BCEENET
BIOLOGICAL COLLECTIONS IN ECOLOGY AND EVOLUTION NETWORK

Connecting collections with CURE educators & students

Janice L. Krumm, Widener University
Carly N. Jordan, The George Washington University
Cecily Bronson, Portland State University
Elizabeth K. Shea, Delaware Museum of Natural History
Jean L. Woods, Delaware Museum of Natural History

Acknowledgements

Steering Committee
Janice Krumm, PI
Carly Jordan, Co-PI
Elizabeth Shea, Co-PI
Jean Woods, Co-PI
Pam Soltis
Adania Flemming
James Hewlett
Jennifer McCarthy
Molly Phillips
Alex Trillo

Coordination Team
Cecily Bronson

Core Developers
Fran Weaver
Katie Burnette
Michael Caldwell
Alex Krohn
Timothy Whitfeld
John Carroll
Tanya Dewey
Joshua Mays
Ryan Kerney
Elissa Sorojsrisom
Caroline Devan
Elizabeth Waring
Liz Alter
Tiffany Doan

Collaborating Developers
Michelle Gaynor
Matt Johnson
Andrew Stoeher

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Topics

- What is a CURE?
- CUREs using digitized natural history collections data
- How does BCEENET support dNHC CUREs?
- How can we better connect collections with CURE educators and students?

tinyurl.com/hjvrmjf6

Course-Based Research Experiences (CUREs)

As defined by CUREnet:

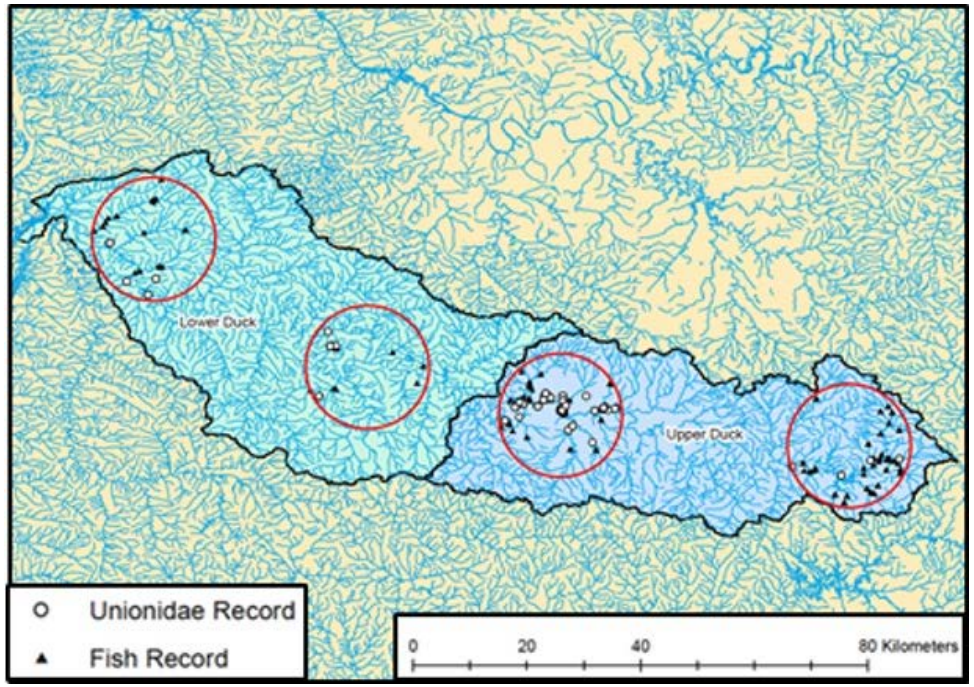
Courses that include undergraduate research experiences that potentially result in discoveries of interest to stakeholders beyond the confines of the course.

- students engage in the iterative process of research, troubleshooting and problem solving
- research questions change as the research project progresses
- students communicate their results to the broader stakeholder community

Widener students in Bio 350 @ DMNH

Digitized Natural History Collections CUREs

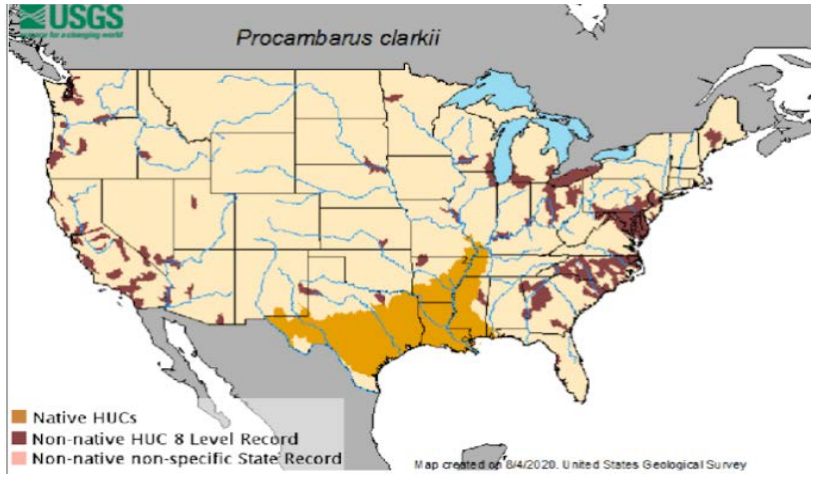
- Students from all institution types can access the same online data resources
- Can be implemented entirely online
- Wide range of potential research topics allows integration with educator research interests
- Students need only access to a computer and the internet



Fish and unionid mollusk occurrence records in four localities in the Duck River Watershed, TN. Created by Widener students Evan Perkowski & Katelyn Mecouch, 2018.

A CURE for Invasions

- Students test hypotheses on mechanisms that influence dispersal in invasive species
- dNHC data are used to analyze distribution changes over time
- Extension: Pairs of species will be compared (invasive vs. invasive or invasive vs. native)



https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=217

Species distributions and their drivers

- Students test hypotheses on the impacts of human activity on the geographic ranges of species
- Compare present species distributions (iNaturalist & field observations) to historical distributions (dNHC data)

Sexual Dimorphism CURE

- Students use digital images to test hypotheses on the effects of environmental conditions and sexual communication on melanization patterns
- Extensions: Native vs. introduced range and changes in melanization patterns through time

Natural History Museum (London) Collection Specimens, retrieved through iDigBio

Morphology CURE

- Students test hypotheses on morphological variation of invasive species in native vs invasive ranges in purple loosestrife
- Morphological characteristics will also be examined over time

Sexual Dimorphism CURE

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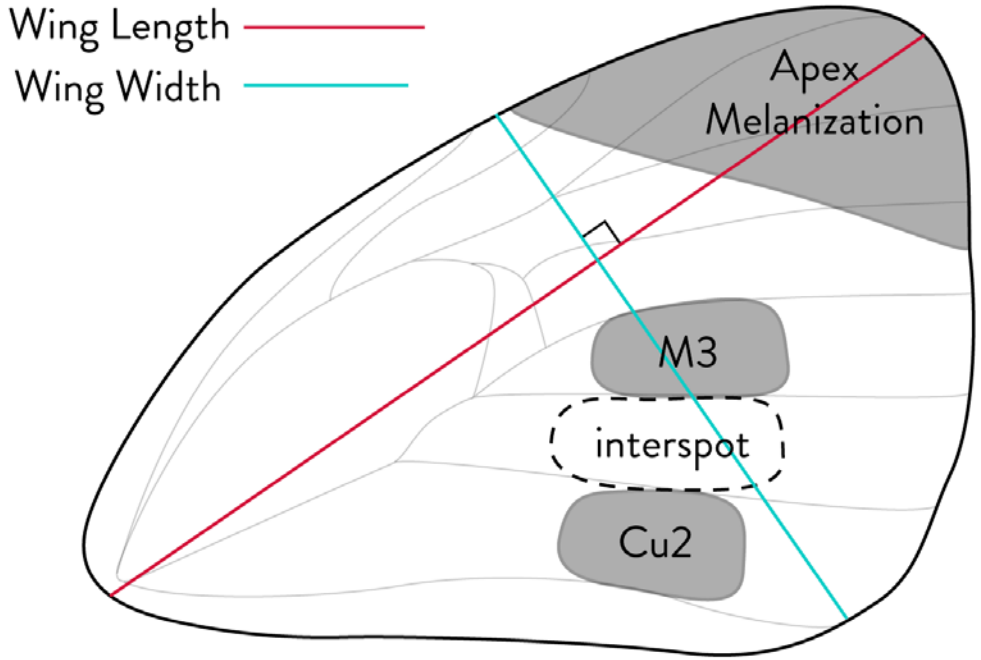
Research Questions:

- Do traits that are sexually dimorphic in butterfly wing patterns vary more or less than traits that are not sexually dimorphic?
- Is the variation in these two types of traits correlated with latitude or seasonality?

Student Skills:

- Data collection using dNHC images of *Pieris rapae* specimens downloaded from iDigBio
- Data management and analysis
- Scientific communication, oral and written
- Collaboration with scientific community
- Develop scientific self-efficacy



How does BCEENET support CUREs?

- Instructor training and implementation support, including introductions to collections, data portals, and tools
- Development and dissemination of CURE educational materials
- Access to a community of collections professionals and educators with expertise in natural history collections CUREs
- Encourages implementation at diverse institutions, thereby increasing undergraduate research opportunities, especially for underrepresented populations in STEM and first generation students

BCEENET CUREs

4 CUREs using digitized natural history collections created in summer 2020

In 2020-2021, these CUREs were implemented in:

- Over 30 institutions, including R1s, PUIs, community colleges, and MSIs
- First-year through upper division courses
- Online and hybrid, synchronous and asynchronous settings

> "Often in lab classes, the data you generate is the data you use," said first-year biology major Julia Felton. "But in this case, we had access to datasets from over 20 years ago. This gave us the opportunity to observe the effects over time of factors like climate change on butterfly populations."

Over 1400 students participated in undergraduate research!

Connecting Collections with CUREs

- What information/data sets would you need for your ideal collections-based CUREs?
- Is there a research question you would like to see addressed by a CURE?
- Do you know of any species that have robust specimen record sets that would be useful for a CURE?

Get Involved!!

New Collaborators & Implementers Welcome!!

Attend the 2021 BCEENET Meeting

https://bceenetwork.org/2021-virtual-meeting/

Email the coordination team at:

bceenetwork@gmail.com

Visit our webpage and sign up for our mailing list at:

https://bceenetwork.org/