

NATURAL HISTORY COLLECTIONS:

UNDERSTANDING OUR PAST TO INFORM OUR FUTURE



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Main Types of Natural History Collections



Pressed and dried plant specimen



Fossil specimen



Pinned insects



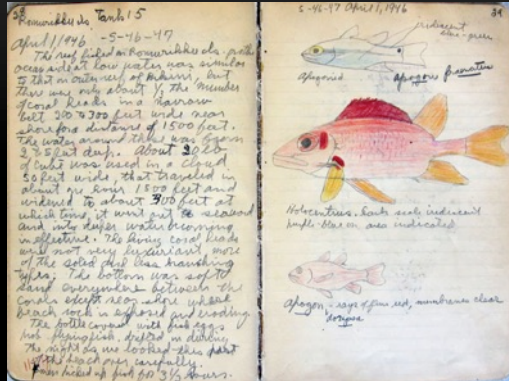
Fish specimens in fluid



Mammal skin specimen

The most common types of natural history collections are vertebrates, both extinct and modern; invertebrates, including insects, the most abundant collection type, and plants

Other Natural History Collections



Field notes



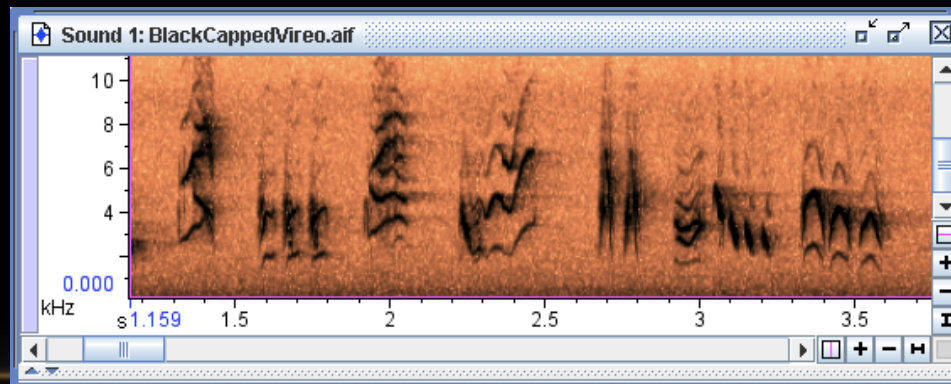
Tissue samples



Fossilized footprints



Egg collection

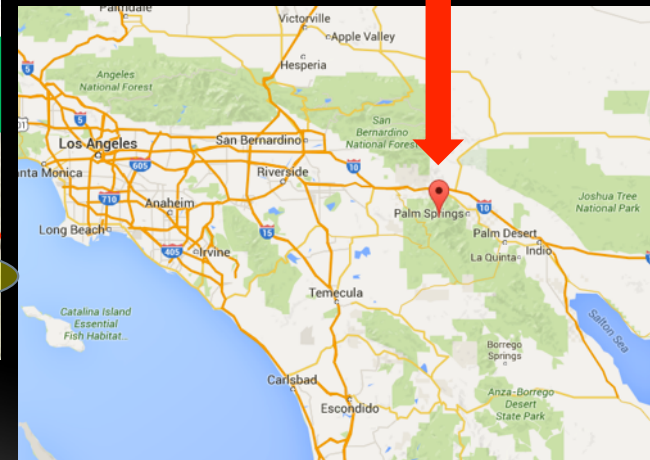
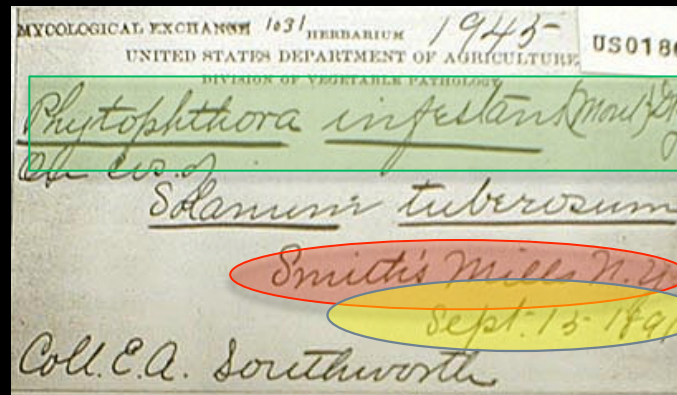
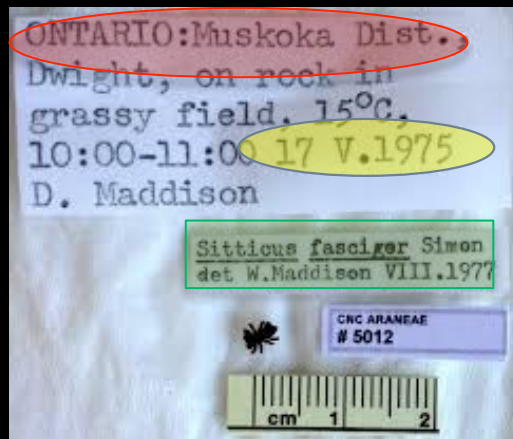
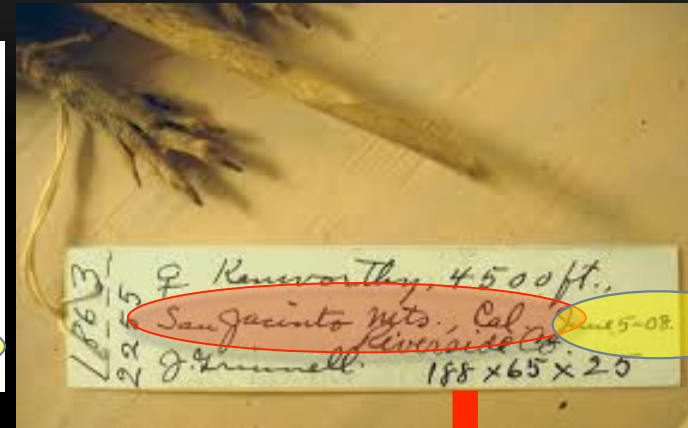
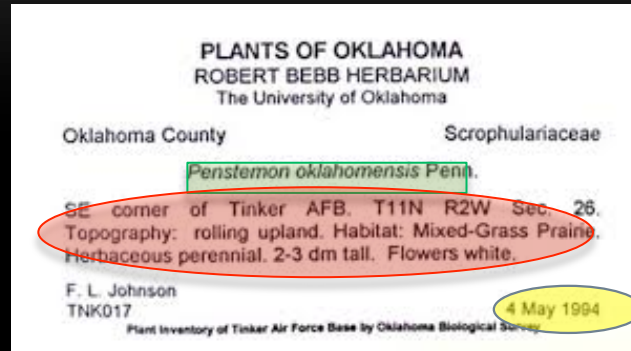
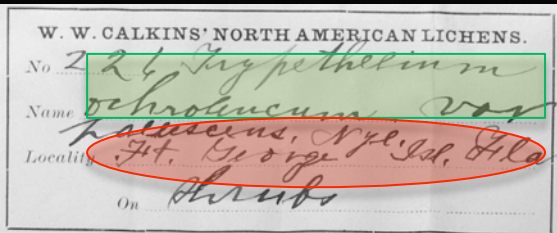


Bird song recordings



Plant pollen collection

What Natural History Collections Have in Common



Scientific natural history collections all contain information about the identity of the organism and where and when the specimen was collected. These collections are all maintained permanently

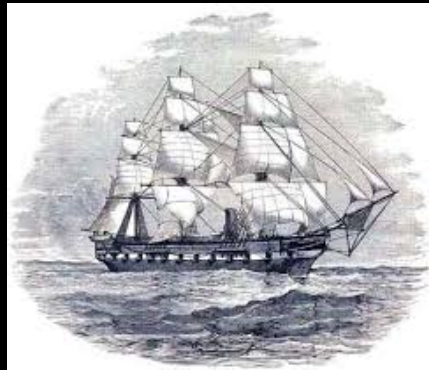
Sources of 19th Century Natural History Collections

*Lewis and Clark Expedition,
1804-1806*



1800

*U.S. Exploring Expedition,
1838-1842*



1825



*Pacific Railroad Survey,
1853-1854, Mojave desert
encampment*

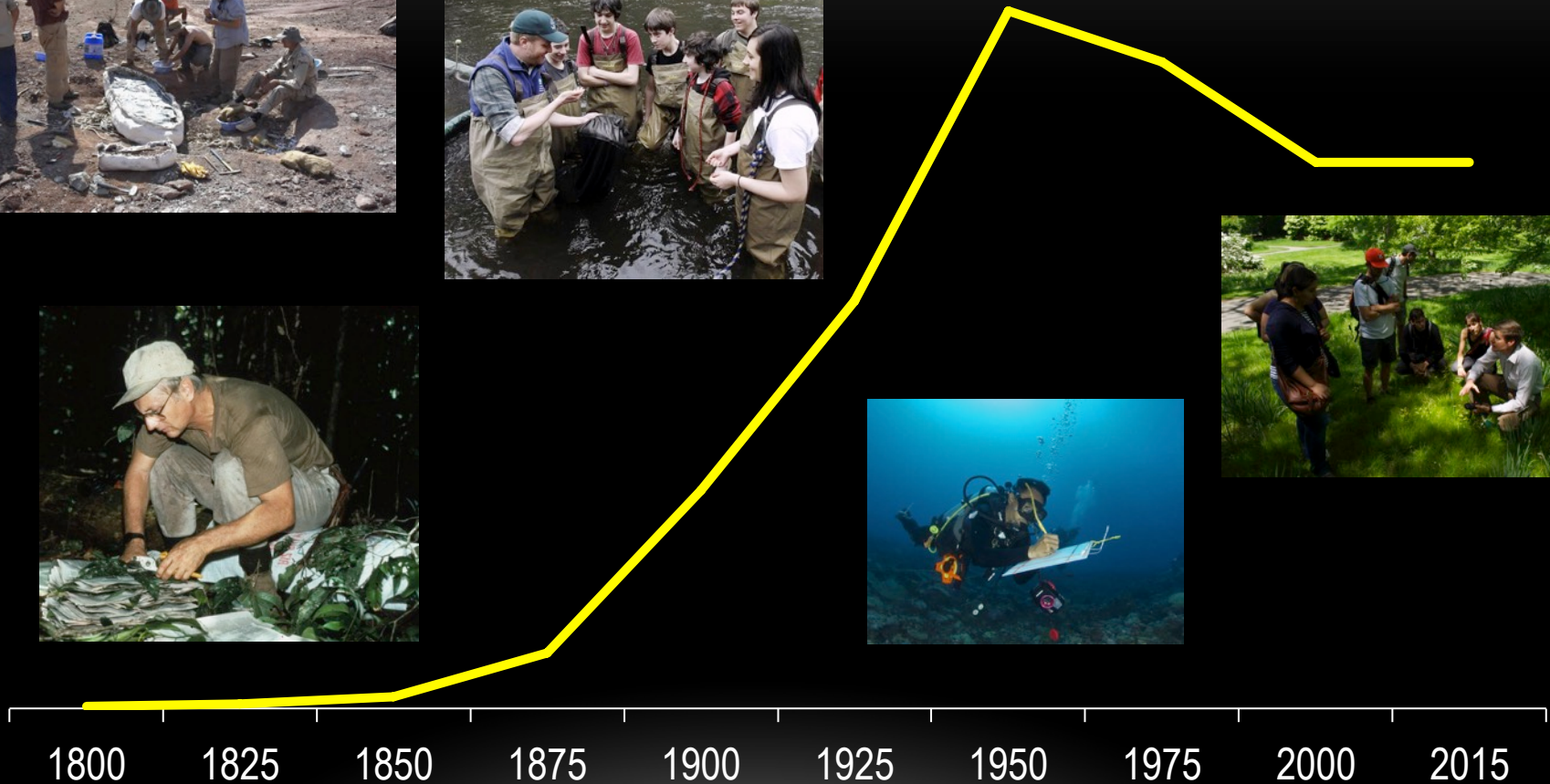


1850

1875

1900

Sources of 20th Century Natural History Collections



Graph shows the approximate rate of growth of Natural History Collections in the U.S. in the 19th to 21st centuries

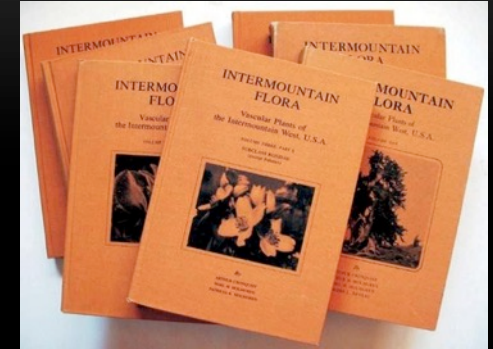
How Scientists Use Natural History Collections



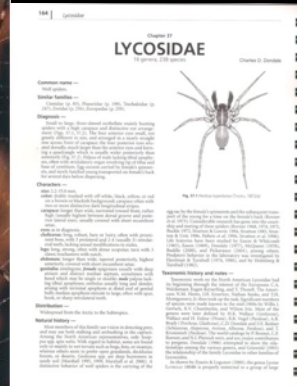
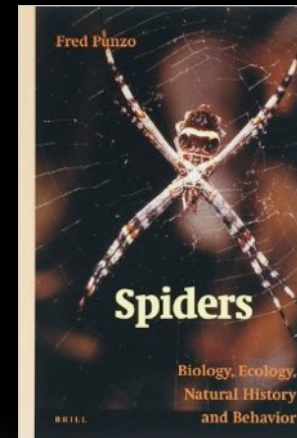
Scientist examining plant specimen



DNA extraction from plant specimen



Plants of the Intermountain west



Identification manual, North American spiders

Understanding and Controlling Infectious Disease



Myonycteris torquata



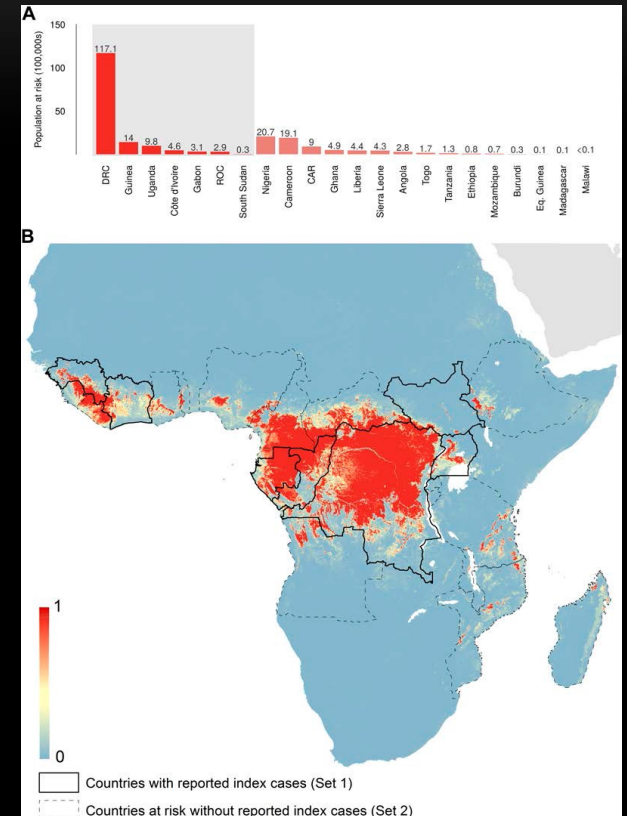
Hypsignathus monstrosus



Epomops fraquetii



Electron micrograph of Ebola virus



Areas where bat species occur

Mapping the zoonotic niche of Ebola virus disease in Africa, eLife. 2014; 3: e04395.

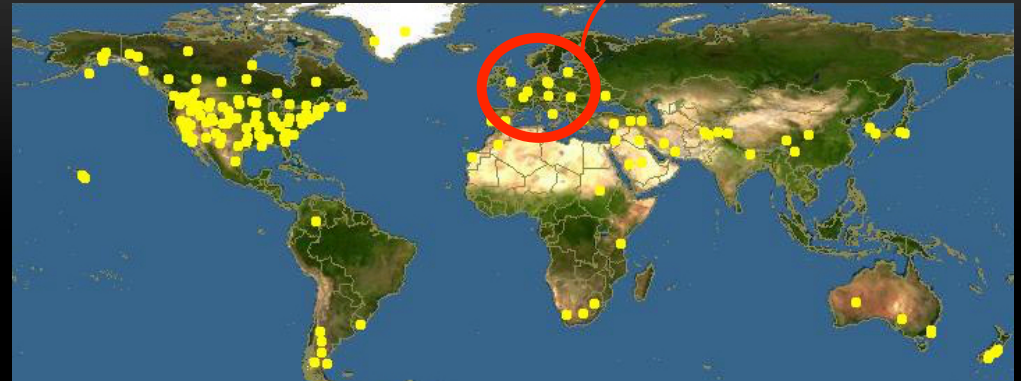
Published online 2014 Sep 8. doi: [10.7554/eLife.04395](https://doi.org/10.7554/eLife.04395)

Understanding Why Species Become Invasive

Native
range



Cheatgrass invading a wheat field



World distribution of Cheatgrass



Spiky fruits of cheatgrass



Armenian specimen
from native range



First known U.S.
specimen of Cheatgrass



Recent specimen
from Texas

Novak, S. & R. Mack, Tracing Plant Introduction and Spread: Genetic evidence from *Bromus tectorum* (Cheatgrass).
BioScience doi: 10.1641/0006-3568(2001)051[0114:TPIASG]2.0.C

Species Extinction



Spiny worm, 500 million years old



Trilobite, 350 million years old



Triceratops fossil, 70 million years old



Mastodon fossil, 2 million years old



Passenger pigeon, went extinct in 1914

Identifying Species at Risk for Extinction



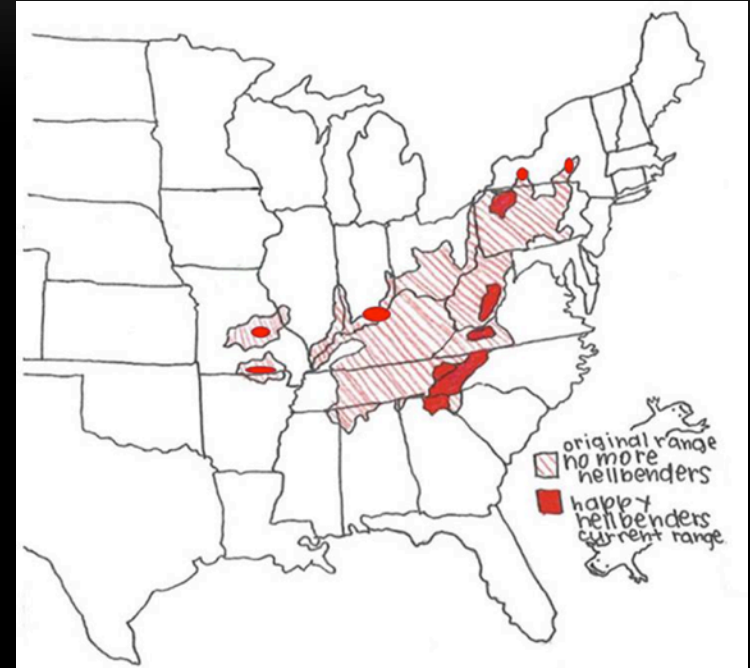
Hellbender specimen



Living Hellbender salamander



Hellbender habitat

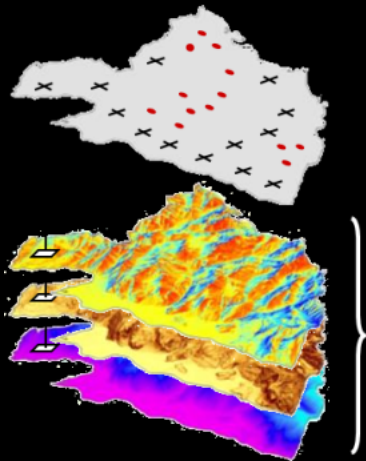


Past and present distribution of the Hellbender

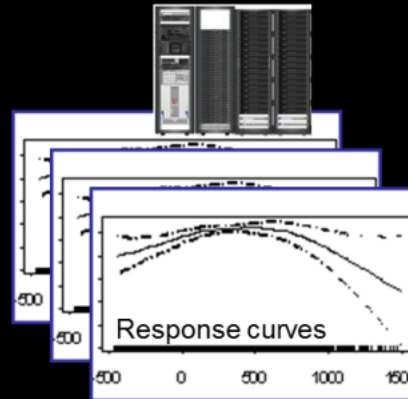
*From a study by college undergraduate Charlotte Merzbacher at U.C. Berkeley:
http://mvz.berkeley.edu/SpecimenSpotlight_Jul2013.html, with additional input from Dr. M. Nickerson, Univ. Florida*

Predicting Future Species Extinction by Studying Past Extinctions

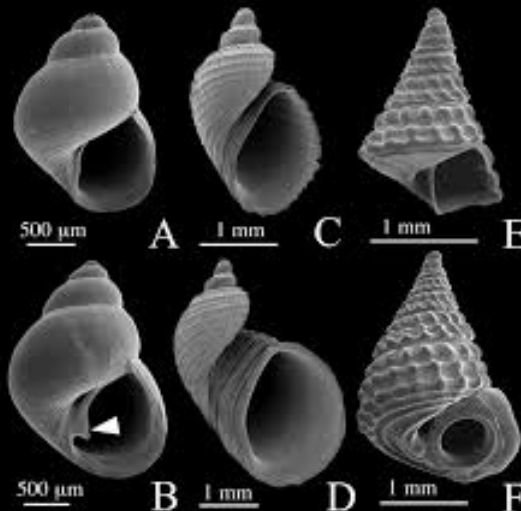
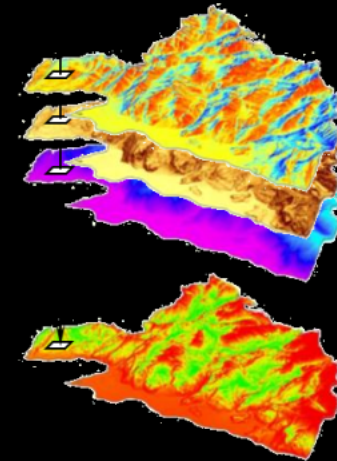
Combine Data Layers



Make statistical and dynamic models



Make spatial predictions



Saupe, E., et al. 2015. Niche breadth and geographic range size as determinants of species survival on geological time scales. Global Ecology and biogeography 24: 1159-1169



Current and Potential Users of Natural History Specimen Data

Environmental Impact



Biodiversity Collections Network (BCoN)