

# Digitizing paleontological collections for new audiences: Past practices and the potential for public participation



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# Talk outline:

1. Digitization and education/outreach
2. Who are our audience?
  - researchers
  - downstream users
3. How are we doing? (content analysis)
  - images online
  - catering downstream
  - best examples
4. Concluding remarks and a challenge!

# Digitization through an education/outreach lens

- <1% of all fossil specimens are on display.
- <10% of U.S. Museums have online databases.
- Collections are a tremendous source of information and a vehicle for education.

# Digitization through an education/outreach lens

- Most of this information is trapped in the cabinets, databases, and registries.
- Once digitized they become available for education and outreach to downstream users.
- Our challenge is making these data available in an appropriate form.

# Who are our audience?

- Researchers.
- Downstream User—someone using digitized paleocollections other than for research.
- These audiences may include:
  - teachers, students
  - fossil club/paleo society members
  - lifelong learners & families



# How are we doing?

- Content analysis of the websites of 15 major natural history museums.
- To what extent and how are electronic images used by these collections?
- Are they being effectively presented to downstream users?
- To what extent do existing workflows result in products for downstream users?

# Images online (invert only)

INSTITUTION	SIZE (mil.)	ONLINE SEARCH	IMAGE SEARCH	IMAGE GALLERIES	EDUCATION CONTENT
Smithsonian	31	✓	✓	✓	✓
U Nebraska	7.5	✓	x	✓	✓
AMNH	4.5	✓	✓	✓	✓
Yale Peabody	4	✓	x*	✓	x
Texas Nat. Sci.	4	✓	x*	x	x
L.A. County	3.5	✓	✓	x	x
FLMNH	2.5	✓	x	✓	x
Field	2	x	x	✓	✓
U Michigan	2	x	x	✓	x
Kansas U	<1	✓	x	✓	x
MCZ	2	✓	✓	x	x
ANSP	1	✓	x	x	x
Sam Noble	1	✓	✓	✓	✓

Data from various museum collection homepages, or Allmon & White (2000) if otherwise not available.

# Catering downstream (all)

INSTITUTION	CONTENT	SEARCH	K-12/PUBLIC	ED PRODUCTS	RESEARCHERS
Smithsonian	...	...	..	•	..
U Nebraska	..	..	...	•	•
AMNH	...	...	..	•	•
Yale Peabody	...	..	..	•	...
Texas Nat. Sci.	...	...	..	•	•
L.A. County*	...	...	•	•	•
FLMNH	...	..	...	•	..
Field	...	•	..	•	•
U Michigan	...	•	•	•	•
Kansas U	...	•	•	•	•
MCZ	...	...	•	•	•
ANSP	...	..	•	•	•
Sam Noble	...	...	...	•	•

# Content analysis attributes

- Efficiency: action can be performed successfully and quickly.
- Authority: author is competent in relation to the subject.
- Currency: time scope of the content's validity is clearly stated.
- Consistency: similar information is treated in a similar fashion.
- Structure effectiveness: organization is not disorienting.
- Accessibility: information is easily and intuitively accessible.
- Completeness: user can find all the information required.
- Richness: information required is rich (many examples, data...)
- Clarity: information is easy to understand.
- Conciseness: basic pieces of information are given.
- Multimediality: different media are used to convey information.
- Multilinguisticity: information is given in multiple languages.

# Catering downstream

- Image galleries (n=11)
  - Pros: workflow, consistency, clarity, conciseness
  - Cons: richness
- Text with embedded images (n=7)
  - Pros: richness
  - Cons: workflow, conciseness
- Slideshows (n=5)
  - Pros: consistency, conciseness
  - Cons: accessibility, completeness, richness

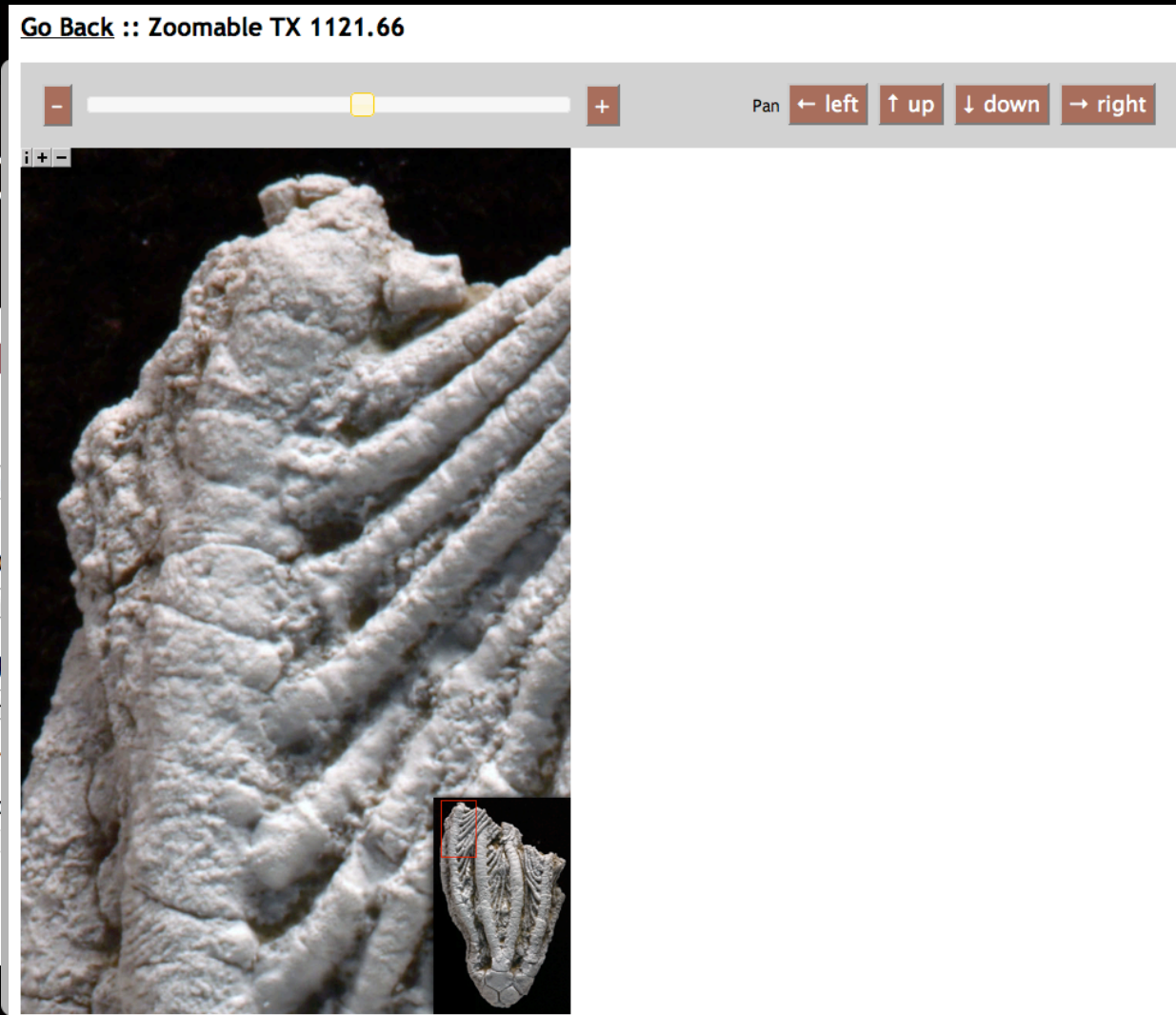
# Resource suggestions

- If the public/K-12 are your audience
  - Image galleries work best
    - workflow efficiency, accessible
  - Embedded images also okay
    - rich content, good for education
  - Avoid slideshows for specimen images\*
    - difficult to navigate, lack rich information
- \*good for sequential images, perhaps associated with a story (e.g., stages of fossil preparation)

# Search engine suggestions

- Cognizant that the public/K-12 do use search engines, what are some suggestions?
  - Fields are logically defined
  - Ability to search useful terms
    - common name, county, formation
  - Summaries of retrieved data
    - lists of records that are quick to navigate and potentially be downloaded

# Search engines – best example



# Search engines – good example

Smithsonian

Arctodus floridanus Gidley : Ursidae : Carnivora : Mammalia : Chordata

Catalog Number: USNM V 11833

Collection Name: Mammalia Primary Type

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Carnivora

Family: Ursidae

Common Name: bear

Scientific Name (As Filed): Arctodus floridanus Gidley

Identified By:

Other Identifications:

Type Citations:

Taxon	Type Status	2 <sup>o</sup> Type S
	holotype	

Collector(s): Gidley, J. W.

Dates Collected:

Country: United States

Province/State: Florida

District/County: Brevard County

Precise Locality:

Ocean:

Sea/Gulf:

Bay/Sound:

Centroid Latitude:

Centroid Longitude:

Expedition Name:

Vessel Name:

Cruise Number:

Site/Station Number:

Geologic Age:

Era	System	Series
Cenozoic	Quaternary	

Stratigraphy:

Group	Formation
	Melbourne Fm

Skeletal Morphology: Skull partial, partial right lower jaw, T-(13)

Specimen Count: 1

Notes:

Arctodus floridanus Gidley : Ursidae : Carnivora : Mammalia : Chordata

Title: USNM V 11833

Description: Arctodus floridanus, holotype.


Creator: Michael Brett-Surman

Format: image/jpeg

Resolutions: 320x227, 640x455 (Please contact Mark Florence, Kathy Hollis, or Tom Jorstad for hi resolutions and/or non-jpeg formats.)

Rights Holder: Smithsonian Institution - Department of Paleobiology

Rights: Unless otherwise noted, this image or its contents may be protected by international laws.



Identification | Collection | **Location** | Morphology | Geologic Age/Stratigraphy

# Public resources – best examples

MUSEUM HOME | RESEARCH COLLECTIONS | VERTEBRATE PALEONTOLOGY | COUNTY FOSSILS

UNIVERSITY OF NEBRASKA STATE MUSEUM  
VERTEBRATE PALEONTOLOGY  
NEBRASKA COUNTY FOSSILS

FOSSILS FROM THE  
RESEARCH COLLECTIONS

RETURN TO STATE MAP OR  
Use the County Quick Link





click map &  
fossils for info

Fossil Index | Special Feature Index | What's New?

Banner County,

Nebraska Fossils

UNIVERSITY OF NEBRASKA STATE MUSEUM  
VERTEBRATE PALEONTOLOGY  
NEBRASKA COUNTY FOSSILS

**FOSSIL HIGHLIGHT OF BANNER COUNTY, NEBRASKA**



*Aelurodon* was a common carnivore during Miocene times and is found in most deposits of this age across Nebraska. It may have looked much like a German shepherd (left) or wolf and probably had a similar life-style. Unlike the modern wolf, however, *Aelurodon* was not the "top dog" of it's time. Canids have been important predators in North America for more than 40 million years.




Scientific Name	<i>Aelurodon wheelerianus</i>
Common Name	Wheeler's Cat-toothed dog
Family	Canidae
Geologic Age	Late Miocene (Barstovian) About 14 million years old
Collected	1947


# Public resources – best examples

SAM NOBLE MUSEUM  
COMMON FOSSILS OF OKLAHOMA

Search

## Common Fossils Database


 Paleocommunities

 How to Become a Fossil


### What do paleontologists do?


Paleontologists study the record of life on Earth left as fossils. More than 99 percent of all species that have ever lived are extinct, so paleontologists will not run out of work any time soon. Paleontological research includes working out the relationships between extinct animals and plants and their living relatives. We reconstruct early communities and their environments, and try to understand the changes that have led to those of the present day. We study major extinction events of the past in the hope of applying our conclusions to extinction in the modern world as global climates and environments change.


#### Field work





Most paleontologists spend a lot of time in the field to collect the fossils that they study. Field work can be done anywhere from a remote mountaintop to a local quarry.


 Paleocommunities

 How to Become a Fossil

 Common Fossils Database

 What Paleontologists Do

 How Paleontologists Tell Time

 Invertebrate

# Public resources – best examples



Google™ Custom Search

SEARCH

MUSEUM INFO | EVENTS | EXHIBITS | EDUCATION | **RESEARCH & COLLECTIONS** | JOIN US | GIVE | UW COMMUNITY | CONNECT | **W**

[Project Home](#)

[Identification](#)

[Project Background](#)

[Bibliography](#)

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[Quick Search](#)

## Morphotype Details

**Morphotype:** RP006

**Name (Author):**

**Organ:** Leaf    **Rarity:** Rare

**Family:**    **Order:**

**Specimen #:** SR02-18-08    **Category:** Holomorphotype

**Diagnostic Features:**

Unlobed, pinnate primary vein. Secondary veins are semicraspedodromous with strong loops forming between adjacent secondaries. No agrophic veins. Margin has small, widely spaced teeth that appear to be glandular.

**Higher Taxon:**

**Source of Name:**

**Publication Pages:**

**Collected By:**

**Collection ID:** SR

**Morphotype Description:**

**Comments:**

[View other specimens of this morphotype](#)



# Public resources – best examples

The Field  
Museum

PLAN your visit HAPPENING

## EXPLORE SCIENCE

### Follow Our Research

Social Sciences

Biological Sciences: Plants

#### Earth Sciences

Fossil Amphibians and Reptiles

Fossil Birds

Fossil Fishes

Fossil Invertebrates

Fossil Mammals and Synapsids

#### Fossil Plants

Gems and Minerals

Meteorites

Polar Studies

Preparation Lab

Biological Sciences: Animals

Science Action

Pritzker DNA Lab

### Conservation Efforts

### Explore Our Collections

### Research Resources

### Science Podcasts

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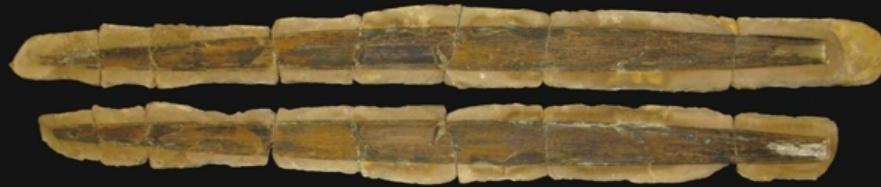
Tickets

Contact Us

SEARCH



*Stephanospermum konopeonus* - FMNH PP27766



10 cm

*Cordaites* sp. - FMNH PP55152



*Alethopteris serlii* - FMNH P30098

# Concluding thoughts

- Natural history museums have challenges in reaching diverse public audiences that may access their online paleontological collections.
- Content provided for downstream users is spotty in coverage and composition, and images are presented via a wide range of design approaches.
- Few websites assessed have apparently planned their content with K-12 curricular or science education standards in mind.

# Concluding thoughts

- Traditional museum search engines (useful to researchers) do not provide easy access among non-professional audiences, and can't be effectively paired with education content.
- More effective tools for sharing education content include image galleries, text pages with embedded images, or slideshows.

# A callout to our amateur community

- Natural history museums could more effectively share their collections by working directly with downstream users in the design of these online resources.
- This is one example of why museums should engage more amateur paleontologists in the digitization of their collections.









## Fossils of Panama

### Fossils of the Gatun Formation

🏠 Fossils of Panama

Gatun Formation

Fossil	Scientific Name	Common Name
	<u><i>Anadara (Cunearca) chavezii</i></u>	<u>ark shell   concha arca</u>
	<u><i>Anadara (Raslia) dariensis</i></u>	<u>ark shell   concha arca</u>
	<u><i>Chama berjadinensis</i></u>	<u>jewel box   joyero</u>
	<u><i>Dalloccardia baxterum</i></u>	<u>prickly cockle   berberecho espinoso or cardo espinoso</u>
	<u><i>Apiocardia n. sp.</i></u>	<u>white cockle   berberecho blanco or cardo blanco</u>

## Fossils of Panama

### *Chama berjadinensis*

jewel box | joyero

Fossils of Panama

Gatun Formation



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Shell is circular to irregularly ovate in shape, and either inflated and convex (left valve) or flat (right valve). Sculpture has irregular (sometimes frilly) ridges parallel to the shell margin.

**Size:** 30-40 mm.

**Ecology:** inhabits nearshore marine waters (0-15 m), attached to shells and rocks.

**Geological range:** Middle-Late Miocene (14-8 million years ago).

**Geographic distribution:** Caribbean - Panama, Colombia, and Venezuela.

--Click on thumbnails for larger view--



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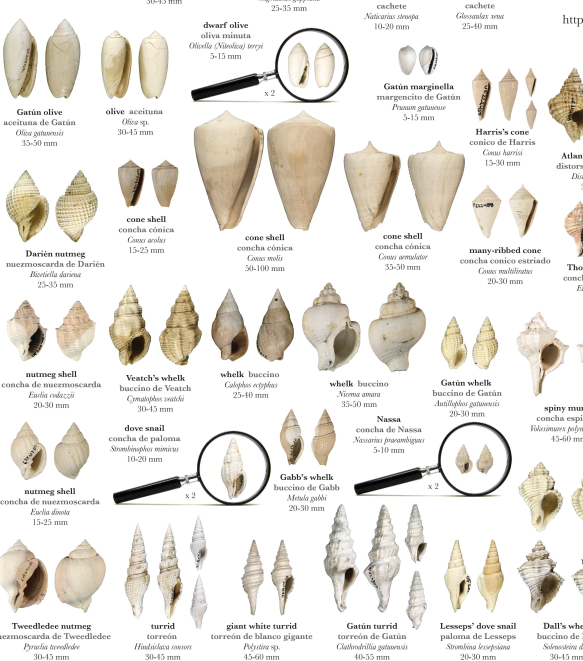
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Gastropods  
Gastropodos

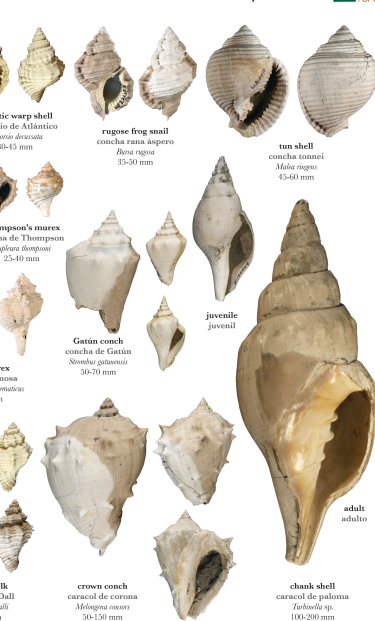


# Geology and paleontology of the Gatún Formation

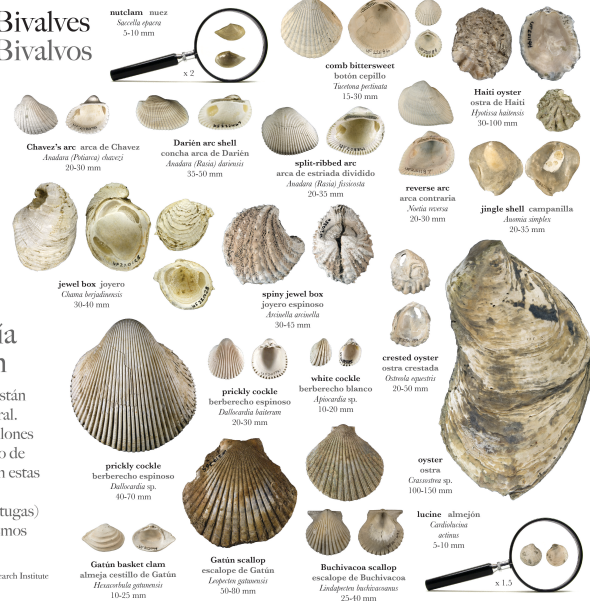
The Gatún Formation is a group of rocks exposed on the Caribbean coast of central Panama. They are approximately 11.5-8.5 million years old and belong to a time interval known as the Miocene. The fossils in these rocks are the remains of once living sea creatures (molluscs, crabs, shrimps, sharks, and turtles). They live in shallow marine environments.

All fossil images are actual size unless specified.

<http://www.flmnh.ufl.edu/panama-pire/fossils-of-Panama>  
© 2013 Florida Museum of Natural History

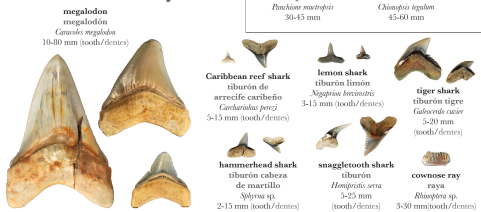


Bivalves  
Bivalvos



## Sharks and rays

### Tiburón e raya



**Other fossils**  
**Otros**  
**fossiles**





# Fossils of Panama



# Fossils of Panama



# Fossils of Panama



# Thank you!

