



# Species-rich Invertebrate Faunas Document Causes and Consequences of Biodiversity Shifts in North America

Liz Shea

Delaware Museum of Natural History  
on behalf of the PIs





## Why digitize terrestrial and freshwater mollusks and insects?

high species richness, abundance and ecological importance  
(est. 1100 mollusk spms/species)

Use these data to answer questions about:

Distribution

Conservation

Climate change





# Collaborating Institutions

## Mollusk Collections



## Insect Collections



The Frost Entomological Museum



PENS



2016

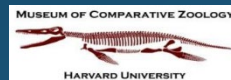


2018



2020

Bioinformatics







## Project Goals

- Digitize, georeference, mobilize data of 3 million specimens of freshwater and terrestrial insects and mollusks.
- Bring new museum collections online for the first time
  - DMNH, AUMNH, CMNH
- Update taxonomic authority tables for Mollusks and provide access through MolluscaBase and WoRMS





# Results



Worked with Symbiota to:

- Create InvertEBase.org and add 22 NHCs
  - >2.2 million mollusk *lots* now available!
- Moved Insects to SCAN (CMNH, Auburn, PSU and UMMZ)



	Data reported from InvertEBase (Mollusks) or SCAN (insects) 20 Sept 20				
Partner	Mollusk (M) or Insect (I)	#lots or occurrences	% geo referenced	estimated #specimens	as of Notes:
Auburn U. MNH	I	97,931	31	97,931	Oct-19 new online
Chicago Academy of Sci	M	15,423	42	154,230	Nov-19 PEN, new online
Chicago Academy of Sci	I	26,175	39	26,175	Oct-19 PEN, new online
Cleveland MNH	I	126,703	97	126,703	Aug-19 new online
Delaware MNH	M	78,482	52	784,820	Feb-20 new online
Field MNH	M	256,522	22	2,565,220	Jul-20 # includes all digitized material
Field MNH	I	438,272	74	438,272	Jul-20 # includes all digitized material
Frost Entomological M	I	131,808	58	131,808	Sep-20 new online
Museum of N. Arizona	I	456	87-100	456	Sep-20 PEN, new online
U. Colorado MNH	I	100,754	100	100,754	Sep-20 PEN, new online
U. Michigan Museum of Zoology	M	105,094	60	1,050,940	Sep-17 Some insects on SCAN
	Total lots	1,377,620	Total Spms	5,477,309	

# Additional Outcomes

## Mollusk Digitization workshop

2017 American Malacological Society meeting  
NSF travel support



## 6-panel exhibit



**Little Creatures, Big Data**  
Digitizing Natural History Collections

**Preserving Nature**  
For every animal or plant you see at a natural history museum, there are millions more behind the scenes.

- Fish in jars
- Shells in boxes
- Insects on pins
- Birds in drawers
- Plants on paper
- ...and so many more

**What are natural history collections?**  
Examples of animals and plants that are preserved, labeled, and organized so they can be studied—like unique books in a giant library of life.

**Where do the animals and plants come from?**  
All over the world—every continent, every country, every ocean. Scientists climb mountains, wade in rivers, hike through forests, and even dive under the sea to find them.

**Why are there so many?**  
Scientists need to have many examples of animals and plants to identify and name different species, find out how they are related, and document where they live.

**What do the labels say?**  
A label with each specimen gives its scientific name, who collected it, and where and when it was collected. These recorded pieces of information are the specimen's data. Scientists record these data so the specimen will be useful for study.

**What are all these collections for?**  
*Understanding life on Earth—past, present, and future.*

## High-throughput imaging (pin & vial)



## Papers & Posters

*Amer. Malac. Bull.* 36(2): 177–214 (2018)

### Mobilizing mollusks: Status update on mollusk collections in the U.S.A. and Canada

Petra Sierwald<sup>1</sup>, Rüdiger Bieler<sup>2</sup>, and Gary Rosenberg<sup>3</sup>  
*Amer. Malac. Bull.* 36(2): 171–176 (2018)

<sup>1</sup>Field Museum of Natural History  
rsierwald@fieldmuseum.org

<sup>2</sup>Delaware Museum of Natural History

<sup>3</sup>Academy of Natural Sciences, U.S.A.

### Priorities and opportunities for digitizing mollusk collections

Elizabeth K. Shea<sup>1</sup>, Petra Sierwald<sup>2</sup>, Rüdiger Bieler<sup>2</sup>, and Gary Rosenberg<sup>3</sup>

<sup>1</sup>Delaware Museum of Natural History, 4840 Kennett Pike, Wilmington, Delaware 19807, U.S.A. EShea@delnvh.org

<sup>2</sup>Field Museum of Natural History, 1400 South Lake Shore Drive, Chicago, Illinois 60605-2496, U.S.A.

<sup>3</sup>Academy of Natural Sciences of Drexel University, 1900 Benjamin Franklin Parkway, Philadelphia, Pennsylvania, 19103, U.S.A.



## Ongoing activities

- refine georeferencing workflows
- refine and improve the taxonomic authority files in WoRMS
- connect datasets to iDigBio, GBIF and other data portals as appropriate





**Eastern Seaboard**  
Digitizing Millions of Marine Mollusks

InvertEBase Mollusk collections will continue digitizing  
with an expanded scope and partners

Eastern Seaboard TCN