research in her laboratory focuses on the molecular mechanisms that bacteria use for intercellular communication. This process is called quorum sensing. Bassler's research is paving the way to the development of novel therapies for combating bacteria by disrupting quorum-sensing-mediated communication. Bassler previously directed the Molecular Biology Graduate Program and chaired Princeton University's Council on Science and Technology, tasked with rejuvenating the STEM curriculum for non-STEM concentrators. Bassler served as President of the American Society for Microbiology and Chair of the American Academy of Microbiology Board of Governors.

Bassler has received many prizes including a MacArthur Foundation Fellowship, Eli Lilly Investigator Award, Wiley Prize in Biomedical Science, National Academies' Richard Lounsbery Award, UNESCO-L'Oreal Woman in Science Award for North America, Shaw Prize in Life Sciences and Medicine, the Peal Meister Greengard Prize, and the Dickson Prize in Medicine. She was also awarded Princeton's President's Award for Distinguished Teaching. She has been elected to the American Academy of Microbiology, American Association for the Advancement of Science, National Academy of Sciences, National Academy of Medicine, American Academy of Arts and Sciences, Royal Society, American Philosophical Society, and EMBO. She was a member of the National Science Board for six years and was nominated to that position by President Barack Obama. The Board oversees the NSF and prioritizes the nation's research and educational activities in science, math, and engineering.

[For session details, see page 61.](#)

Friday, November 15

APS SPONSORED  
SPEAKER SERIES



**Neil A. Bradbury, Ph.D.**

**Professor of Physiology and Biophysics**

Rosalind Franklin University,  
Chicago Medical School, North Chicago, IL



Neil Bradbury is Professor of Physiology and Biophysics at the Chicago Medical School, and President of the Master Teacher Guild. Neil earned a B.Sc. with honors from St. Andrews University in Scotland, and a Ph.D. in Medical Biochemistry from the Welsh National School of Medicine, in Cardiff, Wales. As a graduate

student, Bradbury started his interest in Cystic Fibrosis, an interest which is still carries on today in his research. He has made fundamental discoveries in Cystic Fibrosis, particularly in the intracellular movement of ion channels, receiving funding from the Cystic Fibrosis Foundation and the NIH.

Bradbury has published numerous research papers, reviews and book chapters on Cystic Fibrosis. He is a passionate educator, having taught physiology at small liberal arts undergraduate institutions, dental and optometry students, graduate students and large medical school classes. Bradbury has received numerous teaching awards from students, including *Most Engaging Lecturer*, and the *Rosalind Franklin Excellence in Teaching* award. He is especially excited about the upcoming release of his first book, *A Taste for Poison: Eleven molecules of death and the killers that used them*, to be published by St. Martin's Press.

For session details, see page 28.

Saturday, November 16

2019 NABT FOUR-YEAR SECTION  
RESEARCH IN BIOLOGY EDUCATION AWARD

**Brian A. Couch, Ph.D.**

**Assistant Professor**

School of Biological Sciences  
University of Nebraska – Lincoln, Lincoln, NE



Brian Couch earned a bachelor's degree in biology from Regis University and a doctorate in molecular biophysics and biochemistry from Yale University before transitioning to education research as a postdoc at the University of Colorado Boulder. He is currently on the faculty in the School of Biological Sciences at the University of Nebraska-

ka-Lincoln, where he teaches introductory molecular biology and conducts biology education research.

Working with collaborators, Couch's research group has generated tools and knowledge to help departments across the country monitor and improve their undergraduate biology programs. The group has generated instruments, administration strategies, and question formats to assess conceptual understanding. They have characterized student engagement with formative assessments and promoted the use of student feedback to optimize course activities. The research group has also developed an instrument to document teaching practices and determine how students, instructors, and observers differ in how they gauge course practices.

For session details, see page 45.

## NABT BOARD OF DIRECTORS

President **Sherry Annee**  
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 Secretary/Treasurer **Steven Christenson**  
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**Camden Hanzlick-Burton**  
 Region X (Canadian Provinces & Territories) **Vacant**

## SECTION CHAIRS

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 NABT BioClub **Chris Monsour**  
 Four-Year College & University Section **Kathy Gallucci**  
 Two-Year College Biology Section **Tara Holmberg**

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

## 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**)

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

## FULL MEETING SCHEDULE (All meetings on Level 3)

Awards Committee	Fri.	10:30 AM – 11:45 AM	Edgewater
ABT Advisory Committee	Fri.	10:30 AM – 11:45 AM	Bridgeport
Social Media Committee	Fri.	12:00 PM – 12:30 PM	Edgewater
Retired Member Committee	Fri.	12:00 PM – 12:30 PM	Bridgeport
OBTA Directors & Regional Coordinators	Fri.	2:00 PM – 3:15 PM	Edgewater
Nominating Committee	Fri.	2:00 PM – 3:15 PM	Bridgeport
Pre-Service Teacher Committee	Fri.	3:30 PM – 4:00 PM	Edgewater
Archival Committee	Fri.	3:30 PM – 4:00 PM	Bridgeport
Conference Committee	Sat.	9:00 AM – 10:15 AM	Edgewater
Member Resources Committee	Sat.	9:00 AM – 10:15 AM	Bridgeport
Professional Development Committee	Sat.	10:30 AM – 11:00 AM	Edgewater
AP Section Meeting	Sat.	2:00 PM – 3:15 PM	Edgewater
Citizen Science & Informal Education Committee	Sat.	3:30 PM – 4:00 PM	Edgewater

## BIOCLUB STUDENT AWARDS

### Malar Muthukumar

The Independent School, Wichita, KS

### Evelyn Crowley

Vincennes University, Vincennes, IN

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 being eligible each year.

Sponsored by Carolina Biological Supply Company

## BIOLOGY EDUCATOR LEADERSHIP SCHOLARSHIP (BELS)

Not awarded in 2019

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

### Bonnie Bassler

Princeton University, Princeton, NJ

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

Sponsored by the National Association of Biology Teachers

## ECOLOGY/ENVIRONMENTAL SCIENCE TEACHING AWARD

### Christine Brothers

Falmouth High School, Falmouth, MA

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

Sponsored by Vernier Software and Technology

## EVOLUTION EDUCATION AWARD

### John Mead

St. Mark's School of Texas, Dallas, TX

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

Sponsored by BEACON and BSCS

## FOUR-YEAR COLLEGE & UNIVERSITY SECTION BIOLOGY TEACHING AWARD

### Peter White

Michigan State University, East Lansing, MI

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

### Brian Couch

University of Nebraska, Lincoln, NE

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

### Don Pinkerton

Revere High School, Revere, MA

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

Sponsored by ASHG and GSA

## HONORARY MEMBERSHIP

### Dennis Gathmann

Lake Land College (retired), Mattoon, IL

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

### Yekaterina (Kate) Cilluffo

J.P. Stevens High School, Edison, NJ

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 & Private Donations

## THE KIM FOGLIA AP® BIOLOGY SERVICE AWARD

### Kelly Riedell

Brookings High School, Brookings, SD

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 2019 Honorees

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

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

## OUTSTANDING NEW BIOLOGY TEACHER ACHIEVEMENT AWARD

### Tina Vega

Proviso East High School, Maywood, IL

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

### Wendy Kuntz

Kapi'olani Community College, Honolulu, HI

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

### Tatiana Tatum Parker

Saint Xavier University, Chicago, IL

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

Sponsored by Bio-Rad Laboratories

## TWO-YEAR COLLEGE BIOLOGY TEACHING AWARD

### Tami Imbierowicz

Harford Community College, Bel Air, MD

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:



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

### THANK YOU TO OUR OBTA DIRECTORS

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



## OBTA HONOREES 2019

### Region I

**Amanda Dillingham**  
East Boston High School  
East Boston, MA

**Cara Bak**  
Manchester Central High School  
Manchester, NH

### Region II

**Charles Alt**  
Princeton Day School  
Princeton, NJ

**Michael Szczepanik**  
Hilton High School  
Hilton, NY

**Diane MacWilliams**  
McDowell Intermediate High School  
Erie, PA

**Elizabeth Romano**  
The Governor's School @ Innovation Park  
Manassas, VA

### Region III

**Lauren Baldacci**  
Manteno High School  
Manteno, IL

**Jason Cox**  
Scottsburg High School  
Scottsburg, IN

**Mark Eberhard**  
St. Clair High School  
St. Clair, MI

**Ashlie Gowitzka**  
Perkins High School  
Sandusky, OH

**Tom Kammer**  
LaCrosse Logan High School  
LaCrosse, WI

### Region IV

**Michael Skopec**  
North Tama High School  
Traer, IA

**Daniel Smalley**  
Blue Valley North High School  
Overland Park, KS

**Gretchen Pendley**  
Poplar Bluff High School  
Poplar Bluff, MO

**Christin Frahm Krick**  
Burke High School  
Omaha, NE

**Cherrie Martenson**  
Douglas High School  
Box Elder, SD

### Region V

**Cari Kaylor**  
Northwood High School  
Pittsboro, NC

**Lauren Brown**  
Spring Hill High School  
Chapin, SC

**Chikezie Madu**  
White Station High School  
Memphis, TN

**William Dorsey**  
Capital High School  
Charleston, WV

### Region VI

**Meredith Barkley**  
Oxford High School  
Oxford, AL

**Christina Spears**  
North Oconee High School  
Bogart, GA

**Blake Touchet**  
North Vermilion High School  
Maurice, LA

**Margaret Smith-Black**  
Cleveland Central High School  
Cleveland, MS

### Region VII

**Renee Ashlock**  
Arizona School for the Arts  
Phoenix, AZ

**Linda Stocker**  
Fayetteville High School  
Fayetteville, AR

**Stephanie Mitchell**  
Los Alamos High School  
Los Alamos, NM

**Keri Shingleton**  
Holland Hall School  
Tulsa, OK

**Lisa O'Brien**  
Hebron High School  
Carrollton, TX

### Region VIII

**Katie Capp**  
Belgrade High School  
Belgrade, MT

### Region IX

**Sehel Nazeeha Bawaney**  
Sonora High School  
La Habra, CA

**Mickey Laney-Jarvis**  
Grants Pass High School  
Grants Pass, OR

## PAST PRESIDENTS & CONFERENCE LOCATIONS

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

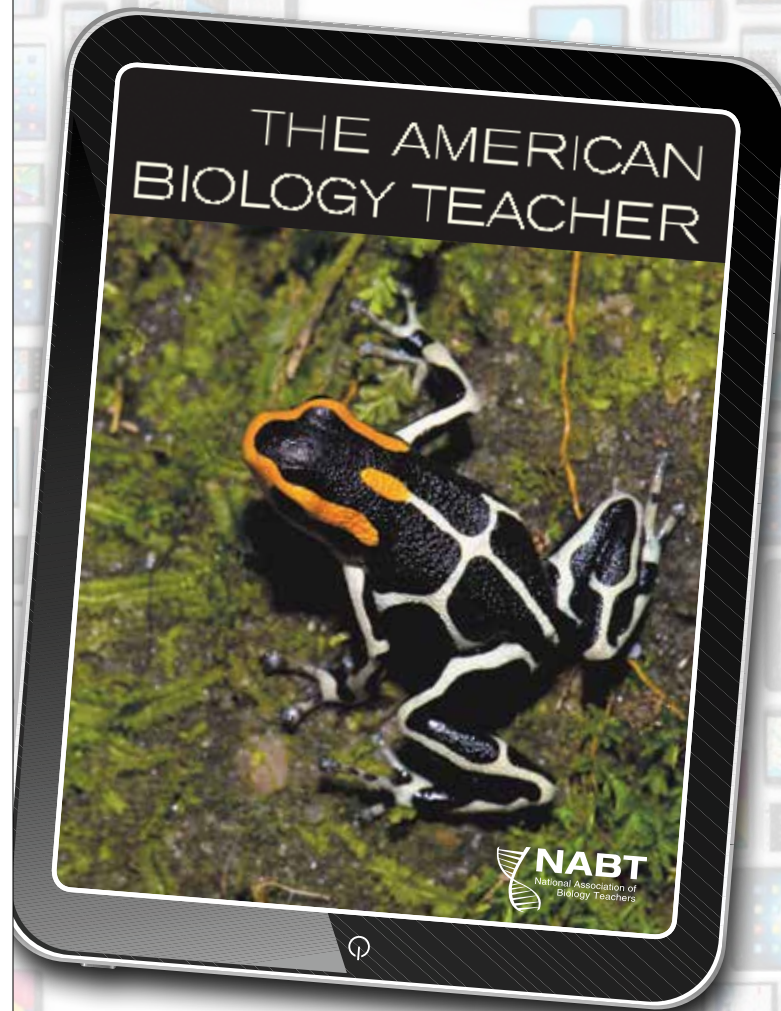
## HONORARY MEMBERS

- 2019** — Dennis Gathmann  
**2018** — Michael Sipes  
**2017** — John M. Moore  
**2016** — Margaret (Betsy) Ott  
**2015** — Sharon Radford  
**2014** — Jay Labov  
**2013** — Todd Carter  
**2012** — Maura Flannery  
**2011** — Louisa Stark  
**2010** — Patricia Waller, Brad Williamson  
**2009** — NOT AWARDED  
**2008** — Donald Cronkite  
**2007** — William H. Leonard  
**2006** — Terry Hufford  
**2005** — Randy Moore, Eugenie Scott  
**2004** — John Penick  
**2003** — Donald Emmeluth  
**2002** — Leonard Blessing  
**2001** — Gordon E. Uno  
**2000** — Elizabeth Carvellas  
**1999** — NOT AWARDED  
**1998** — Ivo Lindauer  
**1997** — Sam Rhine  
**1996** — Kenneth S. House  
**1995** — Joseph D. Novak  
**1994** — Nancy V. Ridenour, Alton L. Biggs  
**1993** — George S. Zahrobsky  
**1992** — Jon R. Hendrix  
**1991** — Robert E. Yager  
**1990** — Jane Butler Kahle  
**1989** — Joseph D. McInerney  
**1988** — Thomas Mertens, Marjorie King  
**1987** — Floyd Nordland  
**1986** — Donald S. Dean  
**1985** — Stanley Weinberg  
**1984** — Jack Carter, Samuel Postlethwait  
**1983** — Manert Kennedy  
**1982** — Harold "Sandy" Wiper, Jerry P. Lightner  
**1981** — Sophie Wolfe  
**1980** — Sister M. Gabrielle, Ted F. Andrews, Sister Marian Catherine McGrann  
**1979** — Ingrith Olsen  
**1978** — John A. Moore  
**1977** — Addison E. Lee  
**1976** — Paul DeHart Hurd  
**1975** — Garrett Hardin, Stanley E. Williamson  
**1974** — H. Seymour Fowler  
**1973** — William V. Mayer  
**1972** — Chester A. Lawson, Paul E. Klinge, Robert L. Gantert  
**1971** — NOT AWARDED  
**1970** — NOT AWARDED  
**1969** — Arnold B. Grobman  
**1968** — NOT AWARDED  
**1967** — NOT AWARDED  
**1966** — NOT AWARDED  
**1965** — John Breukelman, H. Bentley Glass, George W. Beadle, Paul B. Sears, Brother H. Charles Severin  
**1964** — E. Laurence Palmer, Hermann J. Muller, Roger Tory Peterson, Oscar Riddle, Helen Irene Battle



## NABT DISTINGUISHED SERVICE AWARD RECIPIENTS

- 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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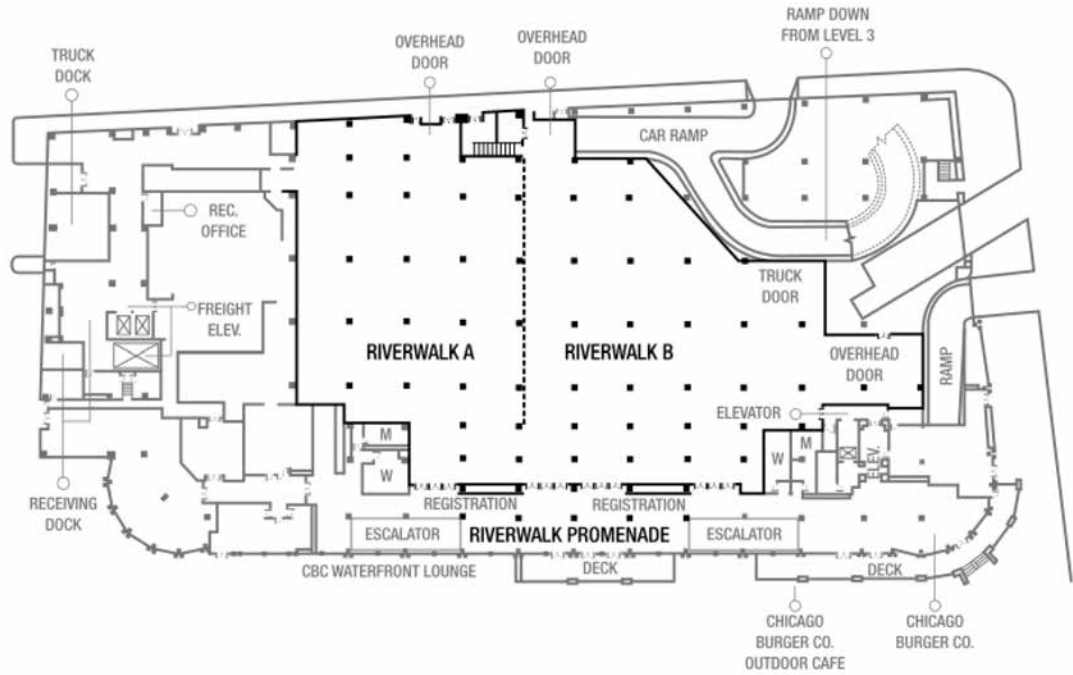
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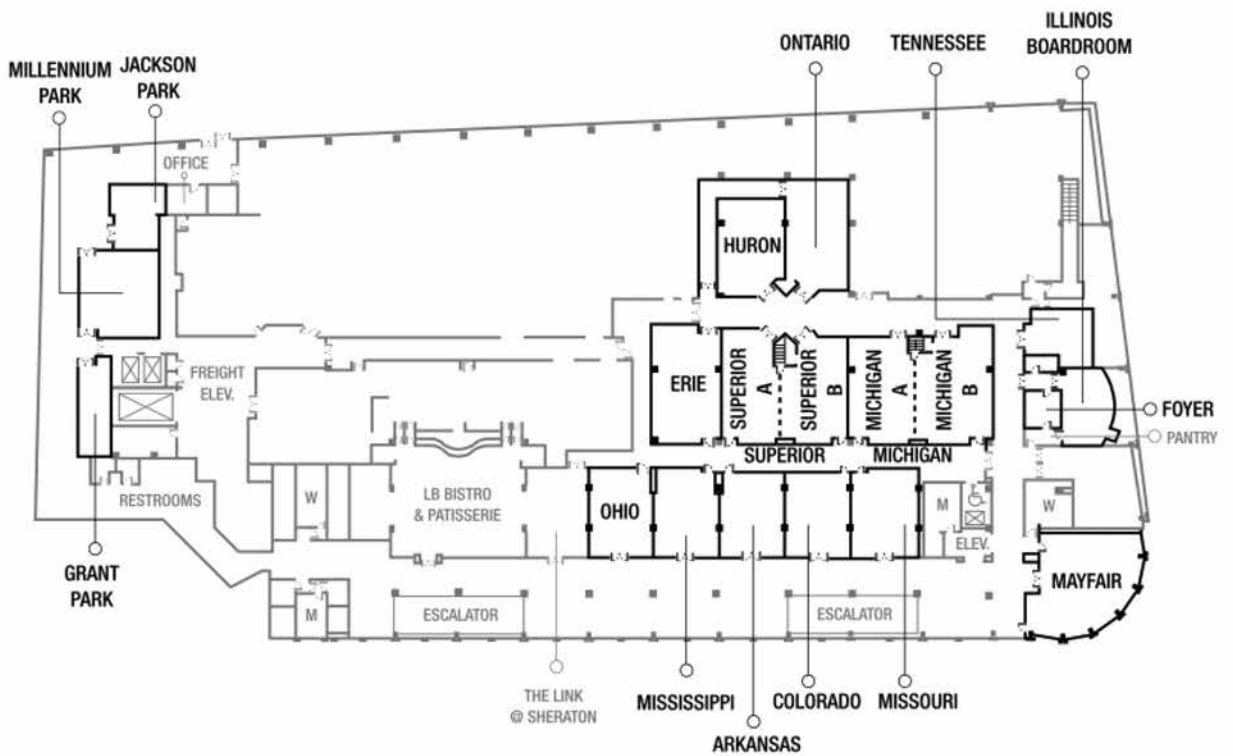


# CONVENTION MAPS

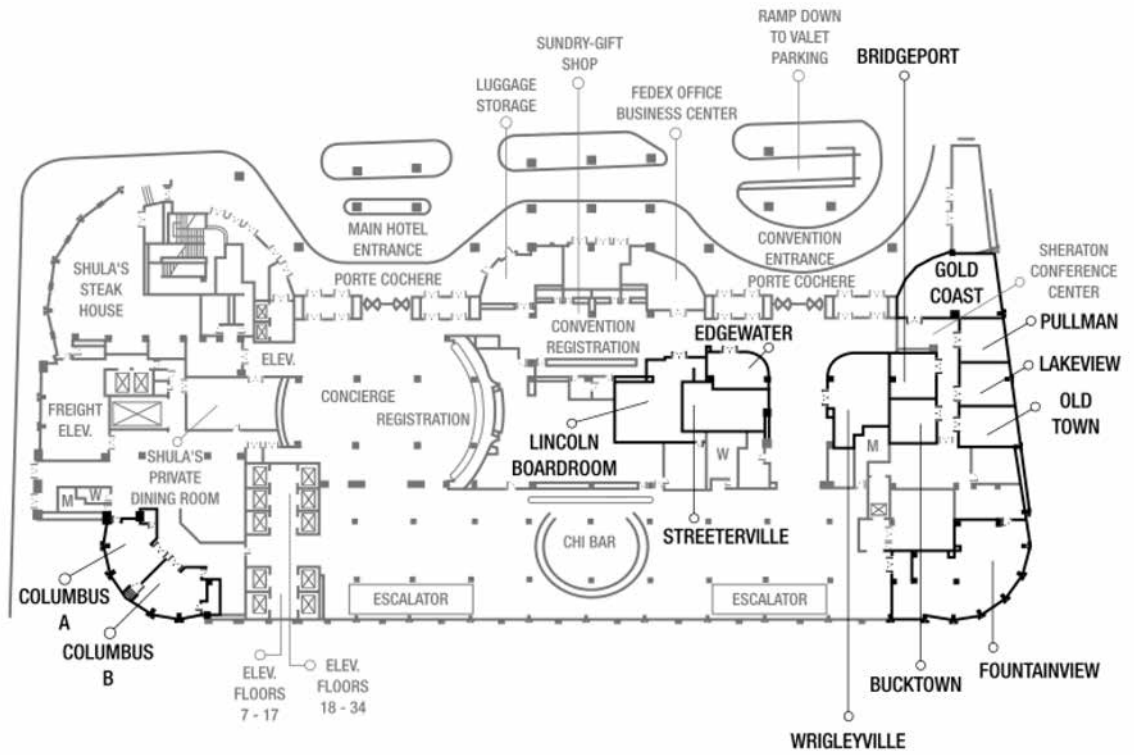
## LEVEL 1



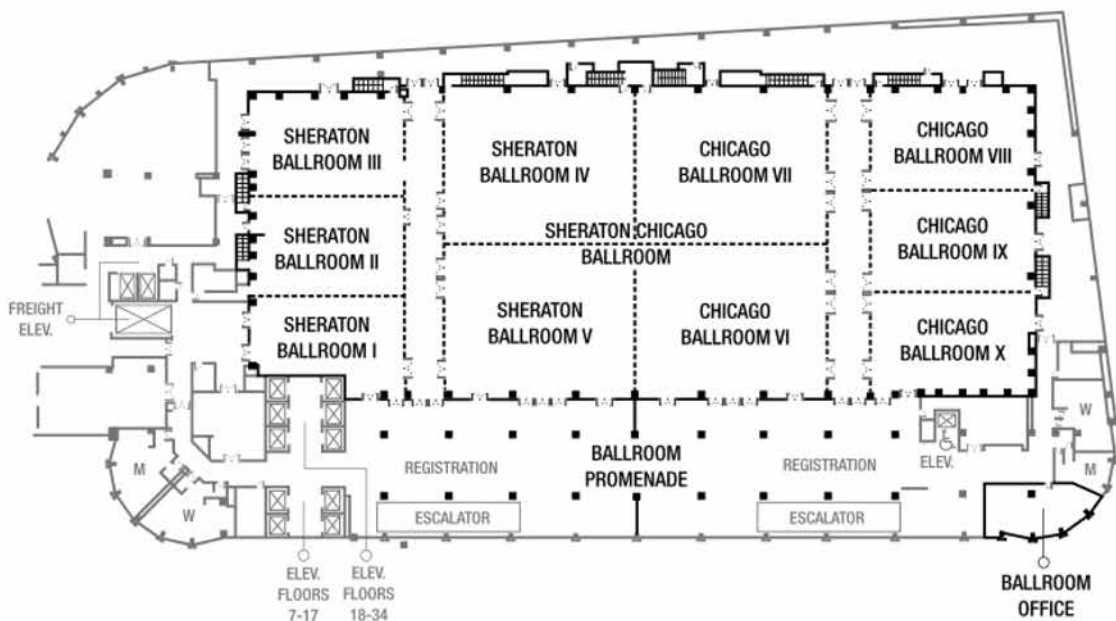
## LEVEL 2



LEVEL 3



LEVEL 4



## SPECIAL WORKSHOPS

Thursday, November 14

**20 in 20: The Next Generation**1:00 PM – 3:30 PM  
FREE (Tickets Required)

Try numerous 20-minute inquiry based activities that are sure to engage and excite your students. You and your students will be glad you did!

**AMTA Presents: Energy in Biology**12:30 PM – 3:30 PM  
FREE (Tickets Required)

Energy? Respiration? Conceptual models? Modeling instruction? Why is modeling great for helping students become critical thinkers? How does modeling work in Biology? Join us to learn more!

**AP Biology Course Deep Dive into the Changes, 2019**1:00 PM – 3:30 PM  
FREE (Tickets Required)

New and experienced teachers will have the opportunity to gain understanding for use of the CED. Time permitting, teachers will collaborate on working with the CED in the first months.

**Designing Courses to Integrate Student-centered Learning: A Constructivist Workshop**12:30 PM – 3:30 PM  
FREE (Tickets Required)

Come explore a high-rigor toolkit of non-lecture instructional strategies for high school and college courses to reimagine your biology instruction based on national standards and authentic science practices.

**Developing Resources for Teaching Evolutionary Medicine: Understanding Teachers' Needs**1:30 PM – 3:30 PM  
FREE (Tickets Required)

The International Society for Evolution, Medicine, and Public Health is developing resources for teaching about evolutionary medicine. This workshop will summarize evolutionary medicine and seek your input about needed resources.

**Evolution of Data in Biology Education: From Data to Data Science**12:30 PM – 3:30 PM  
Advance: \$25 / Onsite: \$35

Explore resources for teaching data science practices, and join a community discussion on the role of data science in biology education and its relationship to the current curriculum.

**Practice & Learn - Laboratory Techniques in 10 minutes from Carolina!**12:30 PM – 3:30 PM  
FREE (Tickets Required)

Join us for 10 minutes (or more)! Go through a hands-on speed demonstration of popular classroom techniques and learning tips to help you. Take away techniques, classroom resources, and promos.

**NABT Intro Bio Task Force: Advancing the Intro Bio Experience**1:30 PM – 3:30 PM  
FREE (Tickets Required)

Attendees will help develop a more unified vision for the introductory biology courses that focuses on the improving science practice skills in introductory biology—regardless of content focus (e.g. majors vs. non-majors)—for ALL students.

**Storylining in Biology for Coherent Instruction**12:30 PM – 3:30 PM  
FREE (Tickets Required)

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 this workshop.

**Using and Creating BioInteractive Video Case Studies**12:30 PM – 3:30 PM  
FREE (Tickets Required)

HHMI BioInteractive features video case studies that encourage students to think scientifically (formulate hypotheses, construct explanations). Come and learn how to use, customize, or create your own video case study.

**Using Guided Inquiry to Teach Anatomy and Physiology Core Concepts**12:30 PM – 3:30 PM  
FREE (Tickets Required)

Participants will explore inquiry-based activities addressing A & P core concepts. In these activities, students use scientific process skills to develop their understanding of principles such as homeostasis and communication.

**Writing Assessments that are Relevant, Engaging, and Evaluate Outcomes**11:00 AM – 3:30 PM  
FREE (Tickets Required)

Participants will focus on writing measurable learning objectives and learn how to create a “fair” test by populating it with multiple-choice items at several cognitive levels that are assessing outcomes equitably. Lunch will be provided.



## SPECIAL WORKSHOPS

Sunday, November 17

### Debrief, Coaching, and Networking around Student-centered Active Learning

9:30 AM – 11:30 AM  
FREE (Tickets Required)

Join college professors and high school teachers to debrief learning from the conference, share plans for the future, and begin building a community of practice around constructivist, non-lecture instructional strategies.

### Strategies for a More Inclusive Biology Classroom

8:30 AM – 11:30 AM  
FREE (Tickets Required)

Interested in learning how to create a more inclusive learning environment in your classroom or how to study inclusion in biology education? Hosted by the iEMBER network with support from

**BIO-RAD**

### Writing Assessments that are Relevant, Engaging, and Evaluate Outcomes

8:00 AM – 11:30 AM  
FREE (Tickets Required)

Participants will focus on writing measurable learning objectives and learn how to create a “fair” test by populating it with multiple-choice items at several cognitive levels that are assessing outcomes equitably.



## MEAL FUNCTIONS

Friday, November 15

### First Timers' Breakfast

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

First time attendees are invited to learn more about the NABT Professional Development Conference during breakfast with NABT leaders. This event is made possible through the generous support of



## MEAL FUNCTIONS

Friday, November 15 (continued)

### AP Biology Section Luncheon

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

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



### Four-Year College & University Section Luncheon

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

Join faculty, education researchers, graduate students, and others to learn more about the programs, initiatives, and opportunities available from the section. This meeting included a special presentation of the Four-Year College & University Section Awards. Sponsored by

**BIO-RAD**

### Two-Year College Section Luncheon

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

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

Saturday, November 16

### BioClub Breakfast

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

It's time to join the (Bio)Club! The NABT BioClub continues to grow, and both current and future BioClub Advisors are invited to share favorite resources and stories about their chapters. Sponsored by



## FIELD TRIP

Thursday, November 14

### The Science of Shedd Aquarium

11:00 AM – 3:00 PM  
~~Advance: \$50 / Onsite: \$60~~ **SOLD OUT**

Shedd Aquarium has been a Chicago institution since 1930, but it is more than a destination. It is a premier research facility! Dive in to learn more about Shedd Aquarium during this special trip highlighting the science behind the scenes.

## SPECIAL EVENTS

Friday, November 15

### HHMI Night at the Movies with Sean Carroll

5:30 PM – 8:00 PM  
FREE

Please note: Tickets for the *HHMI Night at the Movies with Sean Carroll* will be available onsite with registration materials.



Saturday, November 16

### NABT Honors Luncheon

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

Join us as we recognize the 2019 NABT Award recipients. This celebration honors exceptional biology teachers from all levels, and everyone is welcome to help us applaud these remarkable individuals.

### Chicago City Lights Architecture River Tour

5:30 PM – 8:30 PM  
Advance: \$40 / Onsite: \$50

Experience Chicago's legendary architecture on a special evening cruise (operated by Wendella). This tour is Chicago's Original Architecture Tour®, focusing on Chicago's rich architectural heritage and history. Tickets include food, drinks, and a tour through the heart of the city with a professional architecture guide.

NABT

BioClub



MEMBERS

Alan C. Pope High School, Marietta, GA  
American International School of Muscat,  
North Chesterfield, VA  
Arcadia High School, Phoenix, AZ  
Archbishop Curley High School, Baltimore, MD  
Athens High School, Troy, MI  
Auburn High School, Rockford, IL  
Ayala High School, Chino Hills, CA  
The Barstow School, Kansas City, MO  
Bethlehem High School, Bardstown, KY  
Bishop Garcia Diego High School, Santa Barbara, CA  
Bladen Community College, Dublin, NC  
Brentwood Academy, Brentwood, TN  
Broad River Elementary, Beaufort, SC  
Broomfield High School, Broomfield, CO  
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  
Center for Advanced Professional Studies,  
Overland Park, KS  
Central Carolina Technical College, Sumter, SC  
Central Falls High School, Central Falls, RI  
Central Magnet School, Murfreesboro, TN  
Chester High School, Chester, PA  
Clayton High School, Clayton, MO  
Colonia High School, Colonia, NJ  
Darnell-Cookman School of the Medical Arts,  
Jacksonville, FL  
Dora R-III School, Dora, MO  
Dougherty Valley High School, San Ramon, CA  
Eastern Mennonite High School, Harrisonburg, VA  
El Centro College, Dallas, TX  
Emmett High School, Emmett, ID  
Fairhaven High School, Fairhaven, MA

Florida SouthWestern State College, Naples, FL  
Frankford High School, Philadelphia, PA  
Freedom High School, Freedom, WI  
George Mason High School, Falls Church, VA  
George Washington High, Charleston, WV  
Gillette College, Gillette, WY  
Grafton High School, Grafton, WI  
Grand View University, De Moines, IA  
Greater New Bedford Regional Vocational  
Technical High School, New Bedford, MA  
Greensburg Salem High School, Greensburg, PA  
Harmony School in Innovation, Katy, TX  
Heathwood Hall Episcopal School, Columbia, SC  
Hilltop High School, Chula Vista, CA  
Incarnate Word Academy, Houston, TX  
The Independent School, Wichita, KS  
Iowa City West High, Iowa City, IA  
Kenmore West High School, Buffalo, NY  
Kent County High School, Wornton, MD  
Kettle Run High School, Nokesville, VA  
Lake Metroparks, Concord, OH  
Lakeville North High School, Lakeville, MN  
Lexington High School, Mansfield, OH  
Lincoln High School, Esko, MN  
Los Fresnos High School, Los Fresnos, TX  
Martin Luther College, New Ulm, MN  
Mary Persons High School, Forsyth, GA  
Marysville High School, Marysville, KS  
Metropolitan Community College, Omaha, NE  
Midland Park High School, Midland Park, NJ  
Minnetonka High School, Minnetonka, MN  
Moscow High School, Moscow, ID  
Mount Abraham Union High School, Bristol, VT  
Mount Saint Mary Academy, Watchung, NJ  
Nassau Community College, Garden City, NY

Palm Tree School, Fairfax, VA  
Panorama High School, Panora, IA  
Perkins High School, Sandusky, OH  
Pike High School Freshman Center,  
Indianapolis, IN  
Pikeview High School, Princeton, WV  
Putnam City High School, Oklahoma City, OK  
Riverside City College, Riverside, CA  
Ronald Reagan College Prep School, Milwaukee, WI  
Sacred Heart Greenwich, Greenwich, CT  
Salem High School, Salem, IN  
Saltsburg High School, Saltsburg, PA  
Seabury Hall, Makawao, HI  
Seneca East High School, Attica, OH  
Sherando High School, Winchester, VA  
Skyline High School, Sammamish, WA  
Snow College, Ephraim, UT  
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  
The Summit County Day School, Cincinnati, OH  
Sunlake High School, Land O'Lakes, FL  
Tiffin Columbian High School, Tiffin, OH  
Unionville High School, Kennett Square, PA  
University Christian High School, Hickory, NC  
Valley View High School, Archbald, PA  
Vincennes University, Vincennes, IN  
Visitation Academy - Saint Louis, St. Louis, MO  
West Mifflin Area High School, West Mifflin, PA  
Western Sierra Collegiate Academy, Rocklin, CA  
Whiting High School, Laramie, WY  
Windsor High School, Windsor, CO  
Worthington Christian High School, Worthington, OH  
York Community High School, Marion, IL

*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](mailto:office@nabt.org).

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NABT PRESIDENT-ELECT

# Sharon Gusky

IS ONE **lucky** PERSON.



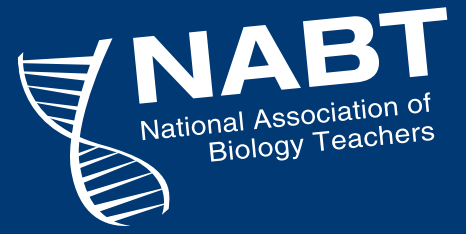
**WINNER**



**Sharon has won some great prizes by entering contests! Now it's your turn!**

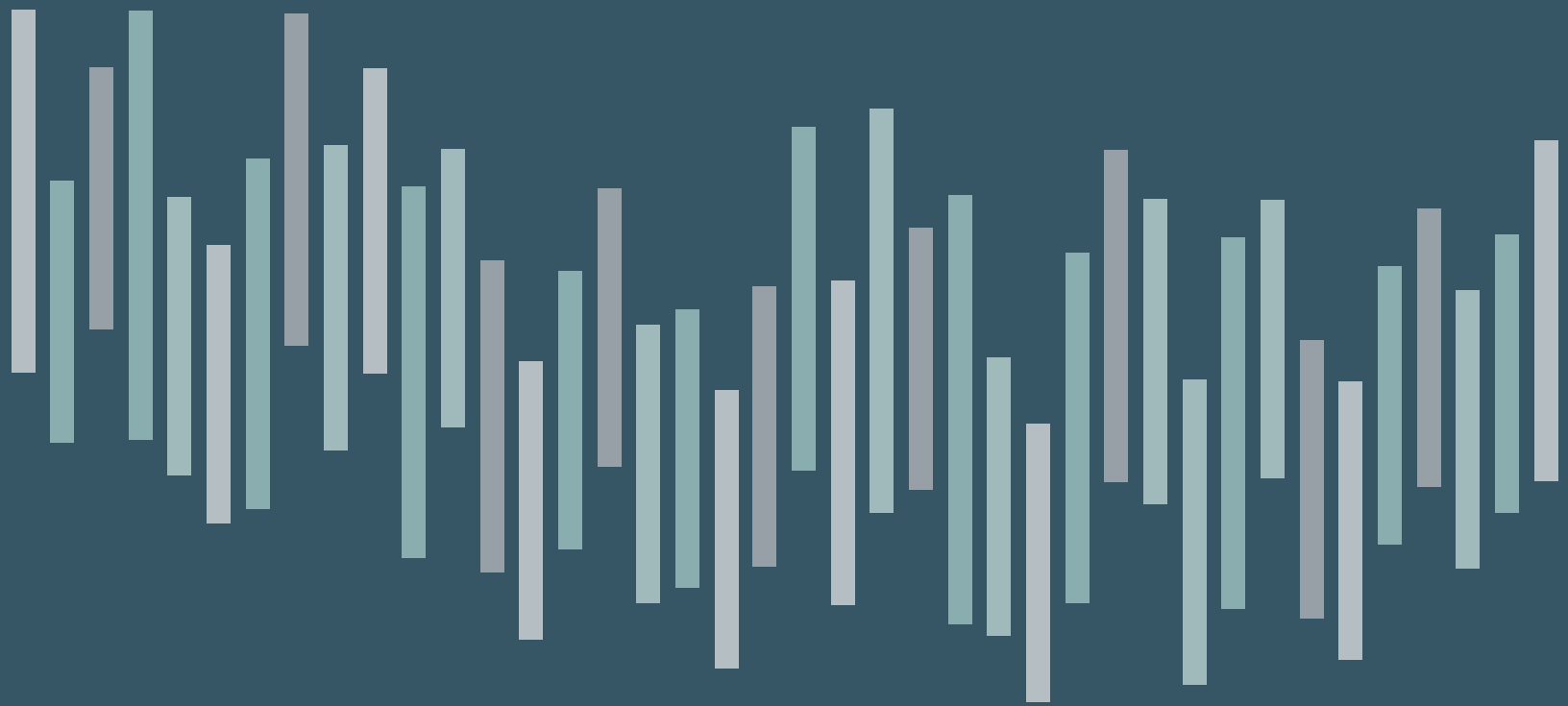
Find Sharon in Chicago and you could be the winner of some great prizes from NABT. The drawing will be on **Friday, November 15th** in the Exhibit Hall!

## CHICAGO 2019



# THURSDAY

NOV 14



#### ABBREVIATION KEY

**E:** Elementary School

**2Y:** Two-Year College

**MS:** Middle School

**4Y:** Four-Year College

**HS:** High School

**GA:** General Audience

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11:00 AM – 3:00 PM

**The Science of Shedd Aquarium Meeting in Lobby for Bus** • Field Trip (SOLD OUT) • GA

Shedd Aquarium has been a Chicago institution since 1930, but it is more than a destination. It is a premier research facility! Dive in to learn more about Shedd Aquarium during this special trip highlighting the science behind the scenes.

11:00 AM – 3:30 PM

**2672 Writing Assessments that are Relevant, Engaging, and Evaluate Outcomes**

**Chicago Ballroom IX** LEVEL 4 • General Biology • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Participants will focus on writing measurable learning objectives, and learn how to create a “fair” test by populating it with multiple-choice items at several cognitive levels that are assessing outcomes equitably.

Peggy Brickman, University of Georgia, Athens, GA; Rebecca Orr, Collin College Plano, TX; Melissa Csikari, HHMI, Chevy Chase, MD



11:30 AM – 2:00 PM

**NABT Board of Directors Meeting & Leaders Lunch**

**Columbus A&B** LEVEL 3 • Invitation Only • Special Program • GA

12:30 PM – 3:30 PM

**2668 Using and Creating BioInteractive Video Case Studies**

**Chicago Ballroom X** LEVEL 4 • Curriculum Development • Special Workshop (Tickets Required) • HS, 2Y, 4Y

HHMI BioInteractive features video case studies that encourage students to think scientifically (formulate hypotheses, construct explanations). Come and learn how to use, customize, or create your own video case study.

Phil Gibson, University of Oklahoma, Norman, OK; Annie Prud'homme-Genereux, Capilano University, North Vancouver, BC, Canada; Laura Bonetta, HHMI Chevy Chase, MD



**2552 Designing Courses to Integrate Student-centered Learning: A Constructivist Workshop for College and High School Instructors**

**Michigan A** LEVEL 2 • Instructional Strategies • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Come explore a high-rigor toolkit of non-lecture instructional strategies for high school and college courses to reimagine your biology instruction based on national standards and authentic science practices.

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

**2621 Evolution of Data in Biology Education: From Data to Data Science**

**Mississippi** LEVEL 2 • General Biology • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Come explore resources for teaching data science practices, and join a community discussion on the role of data science in biology education and its relationship to the current curriculum.

Kristin Jenkins, BioQUEST, Boyds, MD; Stacey Kiser, Lane Community College, Eugene, OR; Vedham Karpakakunjaram, Montgomery College, Rockville, MD; Brad Williamson, University of Kansas (retired), Lawrence, KS

**2583 American Modeling Teacher Association (AMTA) Presents: Energy in Biology**

**Missouri** LEVEL 2 • General Biology • Special Workshop (Tickets Required) • HS

Energy? Respiration? Conceptual models? Modeling instruction? Why is modeling great for helping students become critical thinkers? How does modeling work in Biology? Join us to learn more!

Tanea Hibler, Brophy College Preparatory, Phoenix, AZ; Clarissa Furlong, South-Western City School District, Grove City, OH; Renee Ashlock, Arizona School for the Arts, Phoenix, AZ

**2441 Using Guided Inquiry to Teach Anatomy and Physiology Core Concepts**

**Ohio** LEVEL 2 • Anatomy & Physiology • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Participants will explore inquiry-based activities addressing anatomy and physiology core concepts. In these activities, students use scientific process skills to develop their understanding of principles such as homeostasis and communication.

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

12:30 PM – 3:30 PM continued

**2517 Storylining in Biology for Coherent Instruction**

**Superior A LEVEL 2** • General Biology • Special Workshop (Tickets Required) • MS, HS, GA

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 this workshop.

Jason Crean, Lyons Township High School and Saint Xavier University, Western Springs, IL; Michele Koehler, Riverside-Brookfield High School, Brookfield, IL; Kristin Rademaker and Kathy Van Hoeck, All Species Education Consulting, Woodridge, IL

1:00 PM - 3:30 PM

**2490 20 in 20: The Next Generation**

**Erie LEVEL 2** • General Biology • Special Workshop (Tickets Required) • MS, HS, GA

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

Whitney Hagins, MassBioEd/BioTeach, Cambridge, MA

**2661 AP Biology Course Deep Dive into the Changes, 2019**

**Michigan B LEVEL 2** • AP Biology • Special Workshop (Tickets Required) • HS

New and experienced teachers will have the opportunity to gain understanding for use of the CED. Time permitting, teachers will collaborate on working with the CED in the first months.

Catherine Walsh, The College Board, New York, NY

1:30 PM – 3:30 PM continued

**2660 Practice & Learn – Laboratory Techniques in 10 Minutes!**

**Superior B LEVEL 2** • Science Practices • Special Workshop (Tickets Required) • HS, 2Y, GA

Join us for 10 minutes (or more)! Go through a hands-on speed demonstration of popular classroom techniques, learning tips to help you. Take away techniques, classroom resources, and promos.

Crystal Risko, Dhani Biscocho, and Scott Eddleman, Carolina Biological Supply Company, Burlington, NC



**2446 Developing Resources for Teaching Evolutionary Medicine: Understanding Teachers' Needs**

**Arkansas LEVEL 2** • Evolution • Special Workshop (Tickets Required) • HS, 2Y, GA

The International Society for Evolution, Medicine, and Public Health (ISEMP) is developing resources for teaching about evolutionary medicine. This workshop will summarize evolutionary medicine and seek your input about needed resources.

Jay Labov, International Society for Evolution, Medicine, and Public Health, Vienna, VA; Barbara Natterson-Horowitz, University of California Los Angeles and Harvard University, Los Angeles, CA; Robert Perlman, University of Chicago, Chicago, IL

**2656 NABT Intro Bio Task Force: Advancing the Intro Bio Experience**

**Colorado LEVEL 2** • Instructional Strategies • Special Workshop (Tickets Required) • GA

Attendees will help develop a more unified vision for the introductory biology courses that focuses on the improving science practice skills in introductory biology – regardless of content focus (e.g. majors vs. non-majors) – for ALL students.

Anna Hiatt, University of Nebraska-Lincoln and Chair of the NABT Introductory Biology Task Force, Lincoln, NE

2:30 PM – 3:30 PM

**Graduate Student Workshop: Poster Presentation Practice Session**

**Gold Coast LEVEL 3** • Invitation Only • Special Program • GA

Graduate and undergraduate students invited! Come meet fellow biology students and receive feedback on presentation skills for the poster competition this Saturday! Refreshments are provided! Information about a special social event for graduate and undergraduate students will also be shared.

Coordinated by the NABT Student Committee

3:00 PM – 3:30 PM

**NABT Open Forum**

**Mayfair LEVEL 2** • Committee Meeting • GA

The volunteer leaders and executive director of NABT will lead this interactive discussion highlighting the “state of the association.” Learn more about the projects and programs that support you as a biology educator and share your ideas as well. Everyone is welcome to get more involved with NABT.

Jaclyn Reeves-Pepin, NABT, Colorado Springs, CO

**NABT/BSCS AP & Academy Meet Up**

**Sheraton Ballroom I LEVEL 4** • Invitation Only • Special Program • GA

Participants of the NABT/BSCS Teacher Academies are invited to “meet up” and network with other academy leaders and attendees to enjoy a light snack before opening session.

Sponsored by



4:00 PM – 5:30 PM

**GENERAL SESSION SPEAKER**

**Savannah Martin**

See page 8 for biography.

**Says Who? Disrupting the Feedback Loops of Authority and Legitimacy in Scientific Knowledge Production and Science Education**

**Chicago Ballroom VI & VII LEVEL 4** • Special Speaker • GA

Historically, most STEM fields have been unwelcoming to scientists from under-represented communities and they can continue to be unwelcoming to marginalized scholars today. This is largely due to the unaddressed colonial roots of western science and the failure to acknowledge how these foundations result in Eurocentric biases that value western epistemologies above all others.

The Summer Internship for Indigenous Peoples in Genomics (SING) is a week-long program aimed at disrupting the historic underrepresentation of Indigenous scientists and Indigenous ways of knowing in science research. Biological anthropologist and Siletz Tribal member Savannah Martin will discuss her experiences as both a participant and faculty member of SING, how her research has been shaped by exposure to and affirmation of Indigenous epistemologies, and how these experiences have resulted in a more ethical, engaged approach to research and science communication. Additionally, Savannah will provide examples of steps individuals can take to disrupt Eurocentric narratives and hierarchies presently dominating scientific knowledge production and science education, to realize a more inclusive and intellectually robust field for current and future scholars.

5:30 PM – 7:30 PM

**Exhibit Hall Grand Opening Reception**

**Riverwalk A & B LEVEL 2** • Special Event • GA

Welcome to the “windy city” with a special reception in the 2019 NABT Exhibit Hall. Our vendor and partner community will showcase the latest and greatest resources for teaching biology, helping you find those familiar favorites and new innovations.

6:30 PM – 7:30 PM

**NABT Past President's Advisory Council Meeting & Reception**

**President's Suite** • Invitation Only

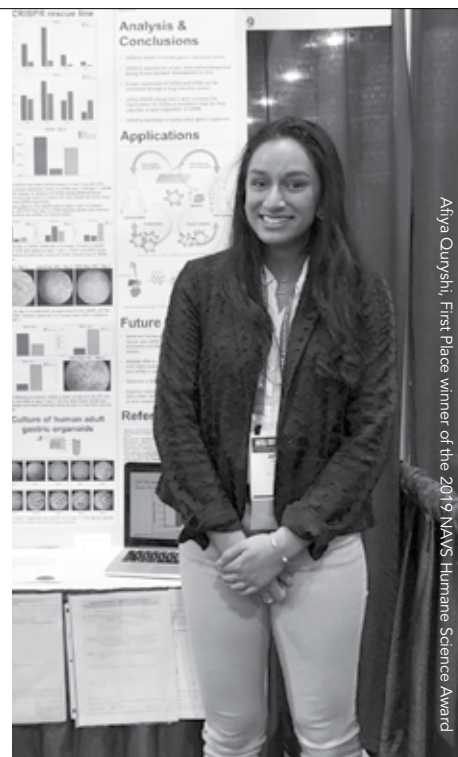
**ARE SCIENCE FAIRS IN YOUR STUDENTS' FUTURE?**

Science fairs allow students to transform classroom knowledge into real-world results. At the National Anti-Vivisection Society, we're excited to see students using their talents to advance science in innovative, humane ways.

Each year at the International Science and Engineering Fair (ISEF), the world's largest pre-college science competition, NAVS presents its Humane Science Award to exceptional students who develop or use non-animal research methodologies for their projects.

When your students take part in local science fairs, encourage them to select projects that advance humane science—maybe they'll be the next recipients of NAVS' Humane Science Award.

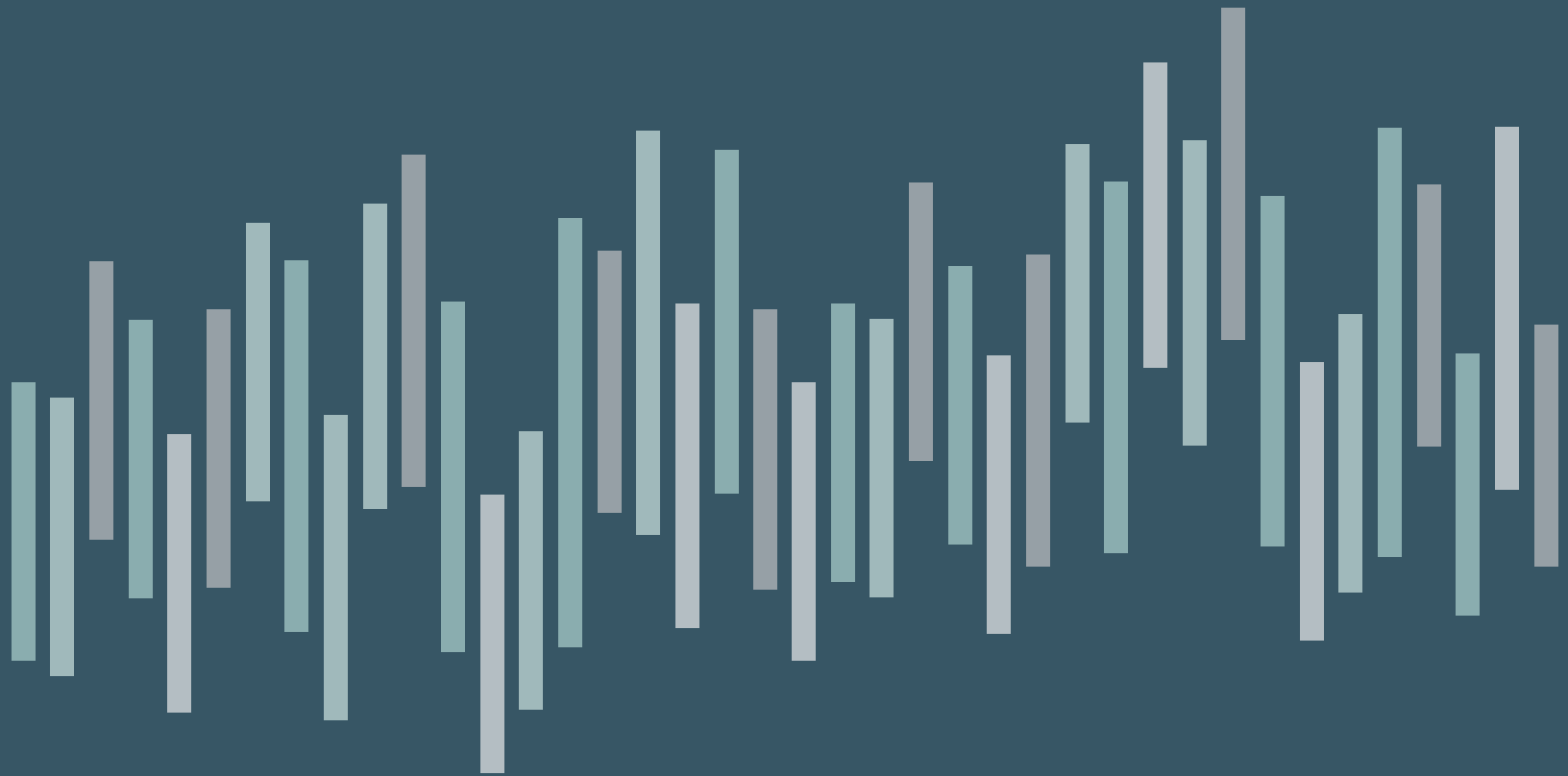
**Cash prizes totaling \$17,500 will be awarded.**  
Learn more at [www.NAVS.org/ISEF](http://www.NAVS.org/ISEF).



**National Anti-Vivisection Society** / 53 W. Jackson Blvd., Suite 1552 / Chicago, IL 60604 / [navs.org](http://navs.org)

# FRIDAY

NOV 15



## ABBREVIATION KEY

- |                             |                              |
|-----------------------------|------------------------------|
| <b>E:</b> Elementary School | <b>2Y:</b> Two-Year College  |
| <b>MS:</b> Middle School    | <b>4Y:</b> Four-Year College |
| <b>HS:</b> High School      | <b>GA:</b> General Audience  |

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7:30 AM – 8:45 AM

**First-Timers' Breakfast**

**Sheraton Ballroom IV & V** **LEVEL 4** • Meal Function (Tickets Required) • GA

First time attendees are invited to learn more about NABT and the 2019 Professional Development Conference during breakfast with NABT leaders. Each table will have an “NABT Mentor” to answer your questions and help you make the most of your time in Chicago.

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



8:00 AM – 9:00 AM

**SPECIAL PROGRAMMING PRESENTED BY**

**Bio-Rad Laboratories**

**2687 Are Increased Incidences of Infection the Result of Climate Change?**

**Colorado** **LEVEL 2** • Ecology / Environmental Science / Sustainability • Demonstration (60 min) • HS, 2Y, 4Y

Why does climate change matter for human health? Discover why rates of harmful infections may become more common as Earth's temperature increases.

Cassandra Granieri, Bio-Rad Laboratories, Hercules, CA

8:30 AM – 9:00 AM

**SPECIAL PROGRAMMING PRESENTED BY**  
**miniPCR**

**2710 Lab in a Box: A Free Biotechnology Loaner Program from Genes in Space**

**Missouri** **LEVEL 2** • Biotechnology • Hands-on Workshop (30 min) • MS, HS

Learn about the free biotechnology loan program that brings hands-on DNA science into middle and high school classrooms across the USA.

Katy Martin, Mary Clark, and Zeke Alvarez Saavedra, miniPCR, Cambridge, MA

9:15 AM – 10:15 AM

**GENERAL SESSION SPEAKER: SCOTT WILLIAMSON SPEAKER SERIES**

**Richard O. Prum**

See page 8 for biography.

**The Evolution of Beauty: Darwin's Really Dangerous Idea**

**Chicago Ballroom VI & VII** **LEVEL 4** • Special Speaker • GA

After *The Origin of Species*, Charles Darwin published *The Descent of Man and Selection in Relation to Sex* in which he proposed the theory of sexual selection. To Darwin, the process included mating competition within one sex, and mate choice between sexes. Critically, Darwin viewed mate choice as a “taste for the beautiful” that was a distinct evolutionary mechanism from natural selection. Following Alfred Russel Wallace, the concept of sexual selection has been redefined as a variety of natural selection. This talk will revitalize the Darwinian view that mate choice is an aesthetic evolutionary process that results in traits that function through the subjective evaluations of other individuals. Recognition of the emergent aesthetic agency of animals allows us to understand the impact of sexual coercion and violence on sexual autonomy. Examples of this process will be drawn mostly from birds including birds of paradise, pheasants, manakins, ducks, and bowerbirds, but also extend to the evolution of human sexuality.

We are proud to feature Dr. Prum as part of the Scott Williamson Speaker Series. The series was established in 2017 by Brad and Carol Williamson to honor their son Scott, a gifted biologist who loved the challenge of the big questions in biology.

10:30 AM – 12:30 PM

**AP Biology Symposium: Using Primary Source Papers and Data Points in AP Biology**

**Fountainview** **LEVEL 3** • AP Biology • Symposium (120 min) • HS, 2Y, 4Y

Come and learn how to incorporate the use of primary source papers and data resources into the science classroom. We'll also discuss how to integrate the new science practices into assessments using the content of the recently released CED for AP Biology.

Coordinated by the NABT AP Biology Section's Professional Development Committee

10:30 AM – 11:45 AM

**2588 Learn R, in R: Crash-course in using Swirl for an Easy Guide to Crunching Numbers**

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

Don't let your fears or dated quantitative skills hold your students back! Come learn how to use and teach one of the hottest programming languages in Biology through approachable means!

Emily Weigel, Georgia Institute of Technology, Atlanta, GA

**ABT Advisory Committee**

**Bridgeport** **LEVEL 3** • Committee Meeting (75 min) • GA

William McComas, ABT Editor

APS SPEAKER SERIES

Neil A. Bradbury

See page 10 for biography.



Six Feet Apart

Chicago Ballroom IX LEVEL 4 • Special Speaker • GA

Patients with the genetic disease Cystic Fibrosis (CF) are asked to stay at least six feet apart from each other to prevent sharing debilitating lung infections. But CF not only affects the lungs, making breathing difficult. CF also affects the intestine and the ability to digest and absorb nutrients, and it also impacts on the ability of patients to have children. In short, CF affects every aspect of life. A deadly disease, CF also provides tremendous insight into the workings of the human body, and how things can go wrong. *Six Feet Apart* will take a journey through time from medieval witches, to heat waves in New York, to modern drug treatments. *Six Feet Apart* will also take a tour through the human body, showing how CF can illustrate fundamental biological processes, from middle school concepts of osmosis to college level ion transport physiology.

2671 Telling Engaging Stories with HHMI BioInteractive's Playlist & Storyline Lesson Planning Tools

Chicago Ballroom X LEVEL 4 •

Instructional Strategies • Hands-on Workshop (75 min) • MS, HS, GA

Storylines engage students in learning complex concepts. Explore HHMI BioInteractive lesson planning tools that organize the resources you know and love while discovering what others are using in their classrooms.

Valerie May, Woodstock Academy, Woodstock, CT and Kate Fisher, Oregon City High School, Oregon City, OR

SPECIAL PROGRAMMING PRESENTED BY Bio-Rad Laboratories

2688 The Opioid Epidemic: Decoding the Genetic Associations to Opioid Abuse

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

As the opioid crisis surges, researchers race to decode the genetics of opioid dependence. In this hands-on workshop, use fast DNA electrophoresis to evaluate genetic links and explore personalized medicine.

Cassandra Granieri, Bio-Rad Laboratories, Hercules, CA

NABT Awards Committee

Edgewater LEVEL 3 • Committee Meeting (75 min) • GA

Jason Crean, Committee Chair

2615 Using Polymerase Chain Reaction (PCR) to Diagnose Threats to Food Supplies

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

Are pathogens in soil evenly spread across the United States? This session will introduce a Citizen Science project in partnership with the National Agricultural Genotyping Center.

Jane Hunt, EducationProjects.org, Dublin, OH and Zack Bateson, National Agricultural Genotyping Center, Fargo, ND

2649 Using the Sea Anemone *Aiptasia pallida* to Understand Symbiosis and Coral Bleaching

Gold Coast LEVEL 3 • General Biology • Demonstration (75 min) • HS, 2Y, 4Y

Introduce yourself to the sea anemone *Aiptasia*. Easy to care for, symbiotic like coral. Learn how to use it to develop experiments about Cnidarian biology, coral bleaching, and climate change.

Sara Sawyer, Glenville State College, Glenville, WV

SPECIAL PROGRAMMING PRESENTED BY miniPCR

2711 P51™ Glow labs: DNA Structure and Enzyme Activity through Fluorescence

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

Use fluorescence to directly visualize the effects of temperature, pH, and genetic sequence on DNA structure. Then see how inhibitors, concentration, temperature and pH affect the rate of enzymatic reactions. Go beyond building models; watch it glow!

Alex Dainis, Bruce Bryan, Katy Martin and Mary Clark, miniPCR, Cambridge, MA

10:30 AM – 12:30 PM

### 2019 NABT Evolution Symposium

Michigan B **LEVEL 2** • Evolution • Symposium (120 min) • HS, 2Y, GA

#### Using Genetics to Learn About a Favorite New Jersey Fish, the Striped Bass

Striped bass are economically and ecologically important. Migratory populations along the Jersey Shore could come from different spawning sites. In this study, we use genetic data to investigate these populations.

Megan Phifer-Rixey, Monmouth University, West Long Branch, NJ

#### Data Nugget Workshop: Fishy Origins – Finding Out Where Fish Come From

In this workshop, we will share strategies for using Data Nuggets in the classroom and introduce one that features microsatellite data for various populations of striped bass.

Melissa Kjelvik and Elizabeth Schultheis, Michigan State University, East Lansing, MI and Chelsea Barreto, Summit Public Schools, Summit NJ

This symposium is made possible by the BEACON Center and The American Society of Naturalists.

## NABT 2019 EVOLUTION SYMPOSIUM



**BEACON**  
An NSF Center for the Study of Evolution in Action



American Society of Naturalists

### Emerging Research in Evolutionary Biology

Join us to hear about new research in evolutionary biology, and attend a Data Nuggets workshop to bring this authentic data into your classroom.

#### Using genetics to learn about a favorite New Jersey fish, the striped bass

**Megan Phifer-Rixey, Monmouth University**  
Megan's talk explores the use of genetic markers to identify the source populations of migratory striped bass.

#### Data Nugget Workshop: Fishy origins

**Melissa Kjelvik and Elizabeth Schultheis**  
We will present & release a new Data Nugget where students work with microsatellite data to explore the origins & management of striped bass.





10:30 AM – 11:45 AM continued

**2511 The Wolbachia Project: Discover the Microbes Within Using Freely Accessible Curriculum and Resources**

**Lakeview LEVEL 3** • Biotechnology • Symposium (75 min) • HS, 2Y, 4Y

Join Wolbachia researchers, educators, and students to study one of the greatest pandemics in the animal world. Learn how to easily incorporate biodiversity, molecular biology, and bioinformatics into your classroom.

Sarah Bordenstein, Vanderbilt University, Nashville, TN; Kerry O'Brien, St. Albans School for Boys, Washington, DC; Bob Kuhn, Centennial High School, Roswell, GA; Christine Girtain, Toms River Regional Schools, Toms River, NJ

**2563 Vernal Pools and Pollinator Gardens: Wetlands Construction at Schools for Conservation and Education**

**Michigan A LEVEL 2** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • MS, HS

Wade into this EPA award-winning project in which grade 7-12 students build vernal pools and pollinator gardens as outdoor laboratories to study ecology and environmental science and restore critical habitats.

Chris Brothers, Falmouth High School, Falmouth, MA and Ian Ives, Massachusetts Audubon Society, Barnstable, MA

**2470 Using Conceptual Models to Build Connections in Biology**

**Mississippi LEVEL 2** • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Participants will learn how to implement conceptual modeling in different classroom contexts. Workshop features include team-based modeling, grading and rubric development, and delivering efficient and effective feedback.

Jennifer Momsen, North Dakota State University, Fargo, ND; Elena Bray Speth, St. Louis University, St. Louis, MO; Sara Wyse and Steve Bennett, Bethel University, St. Paul, MN; Tammy Long, Michigan State University, East Lansing, MI

**2605 Game On: Using Game Mechanics to Explore and Manipulate Scientific Models**

**Ohio LEVEL 2** • General Biology • Hands-on Workshop (75 min) • MS, HS

Come learn how we have adapted the mechanics of common games to have students analyze, manipulate, and defend scientific models in biology.

Lesley Shapiro, Keene State College, Keene, NH and Rudolf Kraus, Rhode Island College, Providence, RI

**SPECIAL PROGRAMMING PRESENTED BY Nasco**

**2696 Forensic Science - A Fun Twist to a Traditional Dissection**

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

Make dissection more interactive and engaging with all of your students by learning how to add forensic science into your classroom. This workshop is designed for beginners and experienced educators.

Jordan Nelson and Carrie Simmons, Nasco, Fort Atkinson, WI

**2421 Hypothesis Testing and the Meaning of Statistical Significance**

**Superior A LEVEL 2** • AP Biology • Demonstration (75 min) • HS, 2Y, 4Y

Learn the rationale behind hypothesis testing methods like Student's t-Test and Chi-square. A classroom activity comparing leaf surface areas will be presented. Bring a computer or calculator.

Robert Cooper, Pennsbury High School, Fairless Hills, PA

**2492 Introducing inquiryHub Biology: A Phenomenon-Based High School Curriculum Aligned to the Next Generation Science Curriculum**

**Superior B LEVEL 2** • Curriculum Development • Hands-on Workshop (75 min) • HS

This workshop will introduce high school biology teachers to the inquiryHub biology curriculum, a full-year curriculum co-designed by teachers and researchers that is aligned to the Next Generation Science Standards.

Bill Penuel, University of Colorado Boulder, Boulder, CO and Samantha Agoos, Denver East High School, Denver, CO

**2431 Visual Notetaking for Science Educators**

**Wrigleyville LEVEL 3** • Instructional Strategies • Hands-on Workshop (75 min) • GA

Want to engage ALL students in new ways while optimizing their thinking capacities? Discover more about the what, how, and why of visual note-taking. No artistic experience required. Pinky promise.

Wendi Pillars, Jordan-Matthews High School, Siler City, NC

12:00 PM – 12:30 PM

**2592 Can a Devaluation of Grades Lead to an Increase in AP Student Engagement & Success?**

**Arkansas LEVEL 2** • AP Biology • Demonstration (30 min) • HS, 2Y, GA

Have you ever been frustrated with students concerned with grades over learning from assignments? Come learn about a philosophy that helped students shift their focus from grades to reflective learning.

Faith Nelson and Matt Kirkpatrick, Oak Park and River Forest High School, Oak Park, IL

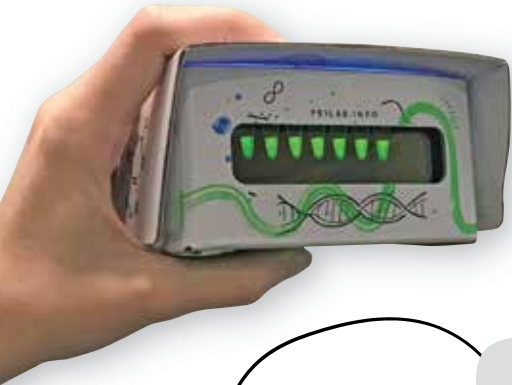
**Retired Member Committee**

**Bridgeport LEVEL 3** • Committee Meeting (30 min) • GA

Dennis Gathmann, Committee Chair

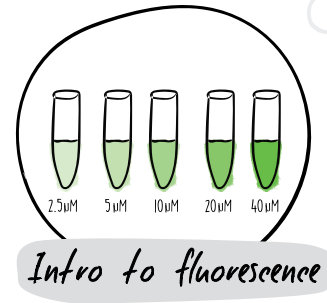
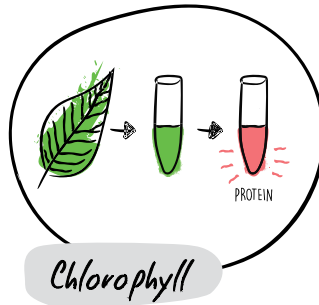
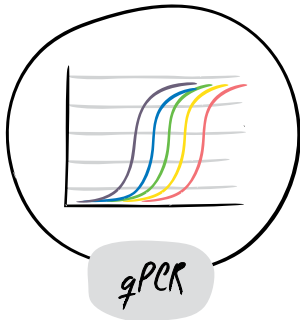
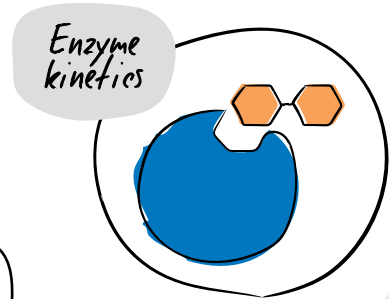
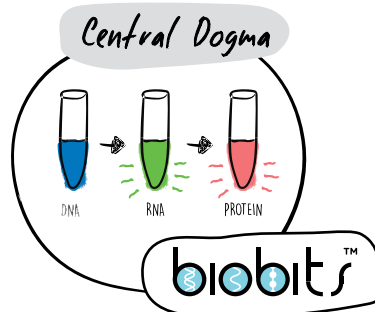
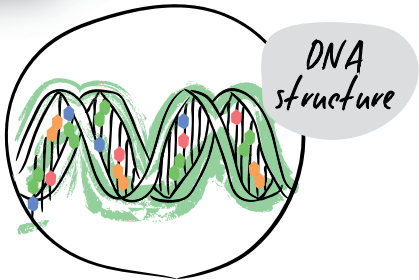


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through fluorescence

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Booth **411**



Biotechnology Equipment



Innovative Curriculum

12:00 PM – 12:30 PM continued

**2663 HHMI Biointeractive's Online Professional Learning Course on Evolution for High School Teachers**

**Chicago Ballroom X LEVEL 4** •

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

This course is designed to strengthen content knowledge, model sequencing Biointeractive resources into coherent storylines, and explore resources from a student perspective. You can also receive a certificate for completion!

Mark Eberhard, St. Clair High School, St. Clair, MI and Laura Bonetta, HHMI, Chevy Chase, MD

**SPECIAL PROGRAMMING PRESENTED BY Bio-Rad Laboratories**

**2689 Ready or Not, It's Coming! Biotechnology, the Science of Our Age. Are Your Students Prepared?**

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

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

Cassandra Granieri, Bio-Rad Laboratories, Hercules, CA

**Social Media Committee**

**Edgewater LEVEL 3** • Committee Meeting (30 min) • GA

John Moore, Lead Moderator

**2607 Making It Personal: How to Teach Cancer With Personalized Medicine**

**Erie LEVEL 2** • Biotechnology • Demonstration (30 min) • HS, 2Y

We will feature a suite of biology lessons, taught through a social justice lens, which include pgEd materials, a lab with HeLa cells, and making pedigrees with gel electrophoresis.

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

**2518 Shark Attack! An NGSS Storyline on Homeostasis and Body Hierarchy**

**Gold Coast LEVEL 3** • General Biology • Hands-on Workshop (30 min) • MS, HS, GA

An NGSS storyline on homeostasis and body hierarchy will be presented. Teachers are guided through the storyline and receive all materials for the unit. Storyline creation is also discussed.

Amber Willis, Harbor Teacher Preparation Academy, Wilmington, CA

**SPECIAL PROGRAMMING PRESENTED BY miniPCR**

**2712 Sickle Cell Genetics: Using Gel Electrophoresis to Investigate Molecular Genetics, Inheritance and Disease**

**Missouri LEVEL 2** • Genetics • Hands-on Workshop (30 min) • MS, HS, GA

Help a fictional family obtain a molecular diagnosis with this rich activity that can be easily tailored to classrooms ranging from middle school science to Advanced Placement Biology and beyond.

Bruce Bryan, Alex Dainis, and Mary Clark, miniPCR, Cambridge, MA

**2616 Why Do Students Leave Lab Early? Our Journey Into Learning More About Anatomy Lab**

**Lakeview LEVEL 3** • Anatomy & Physiology • Paper (30 min) • 2Y, 4Y, GA

Come listen to our progress in identifying how leaving an open, standalone, anatomy lab affects students grades, chances of success, and more!

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

**2654 Do a BioBlitz with Your Students!**

**Michigan A LEVEL 2** • Ecology / Environmental Science / Sustainability • Demonstration (30 min) • MS, HS, GA

A BioBlitz is specific time to record as many species as possible in a given area. In this workshop, I will share my experiences using a BioBlitz with my students.

Eric Rude, Pocatello High School, Pocatello, ID

**2619 Using Modeling and Feedback in AP Biology**

**Mississippi LEVEL 2** • AP Biology • Hands-on Workshop (30 min) • HS

Join us to see how students are using stop motion studio in our course to model concepts and how we assess them. Be prepared to try it out for yourself!

Karen O'Connor, Christina Palffy, Brett Erdmann, and Amerigo Carnazzola, Stevenson High School, Lincolnshire, IL

**2553 The Last Days of Ötzi**

**Ohio LEVEL 2** • General Biology • Hands-on Workshop (30 min) • ES, MS, HS

Use the rich story of “Ötzi the Iceman” as a platform to integrate forensics and anthropology in an investigative setting. Perform pollen analysis to learn more about this ancient murder.

Lindsay Barone, Cold Spring Harbor Laboratory - DNA Learning Center, Cold Spring Harbor, NY

**SPECIAL PROGRAMMING PRESENTED BY PASCO scientific**

**2694 Photosynthesis and Respiration: Light and Dark Reactions Quantified with Technology**

**Old Town LEVEL 3** • General Biology • Hands-on Workshop (30 min) • MS, HS

Use a Carbon Dioxide sensor and graphing software to develop a model of how plants cycle energy and matter during photosynthesis and respiration under different light conditions.

Barbara Pugliese, PASCO scientific, Roseville, CA



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12:00 PM – 12:30 PM continued

**2512 Formative Assessment Strategies for the Biology Classroom**

**Superior A LEVEL 2** • Instructional Strategies • Hands-on Workshop (30 min) • MS, HS, GA

Come learn how to integrate paper and/or electronic formative assessment techniques into classroom routines, practice preparing formative assessment prompts, and help students track their progress toward mastery of learning objectives.

Molly Proudfit, Notre Dame Academy, Park Hills, KY

**2575 Use Community Engaged Learning in Biology Classrooms to Promote Interdisciplinary “Big Picture” Understanding**

**Superior B LEVEL 2** • Instructional Strategies • Paper (30 min) • HS, 4Y, GA

Community engaged learning involves students in local issues and develops big picture understanding – while students acquire and apply biology content! Learn how CEL can be successful in YOUR classroom.

Renee Clary, Mississippi State University, Mississippi State, MS

**2502 Grow Your Students’ Understanding with PlantingScience**

**Wrigleyville LEVEL 3** • Botany & Plant Biology • Hands-on Workshop (30 min) • MS, HS

Try out the labs, get tips for planning in your classroom, and hear about my experience with PlantingScience to get your students planning and conducting inquiry investigations with working plant scientists.

Aubrey Mikos, Ottawa Township High School, Ottawa, IL

12:45 PM – 1:45 PM

**SPECIAL PROGRAMMING PRESENTED BY miniPCR**

**2713 Bringing Molecular Genetics to your Biology Classroom with miniPCR**

**Gold Coast LEVEL 3** • Biotechnology • Hands-on Workshop (60 min) • HS, 2Y, 4Y

miniPCR bio is the leader in bringing PCR and gel electrophoresis into classrooms with affordable, innovative, hands-on tools and activities. Learn how the miniPCR machine makes classroom biotechnology faster, simpler, and more intuitive than ever before.

Bruce Bryan, Robert Dennison and Ruth Gleicher, miniPCR, Cambridge, MA

**Two-Year College Section Luncheon**

**Sheraton Ballroom I LEVEL 4** • Meal Function (Tickets Required) • 2Y

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

**Four-Year College & University Section Luncheon**

**Sheraton Ballroom II LEVEL 4** • Meal Function (Tickets Required) • 4Y

Join faculty, education researchers, graduate students, and others to learn more about the programs, initiatives, and opportunities available from the section. This meeting included a special presentation of the *Four-Year College & University Section Awards*.

Sponsored by



**AP Biology Section Luncheon**

**Sheraton Ballroom III LEVEL 4** • Meal Function (Tickets Required) • AP

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

Sponsored by



1:00 PM – 1:45 PM

**SPECIAL PROGRAMMING PRESENTED BY Bio-Rad Laboratories**

**2690 Think Like an Engineer in Your Biology Class**

**Colorado LEVEL 2** • International / Global Education • Hands-on Workshop (45 min) • HS, 2Y, 4Y

Incorporate NGSS engineering practices in your biology class by challenging students to address world hunger. Students will consider constraints and design an evidence-based treatment plan (solution) for protein-energy malnutrition.

Cassandra Granieri, Bio-Rad Laboratories, Hercules, CA

2:00 PM – 4:00 PM

**11th Annual Biology Education Research Symposium**

**Fountainview LEVEL 3** • Instructional Strategies • 2Y, 4Y, GA

NABT is proud to present the *Annual Biology Education Research Symposium*, which it now in its 11th year! Presentations were accepted through a double-blind review process that was open to biology instructors and education researchers at all levels. The format of the symposium is a traditional presentation of papers by individual or co-authors lasting 15 minutes each.

See page 36 for full listing

2:00 PM – 3:15 PM

**2479 Mission: Possible - Using Breakout and Escape Room Games to Transform Biology Teaching and Learning**

**Arkansas LEVEL 2** • Instructional Strategies • Hands-on Workshop (75 min) • MS, HS, GA

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

Chris Chou, Longmont High School, Longmont, CO

**Nominating Committee**

**Bridgeport LEVEL 3** • Committee Meeting (75 min) • GA

Donald French, Committee Chair

**2467 Top 10 Biotech Stories of 2018/19**

**Chicago Ballroom IX LEVEL 4** • General Biology • Symposium (75 min) • MS, HS, GA

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

Neil Lamb, HudsonAlpha Institute for Biotechnology, Huntsville, AL

**2665 Getting Students to Ask (Good) Scientific Questions with HHMI BioInteractive Resources**

**Chicago Ballroom X LEVEL 4** • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Explore ways to help students practice writing their own phenomena-based scientific questions, design appropriate experiments, and develop and analyze questions from scientific papers that involve cause and effect.

Paul Beardsley, Cal Poly Pomona, Pomona, CA; Bernice O'Brien, Bainbridge Island School District, Bainbridge Island, WA; Mark Nielsen, HHMI, Chevy Chase, MD

**Warning: contains graphic material**

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## 2019 Biology Education Research Symposium

2:00 PM – 4:00 PM

Fountainview

LEVEL 3

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

Proceedings will be posted online at [www.NABT.org](http://www.NABT.org).

### Student Results from an Efficacy Trial of a New NGSS Evolution Unit that Integrates Heredity

Louisa A. Stark, Dina Drits-Esser, Sheila A. Homburger, and Molly Malone University of Utah, Salt Lake City, UT; Joseph Hardcastle, Jo Ellen Roseman, and George E. DeBoer, AAAS Project 2061, Washington, DC; Kristen M. Bass, Rockman et al, San Francisco, CA

We report on student pre/post assessment results from efficacy testing of a new seven-week, five-module, freely available unit that integrates heredity and evolution. *Evolution: DNA and the Unity of Life* supports students in building a coherent understanding of evolution through analysis and interpretation of skill-level-appropriate data about phenomena in published scientific research and the construction of evidence-based arguments. Ideas are framed through crosscutting concepts throughout the unit. Results from the nationwide randomized controlled efficacy trial with 38 teachers (19 in each condition) and their students ( $n=1,165$  treatment,  $n=1,094$  control) indicated that students who used the new curriculum showed significantly greater pre/post gain scores with a moderate effect size than students in the control condition (NGSS business-as-usual) in their understanding of evolution and their argumentation-writing competencies. We describe the unit, the efficacy trial research design, and student testing results from multiple choice and constructed response items.

### The Effect of Argumentation Upon Student Content Knowledge and Perception of Science in a Middle School Science Classroom

Aaron E. Kidd and Elizabeth Allan, University of Central Oklahoma, Edmond, OK

Since the release of the 2012 Framework for K-12 Science Education, educational institutions have been tasked to increase scientific literacy through the implementation of more robust science standards. The Framework identifies three key dimensions of science education: Scientific and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The Scientific and Engineering Practices are composed of a variety of broad science-oriented skills such as engineering, mathematics, and argumentation. Research has clearly indicated the efficacy of engineering in fostering science education. However, the effectiveness of argumentation has not been fully explored, particularly in middle-level classrooms. In the spring semester of 2019, 151 7th grade science students participated in two treatment and three control science units. In treatment units, students were presented a unit-specific phenomenon and provided a limited time frame to develop an explanation. Classes then engaged in student-led argument sessions to debate and further develop their proposed models. Pre and post-assessment results indicated greater content knowledge growth occurred in Honors courses during treatment units while mid-low level classes showed little difference regardless of unit type. Despite generally positive student responses through randomly selected interviews however, overall interest in science was not significantly impacted by participation in treatment sessions.

## Engaging and Assessing Biology Students in Science Communication

Jason Wack, Collin Jaeger, Shupeí Yuan, and Heather E. Bergan-Roller, Northern Illinois University, DeKalb, IL

Communicating science to a general audience (SciComm) is an important scientific skill widely practiced by scientists. It is important that scientists do SciComm as it can impact decision making by the public and inform public policies. Recently, seminal reports have indicated that SciComm is a practice in which students should become competent. Unfortunately, students have few opportunities to engage in SciComm partially due to a lack of a framework that can help instructors facilitate such activities. We present a framework of the essential elements of effective SciComm that synthesizes previous work to describe the who, why, what, and how of SciComm. We applied the framework to a lesson for undergraduate biology and assessed its effectiveness. The lesson uses an introduction, assignment sheet, and worksheet to guide students through planning, producing, describing, and reflecting upon their SciComm. We assessed the effectiveness of the lesson by quizzing students on their knowledge of SciComm and asking their perceptions. Students performed well particularly on elements used in the lesson. Moreover, students reported that the lesson improved their understanding of SciComm and biological content. This work can be used by practitioners and researchers to understand how to engage students in important scientific practice.

## Activities in Voluntary PLTL Complement Active Learning Lectures and Appeal to Students with Diverse Attitudes Towards Learning

Troy R. Nash, Mercer University, Macon, GA and Suann Yang, State University of New York at Geneseo, Geneseo, NY

Because Peer-Led Team Learning (PLTL) is an effective academic support system, examining the effect of curricular context and what influences student attendance are critical considerations for voluntary PLTL programs. We predicted that if active learning occurs during class, structured PLTL sessions may not benefit learning because the PLTL activities would be redundant with those in class. We also expected students to be more likely to attend voluntary sessions if they had a growth mindset and positive attitude toward group work, because these students would be receptive to the feedback and collaborative activities of PLTL. We were surprised to find that, for an active-learning, introductory biology course, students who attended structured sessions more frequently had a greater improvement in performance than those who attended less frequently. This suggests that structured activities in voluntary PLTL are not redundant with those that occur in class. We also found that mindset and collaborative attitude did not explain attendance. Thus, fixed mindset and negative attitudes toward collaboration do not hinder student participation. We conclude that the value of additional practice in PLTL is not diminished by active-learning lectures, and these sessions will be attended by students with a variety of mindsets and attitudes toward collaboration.

## Fear of Negative Evaluation and Student Anxiety in Community College Active Learning Science Courses

Virginia R. Downing, Katelyn M. Cooper, Logan E. Gin, and Sara E. Brownell, Arizona State University, Tempe, AZ; Jacqueline M. Cala, Chandler-Gilbert Community College, Chandler, AZ

Anxiety is increasingly common and can have negative impacts on college science students. Particularly, as we transition our classes to active learning, studies have demonstrated that anxiety can have both negative and positive effects on students. To our knowledge, all of the studies exploring the relationship between active learning and student anxiety in college science have been conducted exclusively at four-year institutions. Understanding the educational practices as well as the challenges facing students in community college science courses is critical because the attrition rates of students pursuing science careers are higher at community colleges compared to four-year institutions, particularly in STEM fields. Studying factors, such as student anxiety, that may negatively affect student persistence in science, will further elucidate ways in which community colleges can maximize student success. In this study, we examined the factors that influence student anxiety in active learning community college science courses. We interviewed 29 community college students enrolled in active learning science courses and asked students' to explain why specific aspects of active learning increased or decreased their feelings of anxiousness. We found that active learning can either increase or decrease students' anxiety depending on the techniques being used.

2:00 PM – 3:15 PM continued

**SPECIAL PROGRAMMING  
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Bio-Rad Laboratories**

**2691 It's in Their DNA! Teach Personalized Medicine with Students' Own DNA**

**Colorado LEVEL 2** • Genetics • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Experience a hands on classroom activity where students work with their own genes and PCR in the context of personalized medicine, the wave of future disease treatment.

Cassandra Granieri, Bio-Rad Laboratories, Hercules, CA

**OBTA Directors & Regional Coordinators Meeting**

**Edgewater LEVEL 3** • Committee Meeting (75 min) • GA

Mark Little, National Program Coordinator

**2460 Connecting Natural Selection and Speciation**

**Erie LEVEL 2** • Evolution • Hands-on Workshop (75 min) • HS

What drives life's diversification? NGSS-designed curriculum materials that examine speciation as a process and employ an authentic inquiry into a possible divergence in *Rhagoletis* flies. Free at <https://teach.genetics.utah.edu/content/evolution/speciation>

Louisa Stark, Genetic Science Learning Center at the University of Utah, Salt Lake City, UT

**2647 Exploring the Cell Cycle, Cancer, and a "Guardian" Gene**

**Gold Coast LEVEL 3** • AP Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Use the phenomenon of cancer and regulatory genes to explore the cell cycle. Use on-line resources and analyze data to support a CER. Free classroom-ready materials from HHMI are provided.

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

**SPECIAL PROGRAMMING  
PRESENTED BY  
miniPCR**

**2714 miniPCR qPCR Lab: Principles of Quantitative PCR**

**Missouri LEVEL 2** • AP Biology • Hands-on Workshop (60 min) • HS, 2Y, 4Y

This hands-on lab offers students an introduction to the world of quantitative PCR. Using low cost tools, students are able to visualize amplification of DNA and calculate relative concentrations of DNA template. No gels needed!

Bruce Bryan, Robert Dennison and Ruth Gleicher, miniPCR, Cambridge, MA

**2419 BioBuilder PCR: Why did the Engineered Golden Yeast Lose their Ability to Produce Beta-carotene?**

**Lakeview LEVEL 3** • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Golden Yeast are engineered for beta-carotene production, turning them orange. However, some white, yellow, and red colonies are produced, showing a breakdown in the biosynthetic pathway, tested here with PCR.

Lindsey L'Ecuyer, Andover High School, Andover, MA

**2456 The American Association of Immunologists Presents: Teachers Research Program – Immunology Lessons for the Classroom**

**Michigan A LEVEL 2** • AP Biology • Hands-on Workshop (75 min) • HS, 2Y

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

Courtney Pinard, American Association of Immunologists, Rockville, MD and Mike Criscitiello, Texas A&M University, College Station, TX

**2676 Using Evolutionary Medicine to Enhance Your Teaching and Your Students' Learning**

**Michigan B LEVEL 2** • Evolution • Hands-on Workshop (75 min) • GA

Evolutionary medicine focuses on human health and disease from evolutionary and comparative biological perspectives. This session will explore how evolutionary medicine can engage your students in the study of evolution and other aspects of biology.

Barbara Natterson-Horowitz, UCLA Medical School & Harvard University, Los Angeles, CA; Robert Perlman, University of Chicago, Chicago, IL; Jay Labov, National Academies of Sciences, Engineering, and Medicine (retired), Vienna, VA

**2484 CUREs: How to Create & Incorporate a Collaborative Ant-based Project to Teach Science Practices**

**Mississippi LEVEL 2** • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Discover interdisciplinary research and learn how to bring fieldwork and genetics to life in your classroom! Handouts and data files provided. Bring a computer if possible.

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

**2578 From Cave Paintings to Moon Shots: Exploring the Spectrum of Models in Biology Education**

**Ohio LEVEL 2** • General Biology • Hands-on Workshop (75 min) • HS, 4Y, GA

The best opportunities for teaching and learning often occur while building and refining models. Let's unpack simple, complex, and dynamic models designed to help students make sense of biological systems.

Ryan Reardon, Jefferson County International Baccalaureate, Irondale, AL and Jon Darkow, Seneca East High School, Attica, OH



2:00 PM – 3:15 PM continued

**SPECIAL PROGRAMMING  
PRESENTED BY  
Edvotek**

**2705 Introducing Your Students  
to Gene Editing with CRISPR**

**Streeterville LEVEL 2** • Biotechnology • Hands-on Workshop (75 min) • MS, HS, 2Y

CRISPR as a gene editing tool is an incredible biotechnology breakthrough. Here, we'll review the biology behind CRISPR-Cas technology and examine the use of gene therapy to treat Cystic Fibrosis.

Kelly Barford, Edvotek, Washington, DC

**2428 Creating and Implementing  
NGSS Storyline Units to Increase  
Student Engagement**

**Superior A LEVEL 2** • Instructional Strategies • Hands-on Workshop (75 min) • MS, HS, GA

Storylines led by engaging phenomena improve student engagement. Group hunting in lions, tusklessness in elephants, disappearing sea otters, and the plight of Tanzanian albinos can anchor instruction in meaningful ways.

Kathlyn Van Hoeck (retired), Marion, IA and Jason Crean, Lyons Township High School, Western Springs, IL

**2516 Mapping Biodiversity to Make  
Conservation Decisions Using The  
Half-Earth Project Map**

**Superior B LEVEL 2** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • MS, HS, 4Y

A team-based mapping activity turns E.O. Wilson's call to save half the planet for nature into a design challenge for students. Participants get a set of maps to take home.

Dennis Liu, E.O. Wilson Biodiversity Foundation, Durham, NC; Amanda Briody, Baltimore City Public, Baltimore, MD; Jim Clark, Next Generation Science Innovations, San Lorenzo, CA



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**Booth  
708**

Come see us **TODAY!**

2:00 PM – 3:15 PM continued

**2408 Contributing to *The American Biology Teacher*: A Hands-on Workshop**

**Wrigleyville LEVEL 3** • Instructional Strategies • Hands-on Workshop (75 min) • GA

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

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

3:30 PM – 4:00 PM

**2432 A Lesson on Race and Human Diversity: Culturally Relevant Pedagogy in the Biology Class**

**Arkansas LEVEL 2** • Instructional Strategies • Paper (30 min) • HS, 2Y, 4Y

In this study, we exam how high school biology teachers present controversial topics related to human diversity through the lens of Culturally Responsive Pedagogy.

Uchenna Emenaha, Kerry Ademosu, and Paige Evans, University of Houston, Houston, TX

**NABT Archival Committee**

**Bridgeport LEVEL 3** • Committee Meeting (30 min) • GA

Jill Maroo, Committee Chair

**2670 How Science Works: An Interactive Tool to Engage Student Thinking About the Process of Science**

**Chicago Ballroom X LEVEL 4** • Nature of Science • Hands-on Workshop (30 min) • MS, HS, 2Y

Teachers will investigate the dynamic and iterative nature of science through an engaging interactive tool that helps students dislodge the misconception that science is a simple linear recipe.

Kim Parfitt, Central High School, Cheyenne, WY and Mark Nielsen, HHMI, Chevy Chase, MD

3:30 PM – 4:00 PM continued

**SPECIAL PROGRAMMING PRESENTED BY Bio-Rad Laboratories**

**2692 Precision Medicine - A Reality with CRISPR and Revolutionary Droplet Digital PCR (ddPCR) Technology!**

**Colorado LEVEL 2** • Biotechnology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

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

Cassandra Granieri, Bio-Rad Laboratories, Hercules, CA

**NABT Pre-Service Teacher Committee**

**Edgewater LEVEL 3** • Committee Meeting (30 min) • GA

Julie Angle, Committee Chair

**2472 Modeling to Mastering**

**Erie LEVEL 2** • General Biology • Demonstration (30 min) • HS

This session will include basic hands-on, interactive student models that classroom teachers can create and use to enhance understanding. These tools, along with instruction, will lead to mastery of content.

Jessica Walus and Kaarin Schumacher, Woodbury High School, Woodbury, MN

**2638 Using Past AP Free Response Questions Effectively to Improve Student Writing and AP Test Scores**

**Gold Coast LEVEL 3** • AP Biology • Hands-on Workshop (30 min) • HS

This session will provide a method for using the released AP Biology FRQs that will help students better interpret questions and answer them in a clear and concise manner.

Christina Palfy and Karen O'Connor, Adlai E. Stevenson High School, Lincolnshire, IL

**2458 Anatomy and Physiology in 8 Weeks?**

**Lakeview LEVEL 3** • Anatomy & Physiology • Demonstration (30 min) • 2Y, 4Y

Eastfield College has transitioned to two 8-week terms per semester. Learn how we adapted instruction and how student performance has been impacted in Anatomy and Physiology. Come share your experiences!

Jessica Kerins, Eastfield College, Mesquite, TX

**2561 Data Interpretation Activities for Examining the Health Effects of Flavored Electronic Cigarettes**

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

Conduct and receive activities that enable students to analyze experimental data from studies assessing the impact of e-cigarette flavorings on the structure and function of the respiratory immune system.

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

**2680 Bacterial Survivor: An Interactive Game that Combats Misconceptions about Antibiotic Resistance**

**Michigan B LEVEL 2** • Microbiology & Cell Biology • Hands-on Workshop (30 min) • GA

We developed an active learning exercise called “Bacterial Survivor” in order to combat misconceptions about antibiotic resistance in a large undergraduate non-majors microbiology course.

Brinda Govindan, San Francisco State University, San Francisco, CA

3:30 PM – 4:00 PM continued

**2612 Dance, Draw, Act - The Art of Using Student-build Models to Drive Learning**

**Mississippi LEVEL 2** • Instructional Strategies • Hands-on Workshop (30 min) • 2Y, 4Y

Come and see how we use both cognitive and kinesthetic student-build models to transform learning of difficult concepts, to drive content and skill acquisition, and as formative assessments.

Dessislava Dimova, Franklin High School, Somerset, NJ and Lee Furguson, Allen High School, Allen, TX

**2544 Scenario-Based Learning**

**Ohio LEVEL 2** • General Biology • Demonstration (30 min) • MS, HS

Learn how to help your students master science and engineering practices using real-world, relatable scenarios that create a deeper understanding while also fostering interest and appreciation for biological concepts.

Kellie Dean, Paige Lehman, Kim Lubecke, and Jenna Aronson, Adlai E Stevenson High School, Lincolnshire, IL

**SPECIAL PROGRAMMING PRESENTED BY PASCO scientific**

**2695 Advanced Biology with a Wireless Spectrometer**

**Old Town LEVEL 3** • AP Biology • Demonstration (30 min) • HS, 2Y, 4Y

Learn how a Spectrometer can help your students investigate the enzymatic activity of peroxidase, relate plant pigments to photosynthetic activity, and determine whether algae beads are predominantly photosynthesizing or respiring.

Barbara Pugliese, PASCO scientific, Roseville, CA

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— *Jeremy E. Miller '17, NYCC MSHAPI Graduate*

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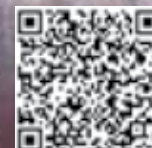
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HUMAN ANATOMY AND PHYSIOLOGY INSTRUCTION



3:30 PM – 4:00 PM continued

SPECIAL PROGRAMMING  
PRESENTED BY  
EducationProjects.org

2704 **Food Security, Sustainability, the Environment: What in the WORLD is going on?**

**Streeterville LEVEL 3** • Instructional Strategies • Hands-on Workshop (30 min) • MS, HS

Come learn how to engage students with investigative learning around these topics. Join a growing national network connecting you to free STEM resources and leadership opportunities.

Jane Hunt and Heather Bryan,  
EducationProjects.org, Columbus, OH

2436 **A PBL-Based Public Health Course for At-Risk Students**

**Superior A LEVEL 2** • Instructional Strategies • Demonstration (30 min) • HS

This session will reflect upon a science-based public health elective designed for at-risk students. Emphasis will be placed upon using real-world, problem-based learning to increase engagement.

Ryan Lacson, Galena R2 Schools, Galena, MO

2639 **Pitfall Traps and Diversity Indices: Applying Quantitative Reasoning to Test Edge Effect Theory**

**Superior B LEVEL 2** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Learn how to reinforce quantitative reasoning (QR-C) problem-solving skills in the context of species richness, diversity, edge effect, and conservation as students collect and analyze real field data.

Paul Strode, Fairview High School, Boulder, CO

2548 **Using Primary Literature to Teach Writing to High School and Early College Students**

**Wrigleyville LEVEL 3** • Instructional Strategies • Demonstration (30 min) • HS, 2Y, 4Y

This session presents a strategy for using papers to teach organization and characteristics of scientific writing. Focusing on form and inspiration rather than content, it broadens primary literature's accessibility.

Hannah Chapin, SAAS Seattle Academy, Seattle, WA

3:30 PM – 4:15 PM

SPECIAL PROGRAMMING  
PRESENTED BY  
miniPCR

2715 **Making Mendel Molecular: Add Genotyping to Wisconsin Fast Plant labs!**

**Missouri LEVEL 2** • AP Biology • Hands-on Workshop (45 min) • HS, 2Y, 4Y

Use modern molecular techniques to investigate mendelian inheritance in Rapid Cycling *Brassica rapa* (also called Fast Plants). An excellent addition to your current Fast Plants investigations or as a stand-alone lab.

Bruce Bryan, Robert Dennison and Ruth Gleicher, miniPCR, Cambridge, MA

4:00 PM – 5:30 PM

**Exhibit Hall Closing Experience**

**Riverwalk A & B LEVEL 1** • Special Event • GA

It's last call in the Exhibit Hall, and your last chance to talk with exhibitors and get those freebies you promised you would bring back. Join us for prize giveaways and more!

5:30 PM – 8:00 PM

**HHMI Night at the Movies**

**Chicago Ballroom VI & VII LEVEL 4** • Special Event • GA

HHMI BioInteractive (www.biointeractive.org) and NABT are pleased to host the 9th Annual *HHMI Night at the Movies with Sean Carroll*. Join Dr. Carroll and special guests for the premiere of a new release and discussion. This free red-carpet event will begin at 5:30 PM with a reception including free food and drink.

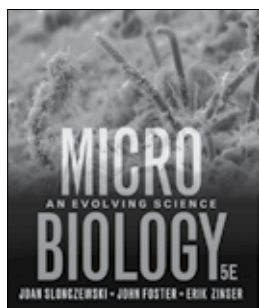
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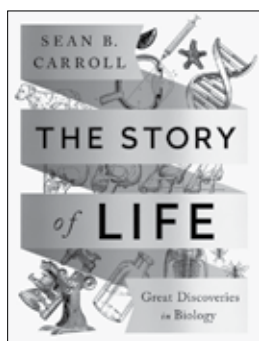
## Microbiology: An Evolving Science, Fifth Edition

Joan Slonczewski, John Foster, Erik Zinser

ISBN: 978-0-393-66458-4 • Available for Fall 2020 Classes

A microbiology text as dynamic as the field it represents. Striking a perfect balance, the Fifth Edition helps instructors convey exciting research in this rapidly evolving field while also motivating students to learn the fundamentals amid an overwhelming amount of information. Engaging examples, abundant eye-catching figures, updated genetics and genomics content by new coauthor Erik Zinser, an updated Smartwork5 course, and new active learning resources provide flexible options for high-quality assessment in and outside of class.

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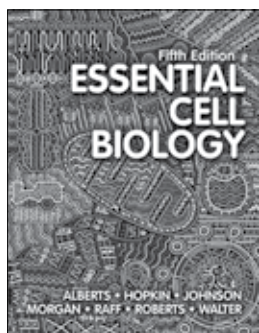
## The Story of Life: Great Discoveries in Biology

Sean B. Carroll

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

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## Also available



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Anne Houtman, Megan Scudellari,  
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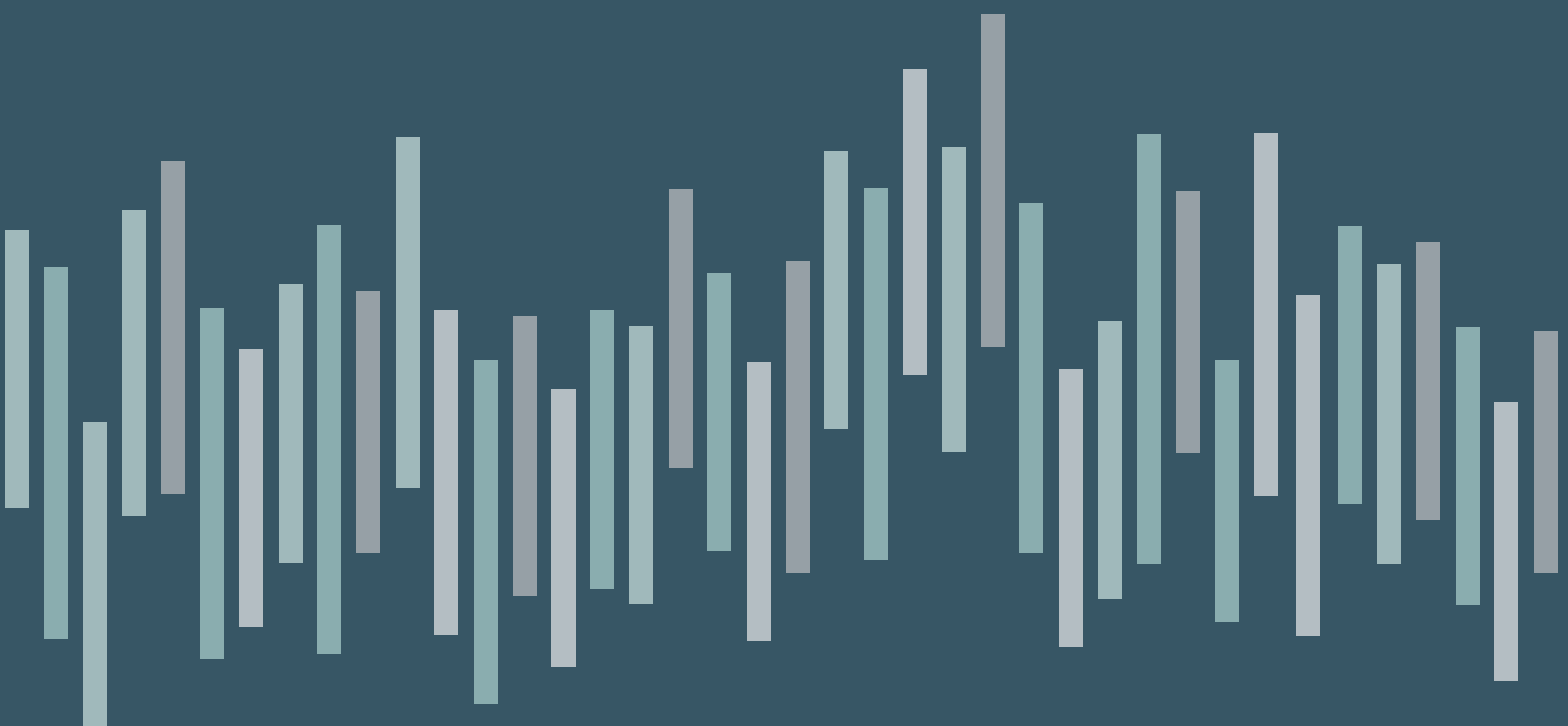
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# SATURDAY

NOV 16



## ABBREVIATION KEY

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

AP® is a registered trademark.

7:30 AM – 8:45 AM

**BioClub Breakfast****Sheraton Ballroom I** LEVEL 4 • Meal Function (Tickets Required) • GA

It's time to join the (Bio)Club! The NABT BioClub continues to grow, and both current and future BioClub Advisors are invited to share favorite resources and stories about their chapters.

Sponsored by **CAROLINA**  
www.carolina.com

8:15 AM – 10:15 AM

**NABT Biology Education Poster Session & Coffee Break****Sheraton Ballroom IV & V** LEVEL 4 • Poster Session (120 min) • GA

The NABT Poster Sessions 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.

See full poster listing on page 46

9:00 AM – 10:15 AM

**2433 Biological Inquiry on the "Rise" – Measuring Cellular Respiration with Yeast-Alginate Spheres****Arkansas** LEVEL 2 • AP Biology • Hands-on Workshop (75 min) • MS, HS, GA

We'll use yeast spheres to measure cellular respiration under different environmental conditions. An inquiry-based approach to experimental design will be emphasized throughout our session. You'll have time to work/play too!

Adam Bergeron, School District of Clayton/ Clayton High School, Clayton, MO and Lee Johnson, Parkway Central High School, Chesterfield, MO

9:00 AM – 10:15 AM

**INVITED SPEAKER****Brian Couch**

See page 10 for biography.

**Cultivating Active Learners: How Instructors Can Modify Their Activities to Improve Student Buy-in, Utilization, and Learning****Chicago Ballroom IX** LEVEL 4 • Special Speaker • GA

Active learning in the form of formative assessment (FA) represents an important way to improve student learning and persistence in STEM courses. While the use of FAs (e.g., Just-in-Time Teaching, Peer Instruction) has increased in recent years, it has also been accompanied by challenges such as students resisting them or using them in ways that may undermine learning. Student buy-in and utilization thus represent critical factors that potentially limit the adoption and efficacy of FAs. Dr. Couch's research group has conducted mixed-methods investigations to understand how instructor-based activity characteristics influence student perceptions and behaviors related to FA activities. Findings from open-ended interviews will be presented, highlighting how students perceive specific activity characteristics (e.g., content, grading policy) to affect their FA engagement. Dr. Couch also will show results from the closed-ended Formative Assessment Buy-in and Utilization Survey (FABUS), demonstrating quantitative connections between student buy-in, utilization, and performance. He will also share suggestions about how FABUS can be used by instructors to monitor and improve their FA implementation to help students succeed.

9:00 AM – 10:15 AM continued

**Member Resources Committee****Bridgeport** LEVEL 3 • Committee Meeting (75 min) • GA

Catherine Ambros, Committee Chair

**2664 Can Genetic Disorders be Cured? Exploring the Central Dogma and Genetic Medicine with HHMI BioInteractive****Chicago Ballroom X** LEVEL 4 • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Use BioInteractive resources on eukaryotic gene expression and genetic medicine to explore real-world applications of several technologies for treating genetic conditions like sickle cell disease and cystic fibrosis.

Holly Basta, Rocky Mountain College, Billings, MT; Ann Brokaw, Rocky River High School, Rocky River, OH; Laura Bonetta, HHMI, Chevy Chase, MD

**SPECIAL PROGRAMMING PRESENTED BY 3D Molecular Designs****2686 Dynamic DNA – One Model to Teach It All****Colorado** LEVEL 2 • General Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Increase student engagement and deepen student understanding of the structure and function of DNA by critically evaluating different models of DNA, including models that demonstrate DNA flexibility, packaging and epigenetics.

Keri Shingleton, Holland Hall and 3D Molecular Designs, Tulsa, OK

**NABT Conference Committee****Edgewater** LEVEL 3 • Committee Meeting (75 min) • GA

Planning to begin for NABT 2020 Conference in Baltimore.

**GENERAL  
(NON-COMPETITION)  
CATEGORY**

**1. Two-week Cell Biology Laboratory Integrating Genetics, Biochemistry, and Cytology Using *Chlamydomonas reinhardtii***

Noveera Ahmed, St. John Fisher College, Rochester, NY

**2. An Improved Protocol for *Drosophila* Polytene Chromosome Squashes: An Exciting Genetics Lab for Undergraduates and High School Students with Prior Experience using Both Stereo and Compound Microscopes**

Beth Albrecht & Sarah Barrow, Stark State College, North Canton, OH

**3. Medicines and Me: A Series of Hands-on Health Literacy Lessons for Adolescents**

Danielle Alcena-Stiner & Susan Holt, University of Rochester, Rochester, NY; Guillermo Montes, St. John Fisher College, Rochester, NY; Dina Markowitz, University of Rochester, Rochester, NY

**4. Faculty Views on Evolution at Several Campuses in the Mid-South**

Mark Bland & Christie Birdsong, University of Central Arkansas, Conway, AR

**5. Lesson Learned from the Development and Implementation of an Interprofessional Case Learning Project (ICLP)**

Nalini Broadbelt & Michelle Young, MCPHS University, Boston, MA

**6. An Explorative Teaching Approach to Learn Anatomy and Physiology by Writing a Targeted Case Study**

Nalini Broadbelt & Michelle Young, MCPHS University, Boston, MA

**7. Identifying the Unwritten Rules of Obtaining Undergraduate Research Experiences**

Jacqueline Cala, Chandler-Gilbert Community College, Mesa, AZ; Katelyn Cooper, University of Central Florida, Orlando, FL; Sara Brownell, Arizona State University, Tempe, AZ

**8. Using Student Collaborative Research in a Field Biology Course to Enhance Student Success**

Larry Corpus, Misericordia University, Dallas, PA

**9. Incorporating an Animal Behavior Research Project into a Non-majors Course**

Elizabeth Davis-Berg & Michelle Rafacz, Columbia College Chicago, Chicago, IL

**10. Organismal and Ecosystem Studies of the Red-Backed Salamander, Invertebrates and Vegetation in Tobyhanna State Park: Flaunting the Hierarchy of Matter for Vision and Change**

John Drummond, Nancy McCreary Waters, Patrick Rikieta, & Zachary Whitney, Lafayette College, Easton, PA

**11. Using the 10-2 Lecture Method and Active Learning to Improve Student Success in STEM**

Lindsey Fields, Apryl Nenortas, & Susan Forrest, Butler Community College, El Dorado, KS

**12. Science and Religion in Symbiosis: A Collaborative Learning Experience for Biology Majors in a Liberal Arts Undergraduate Setting**

Darla French & James Browning, University of Pikeville, Pikeville, KY

**13. Developing and Assessing an Environmental-Testing Education Module to Increase Scientific Literacy**

Katelynn Fry & William Kroen, Wesley College, Dover, DE

**14. Perspectives and Practices in Sharing Data-driven Adaptations in the Biology Classroom: How, Why, When, and Where are Instructors Sharing these High-impact Pedagogies?**

Kristine Grayson, University of Richmond, Richmond, VA; Arietta Fleming-Davies, University of San Diego, San Diego, CA; Raisa Hernández-Pacheco, California State University – Long Beach, Long Beach, CA; X. Ben Wu, University of Texas A&M, College Station, TX

**15. From Abstract to Concrete: Facilitating Student Learning with Models**

Karen Groh, Good Samaritan College of Nursing and Health Science, Cincinnati, OH

**16. YouTube Analytics Reveals Differences Between Majors and Genders in Viewership of Laboratory Educational Videos**

Benjamin Harrison & Amanda Brosnahan, Concordia St. Paul, St. Paul, MN

**17. Using HHMI “Scientists at Work” Videos in a Science Ethics Course**

Melissa Haswell, Davenport University, Grand Rapids, MI

**18. Case Study Pedagogy and Learning Outcomes: A Framework for Teaching Biology with Narratives**

Ally Hunter, UMass Amherst, Amherst, MA & Melissa Zwick, Stockton University, Galloway, NJ

**19. The Development of a Tablet-based Curriculum to Teach Inquiry-based Ecology to Incarcerated Youth**

Ally Hunter, Jeremy Kelleher, Martina Nieswandt, & Michael Krezmien, UMass Amherst, Amherst, MA



### 20. Building Bridges Network for Integrating Biophysics into Life Science Education

Constance Jeffrey, University of Illinois at Chicago, Chicago, IL; Gundula Bosch, Johns Hopkins, Baltimore, MD; Yadilette Rivera-Colon, Bay Path University, Longmeadow, MA; Urszula Golebiewska, Queensborough Community College, Queens, NY; Randy Stockbridge, University of Michigan, Ann Arbor, MI

### 21. BiteScis: Teacher-Researcher Partnerships to Develop Engaging Research-Based Lessons

Stephanie Keep, Shannon Morey, & Erica Kimmerling, BiteScis, Boston, MA

### 22. The PULSE Midwest and Great Plains Regional Network: A Community of Practice for Implementation of Vision and Change Recommendations

Karen Klyczek, University of Wisconsin-River Falls, River Falls, WI; Caroline Breitenberger, The Ohio State University, Columbus, OH; Heather Seitz, Johnson County Community College, Overland Park, KS

### 23. Arriving Prepared, Who Is At Risk

Kimberly Loscko, Mount Carmel College of Nursing, Columbus, OH

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

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

### 25. Biotechnology Pipeline from High School to Industry via Community College - Creating a Dual-Enrollment Culture of Excellence

Amrita Madabushi, James Epres, & Anil Malaki, Baltimore City Community College, Baltimore, MD

### 26. Molecular CaseNet: Developing Case Studies Using Molecular Representations for use in Introductory Chemistry, Biology, and Biochemistry Classes

David Marcey, California Lutheran University, Thousand Oaks, CA; Henry Jakubowski, St. John's University, St. Joseph, MN; Kimberly Linenberger Cortes, Kennesaw State University, Kennesaw, GA; Patricia Marsteller, Emory University, Atlanta, GA; Cassidy Terrell, University of Minnesota Rochester, Rochester, MN; Shuchismita Dutta, Rutgers University, New Brunswick, NJ

### 27. Reflection on and Analysis of Introductory Course Redesign at Pacific University

Leisl McCormick, Pacific University, Forest Grove, OR

### 28. Student Reported Benefits After Participating in Biology-based Student Organizations

Zach Nolen & Kristy Daniel, Texas State University, San Marcos, TX

### 29. Evaluation of the Effectiveness of Student Choice Laws and Policies Pertaining to Animal Dissection

Pamela Osenkowski, Marcia Kramer, & Ignas Karaliunas, National Anti-Vivisection Society (NAVS), Chicago, IL

### 30. Teaching Experimental Design with Computational Thinking

Amanda Peel, Northwestern University, Evanston, IL; Teresa Granito, Evanston Township High School, Evanston, IL; Sugat Dabholkar, Northwestern University, Evanston, IL

### 31. Using Audition as a Tool for Reinforcing Statistical Knowledge

Andrew Petzold & David Haines, University of Minnesota Rochester, Rochester, MN

### 32. Bridging Research and Teaching: How to Build Scenario-based Assessments from the Primary Literature

Rachel Pigg, University of Louisville, Louisville, KY; Suann Yang, SUNY Geneseo, Geneseo, NY; Emily Rauschert, Cleveland State University, Cleveland, OH

### 33. Effect of Phytohormones on the Growth and Development of *Setaria*

Kimberly Rex, Andrew Doust, Hoa Hu, & Julie Angle, Oklahoma State University, Stillwater, OK

### 34. Logic Model Conceptualization of Teacher Research in Chicago EYES on Cancer

Steven Rogg, Carthage College, Kenosha, WI; Megan Mekinda, University of Chicago Medicine Comprehensive Cancer Center, Chicago, IL

### 35. Using FRAMER as a Framework for Scaffold Development to Support Undergraduate Students in Learning and Understanding Biological Concepts

Jaime Sabel, University of Memphis, Memphis, TN

### 36. Student Performance in Critical Thinking Fluctuates in Biology Courses with a Better Performance in Microbiology vs. Non-biology Majors Students

Bara Sarraj, Harold Washington College, Chicago, IL

### 37. Crickets in the Classroom

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

*continued on next page*

**38. Are We Our Own Worst Enemy: Can Faculty Pedagogical History and Professional Identity Undermine Programmatic Change?**

Tarren Shaw, University of Oklahoma, Norman, OK; Jeff Grim, University of Tampa, Tampa, FL; Troy Nash, Mercer University, Macon, GA; Rachel Pigg, University of Louisville, Louisville, KY; Suann Yang, SUNY Geneseo, Geneseo, NY

**39. Microscopic Communities: Interdisciplinary Exploration of Microbiota**

Sandra Small, Jennifer Surtees, Jennifer Tripp, & Lynn Shanahan, University at Buffalo, Buffalo, NY

**40. Inspiring Generation Z to Advocacy Through Immersive, Real-World Experiences**

Vicki Stanavitch & Eric Johnson, Keystone College, La Plume, PA; Barbara Moss, Abington Heights High School, Clarks Summit, PA

**41. Use of *Drosophila* S2 Cells as a Simple Cell Culture Model System in a Cell Biology Laboratory**

Shannon Stevenson, University of Minnesota Duluth, Duluth, MN

**42. Investigating Removal of Perfluorooctanoic Acid (PFOA) from Drinking Water**

Andrew Taylor, Olathe Northwest High School, Olathe, KS; Candice Van Allen, Weskan High School, Weskan, KS; Noses Lor, Mark Shiflett, Ana Rita Morais, & David Corbin, University of Kansas, Lawrence, KS

**43. Promoting Metacognition in STEM for First-year Students in a Hispanic Serving 2 yr Institution to Foster Student Learning**

Sheela Vemu, Waubonsee Community College, Sugar Grove, IL; Deborah Cole, Indiana University-Purdue University, Indianapolis, IN; Youngha Oh, Texas Tech University, Lubbock, TX

**44. Exploring Math Attitudes in a Science Classroom using Biomaap Interventions at a Hispanic Serving Community College to Improve Student Quantitative Skills**

Sheela Vemu, Waubonsee Community College, Sugar Grove, IL; Deborah Cole, Indiana University-Purdue University, Indianapolis, IN; Youngha Oh, Texas Tech University, Lubbock, TX

**45. The Red-Backed Salamander and Tobyhanna State Park: A Tale of Two (Cities?) Curricula**

Nancy McCreary Waters, John Drummond, Vincenzo Olivett, & Sarah Pungitore, Lafayette College, Easton, PA

**46. Concept Maps: Helping Students Learn the Language of Biology**

Heather Minges Wols, Columbia College Chicago, Chicago, IL & Kirstin Parker, Michigan State University, East Lansing, MI

**BIOLOGY EDUCATION RESEARCH POSTER COMPETITION – GRADUATE STUDENTS**

**47. Student Modeling Activities Correlate with Biology Expertise Gains over a Semester**

Karly Ackermann, Anne-Marie Hoskinson, & Greg Heiberger, South Dakota State University, Brookings, SD

**48. An Introvert's Perspective: Analyzing the Impact of Active Learning on Multiple Levels of Class Social Personalities in an Upper-level Biology Course**

William Beckerson, Jennifer Anderson, John Perpich, & Debbie Yoder-Himes, University of Louisville, Louisville, KY

**49. The Effect of Planning and Carrying Out Investigations Upon Student Content Knowledge and Perceptions of Science in a High School Science Classroom**

Cheyenne Heath, Elizabeth Allan, & Mike Nelson, University of Central Oklahoma, Edmond, OK

**50. The Effect of Phenomenon-based Instruction and Modeling upon Student Content Knowledge and Perceptions of Science in a High School Science Classroom**

Jennifer Hofeld, Elizabeth Allan, & Mike Nelson, University of Central Oklahoma, Edmond, OK

**51. A Comparison of Urban and Rural Student Performance in Introductory Science Courses**

John Locke, Donald French, & John Stewart, Oklahoma State University, Stillwater, OK

**52. Student Hormonal Responses in Two Learning Environments**

Antonia MacCrossan, Kristy Daniel, Kafayat Oyejide, & Mar Huertas Pau, Texas State University, San Marcos, TX

**53. A Research-based Design Approach to Creating a Citizen Science Household Spider Observation Activity**

Bria Marty & Kristy Daniel, Texas State University, San Marcos, TX

**54. Student Engagement in Direct Instruction, Undergraduate Microbiology Laboratories**

Eva Nyutu, William Cobern, & Brandy Pleasants, Western Michigan University, Kalamazoo, MI

**55. Validity and Reliability of the Plant Blindness Index (PBI) and the Botanical Literacy Inventory (BLI)**

Kathryn Parsley, Bernie Daigle, & Jaime Sabel, University of Memphis, Memphis, TN

### 56. Peer Instruction, Active Learning, and Building a Learning Community in a Majors Community College Biology Course

Jon Reddick-Lau & Laura Briggs, Truckee Meadows Community College, Reno, NV; Elena Pravosudova, Pamela Sandstrom, & David Crowther, University of Nevada-Reno – Reno, NV

### 57. Exploring Students' Developing Awareness of Abiotic and Biotic Components of Biodiversity During an Outdoor Observation Activity

Sara Salisbury & Joshua Reid, Middle Tennessee State University, Murfreesboro, TN; Kathryn Parsley, University of Memphis, Memphis, TN; Brock Couch & Cindi Smith-Walters, Middle Tennessee State University, Murfreesboro, TN

### 58. The Professional Networks of Biology Graduate Students: A Social Network Comparison of Research and Teaching Universities

Joshua Reid & Grant Gardner, Middle Tennessee State University, Murfreesboro, TN

### 59. A Student Who Understands Evolution, Accepts Evolution: Evidence from a Systems Approach to Evolution Acceptance

Rachel Salter, Brent Hill, & Jennifer Momsen, North Dakota State University, Fargo, ND

### 60. What Makes You Unique?

Kathleen Stuck, Julie Angle, Angela Riley, & Jennifer Grindstaff, Oklahoma State University, Stillwater, OK

### 61. Science in the News: Engaging Non-Biology Majors in the World of STEM

Nicole Thomas & Tina Vo, University of Nevada-Las Vegas, Las Vegas, NV; Jaime Sabel, University of Memphis, Memphis, TN

## BIOLOGY EDUCATION RESEARCH POSTER COMPETITION – UNDERGRADUATE STUDENTS

### 62. Community-Engaged Learning and STEM: How Initial Perceptions Vary Based on Course

Anna Babiak, Saint Mary's College, Notre Dame, IN; Danielle Condry & Kathryn Wissman, North Dakota State University, Fargo, ND; Luis Ibarra, University of California-Los Angeles, Los Angeles, CA

### 63. Evaluating Common Student Errors in an Undergraduate Ecology Course

Cooper Breed & Suann Yang, SUNY Geneseo, Geneseo, NY

### 64. Analyzing Plant and Animal Images in Undergraduate Biology Textbooks

Kristi Brownlee, Kathryn Parsley, & Jaime Sabel, University of Memphis, Memphis, TN

### 65. The Effect of Flipped Environment on Student Achievement in Life Sciences: Meta-Analysis

Anastasiia Gryshyna & Alexey Leontyev, North Dakota State University, Fargo, ND

### 66. Global Challenge of Mosquito Borne Disease: Adapting Cases & VALUE Rubrics for Associate's Level Using High-impact Practices

Nidia Leon-V, Sheela Vemu, & Jeanne McDonald, Waubonsee Community College, Sugar Grove, IL

### 67. Study Practices and Quizlet Use in Undergraduate Human Anatomy

Kehaulani Mankle, Chase Kruse, & Jennifer Mraz-Craig, Southern Utah University, Cedar City, UT

### 68. Students Choice of Group Mates: Avoiding Conflict to Enhance Learning

Aarati Shah & Peggy Brickman, University of Georgia, Athens, GA; Cynney Walters, Kennesaw State University, Kennesaw, GA; Sukhada Samudra, University of Georgia, Athens, GA

### 69. Comparison of Open Notes and Internet Access Exams to Traditional Exams in an Upper Level Biochemistry Class

Alex Sheldon, Alec Rhodes, Isabella Hendrickson, Andrew Nicholas, & John Coogan, The Ohio State University, Columbus, OH

### 70. University Outreach to Public High School Biology Students: Student-driven Research Laboratory Exercise in Antibiotic Discovery

Jesus Tamayo & Todd Kelson, Brigham Young University-Idaho, Rexburg, ID

### 71. How and Why Undergraduates Practice Public Science Communication

Jason Wack, Collin Jaeger, & Heather Bergan-Roller, Northern Illinois University, DeKalb, IL

### 72. Metacognition Development in Undergraduate Biology Majors

Kendra Wright & Jaime Sabel, University of Memphis, Memphis, TN

*continued on next page*

**MENTORED  
UNDERGRADUATE  
RESEARCH POSTER  
COMPETITION**

**73. The Assembly of the Metal Center of Photosynthetic Water Oxidation Requires Light: Developing In vitro Methods of Studying the Assembly of the Mn Catalytic Cluster of Photosystem II (PSII)**

Derrick Chalifoux, Julie Angle, Anton Avramov, & Robert Burnap, Oklahoma State University, Stillwater, OK

**74. Effects of Various Essential Oils on *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Streptococcus epidermidis***

Jacqueline Chavez, Nichole Giani, & Vicki Stanavitch, Keystone College, La Plume, PA

**75. A Survey on Macro/Microplastic and Heavy Metal Pollution, Including Water and Soil pH in the Standing Bear Lake, Omaha, Nebraska**

Katelyn Cook, Jeba Inbarasu, & Kaiguo Chang, Metropolitan Community College, Omaha, NE

**76. *Escherichia coli* K-12 cells Bind In vitro Significantly Stronger to E-selectin than ICAM-1 Substrates Under Flow**

Yasmin Dayeh, Tarannum Uddin, Junoo Tuladhar, & Bara Sarraj, Harold Washington College, Chicago, IL

**77. Identifying Spiders Through PCR Analysis Using the Mitochondrial Cytochrome C Oxidase I (COI) Gene and the 16S Ribosomal RNA Gene**

Chloe Dupleix & Aimee Thomas, Loyola University-New Orleans, New Orleans, LA

**78. Microplastics Within Lake Pontchartrain**

Sofia Giordano & Aimee Thomas, Loyola University-New Orleans, New Orleans, LA

**79. Sensing Death: Predicting Drought Stress with Spectral Indices in Pinyon Pine**

Medelin Kant, William Hammond, Julie Angle, & Henry Adams, Oklahoma State University, Stillwater, OK

**80. The Effect of 2-4D on Aquatic Macroinvertebrate Communities**

Mariana Kendall & Aimee Thomas, Loyola University-New Orleans, New Orleans, LA

**81. Effects of Hormone Treatment on Seed Shattering in *Setaria viridis***

Heidi McIntyre, Kimberly Rex, Hao Hu, Andrew Doust, & Julie Angle, Oklahoma State University, Stillwater, OK

**82. Optimizing Protocols for DNA Barcoding of Zooplankton to Support Biodiversity Research**

Braylen Phelps, Rie Jen, & Donald French, Oklahoma State University, Stillwater, OK

**83. The Natural History of *Latrodectus geometricus* in New Orleans**

Katie Rompf & Aimee Thomas, Loyola University-New Orleans, New Orleans, LA

**84. A 3D Model of Skin Used to Test Compounds or Methods to Improve Wound Healing**

Niloufar Alsadat Hassan Tehrani, Derek Chen, Spencer Adkins, Alex Devlin, Miguel Virador, & Victoria Virador, Montgomery College, Rockville, MD

**85. Vaxx Facts: The Need for Evidence-Based Decision Making**

Nicholas Watkins, The Pennsylvania State University – State College, PA; Giovanni Adan, Birmingham Southern College, Birmingham, AL; Kimberly Booth & Jennifer Momsen, North Dakota State University, Fargo, ND

9:00 AM – 10:15 AM continued

### 2589 So Much Biology, So Little Time! Activities to Develop Both Science Skills and Content Knowledge

**Erie** **LEVEL 2** • Science Practices • Hands-on Workshop (75 min) • MS, HS

Concerned about changes to AP Biology? Standardized tests taking the joy out of teaching? Join us for a lively session where we demonstrate ways to “cover” less and teach more.

Theresa Holtzclaw and Fred Holtzclaw, Webb School of Knoxville, Clinton, TN

### 2499 Using the Lab Experience to Teach the AP Biology Science Practices

**Fountainview** **LEVEL 3** • AP Biology • Hands-on Workshop (75 min) • HS

This session will use a hands-on Genetics Lab to explore ideas for incorporating the six AP Biology Science Practices into the AP Biology classroom by using this fun hands-on experiment.

Allison Kittay, College Board, El Cerrito, CA

### 2650 Thirty Lessons, Demos, and Labs to Teach about Environmental Change

**Gold Coast** **LEVEL 3** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Learn and experience new content as master educators share their ideas for teaching about environmental change. Activities will be made available through NABT.

Elizabeth A. Cowles, Eastern Connecticut State University, Willmantic, CT; Carol Kurth, Academy of Science and Entrepreneurship, Bloomington, IN; Kirsten Milks, Bloomington High School South, Bloomington, IN; Teddie Phillipson-Mower, Indiana University Bloomington, Bloomington, IN; Emily Weigel, Georgia Institute of Technology, Atlanta, GA

### 2455 Teaching Evolution in the Age of Molecular Data: Bioinformatics for Beginners!

**Lakeview** **LEVEL 3** • Evolution • Hands-on Workshop (75 min) • HS

Using Dolan DNA Learning Center, Purdue’s Apple Genomics, HHMI Bio-interactive, and Utah Genetics resources, teachers will gain skills to help students understand biological evolution using digital tools.

Dawn Norton, James Finch, Caitlin McWhirter, Alison Peterson, Robert Hoops, and Jessica Ronk, Minnetonka High School, Minnetonka, MN

### 2426 Algal and Yeast Spheres to Model Cellular Processes: Enzyme Catalysis, Photosynthesis, and Cellular Respiration

**Mayfair** **LEVEL 2** • Science Practices • Hands-on Workshop (75 min) • MS, HS, GA

Algal and Yeast spheres are an easy to prepare and economical way to explore cellular processes. Learn how to prepare spheres and different ways to use them in the classroom.

Kurt Kristensen, Hewitt Trussville High School, Trussville, AL

### 2556 GeneChat: Celebrating DNA Day with Social Learning

**Michigan A** **LEVEL 2** • Technology in the Classroom • Hands-on Workshop (75 min) • GA

Connect with HudsonAlpha to celebrate “DNA Day” through the use of social learning which enables students the opportunity to interact with pioneers and leading researchers in the field of genomics.

Madelene Loftin, HudsonAlpha Institute for Biotechnology, Huntsville, AL

### 2580 Tying Topics Together: Illuminating Relationships in AP Biology

**Michigan B** **LEVEL 2** • AP Biology • Hands-on Workshop (75 min) • HS

Do students struggle to see connections between topics in AP Biology? This session will demonstrate how relationships between topics can be illuminated in your course to maximize student understanding.

Lee Ferguson, Allen High School, Allen, TX

#### SPECIAL PROGRAMMING PRESENTED BY Vernier

### 2701 Simplify Your Lab Setup with Vernier

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

In this hands-on workshop, use our new Go Direct sensors with our free Graphical Analysis 4 app to do biology laboratory activities such as “Enzyme Action” and “Photosynthesis and Respiration.”

Colleen McDaniel, Vernier Software & Technology, Beaverton, OR

### 2596 Invisible Forest: Use STEAM and Project-based Learning to Explore Phytoplankton and our Vast Ocean

**Mississippi** **LEVEL 2** • Science Practices • Hands-on Workshop (75 min) • MS, HS, 2Y

Learn how we study where we cannot see. This NGSS-aligned unit integrates STEAM while using real-world, big data to investigate how our “invisible forest” influences ocean and Earth systems.

Claudia Ludwig, Institute for Systems Biology, Seattle, WA

9:00 AM – 10:15 AM continued

**2442 Storylining in the Integrated Classroom**

**Ohio LEVEL 2** • General Biology • Hands-on Workshop (75 min) • MS, HS

Explore strategies to modify storylining for the integrated classroom. Testimonies from biology and special education teachers who have implemented a storyline approach to bring NGSS to students with learning needs will be shared.

Lisa Pavic, Julia Navarro, Madeline Thomas, Lauren Baker, and Sarah Davis, Glenbrook South High School, Glenview, IL

**SPECIAL PROGRAMMING PRESENTED BY Labster**

**2677 Virtual Lab Simulations: Designing, Implementing and Experimenting**

**Streeterville LEVEL 3** • Technology in the Classroom • Demonstration (75 min) • HS, 2Y, 4Y

Uncover the strategy behind building virtual lab simulations, including key principles and elements, and hear about one professor's experience using simulations as a supplemental tool in their biology course.

Kayla Nicholson, Labster, Somerville, MA

**2545 Who Isn't Talking: Student Status and Increasing Participation in the Science Practices**

**Superior A LEVEL 2** • Instructional Strategies • Hands-on Workshop (75 min) • ES, MS, HS

Participants reflect on students' classroom participation patterns: identifying students who are active participants, those who are not, and impact on those students' learning. Strategies for increasing participation will be shared.

Michele Cheyne, Knowles Teacher Initiative, Moorestown, NJ; Camden Hanzlick-Burton, Summit Public Schools - Sierra, Seattle, WA; Bernice O'Brien, Bainbridge High School, Bainbridge Island, WA; Lauren Kline, Joliet Central High School, Joliet, IL

**2582 Avoiding Teaching Genetic Determinism: Model-based Reasoning that helps Students Understand Multifactorial Models of Genetic Inheritance**

**Superior B LEVEL 2** • Genetics • Hands-on Workshop (75 min) • HS, 4Y, GA

Come discuss and practice how to use and modify gene-to-trait models to teach students about multifactorial genetics with

the goal to reduce belief in genetic determinism among your students.

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

**2601 Argumentation and Explanation with the KLEWS Chart and CER**

**Wrigleyville LEVEL 3** • Instructional Strategies • Hands-on Workshop (75 min) • MS

This session explores how to use different student supports (CER Framework and KLEWS Chart) to use argumentation and explanations in the Biology classroom to richly engage students in inquiry-based activities.

Kelly Moore, Tennessee Tech University, Cookeville, TN

10:30 AM – 11:00 AM

**2462 Using Mindfulness Practices in the Classroom**

**Arkansas LEVEL 2** • Instructional Strategies • Paper (30 min) • MS, HS, GA

Will student attitudes and biology comprehension increase with mindfulness practices in the classroom? Results of a semester-long study will be discussed, as well as some practices modeled with participants.

Erica Kosal, North Carolina Wesleyan College, Rocky Mount, NC

**2673 HHMI BioInteractive Video Case Studies: Increasing Content Knowledge through Problem Solving**

**Chicago Ballroom X LEVEL 4** • Science Practices • Hands-on Workshop (30 min) • HS, 2Y, 4Y

BioInteractive's new interrupted video case studies engage learners in analyzing and interpreting data; obtaining, evaluating, and communicating information; and arguing from evidence in constructing explanations and solutions to real problems.

Katherine Ward, Aragon High School, San Mateo, CA



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Labster

10:30 AM – 11:00 AM continued

**Professional Development Committee**

**Edgewater LEVEL 3** • Committee Meeting (30 min) • GA

Kristina Nicosia, Committee Chair

**SPECIAL PROGRAMMING PRESENTED BY**

**3D Molecular Designs**

**2684 Amplify Your PCR Instruction with Hands-On Modeling**

**Colorado LEVEL 2** • Biotechnology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Work through cycles of PCR using engaging foam manipulatives that make an invisible process visible. Students demonstrate the role of Taq polymerase, primers and nucleotides as they copy target DNA.

Susan Auld, Sehome High School (3D Molecular Designs), Bellingham, WA

**2533 Using “Darwin Cards” to Demonstrate the Amazing Power of Natural Selection**

**Erie LEVEL 2** • General Biology • Hands-on Workshop (30 min) • HS, 2Y

When students challenge evolution as being statistically impossible, this easy lab shows the power of natural selection and will make them revisit their statistics! Simple, low cost, and very effective.

Dave Sheldon, St. Clair County Community College, Port Huron, MI

**2662 Open Forum: 2019 CED Questions Answered**

**Fountainview LEVEL 3** • AP Biology • Hands-on Workshop (30 min) • HS

After a couple months of using the 2019 CED, what questions do you still have? Come to this session for the opportunity to get your questions answered.

Catherine Walsh, College Board, New York, NY

**2598 Science Con-Artists, Fake News, & the Credibility Game**

**Gold Coast LEVEL 3** • General Biology • Hands-on Workshop (30 min) • HS, GA

Efforts to usurp scientific authority abound. I present some strategies for teaching about the problem of credibility and expertise, and for developing skills in analyzing scientific claims in the media.

Douglas Allchin, University of Minnesota, St. Paul, MN

**2599 Meeting Students Where They Are: Teaching Quantitative Biology in Community Colleges**

**Lakeview LEVEL 3** • General Biology • Demonstration (30 min) • 2Y

Interested in understanding where students need support in quantitative skills and what open education resources are available for faculty? Come learn about a project designed to explore these issues!

Vedham Karpakakunjaram, Montgomery College, Rockville, MD; Kristin Jenkins, BioQUEST, Boyds, MD; Stacey Kiser, Lane Community College, Eugene, OR

**2495 Teaching Synaptic Neurotransmission Using Paper Models to Illustrate the Action of Dopamine, Opiates, and Narcan**

**Mayfair LEVEL 2** • Anatomy & Physiology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Teaching molecular pathways such as synaptic neurotransmission in A&P and AP Biology is challenging. This session provides a hands-on, paper model activity that illustrates the unfortunate, real-world application of opioid addiction.

Joe Krumm, Great Oaks Career Campuses, Milford, OH

**2540 Biotechnology in American High Schools: Then and Now**

**Michigan A LEVEL 2** • Biotechnology • Paper (30 min) • HS, GA

This session will compare surveys of two generations of high school biology teachers, drawing insights from the data to map out future directions for biotechnology education.

Lindsay Barone, Cold Spring Harbor Laboratory - DNA Learning Center, Cold Spring Harbor, NY

**Workshop Schedule**  
**Saturday in Room Colorado**

9:00-10:15	<b>Dynamic DNA – One Model to Teach It All</b>
10:30-11:00	<b>Amplify Your PCR Instruction with Hands-On Modeling</b>
2:00-3:15	<b>A Microscopic to Molecular Perspective in Modeling Chromosomes</b>

Exhibit Booth #420  
[3dmoleculardesigns.com](http://3dmoleculardesigns.com)

10:30 AM – 11:00 AM continued

**2520 Proficiency Based Biology!**

**Michigan B LEVEL 2** • General Biology • Demonstration (30 min) • MS, HS

After completing one full year of a curriculum redesign, Stevenson High School biology teachers share the benefits and challenges in implementing proficiency-based assessments (4,3,2,1 scale) for the scientific practices.

Thomas Wolfe, Paige Lehman, Jenna Aronson, Kellie Dean, Kimberly Lubecke, and Abbie Lueken, Adlai E. Stevenson High School, Lincolnshire, IL

**SPECIAL PROGRAMMING PRESENTED BY Vernier**

**2703 Speedy Spectroscopy**

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

We will demonstrate two quick and easy spectroscopy experiments that analyze plant pigment spectra and chlorophyll content in olive oil. Learn how to make spectroscopy easy and exciting for students.

John Melville, Vernier Software & Technology, Beaverton, OR

**2503 Pacing Biological and Geological Time**

**Mississippi LEVEL 2** • Evolution • Demonstration (30 min) • HS, 2Y, 4Y

Get your students active and engaged by having them estimate how long ago major biological and geological events occurred over a 50 meter distance since the formation of the earth.

Tom Freeman, Esperanza High School, Anaheim, CA

**2530 Statements Of Critical Significance (SOCS): Student Use and TA Perception of a Science Communication Tool**

**Ohio LEVEL 2** • Instructional Strategies • Paper (30 min) • 2Y, 4Y, GA

Do your students struggle extracting and using information from articles? This session describes instructor and students' perceptions of Statements Of Critical Significance, a technique to annotate references for lab reports.

Austin Leone and Donald French, Oklahoma State University, Stillwater, OK

**SPECIAL PROGRAMMING PRESENTED BY Labster**

**2683 AR and VR Tool Utilization: A Pathway to Increase Access and Success in STEM Learning**

**Streeterville LEVEL 3** • Technology in the Classroom • Demonstration (30 min) • HS, 2Y, 4Y

Explore AR and VR lab simulations, including how this technology can mimic the laboratory environment and how simulations can be an effective tool to improve student access and learning outcomes.

Gina Marie Greco, Labster, Somerville, MA

**2480 Sour to Sweet? Join a Flavor-Tripping Party for a Lesson on Cell Communication**

**Superior A LEVEL 2** • Instructional Strategies • Hands-on Workshop (30 min) • MS, HS, GA

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

Chris Chou, Longmont High School, Longmont, CO

**2449 The Advantages of Teaching Evolution through a Misconception-Based Approach**

**Superior B LEVEL 2** • Evolution • Hands-on Workshop (30 min) • MS, HS

Interact with lessons that engage students with hands-on activities and real-world data so that they can construct their understanding of evolution in a way that inoculates them against misconceptions.

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

**2542 The Student Anxiety Experience: Clarifying the Causes and Modeling the Mediators**

**Wrigleyville LEVEL 3** • Instructional Strategies • Paper (30 min) • 2Y, 4Y

Many students report anxiety in large introductory biology classrooms. Come and see what students are saying causes them anxiety, and see how we are measuring factors that impact it.

Ben England, University of Tennessee, Knoxville, TN

11:15 AM – 12:30 PM

**2586 Having a BLAST: Getting Comfortable Using Sequence Comparison Programs**

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

Participants will go through exercises that will help them navigate with confidence various websites/software to compare DNA/protein sequences (such as BLAST) and determine evolutionary relationships based on sequence comparisons. BYOD

Dessislava Dimova, Franklin High School, Somerset, NJ and Pamela Close, D.H. Hickman High School, Columbia, MO



11:15 AM – 12:30 PM continued

### 2666 Teaching Population Dynamics with Data and HHMI BioInteractive

**Chicago Ballroom X** LEVEL 4 •

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

Use BioInteractive resources to teach concepts of exponential and logistic population growth. Students can apply this knowledge to a data-driven case study, demonstrating transfer of knowledge to a real-world scenario.

Abigail Kula, Mount St. Mary's University, Emmitsburg, MD and Kristine Grayson, University of Richmond, Richmond, VA

### 2631 March Mammal Madness: A Scientific Social Media Event Not To Miss!!

**Gold Coast** LEVEL 3 • Ecology / Environmental Science / Sustainability

• Hands-on Workshop (75 min) • MS, HS, GA

A behind-the-scenes look at the phenomena that promotes passion for placentals and models marsupial mania! Engage your students in exciting ways with March Mammal Madness! LET'S GET READY TO RUMBLE!

Todd Ryan, Westborough High School, Westborough, MA and Linda Correll, Kettle Run High School, Nokesville, VA

### 2466 Play with Complexity: Teaching the Patterns, System Dynamics, and Critical Experiments in Biology with Simulations

**Lakeview** LEVEL 3 • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, GA

Come explore the dynamic systems found in biology, like logistic growth, feedback, self-regulation, and emergence. Learn how students can use simulations to investigate complex systems using illuminating cases.

Jon Darkow, Seneca East High School, Attica, OH

### 2657 Using Yeast Spheres to Explore the AP Biology Science Practices

**Erie** LEVEL 2 • AP Biology • Hands-on Workshop (75 min) • HS

Participants will engage in an instructional strategy that builds on AP Biology conceptual understanding and AP Biology science practices.

Ed Braddy, Saddlebrook Preparatory School, Wesley Chapel, FL and Mark Little, Broomfield High School (retired), Arvada, CO

### 2522 NGSS Practices: Engaging in Argument from Evidence

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

How do you teach your students to defend the claims they make? Engage them in challenges, competitions, and debates!

Kristen Dotti, Verde Valley School, Sedona, AZ




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11:15 AM – 12:30 PM continued

**2653 How Do Eggs Become Chickens or Other Living Things? A Cell and Developmental Biology NGSS-storyline**

**Mayfair** **LEVEL 2** • General Biology • Hands-on Workshop (75 min) • ES, MS, HS

Explore the role of food, blood, and cells in embryo growth and development through a middle-school storyline focused on LS1 PEs. Experience how connections are made to other living things.

Barbara Hug, University of Illinois, Champaign, IL; Dawn Novak, Maple School, Northbrook, IL; Jamie Noll, Northwestern University, Evanston, IL

**2531 Identification of Fresh Water Zooplankton Using DNA Barcoding**

**Michigan A** **LEVEL 2** • Genetics • Demonstration (75 min) • HS, 2Y, 4Y

We will demonstrate how DNA barcoding can be embedded into undergraduate courses to generate publication quality data that contribute to faculty research and provide students with desirable laboratory skills.

Jie Ren, Donald French, Austin Leone, and Braylen Phelps, Oklahoma State University, Stillwater, OK

**2643 Supporting AP Readiness with a Focus on Scientific Analytical Reading and Evidence-Based Writing**

**Michigan B** **LEVEL 2** • AP Biology • Hands-on Workshop (75 min) • HS

Fuel AP readiness by learning how to engage students in authentic analytical reading and evidence-based writing opportunities. This will also include modeling of best practices for utilizing claim-evidence-reasoning instructional strategies.

Karen Lionberger, The College Board, Duluth, GA

**SPECIAL PROGRAMMING PRESENTED BY Vernier**

**2702 Let's Get Physical: Human Physiology Experiments**

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

Get active and participate in hands-on experiments. Explore limb position, grip strength, spirometry, and EKGs/EMGs. Experiments are designed to encourage students to think about the physiology of human organ systems.

Sara Tallarovic, Vernier Software & Technology, Beaverton, OR

**2581 Putting the Model in Modeling: Creating and Evaluating NGSS-driven Models for the Secondary Education Classroom**

**Mississippi** **LEVEL 2** • Science Practices • Hands-on Workshop (75 min) • MS, HS, 2Y

Learn how to implement modeling as a means of authentic assessment. Participants will practice using a modeling rubric and leave with examples of model integration within a NGSS curriculum.

Amy Welch, Sonora High School, La Habra, CA and Ron Michelotti, Oxford Academy, Cypress, CA

**2613 Using a Driving Question Board to Figure Out Phenomena in the Classroom**

**Ohio** **LEVEL 2** • General Biology • Hands-on Workshop (75 min) • MS

I will share pictures, videos, and activities from my 9th grade biology class to illustrate how a driving question board can be used daily to support students in explaining phenomena.

Wendy Johnson, Kentwood Public Schools, Kentwood, MI

**SPECIAL PROGRAMMING PRESENTED BY Labster**

**2682 Build Your Own Virtual Lab Simulation**

**Streeterville** **LEVEL 3** • Technology in the Classroom • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Join Labster and be guided to create your own mini 3D learning simulation using an exciting prototype tool. Don't just listen, but create the future of learning with us.

Mark Fuller, Labster, Somerville, MA

**2444 Teaching of Cell Respiration and Photosynthesis can be Energizing! Pun Intended.**

**Superior A** **LEVEL 2** • Instructional Strategies • Demonstration (75 min) • HS, 2Y, 4Y

The teaching of bioenergetics processes should be tied to overarching principles that can help lead to understanding of biochemical processes that are found in the mitochondria and chloroplasts.

John Moore, Taylor University, Upland, IN

**2463 Exploring Genetics Through Genetic Disorders**

**Superior B** **LEVEL 2** • Genetics • Hands-on Workshop (75 min) • HS

In this new NGSS-designed unit, students apply concepts from basic genetics to understand how DNA variations lead to different phenotypes at the molecular, cellular, tissue, and organism levels. Free at <https://teach.genetics.utah.edu/>

Louisa Stark, Genetic Science Learning Center at the University of Utah, Salt Lake City, UT

**2571 Empowering Teachers Through Flexibility: Remixing Digital Content in the Classroom**

**Wrigleyville** **LEVEL 3** • Technology in the Classroom • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Give your students the opportunity to engage in the scientific process! The free LabXchange platform developed by Harvard allows teachers to remix content and increase flexibility in the classroom.

Tara Bennett Bristow, Mary Liu, Alia Qatarneh, Carlos Romero, and Jessica Silverman, LabXchange/Harvard University, Cambridge, MA

11:30 AM – 2:00 PM

**NABT Honors Luncheon**

**Sheraton Ballroom III** LEVEL 4 • Special Event (Tickets Required) • GA

Join us as we recognize the 2019 NABT Award recipients. This celebration honors exceptional biology teachers from all levels, and everyone is welcome to help us applaud these remarkable individuals.

**Lab Skills: The Escape Room!**

**Chicago Ballroom VIII** LEVEL 4 • General Biology • Special Event (Tickets Required) • GA

Experience an escape room like no other. Space is limited.

Tickets available at the Bio-Rad booth (booth number 508).



2:00 PM – 3:15 PM

**2625 Influenza Outbreak Investigation: Utilizing Molecular Methods and Bioinformatics to Understand Diagnostics and Epidemiology**

**Arkansas** LEVEL 2 • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y

Following an overview of immunology and antibody structure, an “influenza outbreak” prompts students to use ELISA, PCR, and BLAST vaccine sequence analysis to determine which patients are infected with influenza.

Jan Chalupny, Shoreline Community College, Shoreline, WA

**2669 Nutrients in the Serengeti: Quantifying and Modeling Biogeochemical Cycles**

**Chicago Ballroom X** LEVEL 4 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Participants will experience a new HHMI BioInteractive resource that engages students with biogeochemical data and modeling. Through this hands-on activity, students also explore natural and anthropogenic impacts on nutrient cycling.

Tara Jo Holmberg, Northwestern Connecticut Community College, Winsted, CT; Scott Sowell, Darnell-Cookman Middle/High School, Jacksonville, FL; Mark Nielsen, HHMI, Chevy Chase, MD



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2:00 PM – 3:15 PM continued

**SPECIAL PROGRAMMING  
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**2685 A Microscopic to  
Molecular Perspective in  
Modeling Chromosomes**

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

Engage in hands-on explorations connecting microscopic and molecular characteristics of chromatin, chromosomes, mutations and more. Uncover student misconceptions about independent assortment, crossing over and other mechanisms contributing to genetic variation.

Karen Avery, Pennsylvania College of  
Technology (3D Molecular Designs),  
Williamsport, PA

**NABT AP Biology Section Meeting**

**Edgewater** LEVEL 3 • Committee  
Meeting (75 min) • GA

**2591 LABS ALIVE! Free and  
Low-cost Activities to Engage  
Students with the Natural World**

**Erie** LEVEL 2 • General Biology  
• Hands-on Workshop (75 min) •  
ES, MS, HS

Join us for an entertaining session packed with ideas for working with plants along with some easy animal favorites. Numerous handouts for immediate use!

Theresa Holtzclaw and Fred Holtzclaw, Webb  
School of Knoxville, Clinton, TN

**2585 Elephant Conservation:  
Adding Context to Population  
Growth Concepts**

**Gold Coast** LEVEL 3 • Ecology / Environmental  
Science / Sustainability •  
Hands-on Workshop (75 min) • HS, 2Y, 4Y

Learn about an activity for small or large-enrollment courses that not only teaches about population dynamics, like population growth models, but adds context by applying these concepts to elephant conservation.

Andrea Bierema, Michigan State University,  
East Lansing, MI

**2569 ConnectedBio: Integrated 3D  
Learning Across Multiple Levels of  
Biological Organization**

**Lakeview** LEVEL 3 • Evolution •  
Hands-on Workshop (75 min) • HS

Engage students in sensemaking using technology-enhanced lessons and hands-on manipulatives to teach evolution around a deer mouse case study that explores evolution through molecular, cellular, organismal, and population lenses.

Rebecca Brewer, Troy High School, Troy, MI;  
Jimi McCusker, Ridley High School, Folsom,  
PA; Tim Newman, Bishop O'Dowd High School,  
Oakland, CA

**2474 Make a Case for Case Studies  
in A&P Teaching**

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

Case studies are stories that apply a theory or concept to real situations. This interactive session will show instructors how develop active-learning case studies for reinforcing A&P content.

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

**2532 Caturday Microbiomes -  
Thinking Outside the Litter Box  
With Danny and Lil Bub**

**Michigan A** LEVEL 2 • Biotechnology •  
Hands-on Workshop (75 min) • HS, 2Y, 4Y

Learn how to investigate and compare the microbiomes of Lil Bub, a YouTube celebrity cat with several genetic abnormalities, and Danny, a normal house cat, using genome DNA sequencing data.

Sandra Porter, Shoreline Community College,  
Seattle, WA

**2527 Using Case Studies in  
Secondary School Settings:  
Aligning Practice with  
Pedagogical Theory**

**Michigan B** LEVEL 2 • General Biology •  
Hands-on Workshop (75 min) • HS

This workshop is to examines how case studies can align with content standards and goals, highlight the nature of science, and create inclusion in diverse classroom settings.

Ally Hunter, UMass Amherst, Amherst, MA and  
Mika Hunter Twietmeyer, Riverside High School,  
Durham, NC

**2519 Investigating “Humanity”:  
A Holistic, Hands-on Guided  
Inquiry Approach to  
Reconstructing Human Evolution**

**Mississippi** LEVEL 2 • Evolution •  
Hands-on Workshop (75 min) • HS, 2Y, 4Y

We'll model an engaging, active-learning lesson through which high school and college students practice science with real data, develop critical thinking skills, consider bias, and have fun exploring biology.

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

**2568 Anchored Inquiry: Designing  
Meaningful Instruction to Explore  
Phenomena**

**Ohio** LEVEL 2 • General Biology •  
Hands-on Workshop (75 min) • GA

Experience firsthand how the Anchored Inquiry instructional model can be used to design learning experiences that motivate students to engage with significant, real world phenomena and problems in biology!

Cindy Gay, BSCS Science Learning, Steamboat  
Springs, CO

2:00 PM – 3:15 PM continued

**SPECIAL PROGRAMMING  
PRESENTED BY  
miniPCR**

**2720 BioBits: Hands-on Tools to Visualize Transcription and Translation in Real-time**

**Streeterville LEVEL 3** • Biotechnology • Hands-on (75 min) • HS, 2Y, 4Y

This fast, simple, and uniquely engaging activity allows students to investigate the central dogma of molecular biology in a single class period. Just add DNA to BioBits, then watch them glow. Bring the central dogma to life!

Ally Huang, Bruce Bryan, and Robert Dennison, miniPCR, Cambridge, MA

**2546 Increasing Engagement for All Students with Inclusive Low Floor, High Ceiling Tasks in Biology**

**Superior A LEVEL 2** • Curriculum Development • Hands-on Workshop (75 min) • ES, MS, HS

This session will allow participants to identify and utilize features of inclusive low floor, high ceiling tasks that increase access for all students. Structures for task modification will be shared.

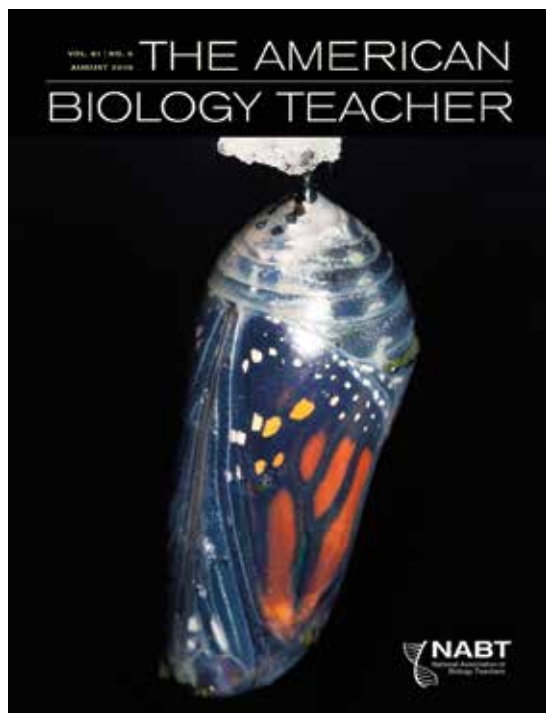
Michele Cheyne, Knowles Teacher Initiative, Moorestown, NJ; Camden Hanzlick-Burton, Summit Public Schools - Sierra, Seattle, WA; Bernice O'Brien, Bainbridge High School, Bainbridge Island, WA; Lauren Kline, Joliet Central High School, Joliet, IL

**2488 Genetics and Ethics in the Age of CRISPR, Ancestry Testing, and Personalized Medicine**

**Superior B LEVEL 2** • Genetics • Hands-on Workshop (75 min) • HS, 2Y, 4Y

How might new advances in personal genetics impact our lives, our medical decisions, and society?

Robin Bowman and Dana Waring, Personal Genetics Education Project (pgEd), Boston, MA



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2:00 PM – 3:15 PM continued

**2646 PlantingScience: Growing Students' Science Understanding Through Independent Investigations and Online Mentoring**

**Wrigleyville** LEVEL 3 • Botany & Plant Biology • Hands-on Workshop (75 min) • MS, HS, 2Y

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

Catrina Adams, Botanical Society of America, St. Louis, MO and Aubrey Mikos, Ottawa Township High School, Ottawa, IL

3:30 PM – 4:00 PM

**2549 Deadly Exposure**

**Arkansas** LEVEL 2 • Microbiology & Cell Biology • Hands-on Workshop (30 min) • 2Y, 4Y, GA

The school has been exposed to a deadly pathogen. It is up to you to solve the microbiology puzzles and find the cure. Experience an "escape room" exercise in assessment!

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

**2667 Building System Models for Understanding Global Change**

**Chicago Ballroom X** LEVEL 4 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • HS

Engage students with an interactive modeling tool from HHMI BioInteractive that illustrates how measurable changes to Earth system processes result from human and nonhuman activities.

David Hong, Diamond Bar High School, Diamond Bar, CA and Mark Nielsen, HHMI, Chevy Chase, MD

3:30 PM – 4:00 PM continued

**Citizen Science & Informal Education Committee**

**Edgewater** LEVEL 3 • Committee Meeting (30 min) • GA

Committee Chair TBD for 2020

**2606 What I Learned in AP Biology: Prioritizing Science Practices to Support Students in Inclusion Classes**

**Erie** LEVEL 2 • Instructional Strategies • Hands-on Workshop (30 min) • HS

The AP Biology redesign provides resources supporting student science practice--struggling students deserve the same experience. Come see strategies from advanced classes that work in inclusive, high-support classes for younger students.

Christina McKittrick, Oak Park and River Forest High School, Oak Park, IL

**2725 Embracing Risks to Engage Students in an Increasingly Digital Learning Landscape**

**Gold Coast** LEVEL 3 • Instructional Strategies • Paper (30 min) • 4Y

The winner of the *Four-Year Section's Biology Teaching Award* describes how he moved from interactive engagement to a blended/flipped course approach, and how student feedback was an integral part of the process.

Peter White, Michigan State University, East Lansing, MI

**2453 Quantitative Electrophysiology with Invertebrates: A Student-led, Goal-directed Lab to Drive Problem-solving and Simulate Authentic Research**

**Lakeview** LEVEL 3 • Neuroscience • Demonstration (30 min) • HS, 2Y, 4Y

Using off the shelf hardware and easily available software we will demonstrate how your students can design and conduct experiments generating quantitative neurophysiological data from many invertebrate species.

Jason Bruck and Donald French, Oklahoma State University, Stillwater, OK

**2603 Using Mental Illness in Animals to Teach Evolution, Neurobiology, and Compassion**

**Mayfair** LEVEL 2 • Evolution • Demonstration (30 min) • MS, HS, 4Y

This workshop will offer a species-spanning, comparative review of the disorders which commonly challenge the mental health of adolescents across the animal kingdom.

Barbara Natterson-Horowitz and Kathryn Bowers, Harvard University, Cambridge, MA

**2448 Increase Engagement and Exam Scores in A&P**

**Michigan A** LEVEL 2 • Anatomy & Physiology • Demonstration (30 min) • HS, 2Y, 4Y

We will show how we used freely available technology to increase engagement and exam scores in our A&P classes. These techniques could be used to help students learn anything.

Andrew Corless and Rene Lamontagna, Vincennes University, Vincennes, IN

**2617 Come Draw Anatomy With Us! How You Can Implement Drawing into Your Anatomy Course!**

**Michigan B** LEVEL 2 • Anatomy & Physiology • Hands-on Workshop (30 min) • 2Y, 4Y, GA

In this workshop, participants will learn how we have implemented drawing into our anatomy curriculum. Participants will draw their way through our workshop and leave with new ideas!

Lance Forshee and Nizhoni Marasco, Southern Utah University, Cedar City, UT

3:30 PM – 4:00 PM continued

**SPECIAL PROGRAMMING  
PRESENTED BY  
Packback**

**2700 The Power of Discussion  
in Biology**

**Missouri LEVEL 2** • Technology in the Classroom • Demonstration (30 min) • 2Y, 4Y

Bring discussion to your biology course with Packback! Packback delivers an easy-to-use and engaging discussion experience for students and instructors, with powerful support from automated moderation, sorting and scoring algorithms.

Jessica Gervais, Packback, Chicago, IL

**2437 You Don't Know It Until You  
Can Explain It!**

**Ohio LEVEL 2** • General Biology • Hands-on Workshop (30 min) • MS, HS, 4Y

Stevenson High School biology teachers share experiences of students constructing and generating their own understanding of DCI's through collaboratively explaining biological processes with cut-out pieces, video, and self-assessment.

Thomas Wolfe, Adlai E. Stevenson High School, Lincolnshire, IL

**2537 Equity & Access for All:  
Developing a Life Science Course  
for At-Risk Students**

**Superior A LEVEL 2** • Instructional Strategies • Hands-on Workshop (30 min) • MS, HS, GA

This session will provide practical scaffolding strategies for an inclusion model Life Science Course that can be immediately implemented.

Ryan Lacson, Galena R2 Schools, Galena, MO and Catherine Walsh, The College Board, New York, NY

4:00 PM - 5:30 PM

**GENERAL SESSION  
& PRESENTATION OF THE 2019 NABT DISTINGUISHED  
SERVICE AWARD**

**Bonnie Bassler**

See page 9 for biography.

**A Conversation with Bonnie Bassler: Bacterial Communication  
and Beyond**

**Chicago Ballroom VI & VII LEVEL 4** • Special Speaker • GA

Dr. Bonnie Bassler is well known for her groundbreaking research on “quorum sensing,” the method in which bacteria communicate with each other using signal molecules. Quorum sensing allows bacteria to synchronize behavior on a population-wide scale, and this same mechanism holds the key to future medical therapies. Dr. Bassler is also an award-winning life science educator and dedicated advocate for promoting science to the public. In this interview-style presentation, Dr. Bassler will discuss the research conducted in her lab, while also sharing insights from her own classroom. You’ll learn what excites her and what she wishes everyone knew about science in their daily lives. Have your questions ready for this interactive – and sure to be engaging – session with Dr. Bassler.

NABT is proud to name Dr. Bonnie Bassler the recipient of the 2019 Distinguished Service Award for Enhancing Education through Biological Research.

A special thanks to Ms. Ann Brokaw for serving as the moderator for this session.

3:30 PM – 4:00 PM continued

**2523 Acceptance, Understanding  
& Experience: Exploring Obstacles  
to Evolution Education Among  
Advanced Placement Teachers**

**Superior B LEVEL 2** • Evolution • Paper (30 min) • HS, 2Y, 4Y

Where do AP teachers fall when it comes to expectations versus reality in teaching evolution? This study suggests assumptions about AP alignment to the science community sometimes miss the mark.

Amanda Glaze, Georgia Southern University, Statesboro, GA

**2539 Incorporating Sustainable  
Development into the Biology  
Classroom**

**Wrigleyville LEVEL 3** • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • HS, 2Y, 4Y

This session will introduce the U.N. Sustainable Development Goals and help attendees find ways to engage students in sustainable development in the biology classroom.

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

4:15 PM – 4:30 PM

**Announcement of 2019 Poster  
Competition Winners**

**Chicago Ballroom VI & VIII LEVEL 4** • Special Event (15 min) • GA

Join us for this special announcement of the student winners of the *Biology Education Research* and *Mentored Undergraduate Research Competitions*.

5:30 PM – 8:30 PM

**Chicago City Lights Architecture  
River Tour**

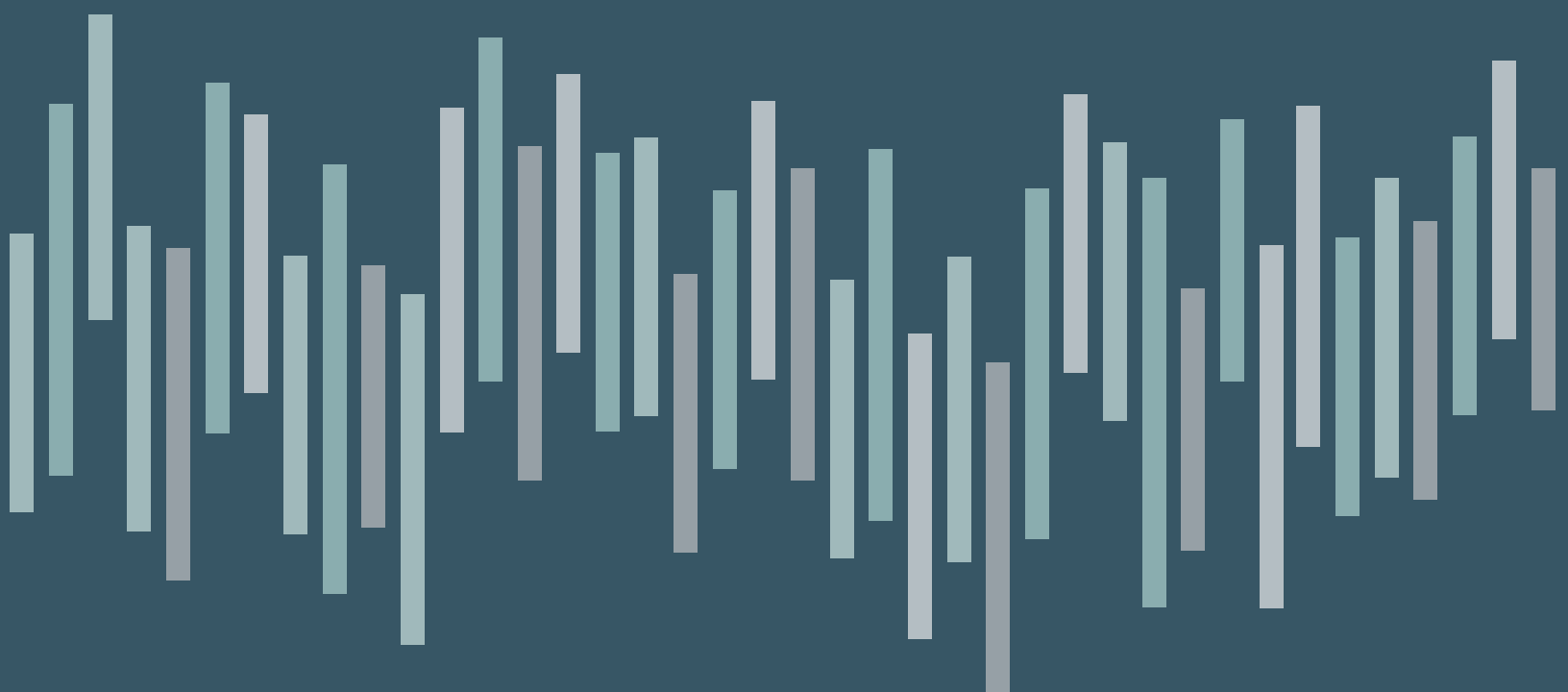
**Offsite** • Special Event (Tickets Required) • GA

Join us for one final evening in Chicago to experience the city's legendary architecture on a special evening cruise (operated by Wendella). This tour is Chicago's Original Architecture Tour®, focusing on Chicago's rich architectural heritage and history. Tickets include food, drinks, and a tour through the heart of the city with a professional architecture guide.

**The cruise will depart promptly at 6:00 PM.** Shuttle will depart from the lobby, or walk the short distance to the cruise departure location.

# SUNDAY

NOV 17



## ABBREVIATION KEY

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

AP® is a registered trademark.



8:00 AM – 11:30 AM

**2674 Writing Assessments that are Relevant, Engaging, and Evaluate Outcomes****Superior B** LEVEL 2 • General Biology • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Participants will focus on writing measurable learning objectives, and learn how to create a “fair” test by populating it with multiple-choice items at several cognitive levels that are assessing outcomes equitably.

Peggy Brickman, University of Georgia, Athens, GA; Rebecca Orr, Collin College, Plano, TX; Melissa Csikari, HHMI, Chevy Chase, MD

**2675 Strategies for a More Inclusive Biology Classroom****Erie** LEVEL 2 • Instructional Strategies • Special Workshop (Tickets Required) • HS, 2Y, 4Y

Interested in learning how to create a more inclusive learning environment in your classroom or how to study inclusion in biology education? Join the iEMBER network to discuss strategies.

Michael Moore, Baylor University, Waco, TX; Taylor Page, Bio-Rad Laboratories, Hercules, CA; Jana Marcette, Harris-Stowe State University, St. Louis, MO; Rebecca Campbell-Montalvo, University of Connecticut, Storrs, CT; Gary McDowell, iEMBER, Chicago, IL; Kara Nuss, Northeastern Illinois University, Chicago, IL; Katie Wiens, Bay Path University, Longmeadow, MA

Support provided by



8:30 AM – 10:30 AM

**Two-Year College Section Meeting****Arkansas** LEVEL 2 • Committee Meeting (120 min) • 2Y, GA**Four-Year College & University Section Meeting****Mississippi** LEVEL 2 • Committee Meeting (120 min) • 4Y, GA

9:30 AM – 11:30 AM

**2559 Debrief, Coaching, and Networking Around Student-centered Active Learning****Superior A** LEVEL 2 • Instructional Strategies • Special Workshop • HS, 2Y, 4Y

Join college professors and high school teachers to debrief learning from the conference, share plans for the future, and begin building a community of practice around constructivist, non-lecture instructional strategies.

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





# EXHIBITORS

## EXHIBIT HALL HOURS

### Thursday

**5:30 PM – 7:30 PM**

Exhibit Hours

+ Exhibit Hall Opening Reception

### Friday

**8:00 AM – 5:30 PM**

Exhibit Hours

**4:00 PM – 5:30 PM**

Exhibit Hall Closing Experience

## EXHIBIT HALL MAP

■ SPONSOR BOOTHS

✕ TREASURE HUNT EXHIBITORS



### ● 3D Molecular Designs


**Booth 420** 

Milwaukee, WI

3dmoleculardesigns.com

Hands-on and minds-on! Our kits and models focus on core ideas and cross-cutting concepts in biology, chemistry, physical and life sciences. We involve teachers in developing products, field testing and presenting workshops. Kits support STEM, NGSS, AP, IB and PLTW. Ask about our new Dynamic DNA Kit and Chromosome Connections Kit!

### AC2 Bio-Link Regional Center

**Booth 713** 

Austin, TX

ac2.bio-link.org

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

### American Museum of Natural History

**Booth 316**

New York, NY

learn.amnh.org

### American Physiological Society

**Booth 212**

Bethesda, MD

the-aps.org

The American Physiological Society (APS) awards more than 1.2 million dollars annually. The Society grants travel funds, stipends for educational programs, professional development opportunities and more. Explore the-aps.org/educatorawards.

### American Phytopathological Society

**Booth 714**

St. Paul, MN

apsnet.org

It is the American Phytopathological Society's mission to discover and disseminate new knowledge of plant systems worldwide to meet humanity's need for safe and nutritious food, affordable fiber, sustainable forests, and verdant landscapes; and promote the development and adoption of economically and environmentally sustainable practices to ensure plant health.

### American Society of Plant Biologists

**Booth 623**

Rockville, MD

aspb.org

The American Society of Plant Biologists was founded in 1924 to promote the growth and development of plant biology, to encourage and publish research in plant biology, and to promote the interests and growth of plant scientists in general.

### Anatmage

**Booth 415**

San Jose, CA


anatmage.com


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

#### EXHIBITOR KEY


#### Sponsorship Tiers

 Diamond

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 Silver

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 Treasure Hunt Exhibitors

### Anatomy in Clay Learning System

**Booth 324**

Loveland, CO

anatomyinclay.com

Anatomy in Clay® Learning System offers unique, successful hands-on anatomy-teaching skeletal models for teachers and students alike – promotes understanding of the 3-dimensional structure of human body systems, encourages learning, and increases knowledge retention. “The Mind Cannot Forget What the Hands Have Learned”™ Visit us in booth 324.

### Animalearn

**Booth 320**

Jenkintown, PA

animalearn.org

Animalearn works to end the harmful use of animals in education. We strive to build awareness about animal use in the classroom and help to nurture a respect for all creatures. Animalearn helps both educators and students find the most effective non-animal methods to teach and study science. Our alternatives to dissection loan program, The Science Bank, is home to over 650 high-quality, animal-friendly humane science education products, from which educators can borrow for free.

## ASCP

### Booth 223

ascp.org

Founded in 1922 in Chicago, ASCP is the world's largest professional membership organization for pathologists and laboratory professionals. ASCP provides excellence in education, certification, and advocacy on behalf of patients, anatomic and clinical pathologists, and medical laboratory professionals. Learn more about who we are, what we do and how we can help you with a career in the lab at [www.ascp.org](http://www.ascp.org).

## Autopsy.Online

### Booth 219

Chicago, IL

autopsy.online

Autopsy.Online - Your Cadaver Lab Next Door. This platform spans the human-digital divide by providing real human casework in accessible, discovery format. Consider how your curriculum would change if, at any moment, you could walk into a human anatomy lab. Would you send your students in to explore? Prefer anatomic guideposts? Aim for higher level thinking by solving a medical mystery? Or focus on basic physiology? You can do it all. Discovery. Didactics. Interaction. Real. Autopsy.Online.

## Bedford, Freeman & Worth High School Publishers

### Booth 521

Hamilton, NJ

highschool.bfwpub.com

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

## BioCorporation

### Booth 108

Alex, MN

biologyproducts.com

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

## Bio-Rad Laboratories, Inc.

### Booth 508

Hercules, CA

bio-rad.com

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

## BiteScis

### Booth 622

Storrs, CT

bitescis.org

BiteScis sparks interest in scientific research by connecting what students learn in the classroom to the questions scientists are currently pursuing, whether in the lab or the field; through a microscope, telescope, or the circuits of a supercomputer. And since they're classroom-tested, free, editable, and tied to standards, they are easy to incorporate into your classroom. Come by the booth to check-out the lessons we currently have and to find out how you can get involved in future work.

## Bone Clones, Inc.

### Booth 516

Chatsworth, CA

boneclones.com

Bone Clones, Inc. is the premier osteological replication company specializing in precise casts of modern human skeletons, fossil hominid skeletons, modern animal skeletons and fossil animal skeletons. For over 25 years, Bone Clones® have been the leading osteological reproductions used in museums, universities, medical schools and other educational institutions.

## Carolina Biological Supply Company

### Booth 317

Burlington, NC

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](http://carolina.com). Carolina™ Science catalog available upon request.

## Catalyst Learning Curricula

### Booth 617

Asheville, NC

catalystlearningcurricula.com

Catalyst Learning Curricula provides educational support in three primary areas of best practices development. We train teachers to broaden their professional skills using AP/IB/NGSS instructional techniques. We write curricula that contain only student-centered lesson plans and diverse teaching methods that exceed AP, IB, or NGSS science course standards. We help teachers, PLCs, schools, or districts create original curricula to suit their specific needs. How can we help you?

## Cell Zone, Inc.

### Booth 514

Springfield, MA

cellzone.org

Have you been looking for a way to make your classroom more active and include more learners? Cell Zone, Inc. offers active learning solutions for teaching cells, biological molecules, histology, diversity and food webs, and mitosis. Founded by a teacher, Cell Zone products transform any classroom into a student-centered learning environment. Come by our booth to see our products and enter our drawing.

**Clemson University****Booth 318**

Clemson, SC  
clemson.edu

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

**Cognitive Surplus****Booth 216**

Portland, OR  
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.

**CONVIRON****Booth 325**

Winnipeg, MB  
conviron.com

Conviron is a world leader in the design, manufacture and installation of plant growth chambers and rooms for plant science and agricultural biotechnology research, with equipment placed in the top research institutions in over 90 countries. By bringing our lab-grade plant science technology into the classroom through the ground-breaking BioSTEM education initiative, we offer teachers a powerful new experiential approach for developing STEM skills across multiple grades.

**DataClassroom****Booth 709**

Charlottesville, VA  
dataclassroom.com

DataClassroom is a web-app that allows students and teachers (grades 6-12) to engage with data through graphing and animated hypothesis testing. Your students can take a dataset or upload their own, make publication-quality graphs in seconds, and can move up to animated hypothesis test when they are ready. The best part of a science class will always be hands-on labs and experimentation. DataClassroom integrates next generation data-skills with the learning experiences you are already creating.

**Earthwatch Institute****Booth 621**

Boston, MA  
earthwatch.org

Earthwatch is the bridge between real environmental research and your classroom. Our 1-2 week expeditions, led by renowned scientists, offer participants a chance to build their skills in field research, contribute to conservation efforts, and see the world at one of dozens of sites, both domestic and abroad. With exclusive field research expeditions for high school students and fellowships for K-12 teachers we guarantee a fascinating, fun, impactful, safe, and transformative experience for all.

**Ecology Project International****Booth 213**

Missoula, MT  
ecologyproject.org

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

**● EDVOTEK****Booth 414**

Washington, DC  
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.

**Expert TA, LLC****Booth 312**

Tulsa, OK  
theexpertta.com

**Fisher Science Education/  
G-Biosciences/EMC Publishing****Booth 208**

El Dorado Hills, CA  
biotech.com

Biotechnology coursework increases student interest in real-world biology. Featuring Ellyn Daugherty's Biotechnology: Science for The New Millennium, 2E and Biotechnology Basics™ by Ellyn Daugherty, Fisher Science Education, G-Biosciences and EMC Publishing provide you with all the curriculum and materials needed to bring real-world science into your science classroom. Visit Booth #208 for booth workshops and bioscience teaching materials and meet with Ellyn one on one.

**Foldscope Instruments, Inc****Booth 423**

Palo Alto, CA  
foldscope.com

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

## ● Greentrek Student Expeditions

**Booth 322**

Oak Park, IL

[greentrek.org](http://greentrek.org)

Greentrek was created as an innovative response to mainstream travel. We believe we can do travel in a responsible way by generating positive benefits to your travel experience, and at the same time contribute to the conservation of the natural environment, empower people and contribute to local economies. We promote non-formal and global education by generating interaction with local stakeholders and creating practical learning experiences.

## ● HudsonAlpha Institute for Biotechnology


**Booth 416** 

Huntsville, AL

[hudsonalpha.org](http://hudsonalpha.org)

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

## ● Labster

**Booth 610** 

Somerville, MA

[labster.com](http://labster.com)

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

## LabXchange

**Booth 417**

Cambridge, MA

[labxchange.org](http://labxchange.org)

LabXchange is an online platform for global science education that integrates the best of digital instruction and virtual lab experiences, while also connecting students, teachers, and researchers in a learning community based on sharing and collaboration.

## LAXCO Inc

**Booth 227**

Mill Creek, WA

[laxcoinc.com](http://laxcoinc.com)

## Maderas Rainforest Conservancy

**Booth 710**

Miami, FL

[maderasrfc.org](http://maderasrfc.org)

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

## Millikin University

**Booth 218**

Decatur, IL

[millikin.edu](http://millikin.edu)

## MiniOne Systems

**Booth 517**

San Diego, CA

[theminione.com](http://theminione.com)

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

## ● miniPCR

**Booth 411** 

Cambridge, MA

[minipcr.com](http://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.

## Modern Biology, Inc.

**Booth 708**

Lafayette, IN

[modernbio.com](http://modernbio.com)

## Montana State University

**Booth 711**

Bozeman, MT

[montana.edu/msse](http://montana.edu/msse)

The MS in Science Education (MSSE) program is delivered primarily online, with summer field and lab courses that utilize the diverse environment of Montana to teach scientific principles and provide models of field-based instruction. Courses in all science disciplines are offered to improve content knowledge and provide innovative inquiry-teaching strategies. Unique characteristics make this program appealing to both traditional and informal science educators. Affordable, competitive tuition.

## Nasco

**Booth 326**

Fort Atkinson, WI

[enasco.com](http://enasco.com)

Nasco specializes in elementary and secondary science materials, kits, live and preserved biologicals, and lab equipment. We focus on quality products and budget-sensitive prices. Please visit us at [www.eNasco.com](http://www.eNasco.com) or call 1-800-558-9595.



## National Anti-Vivisection Society (NAVS)


**Booth 217**  
Chicago, IL  
navs.org

## National Center for Science Education

**Booth 615**  
Oakland, CA  
ncse.com


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

## ● National Corn Growers Association (NCGA)

**Booth 211**   
Chesterfield, MO  
ncga.com

Are your students informed about climate change, environment, sustainability, food science? Be part of a growing national network that provides free curriculum, professional development & supplies! Our phenomena-based lessons explore these issues & engage your students with investigative learning. MS/HS bio, chem, & enviro science educators will benefit from materials written by teachers for teachers, with lessons that connect with NGS standards. Visit Booth 211 for more info! agisstem.org

## ● OpenStax, Rice University

**Booth 311**   
Houston, TX  
openstax.org

OpenStax is committed to improving access to quality learning materials. As a nonprofit ed tech initiative that is part of Rice University and supported by philanthropic foundations, OpenStax provides free college and Advanced Placement textbooks that are developed and peer-reviewed by educators, as well as low cost, personalized courseware that helps students learn.

## Packback

**Booth 220**  
Chicago, IL  
packback.co

## ● PASCO Scientific

**Booth 310**  
Roseville, CA  
pasco.com

PASCO is the award-winning leader in hands-on, inquiry-based science. We transform science education and student learning with innovative sensors, software, equipment, and curriculum that promote 21st century readiness. Biology and physiology students use our sensor technology on their own tablets, computers, and smartphones and see their data in real time. Our award-winning products include the Wireless CO2 Sensor, Wireless Temperature Sensor, SPARKvue® software, and the Wireless Spectrometer.

## Pearson

**Booth 111**  
Austin, TX  
pearson.com/us

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

## Science Take-Out

**Booth 620**  
Honeoye Falls, NY  
sciencetakeout.com

## SimBio

**Booth 608**  
Missoula, MT  
simbio.com

SimBio produces inquiry-driven biology modules built around sophisticated interactive simulations. With instant-feedback to reinforce understanding and integrated auto-graded quizzes, they're great as homework or in-class assignments. We're excited to demo our newest module, DNA Explored, which helps students understand the complexity of DNA structure and replication, at our booth (#608). If you stop by, we'll give you access to FREE EVALUATION SOFTWARE to explore all of our modules on your own!

## Society for Neuroscience – BrainFacts.org

**Booth 522**  
Washington, DC  
sfn.org

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

## The Dana Foundation

**Booth 323**  
New York, NY  
dana.org

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

## **uHandy Mobile Microscope**

**Booth 421**

[loveuhandy.com](http://loveuhandy.com)

Microscopy is the second instinct that gives everyone a deeper understanding of the world. Three exclusive traits—Crystal clear photos, Effortless operation, anytime and anywhere exploration—make uHandy a No.1 choice microscope for the next generation. uHandy restores your curiosity and originality. Getting rid of those expensive and heavy microscopes, uHandy sets curiosity free. Explore the world, discover anytime, anywhere, and find your own solutions to every problem on your own.

## **University College at Washington University St. Louis**

**Booth 308**

St. Louis, MO

[ucollege.wustl.edu](http://ucollege.wustl.edu)

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

## **University of Florida, Biotility**

**Booth 225**

[biotility.research.ufl.edu](http://biotility.research.ufl.edu)

## **Vaccine Education Center at Children's Hospital of Philadelphia**


**Booth 611**

Philadelphia, PA

[vaccine.chop.edu](http://vaccine.chop.edu)

The Vaccine Makers Project (VMP) offers free lessons and resources about the immune system, infectious diseases and vaccines. A program of the Vaccine Education Center at CHOP, the VMP seeks to inspire students with compelling materials and introduction to real-world scientists while equipping educators with easy-to-use, scientifically-accurate tools. Stop by and visit us in booth #611!

## **Vernier Software & Technology**

**Booth 511** 

Beaverton, OR

[vernier.com](http://vernier.com)

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

## **W.W. Norton**

**Booth 616**

New York, NY

[books.wwnorton.com](http://books.wwnorton.com)

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

## **Walking Tree Travel**

**Booth 214**

Denver, CO

[walkingtree.org](http://walkingtree.org)

## **Weber Scientific**

**Booth 614**

Hamilton, NJ

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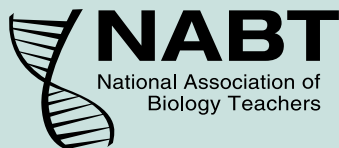
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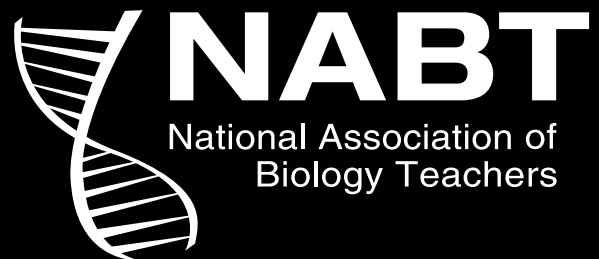
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