

THE COLLECTION CONNECTION: NATURAL HISTORY MUSEUMS AND LIBRARIES

Lesson Plan

Subjects: Environmental science, life science, language arts/writing.

Lesson Summary: Students will learn about museums of natural history, science libraries, and research scientists. They will also begin to learn about the "Linking" database and how to use it.

Objectives:

The students will be able to:

- 1) Explain the roles of a museum of natural history
- 2) Describe the audiences of a museum of natural history
- 3) Explain the similarities of museums and libraries
- 4) Explain why scientists take different kinds of specimen samples from nature
- 5) Describe how scientists at the Florida Museum of Natural History keep track of the specimens they find in the field

Materials:

Each student will need the following:

- 1) Computer with internet access
- 2) Paper
- 3) Pen or pencil
- 4) Copy of the collection database activity
- 5) Copy of the collection writing assignment

Teacher Preparation:

- 1) Print out a copy of the collection database activity and the collection writing assignment. Photocopy enough for everyone in your class.
- 2) Make sure the computers are ready for the students so there is no lost time. Put the Linking home page up on each computer: <http://susdl.fcla.edu/lnh/>.

Procedures:

- 1) Pass out the collection database activity (this one must be filled out while reading the background information).
- 2) The students start at the "Linking" home page, click on "**Curriculum Materials,**" click on "**The Collection Connection: Natural History Museums and Libraries,**" and then click on "**Collection Overview.**"
- 3) Ask them to read the collection overview and complete the collection database activity.
(40-60 minutes)
- 4) Pass out the museum writing assignment and ask the students to complete it.
(30 minutes)

Total Time estimates:

Two 50 minute class periods or less

The Collection Connection: Natural History Museums and Libraries



A Brief History of Museum Collections

By the close of the 16th century, "cabinets of curiosities" had been gathered in Europe for entertainment and aesthetic reasons. These collections of plant and animal *specimens* were the *prototypes* for the private museums of natural history that flourished in the mid-17th century.

Image courtesy [Cabinets de curiosites](#), Gilles Thibault, McGill University



Lewis

Clark

The historical surveying of new U.S. territories by explorers such as Lewis and Clark included the inventorying and collecting of *organisms* the explorers encountered. However, it wasn't until 1879 that the United States National Natural History Museum was established to *curate* the collections of these survey expeditions.



The historical role of collecting, documenting, and preserving physical specimens of plants and animals continues as one of the missions of natural history museums.

Missions of Natural History Museums

All museums of natural history have slightly different missions. Read the [mission statement](#) of the Natural History Museum of the Smithsonian Institution. **On your worksheet write down the three missions of this museum (Question #1).**



The Importance of Museum Collections

Natural History collections document the world's biota (plant and animal life) in space and time. Collections of non-living specimens, e.g., geological specimens, fossils, and human artifacts are also collected by natural history museums. By studying the biotic (living) and non-biotic components of the environment, scientists can begin to understand how *ecosystems* function and living diversity is maintained.



Extinct species can best be studied through the remains preserved in natural history museums. As scientists begin to use molecular and genetic technologies, museum specimens can be used to reexamine and redefine evolutionary relationships between species.

Due to advances in computer and communication technologies, scientists are able to retrieve and analyze specimen data from many museum collections. Because scientists can access a broader amount of information from these collections, they are provided with a clearer picture of species populations and migrations than if they just looked at the data from only one museum collection.

Types of Collections in Natural History Museums

Visit one of these [natural history museums](#) and explore the collections they have. **On your worksheet, write down the name of the natural history museum you visited and describe four collections you found (Question #2).**

Methods of Collecting Specimens

Historically, scientists took specimens back to the museum and preserved them to use in research studies, education, and exhibits. Currently, scientists leave some organisms in their habitat, and instead take very detailed pictures of the organism, take a DNA sample (from any part of the plant or animal), or both. These two techniques keep the museum from contributing to population declines in species.

Methods of Documenting Specimens

Once specimens are collected, researchers record: 1) the species name, 2) where and when the specimen was collected, 3) the collector's name, and often 4) certain physical measurements of the environment and/or the specimen itself. Each specimen receives a unique accession (identification) number. As computers became more accessible, scientists have gone from recording all of this data in handwritten ledgers to entering it into electronic databases.

Specimen Record (Activity)

On your worksheet, you will find a specimen record from the Florida Museum of Natural History. **Fill in the information you can extract from the record (Question #3).** You will note that the museum record contains a genus species, or scientific name. The common name for this specimen is Alligator gar.

Searching in the Databases of the Florida Museum of Natural History

Although scientists use only scientific names, some databases allow us to search by common name for Florida species. Let's search for amphibians and reptiles that were found in the Florida county where you go to school. **Follow the instructions on your activity worksheet (Question #4).**

Research Activities carried out by Museums

It is important to keep in mind that the museum specimens at the Florida Museum of Natural History do not represent a cross section of all organisms in Florida, but a sampling of what has been found whenever collectors are in the field in Florida.

It would take hundreds of scientists in the field all the time to record every plant and animal species in every locale across Florida.

Research projects are enhanced by access to museum specimens and their records include:

Systematics, or the study of the evolutionary relationships between organisms, is dependent on comparing related species. For decades, the physical inspection of museum specimens was the basis for these comparisons. Now scientists are using genetic techniques with museum specimens as well.

Documenting what *endangered*, *threatened*, or unique species have been found in an area helps scientists determine what environmental impact studies should be completed and helps the government decide where to create parks and sanctuaries. Clusters of species may also indicate areas rich in *biodiversity*.

Floral (plant) and faunal (animal) restoration studies are often carried out based on knowledge of what specimens were collected from an area in the past.

The Connection to Libraries

Museum researchers consult the scientific literature as they study specimens. In many cases, detailed photographs or scientific illustrations are carefully compared against the specimen in hand. Similarities and differences are noted. Eventually, scientists share their knowledge by presenting research findings at conferences and submitting papers to journals for publication. Libraries around the world acquire these publications as part of their collections so that anyone who visits the library can have access to the research. Thus, the library becomes a permanent storehouse of published information relating to the organisms in museum collections.

Connecting Scientific Literature to Museum Specimens

Museum specimen records contain the following types of information: catalog number, scientific name, collector, date collected, country, state, county, named place, river basin (for fish) and sometimes physical attributes of the specimen or *habitat*. Libraries also contain information about the organisms that museums collect, but it is the published account of the specimen.

The connecting link between the specimen and the literature about the specimen is its name. Because researchers use the scientific name and non-researchers use common names, it can be difficult to find all the information available. The scientist talks about *Atractosteus spatula*, you and I talk about the Alligator gar. Same fish, different name. The [Name Matrix](#) helps us find common names for Florida mammals, birds, reptiles, amphibians, fishes, and mollusks. A portion of the table is listed below.

Name Matrix	
http://palmm.fcla.edu/lnh/matrix/xls/Matrix%20part%201.xls	Corals, Crustaceans, Fishes and Mollusks
http://palmm.fcla.edu/lnh/matrix/xls/Matrix%20part%202.xls	Arachnids, Insects and Plants
http://palmm.fcla.edu/lnh/matrix/xls/Matrix%20part%203.xls	Amphibians and Fossil amphibians, Reptiles and fossil reptiles, Birds and Fossil birds, Mammals and Fossil mammals

We can find the literature related to species of interest by searching the [Florida Environments Online \(FEOL\) Database](#).

Use the [Linking Florida's Natural Heritage](#) website to finish your worksheet activities (Questions #5 and #6).

Bibliography

Read about "Cabinets of Curiosities" at [Cabinets & Pods](#). [The first section gives the history of cabinets]

["Cabinets de Curiosities"](#) (in French) compiled by Dr. Gilles Thibault, McGill University, Montreal, Canada.

Glossary

biodiversity – Short for biological diversity. The number of different kinds of plants and animals in a specific area.

binomial naming system – The system that gives individual species a two-part name that consists of genus and species epithet. The combination is the species name. ex. Quercus (genus) myrtifolia (species epithet) for myrtle oak.

cultivate – To tend to the growth of a plant that would not grow in the desired way without human intervention.

curate – To manage and maintain a collection. A curator is the person in charge of a museum, art collection, zoo, etc.

ecosystem – Short for ecological system. A community of organisms occupying a given region within a biome. Also, the interactions between organisms and between organisms and their environments.

endangered - A species at risk of extinction because of human activity, changes in climate, changes in predator-prey ratios, etc.

endangered species list - The list kept by the government that keeps track of which animals are currently endangered

eradication - To remove or destroy

exotic species - A species that is not native, is introduced from another area or country

extinction - When there are no more organisms left of a particular species and with no possible way to bring them back

gene bank -A place where scientists store DNA information from plants and animals so that they can use it to reintroduce desired genes back into a gene pool at a desired time.

genus - The level of classification below family and above species. The first part of the scientific name. Plants and animals of the same genus share similar characteristics.

habitat - The natural environment of an organism; place that provides elements essential for survival such as food, shelter, water, and space.

indigenous species - A species that is native or naturally occurring in a specific area

introduced species - A species that is not native to an area and is brought in by human intervention

invasive species - An introduced species that takes over an area and chokes out the native species

keystone species – Critical species in a n ecosystem whose loss profoundly affects several or many other species.

native species - A species that is natural or indigenous to a particular area

natural resources – Anything used by organisms to meet their needs, including air, water, minerals, plants, fuels, and animals.

naturalized exotic - An introduced species that survives but does not take over its new environment, it merely lives side by side with the native species

niche – An organism's place in the ecosystem: where it lives, what it consumes, what consumes it, and how it interacts with all biotic and abiotic factors.

organisms - Life form considered as an entity; an animal, plant, fungus, protistan, or moneran

population - A group of organisms of the same species living within a specified region.

prototype – A specimen of an organism that is kept in a museum collection to represent a certain species found in the wild.

resilient – When an ecosystem is able to return to normal after a disturbance.

species – A group of plants, animals, or microorganisms that have a high degree of similarity and generally can interbreed only among themselves.

species epithet – The second half of the species name. It is usually an adjective that describes something about the organism, the person who found the original, or where it was found. Many different kinds of species share the same species epithet. Thus, it is important to also include the genus name when giving the species epithet.

specimen - A part or an individual taken as exemplifying a whole mass or number ; a typical animal, mineral, etc.

subspecies - A subdivision of a species, esp. a geographical or ecological subdivision.

taxonomy - The science or technique of classification of organisms

threatened - A species likely, in the near future, to become an endangered species within all or much of its range.

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Database Activity

1. What are the three missions of the Natural History Museum of the Smithsonian Institution?
(Please write complete sentences)

A.

B.

C.

2. Which natural history museum did you visit?

Name four collections you found:

A.

B.

C.

D.

****Go back to the computer screen and keep reading about collections.****

3. This is a fish record from the the Florida Museum of Natural History. Use it to answer the questions below.



UF Ichthyology Master Database Search: Results

Catalog Number: 8747	Type Status:	State: Florida	Salinity: F
Genus: Atractosteus	Previous Num:	County: Escambia	Salinity Ppt:
Species: spatula	Size:	Drainage: Escambia River	Gear:
subspecies:	Loc. Remarks:	Depth Start: DEPTH START DATA	Collector: SA Schipman
Number Alch: 0	Questionable: QUESTIONABLE DATA	Depth End: DEPTH END DATA	Date Coll: 12-Jun
Number Skel: 1	Field Number: ZSAS8747	Depth of Capture: DEPTH OF CAPTURE DATA	Year Coll: 1953
Number CS: 0	Region: North America	temp_surface: TEMP SURFACE	Time In: time_in
Determiner: RE Hellman (see remarks)	Country: USA	Temp Bottom: TEMP BOTTOM DATA	Time Out: time_out
Picture Pointer:			

A. What is the scientific name (genus species) of this fish? _____

(The common name for this fish is Alligator Gar)

B. When was it collected? _____

C. Who collected it? _____

D. In what river (drainage) was it caught? _____

E. In what county of Florida was it caught? _____

F. Was the river salty? (Saltiness is called salinity. Your choices are F=Freshwater, B=Brackish, M=Marine) Yes___ No___

****Go back to the computer screen and keep reading about collections.****

4. Here are the directions to discover the amphibians and reptiles that have been collected in your school's county:

A. In what county is your school located? _____. We are going to use the county name and look for amphibians and reptiles that have been collected there.

B. Go to the [Herpetology database](http://www.flmnh.ufl.edu/scripts/dbs/herps_pub.asp) from the Florida Museum of Natural History [http://www.flmnh.ufl.edu/scripts/dbs/herps_pub.asp] and type your county name in the appropriate box and then click on "Query Database." If you look at the top of the results screen it will tell you how many rows, or individual specimens were found.

How many were there? _____

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C. Read through the results and write down the first three scientific names you find. What are the common names for those species? [Hint: Use the common name to scientific name matrix to find out the common names.]

Scientific Name	Common Name

****Go back to the computer screen and keep reading about collections.****

5. Using the Florida Environment's Online Database, search for literature on one of the species you found in #4 above.

1. What species did you use? _____

2. Did you find any citations to literature? _____

(If you don't find any, try the other species you wrote down until you find one that matches the species from above)

3. Copy the first citation:

Author: _____

Title: _____

Journal Title: _____

Year: _____ Vol.: _____ Issue: _____ Pages: _____

6. Have fish specimens been collected from your county? Has someone written about them? Let's find out.

A. From the specimen databases chose the [Ichthyology database](#) from the Florida Museum of Natural History [<http://www.flmnh.ufl.edu/fish/Collection/collectdata.htm>].

Do a keyword search on your county. (If there are no records in your county, try other counties until you find one with records.)

How many records did you find? _____

B. Write down the scientific names of at least three species you found. (if you found that many.) Again, use the Name Matrix to find the common name of the scientific names you found.

Scientific Name	Common Name

C. Now go to the [Florida Environments Online](#) database that searches many different literature databases. It contains references to articles, books, and web sites about Florida species and habitats. The databases it searches include:

-Six contain references to written articles, books, and web sites about species and habitats:

* Everglades Online

* FORMIS Ant Bibliography

* Florida Environments Online

* LFNH Core Collection

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- * SUS Library Catalogs
- * Sea Turtle Resources.

What species did you search? _____

How many records did you find? _____

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Writing Assignment

Writing Situation:

Museums of natural history have many important roles and serve a variety of audiences.

Directions for Writing:

Before you begin writing, think about the benefits and importance of natural history museums.

Imagine that you are the head curator of the museum. You are about to lose a portion of your state funding. Write a letter to the state legislature explaining why they should continue to fully fund the museum.