Digitization: New Tools for Increasing Use of Natural History Collections for Research, Education and Informed Decision-making

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BIODIVERSITY

Photos: M. Jeffords & G. Paulay
The single largest source of information on biological diversity (outside nature) is our natural history collections.

1600 collections in USA

1 billion specimens in USA

3 billion specimens globally
Why do we care?  Why is biodiversity important?

Understanding ecosystems
Land use planning
Food security
Freshwater availability
Human health and safety
Invasive species predictive models
Discovery and exploration
Climate change
Management of agricultural pests
Identification of disease vectors
Recreation
Conservation planning
Bioprospecting for new medicines, foods, and fibers
Problem-solving related to:

Food availability and security
Freshwater availability
Human health and safety
Understanding invasive species
Understanding environmental change
Management of agricultural pests
Identification of disease vectors
Bioprospecting for new medicines, foods, and fibers
TALLAHASSEE — The outlook for production of Florida oranges, the state's signature crop, continues to drop.

"It's essentially in free fall," Agriculture Commissioner Adam Putnam said Wednesday while outlining his priorities for the 2016 legislative session.

Among those priorities, Putnam reaffirmed a request that state lawmakers invest $8.5 million to research *citrus diseases* that are impacting Florida's crops.
Name
Locality
Date
Problem: Data in collections are inaccessible to most potential users
In response to the scientific community

Advancing Digitization of Biodiversity Collections Program (ADBC)

- The goal of ADBC is to remove the inaccessibility through digitization: putting information online -- researchers, educators, policymakers, have access

- $100 million over 10 years non-federal collections
Biodiversity

Collections: Specimens, Images, DNA, Data

Digitization
Databases
Georeferencing
Images

New Discoveries
Understanding
Appreciation

Environmental & Economic Policy
Management, Use, Protection

Research
Education
Outreach
Coordinating Center for the ADBC Program

- Engages the collections community
- Facilitates digitization and mobilization of data
- Provides a search portal

- 2,201 participants from 511 institutions at 48 workshops
15 Thematic Collections Networks (TCNs)

- **InvertNet**: An Integrative Platform for Research on Environmental Change, Species Discovery and Identification *(Illinois Natural History Survey, University of Illinois)*
- **Plants, Herbivores, and Parasitoids**: A Model System for the Study of Tri-Trophic Associations *(American Museum of Natural History)*
- **North American Lichens and Bryophytes**: Sensitive Indicators of Environmental Quality and Change *(University of Wisconsin Madison)*
- **Digitizing Fossils** to Enable New Syntheses in Biogeography-Creating a PALEONICHES-TCN *(University of Kansas)*
- **The Macrofungi Collection Consortium**: Unlocking a Biodiversity Resource for Understanding Biotic Interactions, Nutrient Cycling and Human Affairs *(New York Botanical Garden)*
- **Mobilizing New England Vascular Plant Specimen Data** to Track Environmental Change *(Yale University)*
- **Southwest Collections of Arthropods Network (SCAN)**: A Model for Collections Digitization to Promote Taxonomic and Ecological Research *(Northern Arizona University)*
- **The Macroalgal Herbarium Consortium**: Accessing 150 Years of Specimen Data to Understand Changes in the Marine/Aquatic Environment *(University of New Hampshire)*
- Developing a Centralized Digital Archive of **Vouchered Animal Communication Signals** *(Cornell University)*
- **Fossil Insect Collaborative**: A Deep-Time Approach to Studying Diversification and Response to Environmental Change *(University of Colorado at Boulder)*
- **Great Lakes Invasives**: Documenting the Occurrence through Space and Time of Aquatic Non-indigenous Fish, Mollusks, Algae, and Plants Threatening North America’s Great Lakes *(University of Wisconsin Madison)*
- **InvertEBase**: Reaching Back to See the Future: Species-rich Invertebrate Faunas Document Causes and Consequences of Biodiversity Shifts *(Field Museum of Natural History)*
- **The Key to the Cabinets**: Building and Sustaining a Research Database for a Global Biodiversity Hotspot *(Appalachian State University)*
- **The Microfungi Collections Consortium**: A Networked Approach to Digitizing Small Fungi with Large Impacts on the Function and Health of Ecosystems *(Illinois Natural History Survey, University of Illinois)*
- **Documenting Fossil Marine Invertebrate Communities of the Eastern Pacific**: Faunal Responses to Environmental Change over the last 66 million years *(University of California-Berkeley)*
NATIONAL HUB, THEMATIC COLLECTION NETWORKS, AND COLLABORATORS

Search portal:

- 48 million records for 150 million specimens
- 13 million images

439 collections in 268 institutions in 50 states (15 TCNS & others)
ADBC Program  ➔ Digitization

- Enables access to documentation of life on Earth
- Information vital to understanding the global environment, from human health to agriculture, climate change, invasive species, and landscape modification