

**Thrills and spills: sharing  
experiences, insights, and  
products on education,  
outreach, diversity & inclusion**

**ADBC Summit 2019**



**iDigBio**

Integrated Digitized Biocollections

# Outline

- 75 mins total
- 5 minute lightning talks
- Q&A/Discussion after everyone goes...

# Digital Fossils: There's an App for That



*Bruce S. Lieberman*  
*Biodiversity Institute, University of Kansas*

# The PALEONICHES - TCN



Ordovician  
Cincinnati Region



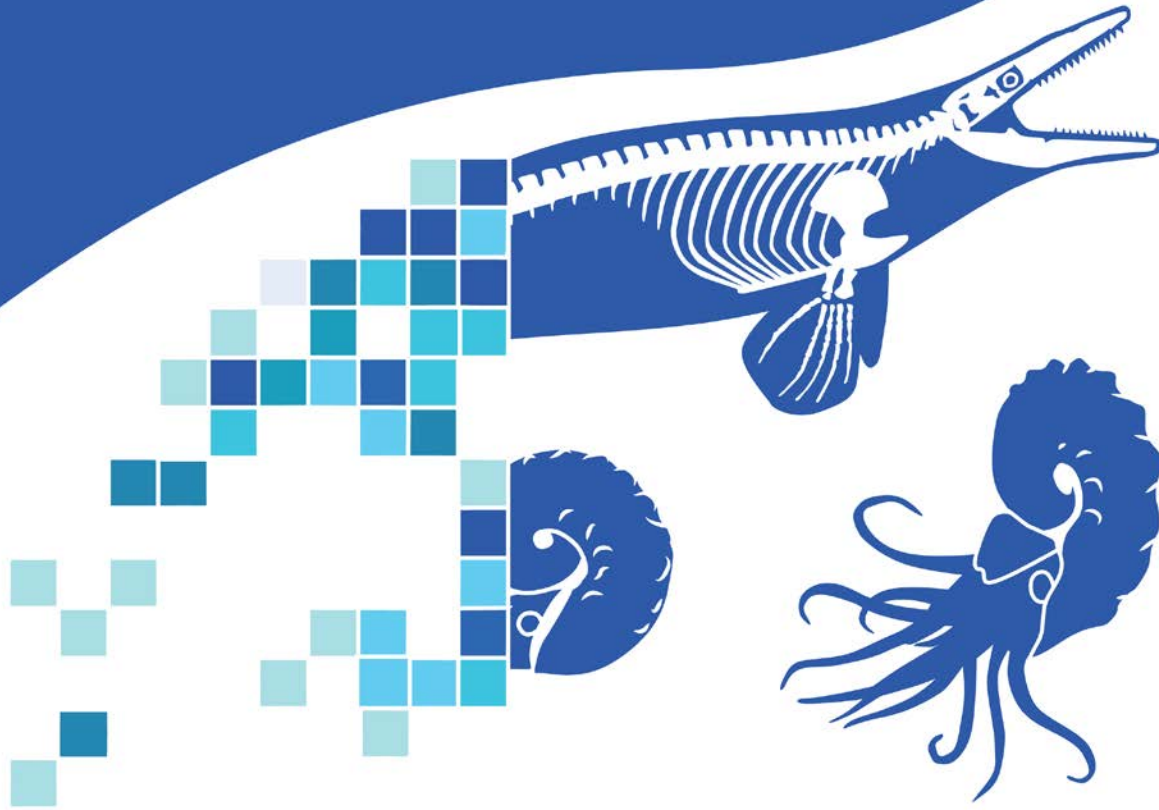
Pennsylvanian  
Midcontinent U.S.



Neogene  
Southeastern U.S.

# The Cretaceous World - TCN

## Cretaceous World



# PALEONICHES – TCN: Outreach



[www.digitalatlasofancientlife.org](http://www.digitalatlasofancientlife.org)

 @PaleoDigAtlas

Digital Atlas App

Free for iPhone/iPad



# Cretaceous World – TCN: Outreach



## Cretaceous Atlas of Ancient Life Western Interior Seaway



Atlas

All Species

Geology

Google™ Custom Search



### Welcome to the Cretaceous Atlas!

A digital field guide to the ancient life of the Western Interior Seaway, which divided North America in half during the age of dinosaurs.

Identify the fossils left behind. Learn where they were found. Discover how they once lived.



# PALEONICHES – TCN: Outreach

*Digital Atlas of Ancient Life* Website:

[www.digitalatlasofancientlife.org](http://www.digitalatlasofancientlife.org)

Described in Hendricks, Stigall, and  
Lieberman. 2015. *Palaeontologia Electronica*

More than 1,250 species represented



# DIGITAL ATLAS OF ANCIENT LIFE *APP*

Derived from *Digital Atlas of Ancient Life*  
website

Works on both *iPad* and *iPhone*

*App* is available for free at *Apple App Store*

Programmers Rod and Zach Spears



Skype



Flappy Bird



Weather



2048



Checkers



Twitter



Calculator P...



COC Calc



Chess Free



Plague Inc.



Fun Run



Zombie Hw



iFunny



Metronome



SoundCloud



Twitch



Netflix



Chrome



HockeyApp



Digital Atlas



Skyward



Photography



Action



Instagram



Music



Settings



# Digital Atlas of Ancient Life

## Electronic Field Guide

Explore taxonomic information, images and maps for three Paleontological time periods.

▶ **START**

🕒 **BROWSE**

🕒 **TIME PERIOD**



Ordovician



Pennsylvanian



Neogene



## Information

The Digital Atlas of Ancient Life Electronic Field Guide App is supported by a grant from the National Science Foundation to principal investigators Dr. Bruce Lieberman (University of Kansas), Dr. Alycia Stigall (Ohio University), and Dr. Jonathan Hendricks (San Jose State University). The grant is titled, "Digitizing Fossils to Enable New Syntheses in Biogeography - Creating a PALEONICHES-TCN" (TCN stands for Thematic Collections Network).

This project is related to a broader natural history specimen digitization effort supported by the National Resource for Advancing Digitization of Biodiversity Collections (ADBC) called Integrated Digitized Biocollections, or iDigBio.

The main portal page for the Digital Atlas of Ancient Life project can be accessed at [www.digitalatlasofancientlife.org](http://www.digitalatlasofancientlife.org). For additional information about the project, please see the recently published open-access paper by Hendricks, Stigall, and Lieberman (2015) in [Palaeontologia Electronica](#). The individual websites can be accessed at: [Ordovician Atlas](#), [Pennsylvanian Atlas](#), and [Neogene Atlas](#).

Funding for development and construction of this webpage was provided by the National Science Foundation (EF-1206757, EF-1206769, and EF-1206750)

Version: 1.0 (26)

Created by Rod Spears  
Designed by Zach Spears



# Digital Atlas of Ancient Life Electronic Field Guide

Explore taxonomic information, images and maps for three Paleontological time periods.



< Back

# Phylum

Tap on a fossil to dig deeper into the taxonomic information.



Arthropoda



Brachiopoda



Bryozoa



Cnidaria



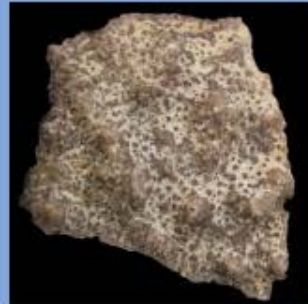
Echinodermata



Hemichordata



Mollusca



Porifera



Trace Fossils

[← Back](#)

## Class Trilobita



Phylum  
**Arthropoda**



Class  
**Trilobita**



Asaphida



Lichida



Phacopida



Ptychopariida



Class  
Trilobita



Order  
Phacopida



Family  
Calymenidae



Genus  
*Flexicalymene*



Species  
*Flexicalymene me...*

< Back

# *Flexicalymene meeki*

(Foerste, 1910)

## Geological Range

Maysvillian to Richmondian Age, C2 to C6 sequences

## Paleogeographical Distribution

Ohio, Indiana, Kentucky, Virginia, New York, and Minnesota

## Remarks

The most commonly found trilobite in Cincinnati strata. Characterized by 13 (rarely 12) segments, sub triangular glabella, three glabellar furrows, and blunt, rounded genal spines.

## Stratigraphic Occurrences

### Richmondian C6

Bull Fork Formation  
Dillsboro Formation  
Elkhorn Formation  
Upper Whitewater Formation

### Richmondian C5

Bull Fork Formation  
Dillsboro Formation  
Liberty Formation  
Waynesville Formation  
Whitewater Formation

### Richmondian C4

Arnheim Formation

### Maysvillian C3

Corryville Formation  
Dillsboro Formation  
Gilbert Formation  
Grant Lake Formation  
Mount Auburn Formation

### Maysvillian C2

Bellevue Formation  
Calloway Creek Formation  
Fairmount Formation  
Fairview Formation  
Mount Hope Formation

| Chatfieldian | Edenian | Maysvillian |    |    | Richmondian |    |  |
|--------------|---------|-------------|----|----|-------------|----|--|
|              | C1      | C2          | C3 | C4 | C5          | C6 |  |



< Back

# *Flexicalymene meeki*

(Foerste, 1910)



Class  
**Trilobita**



Order  
**Phacopida**



Family  
**Calymenidae**



Genus  
***Flexicalymene***



Species  
***Flexicalymene me...***





< Back

# *Flexicalymene meeki*

(Foerste, 1910)



Class  
Trilobita



Order  
Phacopida



Family  
Calymenidae



Genus  
*Flexicalymene*



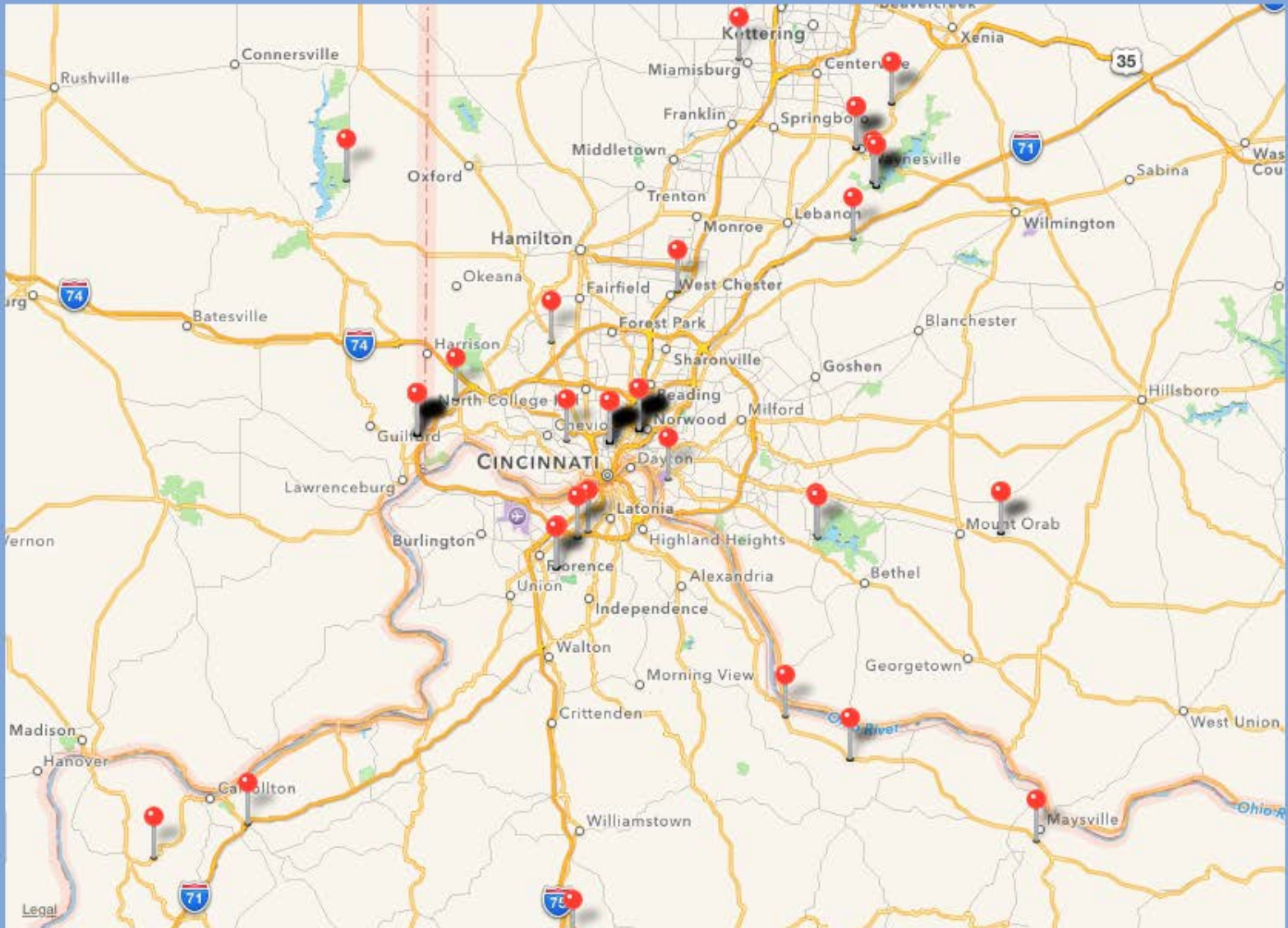
Species  
*Flexicalymene me...*



◀ Back

# *Flexicalymene meeki*

(Foerste, 1910)



Class  
Trilobita



Order  
Phacopida



Family  
Calymenidae



Genus  
*Flexicalymene*



Species  
*Flexicalymene me...*





Class  
Trilobita



Order  
Phacopida



Family  
Calymenidae



Genus  
*Flexicalymene*

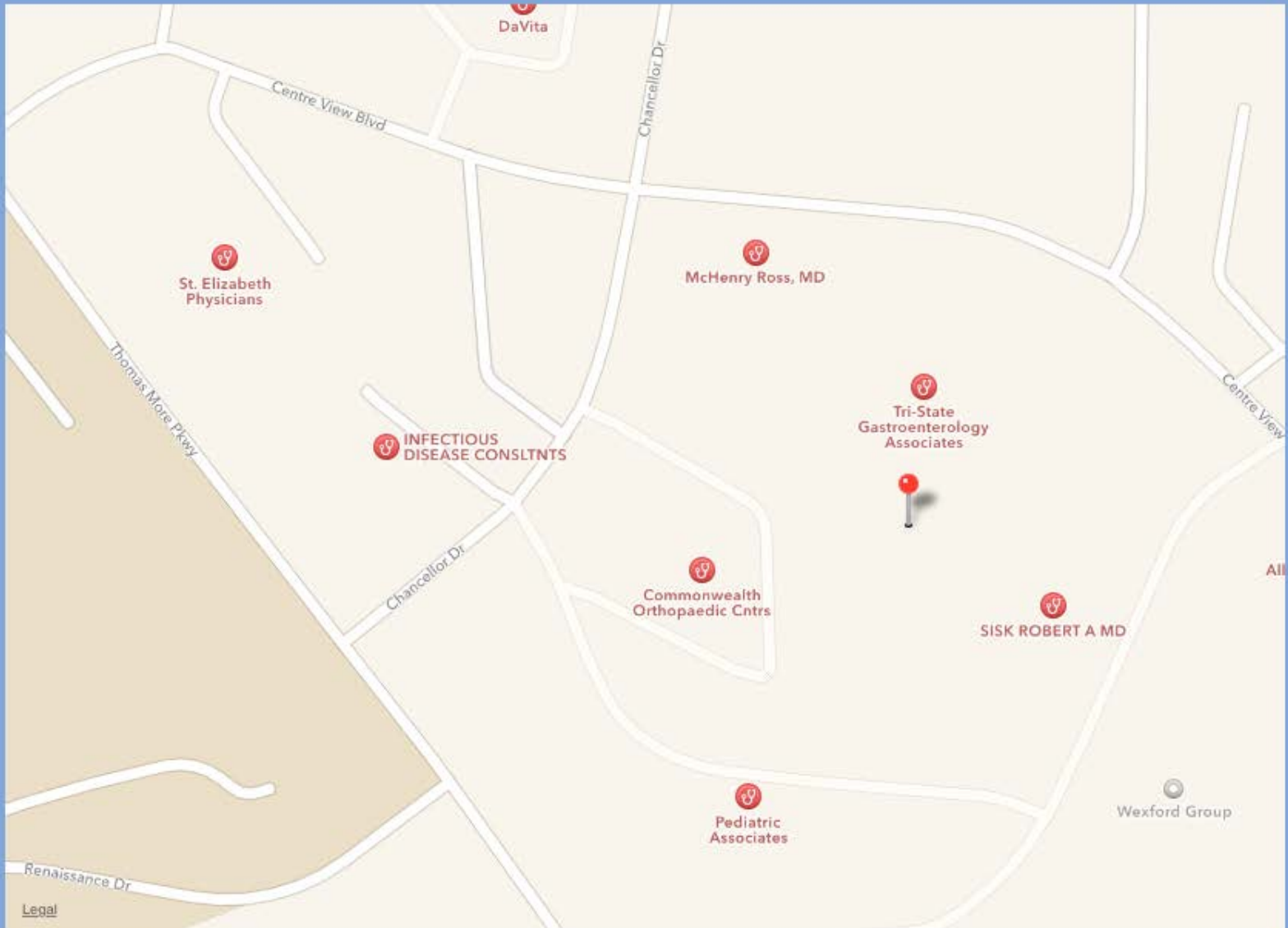


Species  
*Flexicalymene meeki*

< Back

# *Flexicalymene meeki*

(Foerste, 1910)





*Acantholabia sarasotaensis*



*Agathotoma candidissima*



*Agladrillia aulakoessa*



*Agladrillia rabdotacona*



*Agnocardia acrocome*



*Architectonica chipolana*



*Architectonica nobilis*



*Arene agenea*



*Arene solariella*



*Arene tricarinata*



*Astralium phoebium*



*Bellaspira pentagonalis*



Class  
Gastropoda



Order  
Heterobranchia



Family  
Architectonicidae



Genus  
Architectonica



Species  
Architectonica no...

< Back

# Architectonica nobilis

Roding, 1798

## Geological Range

Late Miocene to Middle Pleistocene; Recent.

## Paleogeographical Distribution

Panama to Virginia.

## Remarks

For information on the modern distribution of the species, see [Malacolog](#) and [WoRMS](#).

## Stratigraphic Occurrences

### Middle Pleistocene

Bermont Formation (S. FL)

### Early Pleistocene

Caloosahatchee Formation (S. FL)

Nashua Formation (N. FL)

### Late Pliocene

Duplin Formation (SC, NC)

Duplin / Raysor formations (GA)

Jackson Bluff Formation (N. FL)

Mare Formation (Venezuela)

Raysor Formation (SC)

Tamiami Formation (S. FL)

Tamiami Formation (Lower) (S. FL)

Tamiami Formation (Ochopee Limestone) (S. FL)

Tamiami Formation (Pinecrest Beds) (S. FL)

Yorktown Formation (VA)

### Early Pliocene

Bowden Formation (Jamaica)

Cayo Agua Formation (Panama)

Playa Grande Formation (Maiquetia Member) (Venezuela)

### Late Miocene

Chagres Formation (Panama)

Gatun Formation (Upper) (Panama)

Gatun Formation (Middle) (Panama)

Gatun Formation (Lower) (Panama)

| Pleistocene               |                       |                         |                       | Pliocene                 |                         | Miocene                  |                          |                             |                         |                            |                           |
|---------------------------|-----------------------|-------------------------|-----------------------|--------------------------|-------------------------|--------------------------|--------------------------|-----------------------------|-------------------------|----------------------------|---------------------------|
| Late                      | Middle                | Early                   |                       | Late                     | Early                   | Late                     |                          | Middle                      |                         | Early                      |                           |
| Tarantian<br>0.126–0.0117 | Ionian<br>0.781–0.126 | Calabrian<br>1.80–0.781 | Gelasian<br>2.58–1.80 | Piacenzian<br>3.600-2.58 | Zanclean<br>5.333-3.600 | Messinian<br>7.246-5.333 | Tortonian<br>11.62-7.246 | Serravallian<br>13.82-11.62 | Langhian<br>15.97-13.82 | Burdigalian<br>20.44-15.97 | Aquitanian<br>23.03-20.44 |



< Back

# *Architectonica nobilis*

Roding, 1798



Class  
**Gastropoda**



Order  
**Heterobranchia**



Family  
**Architectonicidae**



Genus  
***Architectonica***



Species  
***Architectonica no...***





Class  
**Gastropoda**



Order  
**Heterobranchia**



Family  
**Architectonicidae**



Genus  
**Architectonica**

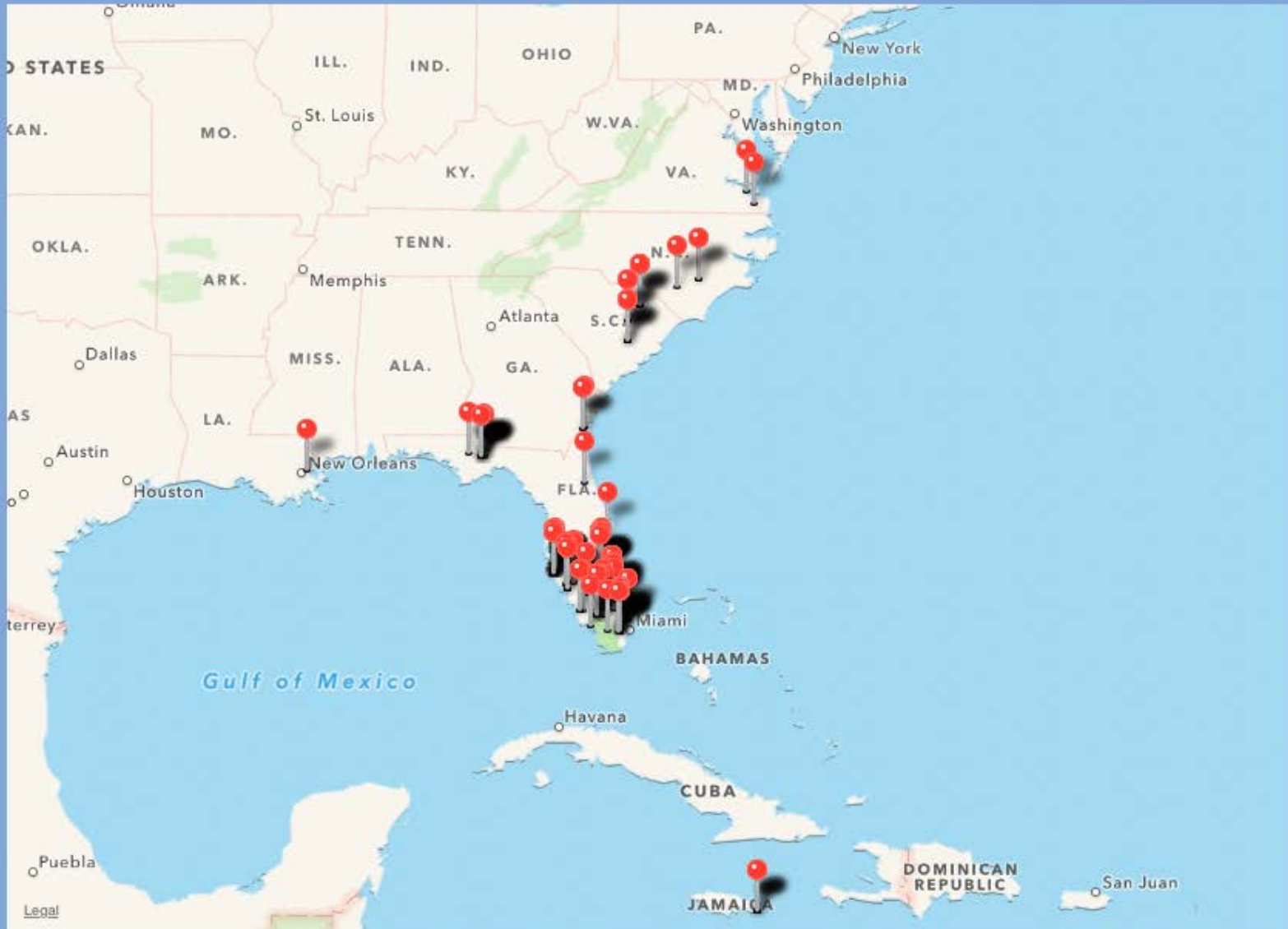


Species  
**Architectonica no...**

< Back

# *Architectonica nobilis*

Roding, 1798



# Conclusions

Digitizing museum collections enables knowledge transfer to the general public





# Thanks to:

Julien Kimmig, Rod & Zach  
Spears, Jim Beach (KU)

Jon Hendricks (PRI)

Alycia Stigall (Ohio U.)



## Funding

NSF Advancing the Digitization of Biological Collections

NSF Emerging Frontiers

# WE DIG FL PLANTS

Digitizing Natural History Together

## Team Challenge 2019!

WeDigFLPlants is pleased to announce the second **Team Challenge**. Five-person teams will compete to contribute data about the greatest number of Florida-collected plant specimens during the Worldwide Engagement for Digitizing Biocollections (WeDigBio) 2019 Event. Winning team members get great-looking t-shirts with the logo on the front (similar to the picture) and their team name across the back. We will also send a t-shirt to the top three most valuable players—participants with the greatest number of contributions who were not on the winning team. There are no restrictions for team composition. You could recruit enough participants to form one or more teams from a student group, a chapter of the Florida Native Plant Society, a Florida Master Gardener group, your high school graduating class, your book club, scattered friends from around the world—the possibilities are endless.



**When:** The team challenge starts as soon as it is October 17 somewhere in the world and ends when it is no longer October 20 anywhere in the world. This corresponds to the start and end of WeDigBio 2019 (see [wedigbio.org](http://wedigbio.org) for more info on that event, if you are interested).

**Where:** You can participate in the competition from anywhere in the world where you can access the internet.

# EXPEDITIONS

VIEW COMPLETED EXPEDITIONS

31 Expeditions

94973 Transcriptions

1912 Transcribers

◆ TITLE ◆ DATE



WeDigFLPlants'  
Buckthorns, Elms, and  
Figs of Florida



3602 Transcriptions 58.74% completed



WeDigFLPlants'  
Buckeyes, Sumacs, and  
Citrus of Florida



2140 Transcriptions 57.39% completed



# Flora Of Lake Miccosukee 1992

## PLANTS OF FLORIDA

Morus rubra L.

**JEFFERSON COUNTY:** Infrequent in mesic hammock, this from a sapling ca. 4 m in height. S end of "Cat Hammock," Mays Pond Plantation. S 1/2 of NW 1/4 Sec 7, T2N R4E.

Coll. K. Craddock Burks # 262  
7 June 1989

Florida State University Herbarium  
Tallahassee, FL 32306, U.S.A.

TASK

TUTORIAL

Florida County

County

Select...

NEED SOME HELP WITH THIS TASK?

Next →



## SCOREBOARD



### Team Challenge 2018

**2784**  
Transcriptions

| # | Team             | Transcriptions |
|---|------------------|----------------|
| 1 | CrossCoasters    | 683            |
| 2 | MAGFLORA         | 592            |
| 3 | The Botaniers :P | 305            |
| 4 | I Wet My Plants  | 295            |
| 5 | Dank             | 262            |



# Wisconsin State Herbarium

Department of Botany

UNIVERSITY OF WISCONSIN-MADISON

***Professor Ken Cameron,  
Director***

LAPI & Global Plants Initiative

WisFlora Project\*

Tritrophic TCN

Lichens and Bryophytes TCN\*

Microfungi TCN

Great Lakes Invasives TCN\*

Endless Forms TCN

Pteridophytes TCN

IMLS Cryptogam Digitization\*

UW/2020 Campus-wide Digitization\*





# Wisconsin State Herbarium

Department of Botany

UNIVERSITY OF WISCONSIN-MADISON

## HERBARIUM CURATION WORKSHOPS

- I. Field Collection and Specimen Preparation
- II. Mounting Herbarium Specimens
- III. Databasing & TCN Web Portals
- IV. Specimen Imaging
- V. Georeferencing
- VI. Filing





# Certificate of Training



*this certifies that*

## Kelly Martin

*has successfully completed*

*the Herbarium Curation Training Program – administered by the Wisconsin State Herbarium: workshops attended include vascular plant mounting, transcribing/digitizing, filing, data management, and geo-referencing*

Signed \_\_\_\_\_

Date \_\_\_\_\_

Mary Ann Feist – Herbarium Curator, Wisconsin State Herbarium  
Sharon West – Microfungi TCN Project Manager, WIS



# Thrills and Spills: Notes from Nature

M.W. Denslow

iDigBio Summit 2019



NSF Award 1410069



# Notes from Nature (NfN)

**TASK** **TUTORIAL**

Unfolded Leaves Present?

Yes

No

NEED SOME HELP WITH THIS TASK?

[Back](#) [Done & Talk](#) [Done](#)

# NfN Basics

- Over 2 million transcriptions
- Over 17,000 registered users
- Over 200 expeditions



# NfN *THRILLS*

- Over 2 million transcriptions
- Over 17,000 registered users
- Over 200 expeditions



# NfN (1.0) Spills

- Images sets very limited
- Loading images challenging
- Backend specialized

**We were getting interest, but how could we possibility keep this going?!**

# NfN (2.0) Thrills

- Proof of concept leads to further development
  - Thank to NSF and community support!
- More control of backend

**We can build smaller thematic expeditions,  
which are much more effective!**



# NfN 3.0 Thrills and Spills

- Giving more control to the community

**As our primary funding runs down how do we keep NfN flourishing?**



# Notes from Nature

Transcribe museum records!

NOTES FROM NATURE

s Volunteer

All

Plants

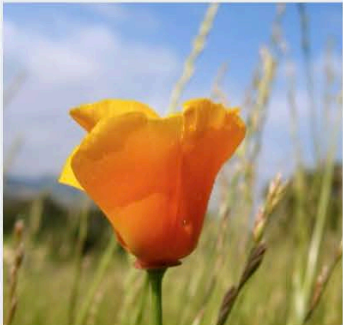
Bugs

Butterflies

Labs



NOTES FROM NATURE -  
SOUTHEASTERN U.S.  
BIODIVERSITY



NOTES FROM NATURE -  
CAPTURING CALIFORNIA'S  
FLOWERS



NOTES FROM NATURE -  
BUTTERFLIES



NOTES FROM NATURE -  
PLANTS OF ARKANSAS

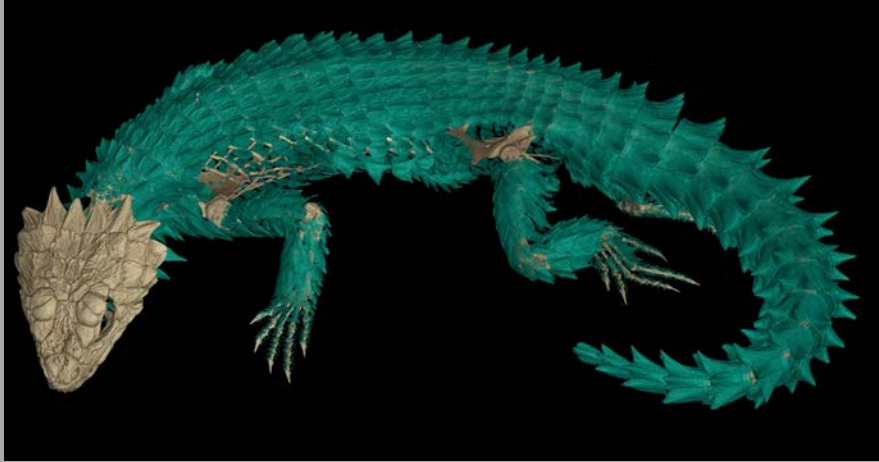


NOTES FROM NATURE -  
CALBUG

# NfN 3.0 Thrills?

- Organization Model
  - Organization = Notes from Nature
  - Projects = Southeastern U.S. Biodiversity
  - Expeditions = Dr. T's Ferntastic Collection
- More content
- More user permission and access to backend

# openVertebrate (oVert) Thematic Collection Network



David C. Blackburn  
Associate Curator of Herpetology  
Florida Museum of Natural History  
University of Florida

*Thrills and spills: sharing experiences,  
insights, and products on education,  
outreach, diversity & inclusion*

University of Florida  
October 2, 2019



#oVertTCN





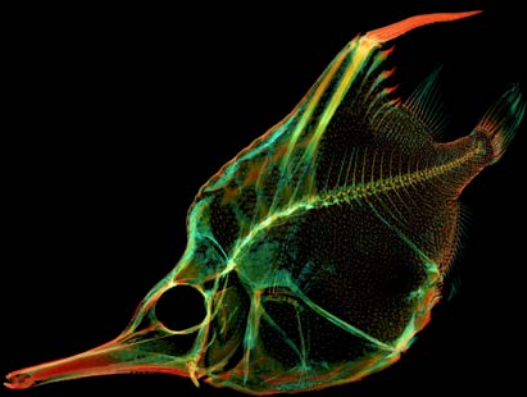
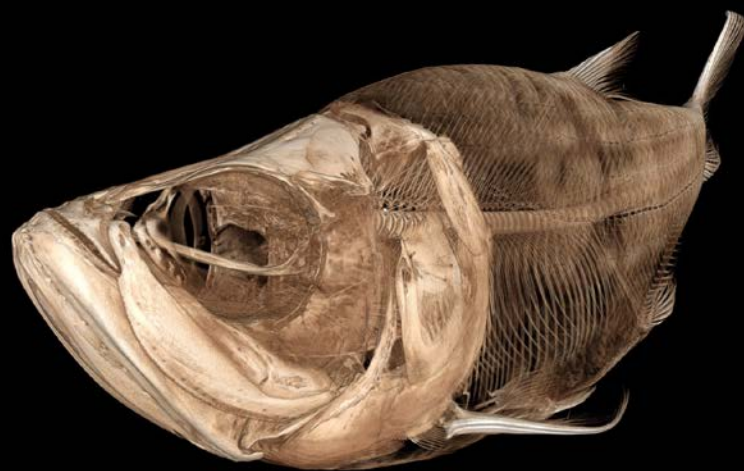
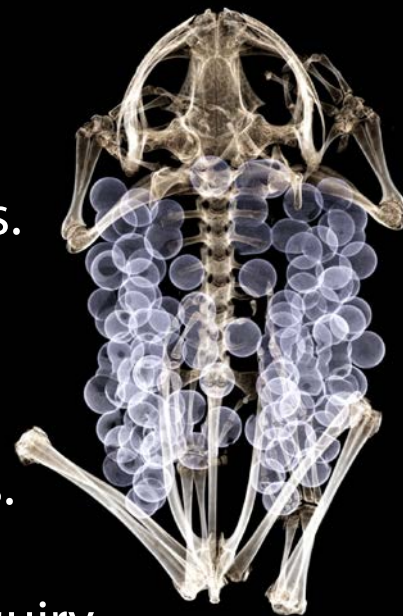
## Digital Collection Objects

Add value to natural history collections.

Increase and democratize access.

Facilitate discoveries across disciplines.

Expand opportunities for object-based inquiry.



# overt

## K12 classrooms



Academy of Holy Names  
Tampa, Florida

## Undergrad Teaching



Chris Sheil  
John Carroll University

## Art: "Creature Design" class



Lars Grant-West  
Rhode Island School of Design



## Working with teachers to develop new learning activities that make use of 3D data in classrooms



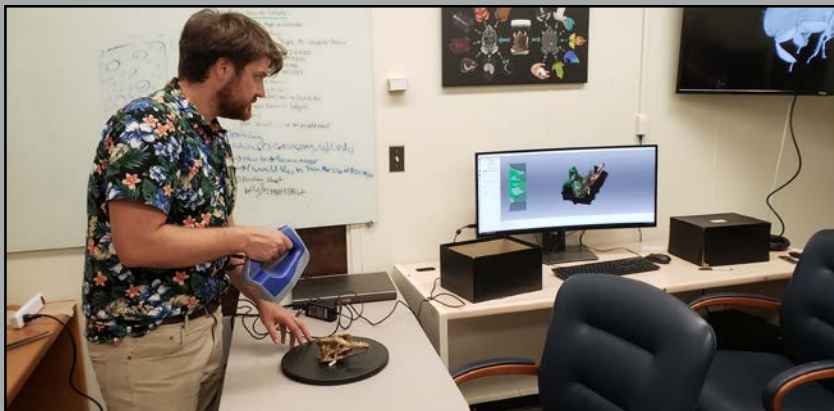
Teacher: Bridget Armstrong

School: Okeehatchee Middle School

[Armstrong\\_Evidence of Evolution Homologous Structures](#)

Abstract:

This lesson plan uses the products of the oVERT project, at the University of Florida, in order to make the Evidence of Evolution section of the Middle School Scope and Sequence both more hands on, and more attractive to students of the technological age. Specifically, it uses the CT (Computed Tomography) scans of vertebrate forelimbs, both as 3D models and as shapefiles, to enhance and illustrate the concepts of homologous structures, and the evolution of anatomical structures as a function of their use (i.e. locomotion, grasping, and burrowing).



Teacher: Jennifer Broo

School: Mariemont High School

[Broo\\_Origin and Diversity of Armor in Girdled Lizards](#)

Abstract:

The girdled lizards (Cordylidae) are a family of distinctively armored lizards endemic to Sub-Saharan Africa. Students examine lizards in this family to classify the lizards based on morphological characteristics. Students graph data on the percentage of osteoderm coverage in each lizard group and discover that natural selection due to predation has resulted in lightly armored lizards living in large rocks and more heavily armored lizards living in open areas. Students then compare their morphological classification to phylogenetic trees created from DNA analysis and discover that convergent evolution is responsible for differences in osteoderm coverage within the Cordylidae family and in the animal kingdom.

June 2019





coming soon: new MorphoSource viewer

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# 3D-printed Puzzles for Teaching & Outreach

## Tips and Fits: Tricks to 3D Puzzle Making

Amber Singh, Rachel Keefe, & David C. Blackburn  
Department of Biology and Florida Museum of Natural History, University of Florida

**UF UNIVERSITY OF FLORIDA FLORIDA MUSEUM**

### INTRODUCTION

- The growing popularity of 3D printers and CT-scanning have made 3D digital models of organisms widely available
- These models, especially those of skeletons, lend themselves to education and outreach opportunities
- Puzzles are a great way to make museum specimens fun to explore and accessible to wide audiences
- In this project, we created an anatomically accurate 3D skull puzzle for *Rhinoceros floridanus* (the Florida worm lizard) color-coded by bone type
- These are some tips we have for making your own puzzles

### GETTING STARTED

- Download files of interest
- Most 3D printers work with all (stereolithography) files—many are available for download via MorphoSource
- Some software (e.g. MeshLab) can convert other 3D file types (.obj) to all files
- Keep in mind the sturdiness of the specimen, robust skulls (e.g. fossorial animals) hold up better than weak ones (e.g. hummingbirds, etc.)

### CONSIDERING PRINTERS

- Many public libraries and universities have 3D printers available—but are some examples:

| TYPE                            | DESCRIPTION   | PROS   | CONS                                    |
|---------------------------------|---|--|---|
| Digital Light Processing (DLP)  | Layers harden liquid resin onto a build platform layer by layer (SLA) | High fidelity; low power for jams                    | Some post-processing; expensive         |
| Fused Deposition Modeling (FDM) | Heats and extrudes plastic strands through a nozzle to produce prints | Cheaper; more common                                 | Can jam; often requires post-processing |
| Selective Laser Sintering (SLS) | Layers fine powder particles layer by layer into a 3D print           | Fast; high fidelity; does not use support structures | Expensive; not widely available         |

### ADHESION METHODS

- The most important aspect of a good puzzle is how the pieces stick together!

| GLUE TYPE     | PROS                    | CONS  |
|---------------|-------------------------|---|
| 1 Magnets     | Cheap, strong, durable  | Orientations must be correct                    |
| 2 Pops/Sticks | No post-processing      | Time consuming; requires high dexterity printer |
| 3 Velcro      | Cheap, easy application | Occlusions will suffice; can wear out           |

- For magnets, either edit the .stl file to have pre-made holes when the model is printed, or use a Dremel tool to make the openings and then glue magnets in place
- Magnets may help in the adhesion of thin bone elements (note that it is only magnet-encapsulated)

### PLASTICS

- Polymers (e.g. ABS, EVA, nylon, etc.) differ in their material properties
- ABS plastic is common in extruder printers and it's in acetone (an acetone bath can help smooth rough edges)
- Lower printers (e.g. Formlabs '2') have durable, flexible, and color-stable
- Explore the options for your printer type

### HOW TO COLOR

| TIER | TYPE          | PROS                           | CONS  |
|------|---------------|--------------------------------|---|
| 1    | Chalking      | Cheap, available               | Some post-processing (dust removal)         |
| 2    | Primer        | No post-processing time        | Expensive, colors often limited             |
| 3    | Mat Polish    | Many colors; available, glossy | Expensive; chips, acetone base can be toxic |
| 4    | Acrylic Paint | Many colors available          | Chips                                       |
| 5    | Watercolor    | Many colors available; cheap   | Chips, poor color transfer                  |

### APPLICATIONS

- These types of puzzles are excellent for classes on biodiversity and comparative anatomy
- Using color to understand bone homologies is simple and accessible
- Puzzles are hands-on and allow students and lifelong learners to interact with museum specimens easily, especially specimens that would otherwise be too small, old, or rare
- Broken pieces can easily be replaced
- They make great outreach tools, as many people are naturally drawn to solving puzzles

### Acknowledgements

- This work was supported by National Science Foundation DUE (David Blackburn, Fellowship DGE-131115) and DUE (Rachel Keefe, Fellowship DGE-Collaboration Network 088-176114)
- Special thanks to the Florida Museum of Natural History for providing access to the digital model
- Special thanks to Amber Singh (ambersingh@ufl.edu) for her help with the Formlabs printer
- Special thanks to Rachel Keefe (rkeefe@ufl.edu) for her help with the 3D printing process
- Special thanks to the Florida Museum of Natural History for providing access to the digital model

**overt**





# BCEENET

**BIOLOGICAL COLLECTIONS IN  
ECOLOGY AND EVOLUTION NETWORK**



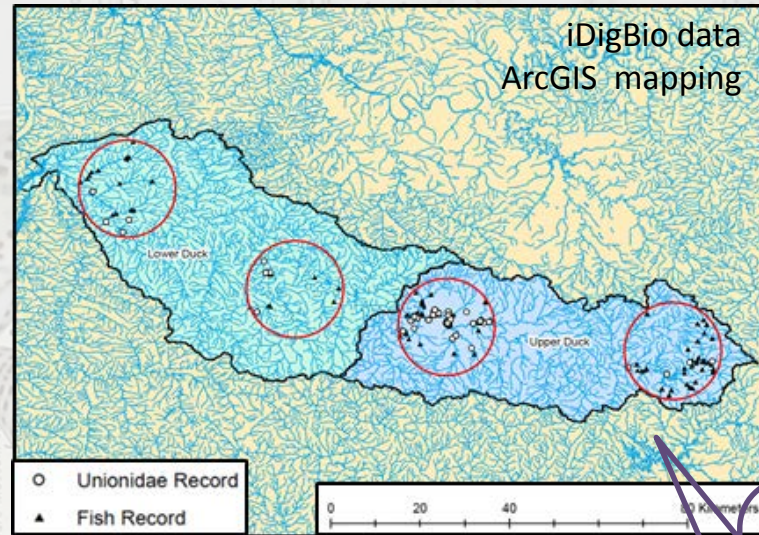
Widener University



Delaware Museum  
of Natural History



Widener University  
BIOL 350: Natural History Collections  
Spring 2018



Course-based Undergraduate Research Experience  
(CURE)

Surprising how few academics knew about digitized natural history collections and their uses!

# RCN-UBE incubator: Network for the integration of NHCs in Ecology and Evolutionary Biology CUREs



The screenshot shows the website for the Biological Collections Ecology and Evolution Network (BCEE Network) on the Delaware Museum of Natural History's website. The page features a green header with the museum's name and navigation links. Below the header is the BCEE Network logo, which consists of stylized green and blue starburst shapes next to the text "BCEENET BIOLOGICAL COLLECTIONS IN ECOLOGY AND EVOLUTION NETWORK". The main content area has a green heading "Welcome to the BCEE Network" followed by a sub-heading "The Biological Collections Ecology and Evolution Network – fostering undergraduate scientific exploration using natural history specimen data." There is a photograph of a woman in a museum setting looking at specimens. Text on the page describes the project's goals, benefits for students, and contact information for Dr. Janice Krumm and Dr. Jean Woods. A blue box at the bottom contains a sign-up form for more information.

## Overview:

- 1 year, NSF RCN –UBE incubator grant
- Steering Committee: iDigBio + faculty from mid-Atlantic Univ
- Goal: get a network up and running
- Activities: survey (now) and workshop (spring)
- Major outcome: 5 year, NSF RCN grant application

## Survey (< 10 min):

- What do museum professionals know about CUREs and how to get involved?
- What do faculty know about NHCs & how to use them?
- What resources/skills are essential?
  - Contribute to ongoing iDigBio & BLUE discussions

<https://tinyurl.com/bceesurvey>



# Related Networks

Natural History Collection Data



NHODE – Natural History Organizations for (bio)Diversity and Education Network (in development)

Quantitative biology education



STUB – Statistical Thinking in Undergraduate Biology

CURE development





# BCEENET

**BIOLOGICAL COLLECTIONS IN  
ECOLOGY AND EVOLUTION NETWORK**

Liz Shea (co-PI)

[eshea@delmnh.org](mailto:eshea@delmnh.org)

Jean Woods (co-PI)

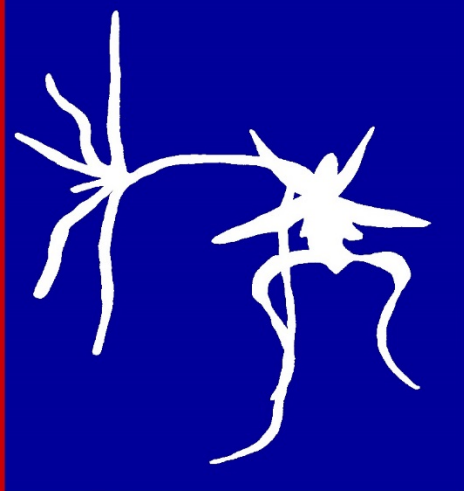
[jwoods@delmnh.org](mailto:jwoods@delmnh.org)

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<https://tinyurl.com/bceesurvey>



# The Endless Forms TCN



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NYBG



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The Academy of  
Natural Sciences  
of DREXEL UNIVERSITY

Berkeley  
UNIVERSITY OF CALIFORNIA



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AMHERST



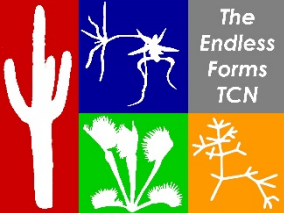
TEXAS  
The University of Texas at Austin



ILLINOIS NATURAL  
HISTORY SURVEY  
PRAIRIE RESEARCH INSTITUTE

MARIE  
SELBY  
BOTANICAL  
GARDENS





# Endless Forms Conservation Internship

- Digitize 2,000,000 herbarium specimens of carnivorous, epiphytic, and succulent plants in 15 families from all global regions
- NYBG partnered with a local NYC High School
- 5 high school students worked at NYBG for 1 month
- They learned about the project, the plants involved, and the conservation threats facing the world's plants
- Students learned basic GIS techniques, and worked on 2 species / student, producing draft conservation assessments







- Students presented their research to NYBG Science staff
- They were interviewed by the NYBG marketing department, and their presentations were filmed

- When asked about how this internship changed their understanding of plant conservation, the students all said this internship completely changed their world view of conservation, and improved their understanding of data gathering & analysis



## Undergraduate Resources

Wed, 2015-10-21 11:42 -- maphillips

### Collections-Based Online Resources for Undergraduate Students and Educators

#### Tutorials

- [iDigBio Basic Search Tutorial \(Video\)](#) Created by Teresa Mayfield
- [Searching for Species with Latitude and Longitude Data on iDigBio \(PDF\)](#) Created by iDigBio

Hello maphillips

- [Arctos introduction for non-managers \(video\)](#) Created by Teresa Mayfield
- [Uploading an Observation to iNaturalist via the Website \(Video\)](#) Created by Erica Kimmel
- [iNaturalist Search Tutorial \(Video\)](#) Created by Teresa Mayfield

#### Modules and Online Resources

##### **Using Digitized Collections-Based Data in Research: A Free hands-on crash course in ecological niche modeling**

Provides step-by-step, hands-on instruction on ways to access and download these specimen data, how to process climate layer data, and how to apply Maxent software to construct ecological niche models. The webinar is designed to introduce the concepts and practice of ecological niche modeling, so little experience is *needed*.


*Created by Blaine Marchant from the Soltis Lab, Florida Museum of Natural History, University of Florida.*

Find the course materials and recordings [here](#).

**Biodiversity Literacy in Undergraduate Education**

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Hello



# Biodiversity Literacy in Undergraduate Education

## Resources

# Biodiversity Literacy in Undergraduate Education

This is a project that is focused on bringing collections data into undergraduate classrooms and using it to teach data skills. It evolved from a meeting in November 2016 called, "[Integrating Resources and Growing the Community: Data Resources and Data Literacy](#)".



# Biodiversity Literacy in Undergraduate Education

## Resources



### Movement: Nature's Flying Machines

Blake Cahill, Anna Monfils, Debra Linton  
Version: 1.0

citizen science, quan... 217 74 0 05.23.2019



### Data is the New Science

Anna Monfils, Debra Linton, Libby Ellwood, Molly Phillips  
Version: 1.0

389 178 0 04.12.2019



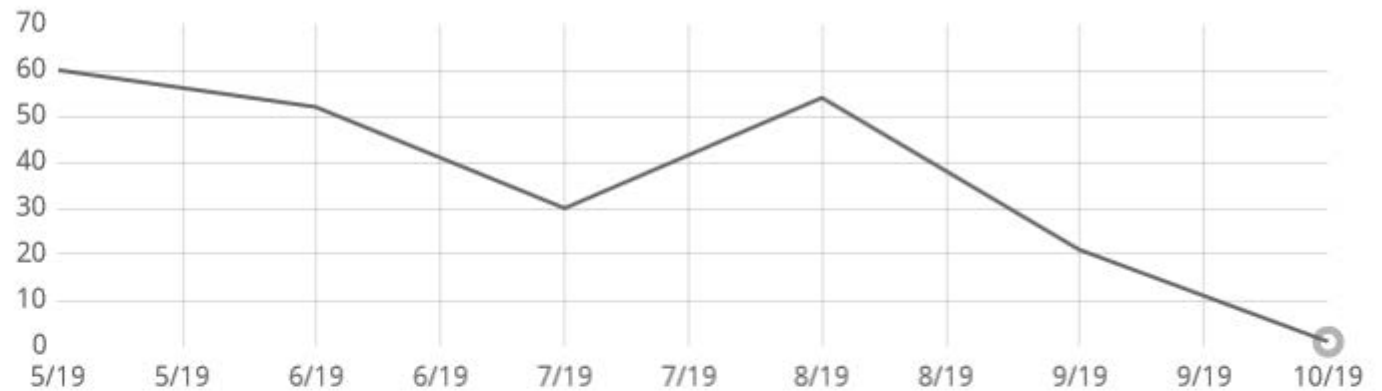
### Following the Data

Anna Monfils, Debra Linton, Molly Phillips, Libby Ellwood  
Version: 1.0

330 86 0 04.09.2019



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