



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

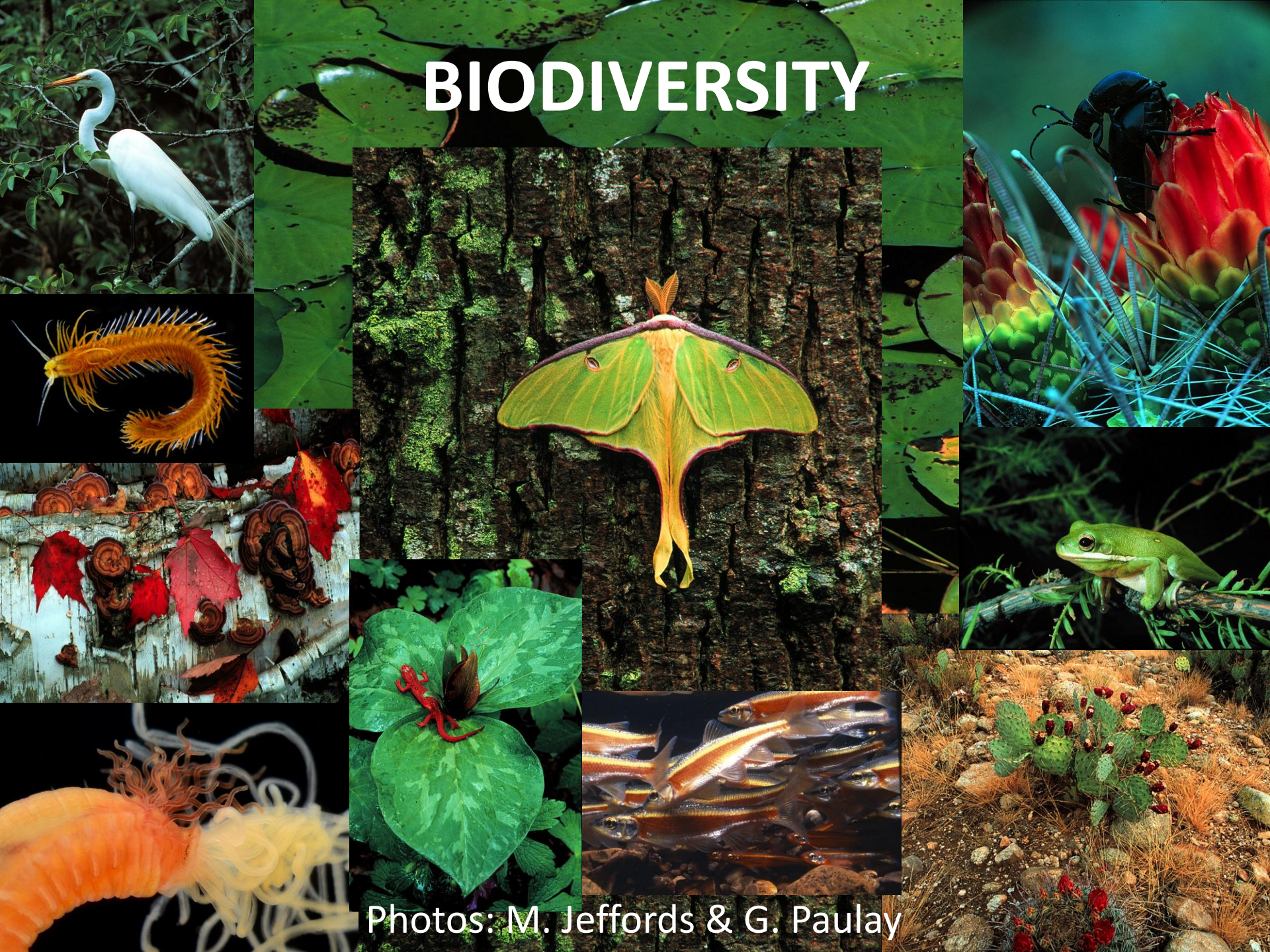
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President, Natural Science Collections Alliance  
Director, iDigBio  
Curator, Florida Museum of Natural History





# BIODIVERSITY



Photos: M. Jeffords & G. Paulay



## **Why do we care? *Why is biodiversity important?***

**Food security**

**Freshwater availability**

**Human health and safety**

**Sustaining ecosystems**

**Land use planning**

**Invasive species predictive models**

**Discovery and exploration**

**Climate change**

**Management of agricultural pests**

**Identification of disease vectors**

**International trade**

**Recreation**

**Conservation planning**

**Prevention of wildlife trafficking**

**Bioprospecting for new medicines, foods, and fibers**



## **Problem-solving:**

**Food availability and security**

**Freshwater availability**

**Human health and safety**

**Understanding invasive species**

**Understanding environmental change**

**Management of agricultural pests**

**Identification of disease vectors**

**Recreation**

**Bioprospecting for new medicines, foods, and fibers**





December 12, 2015

## *Florida's orange crop in 'free fall'*

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.

**The single largest source of information on biological diversity (outside nature) is our natural history collections.**



**1600 collections**



**1 billion specimens in USA**



**3 billion specimens globally**



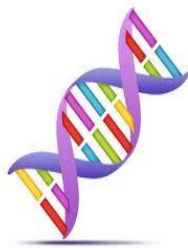
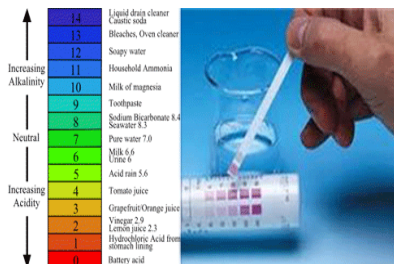
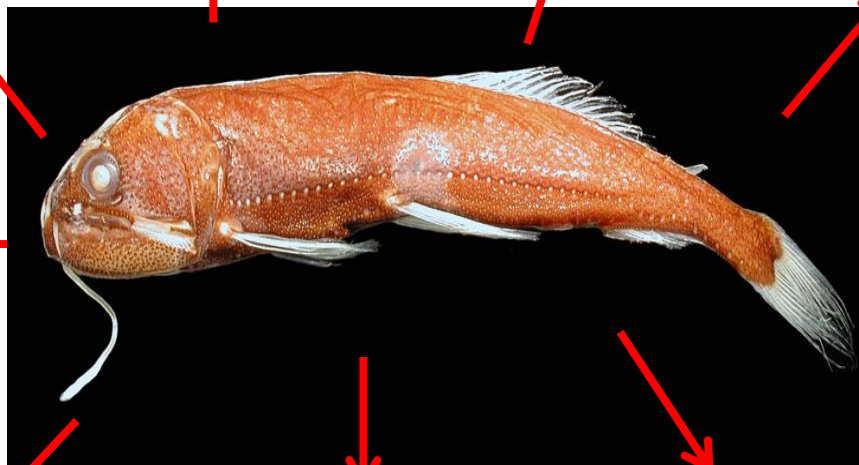
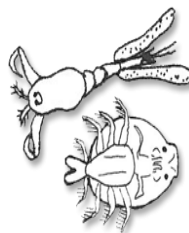
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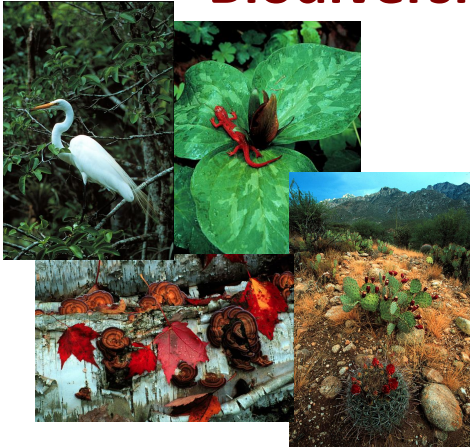




**Problem: Data in collections are inaccessible to most potential users**



# Biodiversity



## Collections: Specimens, Images, DNA, Data



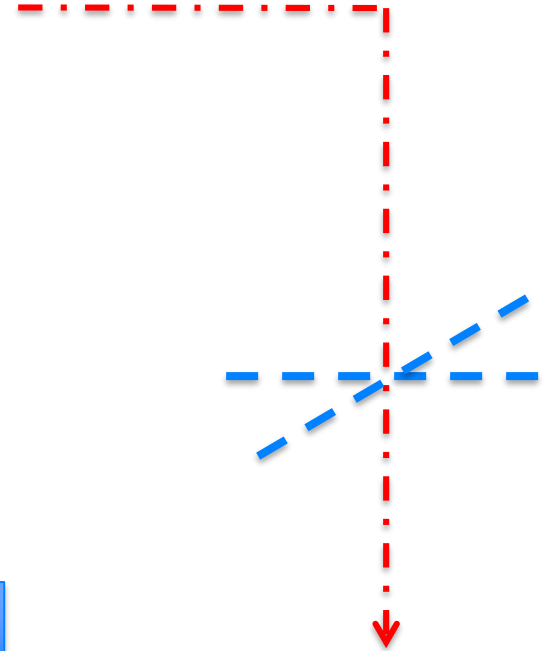
**Environmental &  
Economic Policy  
Management, Use,  
Protection**



**New Discoveries**

**Understanding**

**Appreciation**



**Research**



**Education**

**Outreach**

# U.S. National Science Foundation

*In response to the scientific community*

## Advancing Digitization of Biodiversity Collections Program (ADBC)

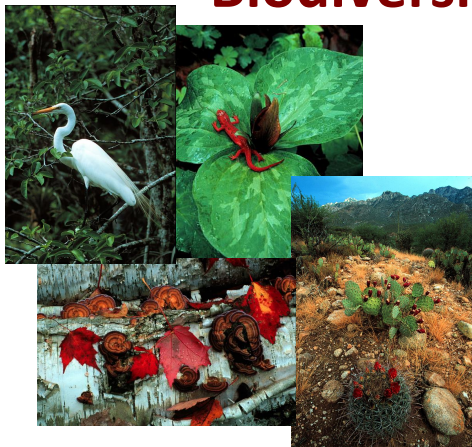
- The goal of **ADBC** is to *remove the inaccessibility* through **digitization**: putting information online -- researchers, educators, policymakers, have access



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



## Biodiversity

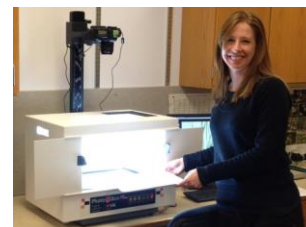


## Collections: Specimens, Images, DNA, Data



## Digitization

Databases  
Georeferencing  
Images



Environmental &  
Economic Policy  
Management, Use,  
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New Discoveries

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## Coordinating Center for the ADBC Program



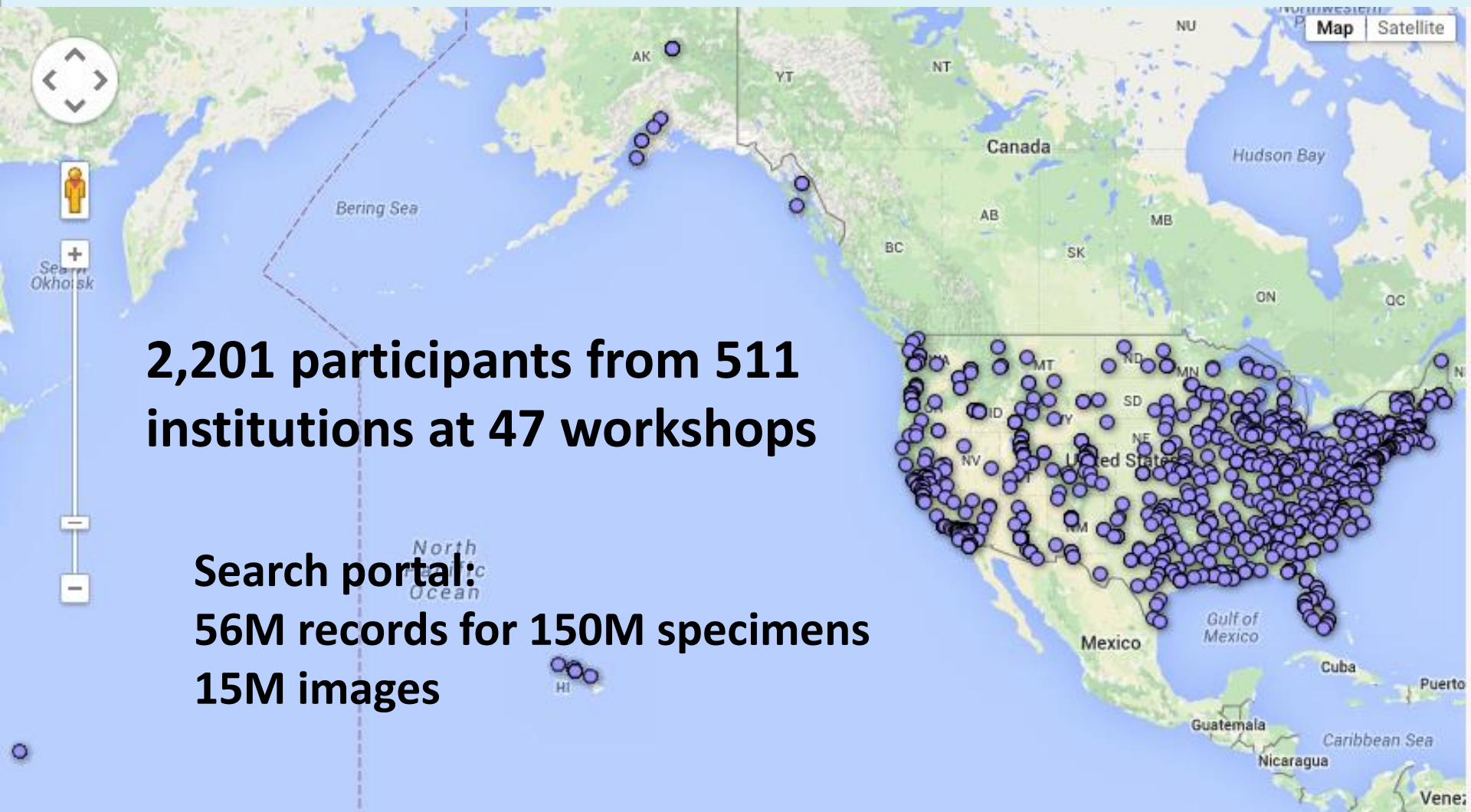
- Engages the collections community
- Facilitates digitization and mobilization of data
- Provides a search portal



# 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*)





**2,201 participants from 511  
institutions at 47 workshops**

**Search portal:  
56M records for 150M specimens  
15M images**

**439 collections in 268 institutions in 50 states (15 TCNS & others)**



Making data and images of millions of biological specimens available on the web






56,464,224  
Specimen Records

13,525,815  
Media Records

700  
Recordsets



**Why digitization matters**  
More about what we do and why

 <p><b>Digitization</b> Learn, share and develop best practices</p>	 <p><b>Sharing Collections</b> Documentation on data ingestion</p>	 <p><b>Working Groups</b> Join in, contribute, be part of the community</p>	 <p><b>Proposals</b> New tool and workshop ideas</p>	 <p><b>Citizen Scientists</b> How can you help biological collections?</p>
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### Researchers

Learn about research directions



### Collections Staff

Learn how your collection can benefit from our work



### Teachers & Students

Download lesson plans about using digitized specimens



### Upcoming Events

[Coding Phenological Data from Herbarium Sheets](#)

03-12-2016 to 03-13-2016

[Digitizing Fluid-preserved Vertebrate Specimens](#)

03-15-2016 to 03-17-2016

[iDigBio @ the League of Environmental Educators of Florida Conference](#)

03-18-2016 to 03-20-2016

[Symbiota Working Group Webinar : Transcription - Julianne Smith \(LBCC\)](#)

03-18-2016

[more events >>](#)

### News

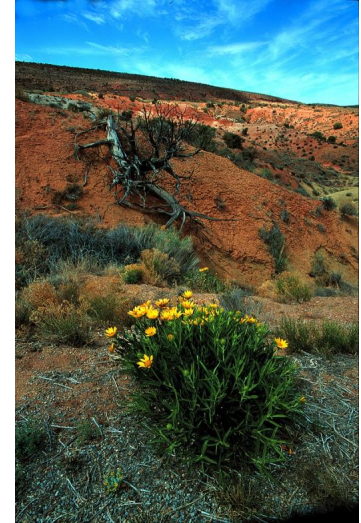
[TEDxUF Club and Florida Museum to display portion of Tree of Life March 11 from Century Tower at the University of Florida](#)

Post date: 03-10-2016



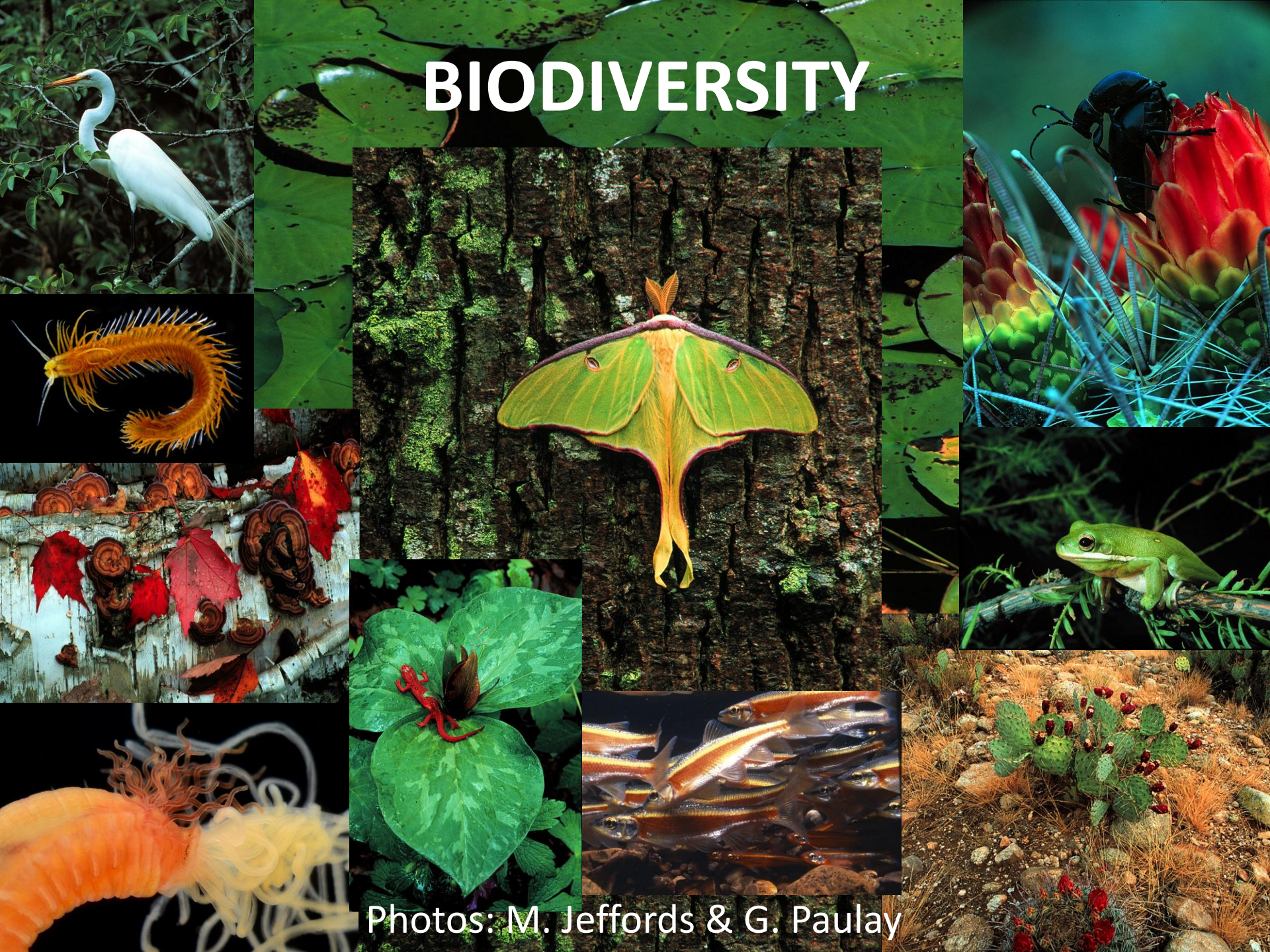
## ***ADBC* → *Digitization***

- **Documentation of life on Earth**
- **Information in collections is vital to understanding the global environment, from landscape from human health to agriculture, climate change, disease to introductions of invasive species**





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